MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

A Plan for Data Recovery Investigations at LA 84927, LA 89021, and LA 138960, U.S. 84/285 Santa Fe to Pojoaque Corridor, Santa Fe County, New Mexico

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ADMINISTRATIVE SUMMARY

In April 2003, the New Mexico State Highway and Transportation Department (NMSHTD) requested that the Museum of New Mexico's Office of Archaeological Studies (OAS) prepare a plan for data recovery at sites LA 84927, LA 89021, and LA 138960. The sites are located near the Rio Tesuque on Pueblo of Tesuque land in Santa Fe County, New Mexico. Data recovery will be performed prior to planned reconstruction of U.S. 84/285.

The three sites have multiple components, with evidence of probable Archaic and prehistoric Puebloan occupations. Structures, features, and intact deposits are present. The sites have the potential to contribute information to our understanding of regional history and prehistory, and have substantial integrity.

This document presents the proposed data recovery plan. Data recovery investigations will be conducted in areas of the sites coinciding with proposed construction activity. Data recovery efforts at LA 84927, LA 89021, and LA 138960 are linked to the overarching research orientation of the encompassing U.S. 84/285 Santa Fe to Pojoaque Corridor Project. The project research orientation focuses on, but is not limited to, inter- and intra-regional social and ideological relationships, community formation, economic and subsistence strategies, and ethnic identities in the Tewa Basin. The data recovery investigations at the three sites will complement both completed and in-progress data recovery investigations at sites in the U.S. 84/285 Santa Fe to Pojoaque Corridor Project area, including LA 160, LA 388, LA 391, LA 740, LA 750, LA 4968, and LA 111333.

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1
INTRODUCTION TO THE PROJECT

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Data recovery investigations at sites LA 84927, LA 89021, and LA 138960, proposed in this document, are part of a much larger series of investigations of cultural resources associated with the reconstruction of U.S. 84/285 between Santa Fe and Pojoaque, Santa Fe County, New Mexico. Between 1995 and 1998, archaeological survey was conducted along 22.4 km (14 miles) of U.S. 84/285 (Hohmann et al. 1998), at the request of the New Mexico State Highway and Transportation Department (NMSHTD) in preparation for planned reconstruction of the highway. Twenty-seven previously recorded archaeological sites were relocated, 29 previously unrecorded sites were recorded, 5 traditional cultural properties (TCPs) were identified, and 311 isolated occurrences were recorded during survey.

In 1999, at the request of the NMSHTD, the Museum of New Mexico's Office of Archaeological Studies (OAS) conducted testing investigations at five sites in the northern portion of the U.S. 84/285 Santa Fe to Pojoaque Corridor Project area, between Pojoaque and the northern boundary of the Pueblo of Tesuque Grant (Boyer and Lakatos 2000; Moore 2000a). Based on the results of testing and the scope of the U.S. 84/285 Santa Fe to Pojoaque Corridor Project at that time, the OAS prepared plans for data recovery investigations at prehistoric sites (Boyer and Lakatos 2000) and historic sites (Moore 2000a) in the project area. Those plans present overarching research orientations and issues for the project's prehistoric and historic sites, and were used to structure data recovery investigations at four sites in 2000 and 2001 (Boyer et al. 2001; Boyer et al. 2002). Subsequent data recovery investigations at sites in the U.S. 84/285 Santa Fe to Pojoaque Corridor Project area are structured to complement the original project research orientations and issues (Moore et al. 2002; Boyer 2003; Lakatos et al. 2003).

This document presents a plan for data recovery investigations at LA 84927, LA 89021, and LA 138960. Although numerous previously recorded archaeological sites, including LA 84927 and LA 89021, were relocated during the first survey of the U.S. 84/285 Santa Fe to Pojoaque Corridor Project area, LA 138960 was not recorded at that time (Hohmann et al. 1998). LA 138960 was recorded during a re-survey of the U.S. 84/285 right-of-way on Pueblo of Tesuque land conducted by the OAS in March and April 2003 (Hannaford and Blinman 2003a, 2003b). The three sites are located near the Rio Tesuque just north of the intersection of U.S. 84/285 and Santa Fe County Road 73 (Figs. 1, 2). Data recovery investigations at the sites are planned prior to construction of an interchange at the intersection. Appendix 1 lists the land status, mile markers, UTM, and legal locations of LA 84927, LA 89021, and LA 138960.

The Natural Environment

The following section is abstracted from a more detailed environmental description prepared for the U.S. 84/285 Santa Fe to Pojoaque Corridor Project as a whole (Moore 2000b). The study area is within the Española Basin, a down-warped structural basin along the Rio Grande Rift (Kelley 1979). The Rio Grande flows down the center of the basin, fed by the Rio Chama to the northwest and carrying runoff from the Sangre de Cristo Mountains to the east and the

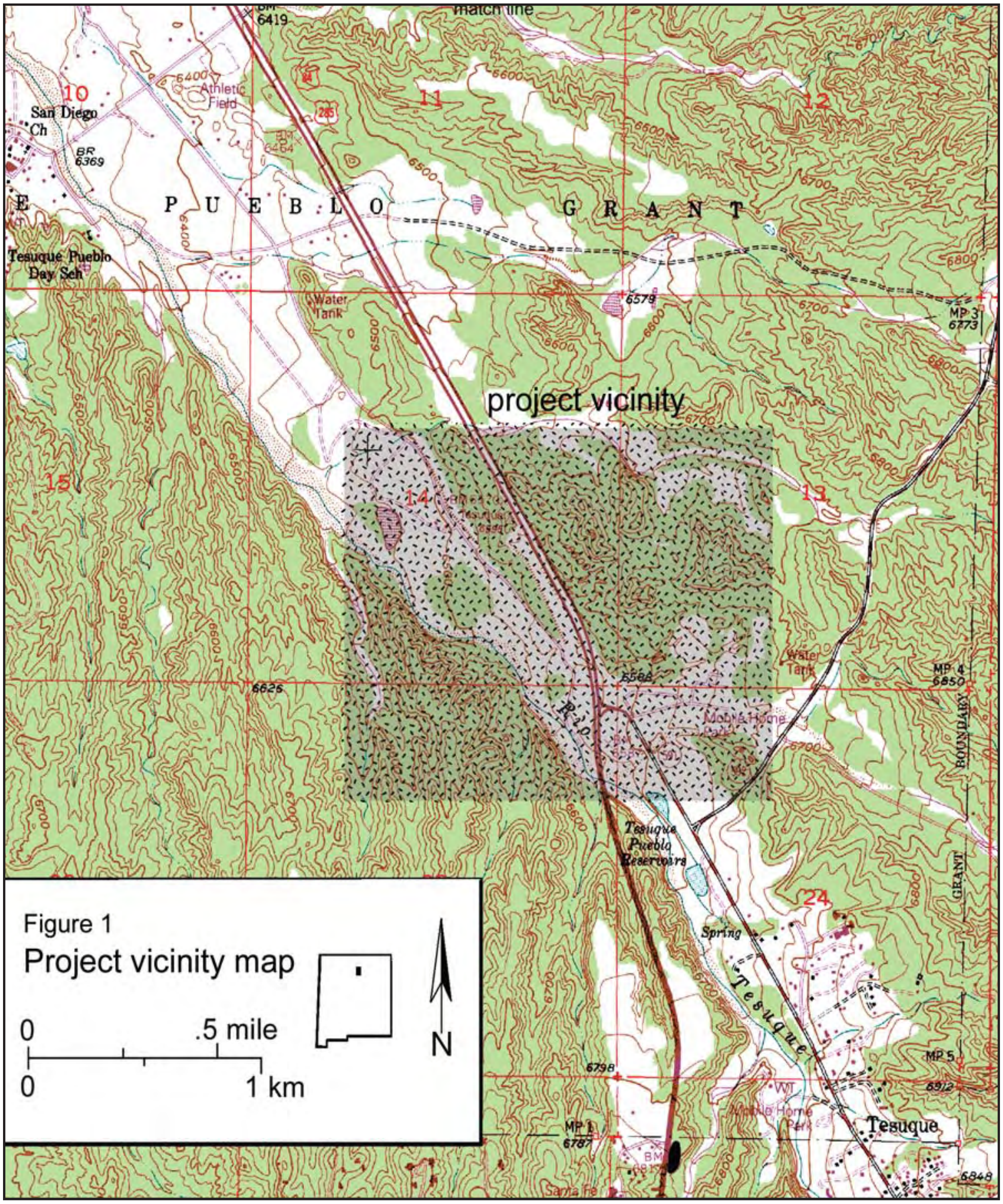

Figure 1
Project vicinity map

Jemez Mountains to the west. Local drainages are intermittent, carrying occasionally heavy runoff from the foothills of the Sangre de Cristo Mountains through the dissected valley-bottom landscape. These arroyos contribute to the Rio Tesuque, which merges with the Rio Pojoaque and flows to the Rio Grande. Small unnamed drainages within the project area were diverted by previous highway construction. Earth movement in historic times has also affected the area by creating a large berm on the west side of the highway to divert drainage.

The local geology consists of alluvial fill of the Rio Grande Rift. The Santa Fe group of

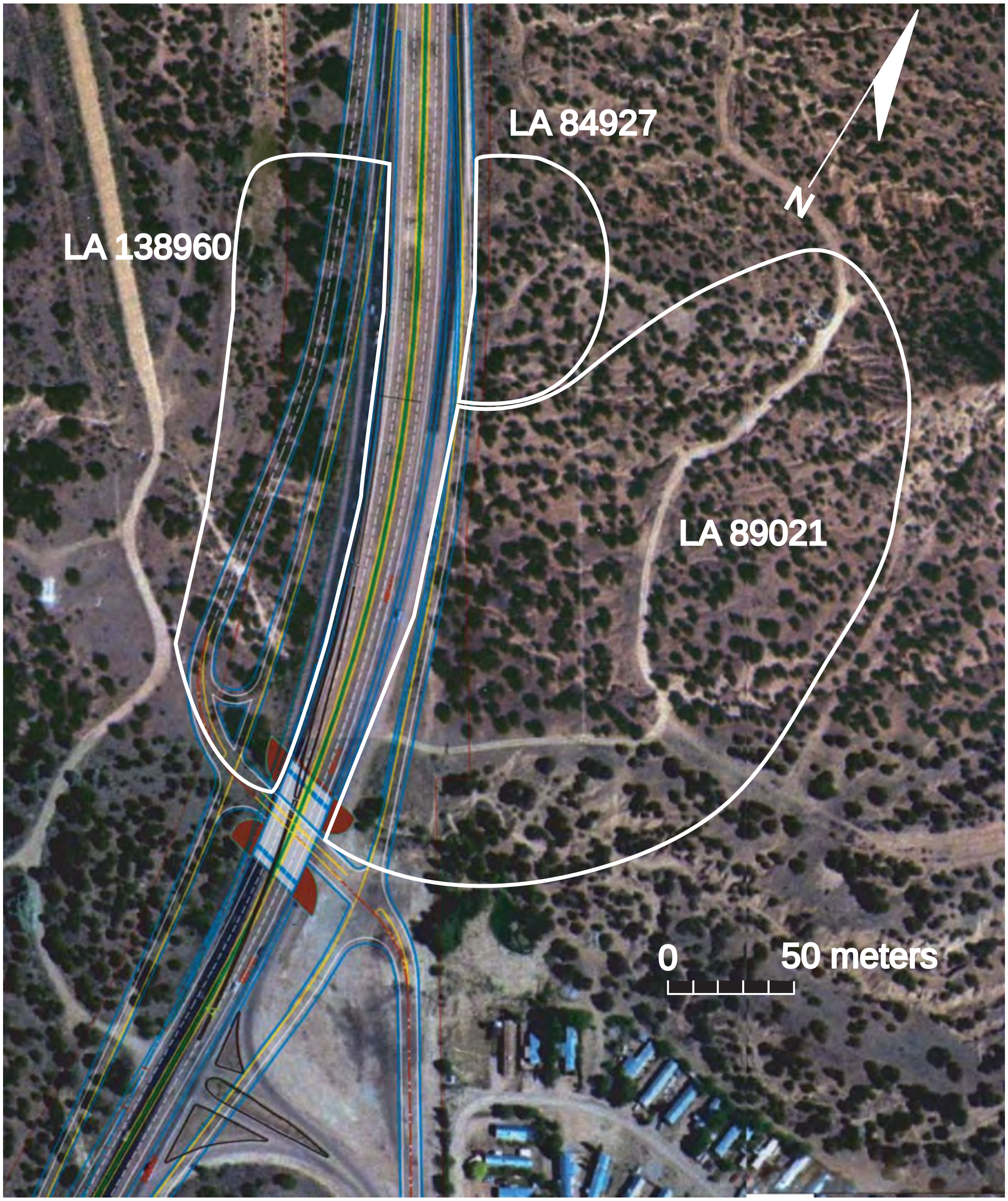

Figure 2. Locations of sites on aerial photograph of U.S. 84/285-CR 73 intersection.

formations are thick, poorly consolidated sands, gravels, conglomerates, mudstones, and siltstones (Lucas 1984). Occasional volcanic ash beds are draped over the landscape surfaces, revealing what is best characterized as a rapidly changing landscape over recent geologic time scales. Soils within the basin are classified within two groups. The Rough Broken Land Association soils occur on broken topography, steep slopes, and rock outcrops, with Pojoaque soils on ridge tops (Maker et al. 1974). The Recent Alluvial Valley soils are dominated by the El Rancho-Fruitland Association, including the low terraces along the Rio Tesuque. The El

Rancho-Fruitland soils are present in the survey area, and elsewhere they are currently used for irrigated crops.

Mean annual temperature for Española is 9.7 to 10.4 degrees C (49.4 to 50.7 degrees F; Gabin and Lesperance 1977). Summers are warm while winters are cool, resulting in an average of 152 frost-free days during the growing season (Reynolds 1956). Topography can influence local temperatures and, in turn, the length of the growing season because of cold air drainage (Tuan et al. 1973:69–70). Approximately 45 percent of annual precipitation falls in the summer months (Tuan et al. 1973; Gabin and Lesperance 1977) as part of a monsoon rainfall pattern (Martin 1963). Tree-ring data suggest that this pattern has been relatively stable through time, with only occasional disruptions (Dean and Funkhouser 1995). Española receives an average of between 237 and 241 mm of precipitation per year (9.3 to 9.5 inches), but there is high interannual variability (Gabin and Lesperance 1977). Also, violent thunderstorms can result in significant runoff rather than replenishment of soil moisture, so that dry farming within the Española Basin can be considered high risk (Anschuetz 1986).

Vegetation in the project area is dominated by juniper-piñon grassland with localized areas of dry riparian and riparian-wetland habitats (Anschuetz 1986; Pilz 1984). The principal understory vegetation includes muhly grass, grama grass, other grasses, four-wing saltbush, sagebrush, rabbitbrush, prickly pear, and cholla. Mountain mahogany, scrub oak, Rocky Mountain bee plant, Indian ricegrass, three-awn grass, side-oats grama, and flax are added in the dry riparian habitat, while willow, cottonwood, rushes, and sedges occur along perennial streams (tamarisk is a modern invasive member of this community).

Animals commonly found in the area include coyote, badger, porcupine, blacktailed jackrabbit, desert cottontail, spotted grounds squirrel, and various birds and small rodents (Anschuetz et al. 1985; Fiero 1978; Pilz 1984). Small numbers of mule deer and bear visit the region for brief periods. Animals that are common in higher elevations of the region include mule deer, wolf, coyote, bobcat, mountain lion, squirrel, skunk, raccoon, and elk.

The Cultural Environment

Detailed overviews of the culture history of the U.S. 84/285 Santa Fe to Pojoaque Corridor Project area are provided by Boyer and Lakatos (2000) and Moore et al. (2002) for the prehistoric periods, and Moore (2000a) for the historic periods. They are abstracted here; the reader is referred to these reports for detailed discussions of regional patterns of human occupation.

Paleoindian Period

Northern Rio Grande expressions of Paleoindian occupations are rare and are dominated by surface finds of isolated diagnostic projectile points or butchering tools (Acklen et al. 1990). Most of these have been found in upland or montane settings. The scarcity of Paleoindian material recorded in the lowlands of the Rio Grande Valley is probably due to low visibility. Archaic, prehistoric Puebloan, and historic Puebloan and Euroamerican occupations may mask these earlier components, but a geomorphic explanation is probably more relevant. Recently completed data recovery excavations along the Rio Tesuque investigated Late Archaic occupation surfaces within alluvium to a depth of at least 2 m, on top of which was a Classic period fieldhouse (Moore 2003). Within the project area, Paleoindian sites are probably deeply buried and subject to discovery only where modern downcutting has exposed profiles of site deposits.

Archaic Period

Archaic period occupations are more strongly represented than are Paleoindian occupations within the Española Basin and adjacent areas. Projectile point styles link these occupations with both the Oshara tradition (Irwin-Williams 1973) and Cochise tradition (Sayles 1983). Isolated finds continue to account for a majority of the Archaic manifestations, but recent investigations have documented an increasing number of both transitory and residential sites. Frequencies of Archaic occupations increase through time, with relatively few Early and Middle Archaic sites. These include sites containing thermal features, artifact scatters, and rarely, structures (Larson and Dello-Russo 1997; Lakatos, Post, and Murrell 2001; Lang 1992; Post 1999). The largest number of Archaic sites date to the Late Archaic period (Acklen et al. 1997), due both to increases in population and changes in settlement patterns. These sites are widely distributed across riverine, piedmont, foothill, and montane settings (Kennedy 1998; Lang 1993; Miller and Wendorf 1958; Post 1996, 1997, 1999; Scheick 1991; Schmader 1994; Viklund 1988). Deeply buried Late Archaic occupation surfaces are present within the project area along the Rio Tesuque in the vicinity of these sites. The Archaic components consist of strong accumulations of charcoal and cultural debris associated with paleosol development within the aggrading floodplain (Moore 2003). The transition between Archaic and Puebloan occupations is poorly understood within the Española Basin. Relatively few Late Archaic components have evidence of corn horticulture, and there is a suggestion that Archaic subsistence strategies (i.e., foraging) and accompanying mobile settlement strategies persisted until as late as A.D. 900 (Dickson 1979; McNutt 1969; Post 1996).

Pueblo Period

The Pueblo period as defined by Wendorf and Reed (1955) for the northern Rio Grande region covers the years between A.D. 600 and 1600. This period is marked by the transition from horticulture to agriculture, the introduction and florescence of pottery traditions, population increase, increasingly sedentary settlement patterns, and the development of social institutions capable of integrating families into large communities. Subdivisions of the Pueblo period into three periods—Developmental, Coalition, and Classic—reflect changes in settlement patterns and material culture technologies and styles, but the changes are not perfectly coherent.

Early Developmental period sites (A.D. 600–900) are characterized by plain gray and brown wares, red-slipped brown wares, and San Marcial Black-on-white (Allen and McNutt 1955). Neckbanded types, Kiatuthlana Black-on-white, Abajo Red-on-orange, and La Plata Black-on-red (Bluff Black-on-red) are added to the pottery assemblage toward the end of the Early Developmental period. The assemblages of this time period suggest contact with both the San Juan Basin to the west and the Mogollon regions to the south and southwest (Cordell 1978).

Early Developmental sites are far more common south of La Bajada than in the Española Basin. Those north of La Bajada are located at higher elevations along some major tributaries of the Rio Nambé, Rio Tesuque, and Rio Pojoaque (Lang 1995; McNutt 1969; Peckham 1984; Skinner et al. 1980; Wendorf and Reed 1955). Habitation sites typically consist of one to three shallow, circular pit structures with little or no evidence of associated surface structures (Allen and McNutt 1955; Peckham 1954, 1957; Stuart and Gauthier 1981), although the extent to which this may be due to excavation strategies is not clear. An exception is a settlement north of Santa Fe that may contain 5 to 20 structures, but their contemporaneity has not been demonstrated (Lang 1995). Pit structure features include hearths, sipapus, and ventilator systems oriented primarily to the east and southeast (Allen and McNutt 1955; Condie 1987; Hammack et al. 1983; Peckham 1957).

Late Developmental period sites (A.D. 900–1200) have been identified from the Albuquerque area north to the Taos Valley and east to the Pecos River Valley. Trade wares from the Cibola area to the west that are abundant during the early part of the period are replaced by Kwahe'e Black-on-white as the local decorated pottery. Trade wares from the south and southwest (such as Socorro Black-on-white and Chupadero Black-on-white) are present but uncommon throughout the period. The number and size of residential sites increases, occupying a wider range of environmental settings, including limited occupation of the Pajarito Plateau (Allen 1972; Cordell 1978; Ellis 1975; Kohler 1990; McNutt 1969; Mera 1935; Orcutt 1991; Peckham 1984; Skinner et al. 1980; Steen 1977; Wendorf and Reed 1955; Wetherington 1968). Sites of the period typically consist of a residential unit comprised of one or two pit structures, sometimes associated with 5 to 20 surface rooms, and an associated midden (Ellis 1975; Lange 1968; Peckham 1984; Stubbs 1954; Stuart and Gauthier 1981; Wendorf and Reed 1955). Clusters of these residential units are common, probably forming loosely aggregated communities. An unusually large community (LA 835) includes a large structure called a "great kiva" (Stubbs 1954), but such structures are rare and do not compare with contemporary Chacoan outliers in the San Juan Basin. Pit structure feature suites include both economic and ceremonial pits, and features remain oriented to the east or southeast (Boyer and Lakatos 1997; Allen and McNutt 1955; Lange 1968; Stubbs 1954; Stubbs and Stallings 1953).

Occupation during the Coalition period (A.D. 1200–1325) is marked by changes in material culture and settlement systems (Cordell 1978; Peckham 1984; Stuart and Gauthier 1981; Wendorf and Reed 1955). Ceramic hallmarks of this period include a shift to organic paint (Santa Fe Black-on-white, Wiyo Black-on-white, and Galisteo Black-on-white). Trade ware pottery decreases in abundance, but it includes White Mountain Redwares from the greater Zuni area (Kohler 1990; Steen 1977; Steen and Worman 1978; Worman 1967). Numbers and sizes of residential sites continue to increase, extending the trend toward village-level community organization evident in the Late Developmental period. Formerly sparsely occupied upland areas such as the Pajarito Plateau and the Tewa Basin are heavily occupied, while populations in formerly heavily occupied lowland areas may have decreased (Crown et al. 1996). In the Santa Fe area, large villages are established (such as Agua Fria School House Ruin [LA 2], LA 109, LA 117, LA 118, and LA 11) or expand from a Late Developmental period base (such as Pindi [LA 1], Tsogue [LA 742], and Tesuque Valley Ruin [LA 746]; Ahlstrom 1985; Franklin 1992; Stubbs and Stallings 1953). Ratios of surface rooms to pit structures increase within settlements, and a greater concentration of domestic activities occurs within surface rooms. Ventilator systems commonly remain oriented to the east or southeast.

The Classic period (A.D. 1325–1600) is characterized as a time of "general florescence" (Wendorf and Reed 1955:153). North of Santa Fe, sites of this period are recognized by the dominance of biscuit wares; Jemez Black-on-white characterizes this period in the Jemez Mountains; and glaze wares are introduced and become dominant south of Santa Fe. Large villages in the Santa Fe area, such as the Agua Fria School House Ruin (LA 2), Arroyo Hondo (LA 12), Cieneguilla (LA 16), LA 118, LA 119, and Pindi (LA 1), grew rapidly and flourished during the early part of this period, but were abandoned in favor of fewer but larger settlements after A.D. 1425 (only Cieneguilla remained occupied in the Santa Fe area). The largest sites of the late Classic period had room blocks arranged around multiple plazas, with and without kivas. The cultural changes of this period are variously interpreted as resulting from expanding indigenous populations (Steen 1977), the arrival of migrants from the Jornada branch of the Mogollon to the south (Schaafsma and Schaafsma 1974), or immigration from the west, stretching from the San Juan Basin to the Zuni area (Cordell 1995; Hewett 1953; Mera 1935, 1940; Reed 1949; Stubbs and Stallings 1953; Wendorf and Reed 1955). A further increase in room to kiva ratios argues for continuing change in ceremonial organization, and new ideological constructs such as the Katsina cult are evident in pottery, kiva murals, and rock art (Dutton 1963; Hayes et al. 1981; Hibben 1975; Schaafsma 1992; Schaafsma and Schaafsma 1974).

Historic Period

A.D. 1600 marks the formal beginning of the historic period, but the Spanish entrada began with Coronado's expedition of 1540–1542 (Winship 1990). Subsequent expeditions entering northern New Mexico include those of Chamuscado-Rodríguez (1581–1582; Hammond and Rey 1966), Espejo (1582–1583; Hammond and Rey 1966), and Gaspar Castaño de Sosa (1590–1591; Hammond and Rey 1966; Schroeder and Matson 1965). At least eight Tewa villages were occupied in the Española Basin during this exploration period (1540–1598), although the historic accounts lack detail and are often ambiguous. Possible historic sites are limited to camps, while the Native American occupations are those of the terminal Classic period.

The exploration period ends and the early Spanish Colonial period (1598–1680) begins with the arrival of the first successful Spanish colonists and Juan de Oñate in 1598 (Espinosa 1988). The initial settlement was at San Gabriel del Yunque, adjacent to San Juan Pueblo, where the settlers occupied a Tewa pueblo abandoned for their use (Ellis 1987). By 1608, the colonists had moved their settlement to Santa Fe, and they faced the reality that the colony would be more successful for its missionizing efforts than as a source of economic wealth (Espinosa 1988:7–9; Simmons 1979:181). The colony was maintained as a mission area in the seventeenth century and its primary function was Christianization of the Pueblos. Because of this, the church was extraordinarily powerful and influential, causing considerable conflict with the secular government (Ellis 1971:30–31; Scholes 1942). Beginning in the 1640s this struggle weakened the Spanish hold on the province (Simmons 1979:184).

Rather than furnishing a permanent military garrison for New Mexico, the Spanish government created a class of citizen-soldiers responsible for defense. As a reward for their service, these citizen-soldiers were given the right to collect an annual tribute from the Pueblos. This was the encomienda system, and the number of encomenderos was set at 35 (Espinosa 1988). In times of trouble, all able-bodied citizens were liable for military service (Espinosa 1988:10). Pueblo Indians were also conscripted to serve as laborers on Spanish farms and haciendas. This was the *repartimiento*, a system of forced labor that was designed to provide workers for Spanish holdings (Simmons 1979:182). While laborers were supposed to be paid for their work, abuses of the system were common and the Spanish often failed to compensate them (Simmons 1979:182–183).

Since New Mexico was primarily viewed as a mission effort, the secular population received little official support. The extensive mission system developed by the church was supported with subsidies from the Spanish Crown, and caravans of supplies arrived from Mexico at average intervals of three years (Ivey 1993; Moorhead 1958; Scholes 1930). Irregular supply at fairly long intervals led to serious shortages of important supplies, such as metal, and kept the cost of manufactured goods high.

Supplies carried by the caravans were meant for support of the missions, though at times goods were also carried north for profit (Hackett 1937; Moorhead 1958). This was particularly true between 1664 and 1671 when the caravan passed out of the church's control and was contracted to Don Juan Manso. Apparently, Manso used up to half of the wagons to carry goods for sale in New Mexico (Scholes 1930). In addition to shipments controlled by the missions and governors, private trade over the Camino Real also occurred. A fairly wide variety of goods moved in both directions:

> Imports represent practical, utilitarian tools, equipment, household items, and a range of luxury goods, primarily clothing and textiles. . . In return, New Mexicans sold coarse, locally made textiles and clothing (mostly stockings), hides, and aside from animals on the hoof, occasional subsistence foods locally produced. (Snow 1993:141)

Most pottery used for domestic purposes was purchased from the Pueblos and Apaches. Majolica imported from Mexico was considered somewhat of a luxury, at least into the nineteenth century (Snow 1993:143). Manipulation of the New Mexican monetary system by Chihuahuan merchants probably assured them of considerable profit and kept the price of imported pottery high when compared to locally produced Pueblo wares.

The early Spanish Colonial period was brought to an end by the Pueblo Revolt (A.D. 1680–1693). A combination of religious intolerance, forced labor, the extortion of tribute, and Apache raids led the Pueblo Indians to revolt in 1680, driving the Spanish colonists from New Mexico. The Pueblos resented Spanish attempts to supplant their traditional religion with Christianity, and numerous abuses of the *encomienda* and *repartimiento* systems fueled their unrest (Forbes 1960; Simmons 1979). These problems were further exacerbated by nomadic Indian attacks, either in retaliation for Spanish slave raids or because of drought-induced famine (Ellis 1971:52; Sando 1979:195). The colonists who survived the revolt retreated to El Paso del Norte, accompanied by the few Pueblo Indians that remained loyal to them. Reconquest attempts were made by Antonio de Otermín in 1681 and Domingo Jironza Petriz de Cruzate in 1689, but both failed (Ellis 1971). In 1692, Don Diego de Vargas negotiated the Spanish return, exploiting factionalism that had again developed among the Pueblos (R. Ellis 1971:64; Simmons 1979:186). Vargas returned to Santa Fe in 1693 and re-established the colony. Hostilities continued until around 1700, but by the early years of the eighteenth century the Spanish were again firmly in control.

The late Spanish Colonial period (A.D. 1693 to 1821) began with the reassertion of Spanish control and continued through the opening of the Santa Fe Trail. The power of the church faded, Spanish systems of tribute and forced labor were never reestablished, and the mission system was scaled down (Simmons 1979). The royal government continued to subsidize the province, but it now served as a buffer against the enemies of New Spain, not as a mission field (Bannon 1963). Although still at the frontier of New Spain, the capital of Santa Fe and its immediate environs slowly developed into an economic and cultural core. The military role of the *encomenderos* was filled by regular presidial garrisons at Santa Fe and El Paso, and they were replaced as an economic force by families who prospered by dealing in sheep. However, most of the people who reoccupied New Mexico were poor farmers and herders.

By the middle of the eighteenth century a considerable trade had developed between New Mexico and Chihuahua (Athearn 1974), mostly to the benefit of the Chihuahuan merchants. Thus, New Mexico was poorly supplied with goods sold at exorbitant prices. This problem was partly rectified by trading with local Indians for pottery, hides, and agricultural produce, and some goods were apparently manufactured by cottage industries. Unfortunately, many products had no local substitutes. Metal, especially iron, was in short supply in New Mexico

(Simmons and Turley 1980). Nearly all iron was imported from Spain, and colonial iron production was forbidden by royal policy to protect the monopoly enjoyed by Vizcaya (Simmons and Turley 1980:18).

Between 1750 and 1785 New Mexico was hit by a defensive crisis caused by intense Plains Indian and Apache raids (Frank 1992). Attacks by Utes and Comanches began as early as 1716 with raids against Taos, the Tewa Pueblos, and Spanish settlements (Noyes 1993:11). However, most of the Comanche's fury was directed against the Apaches during this period, and by 1740 the Apaches had been driven off the Plains or south of the Canadian River, and the Comanches were at peace with the Spanish (Noyes 1993:24–25). This peace was short-lived, because by the mid-1740s the Comanches were mounting intensive raids against Pecos and Galisteo Pueblos, culminating in a series of devastating attacks against Spanish settlements east of the Rio Grande. These raids caused the temporary abandonment of many villages on the east side of the Rio Grande from Albuquerque northward in the late 1740s (Carrillo 2003; Noyes 1993:25). Raiding by Athabaskans aggravated this situation. Often spurred on by drought, Apaches raided New Mexican settlements sporadically in the 1750s and 1760s, and in the 1770s there was a resumption of raids by the Navajo (Frank 1992:39–40).

Military efforts and treaties reduced conflict in the 1780s, but just as hostilities were ending, a major smallpox epidemic struck New Mexico in 1780 to 1781 (Frank 1992:64). Rising birth rates soon countered the effects of the epidemic on the Hispanic population, and the Hispanic population surpassed that of the Pueblos in size for the first time (Frank 1992:64–65). Communications with Mexico by way of the Camino Real were freed up, and settlers gained the ability to open new lands without fear of Indian attack (Frank 1992:71). While in the short run the epidemic seriously disrupted New Mexico, in the long run the juxtaposition of these trends created an economic boom between 1785 and 1815 (Frank 1992:166).

Despite the improving economic situation, New Mexico still depended on shipments from the south to provide manufactured goods, particularly metal and cloth, that could not be produced locally. Irregular but almost annual caravans continued to supply New Mexico via the Camino Real, however the small volume of goods and limited numbers of merchants caused goods sold in Santa Fe to cost several times their original value (Connor and Skaggs 1977:21–22; Frank 1992:237–239). Thus, economic conditions for most New Mexicans through the eighteenth century seems to have been rather dismal. The economy benefitted small groups of wealthy families who retained most of the profits realized through trade with Mexico. Some of this wealth trickled down from the upper class to the bulk of the Spanish population, but the *partido* system in which sheep owners apportioned parts of their flocks out to shepherds, receiving the original animals and a percentage of the increase back at the end of the contract period, theoretically provided a means for poor Spanish settlers to better themselves.

1821 marked the independence of Mexico from Spain and the initiation of trade on the Santa Fe Trail. The Santa Fe Trail period (1821 to 1880) brought two major changes to New Mexico: expansion of the trade network and a more lenient land grant policy (Levine et al. 1985). Expeditions into the recently acquired Louisiana Purchase brought American explorers and traders west from the Missouri River, eventually establishing the Santa Fe Trail. The first trading expedition was that of William Becknell in 1821. While the trail was officially opened in 1821, the amount of commerce moving over it to New Mexico was limited for the first several years of its existence, and there were only eight to ten expeditions between 1821 and 1824 (Connor and Skaggs 1977:34). Trade began in earnest after 1825, which is when the

United States completed a survey of the trail to mark its route and secure safe passage through Indian territory (Connor and Skaggs 1977).

This period saw profound changes in the economic and ethnic structure of New Mexico. The movement of materials over the Santa Fe Trail meant that many goods that had been difficult or impossible to obtain during most of the Spanish period could now be acquired. The Pueblo role in the economy also appears to have changed. An indication of this is the growth of pottery production by Spaniards from a rarity to a minor cottage industry. Spanish pottery production is questionable prior to 1821, except on rare occasions by few individuals. After 1821 pottery appears to have been produced in numerous Hispanic villages, as suggested by Carrillo (1997). In addition to material goods, the Santa Fe Trail also brought citizens from the United States to New Mexico. Most remained only a short while, but some settled permanently, entering into economic relationships with local merchants. The trickle of immigration accelerated when New Mexico was annexed by the United States in 1846.

The economic impact of the arrival of the railroad rivaled that of the opening of the Santa Fe Trail and initiated the railroad period (1880–present). Rail lines reached New Mexico in 1878, when construction began in Raton Pass (Glover and McCall 1988:112). By 1879 the Atchison, Topeka, and Santa Fe line was in Las Vegas, and by early 1880 it was completed to Lamy (Glover and McCall 1988). With this link to the eastern United States, New Mexico entered a period of economic growth and development, primarily in the larger urban areas (Pratt and Snow 1988:441). This linkage also ended New Mexico's long-term position as a frontier territory. It was now firmly linked to the economy of the United States as a whole. In addition to increasing the ease of supply to the region, it also made New Mexico more accessible to tourism from the East, which soon became an important part of the local economy.

With the availability of rapid and inexpensive transport, several industries boomed in New Mexico. While sheep and wool production expanded, the cattle industry was also stimulated and soon became the dominant ranching industry. Mining expanded into the early 1900s, and coal became an important export. The transformation of the New Mexican economy into its modern form was well under way by the time it became the 47th state in 1912.

Goods manufactured in the East could now be easily and cheaply transported to New Mexico, resulting in great changes in consumption patterns. While traditional Hispanic consumption patterns seem to have survived the changes in availability of manufactured goods caused by the Santa Fe Trail, they did not long survive the flood of goods carried by the railroad. An example of this process is the use of Pueblo and Hispanic pottery for cooking and storage. This practice continued into at least the early railroad period, as shown by the results of excavation at the Trujillo House and La Puente in the Chama Valley (Moore et al. 2003). Pueblo pottery, apparently supplemented by Hispanic-made wares, was used at these sites until at least the end of the nineteenth century. However, they were associated with large amounts of Euroamerican wares that seem to have mostly replaced the traditional Pueblo and Mexican wares used for serving and consuming food. As the Pueblos began producing increasing amounts of pottery for the tourist trade, their wares became more expensive. Accompanying this was the availability of other methods of cooking and storing food. Eventually, the use of earthenwares for these purposes virtually disappeared.

Trade over the Santa Fe Trail represents the first erosion of the traditional New Mexican economy, which was mostly based on the barter of agrarian products and goods produced by cottage industries. Before that time there is little evidence for the circulation of specie in New Mexico, and indeed the early Santa Fe traders complained that there was little hard cash in the territory; what little was available was controlled by just a few families (Connor and Skaggs 1977). Even though much of the commerce conducted over the Santa Fe Trail continued to be based on barter, New Mexico in general was finally introduced to a cash economy. As the territory was integrated into the United States after 1846 and especially after the railroad arrived in 1880, New Mexico finally became fully integrated into the cash economy that dominated the rest of the North American continent.

2
LA 84927, LA 89021, AND LA 138960: SITE DESCRIPTIONS

Jeffrey L. Boyer

LA 84927

LA 84927 was recorded by Evaskovich (1991:3-1–3-3), who provides the following description of the site:

> LA 84927 . . . consists of a dense scatter of ceramic, lithic, and ground stone artifacts. A dark charcoal stain and associated fire-cracked rock indicate the presence of a hearth. The artifact scatter extends from a concentration located on a ridge and slope immediately east of the highway ROW, to the north, and to the west, onto the ROW. The scatter measures approximately 50 x 90 m.
>
> The high artifact density includes ceramics, lithics, and ground stone. The sherds are represented by utility wares, corrugated, indented, neck-banded, and incised wares, and black-on-white decorated sherds, including Red Mesa. Lithic debitage, representing all stages of reduction, were observed. Material types includes [sic] local quartzite and chert, and non-local Jemez obsidian and Pedernal chert. Ground stone artifacts consist of formal one- and two-hand manos, and fragments of at least two trough metates. The bulk of the artifacts occur around the charcoal stain with some movement down a steep slope, cut during highway construction, onto the ROW.
>
> The site appears to represent the remains of an Anasazi occupation dating to the Pueblo II period. The artifact assemblage is indicative of a structural habitation site, however, no structural remains were located . . .
>
> LA 84927 is being actively eroded and an unknown portion has been impacted by highway construction. At least 2 m of overburden which may have contained cultural material has been removed. However, intact deposits are probably present on the stable ridgetop, and there is potential for buried cultural materials within this portion of the site.

LA 84927 was revisited during the first survey for the U.S. 84/285 Santa Fe to Pojoaque Corridor Project. Hohmann et al. (1998:21–22) provide this description of the site:

> Site LA 84927 is a prehistoric sherd and lithic scatter (with associated dark gray soil stains) . . . The site covers an estimated 96 m north/south by 31 meters east/west (2976 square meters). During the initial construction of US 84/285, a portion of this site was cut away during embankment/slope modifications enhancing water erosion and down cutting which is washing away archaeological deposits . . .
>
> This is a sparse artifact scatter with two, slightly denser ceramic clusters (with one looking like a collector’s pile). These major densities of artifactual material co-occur with areas of dark gray soil. There is also a small stone pile (measuring approximately 25 centimeters in diameter) and associated ashy stain area which may represent the remains of what Evaskovich (1991) suggested was a hearth feature.
>
> Ceramic materials include Red Mesa Black-on-white bowl and jar sherds, a whiteware ladle fragment, Rio Grande Corrugates, whitewares, and graywares. Lithic include fragments of ground stone plus chert and obsidian primary, secondary, and tertiary flakes.

Finally, LA 84927 was again revisited during a re-survey of the Pueblo of Tesuque Grant portion of the U.S. 84/285 right-of-way (Hannaford and Blinman 2003a). Hannaford and Blinman's (2003a:25–27) description suggests that the site is considerably more complex than indicated by previous surveys:

> Site Description: LA 84927 is a Late Developmental habitation site containing at least three areas of ash-stained soil probably representing the burned remains of pit structures . . . Sherds and lithic artifacts are abundant in the various artifact concentrations.
>
> Assessment of Project Impact: At least one ash-stained soil area representing a possible pit structure is within the existing fenced highway right-of-way. An additional area of ash-stained soil associated with an artifact concentration also overlaps the existing fenced right-of-way.

Hannaford and Blinman (2003a:25) also note that ". . . the site suffers from both sheet wash and deep arroyo cuts. Arroyos have exposed cultural material, and buried deposits are more than likely present." Figure 3 is a map of LA 84927, adapted from Hannaford and Blinman (2003b).

In summary, LA 84927 is a Late Developmental period site probably dating between about A.D. 950 and 1050, based on the presence of Red Mesa Black-on-white pottery and the apparent paucity of Kwahe'e Black-on-white. Three, and perhaps, four large areas of ash- and charcoal-stained soil and sediment, associated with concentrations of surface artifacts, suggest the presence of several habitation structures; considering the time period, these are probably pit structures, although the presence of small surface structures cannot be discounted. Further, the presence of deeply buried Archaic deposits associated with paleosols at sites LA 84927 (see description below), LA 111333 (Moore 2003), and LA 138960 (see below), all located near LA 84927, suggests that such deposits may be anticipated at LA 84927.

LA 89021

LA 89021 was recorded by McKenna (1992), who describes the site as a Developmental period sherd and lithic artifact scatter, measuring about 30-by-20 m, and located about 10 m east of the existing right-of-way fence, along an arroyo north of the U.S. 84/285-CR 73 intersection. Ceramic types observed include Kwahe'e and Santa Fe Black-on-white.

Adams (1995) does not mention LA 89021 in her report of a survey for a transmission line relocation. She does, however, record LA 108379, which she describes as follows:

> This large site consists of a scatter of chipped-stone debris, ceramic sherds, ground stone, and six features . . . The scatter extends from a concentration located along a ridge southward to a deeply entrenched arroyo.
> Five relatively dense concentrations or loci of artifacts were noted. Four of these loci contain . . . six features. Areas between the loci contain artifacts, but the frequency and density are greatly reduced. (Adams 1995:15)

Adams (1995:15–18) then provides descriptions of the six features and associated artifacts. Ceramic types point to occupation of the site during the Coalition period, and Adams (1995:18) suggests that the site represents "a small residential community." Interestingly, Adams's (1995:16) map of LA 108379 shows that the site wraps around LA 89021 on the latter's north, east, and south sides. Although Adams does not mention LA 89021, the LA 108379 site map suggests that she knew of its presence and location, and conformed the site bound-

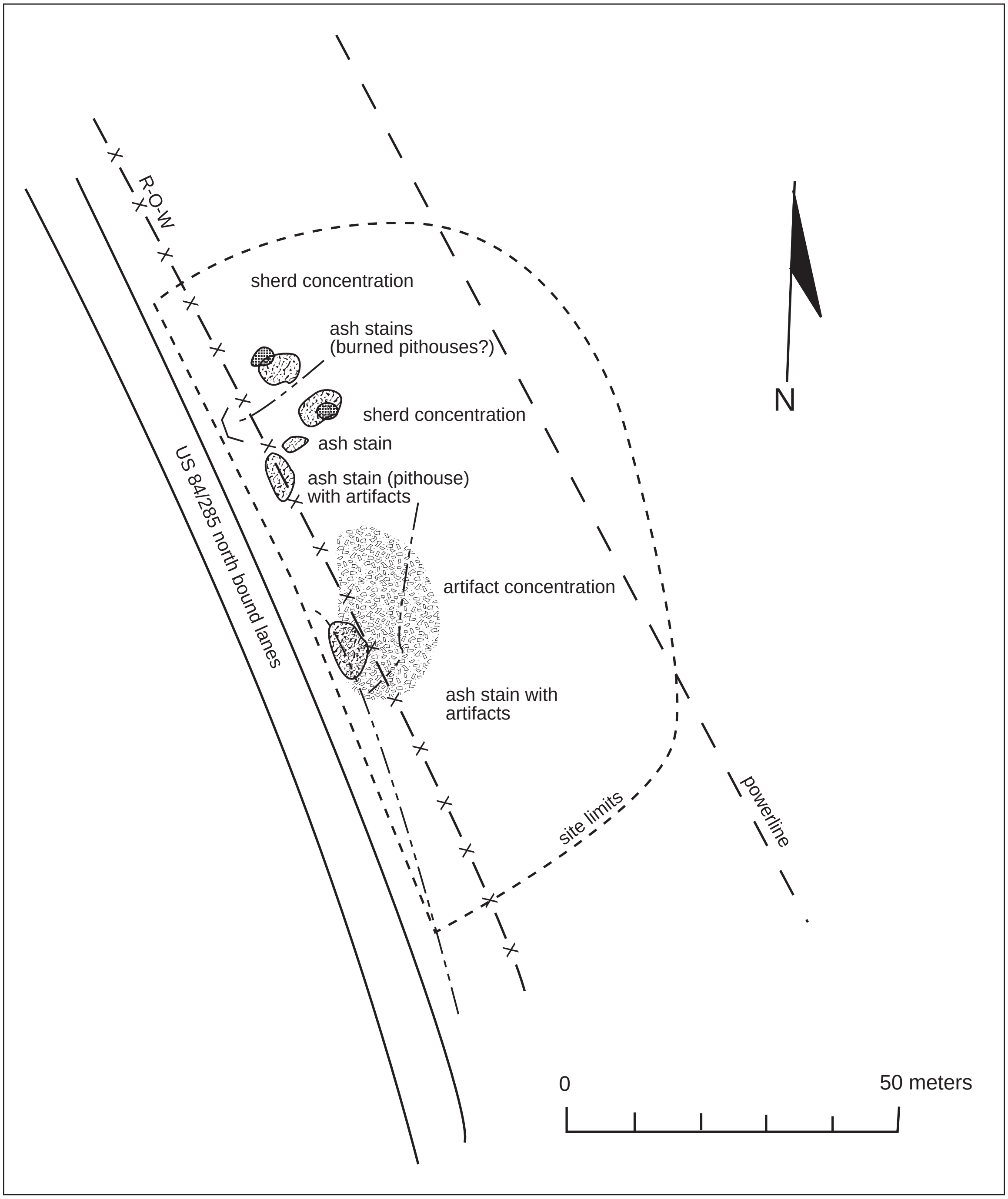

Figure 3. LA 84927: site map.

ary of LA 108379 to fit around that of LA 89021.

The first survey for the U.S. 84/285 Santa Fe to Pojoaque Corridor Project revisited LA 89021, which is described in the report as "a small, shallow prehistoric artifacts scatter" measuring about 20-by-30 m (Hohmann et al. 1998:22). Hohmann et al. (1998:22) go on to state:

> Today the site consists of a small sherd and lithic scatter of approximately 30 artifacts with chert and obsidian primary and secondary flakes being observed. The ceramic sherds include unidentified graywares, Kwahe'e Black-on-white, Tesuque corrugated, and whitewares.

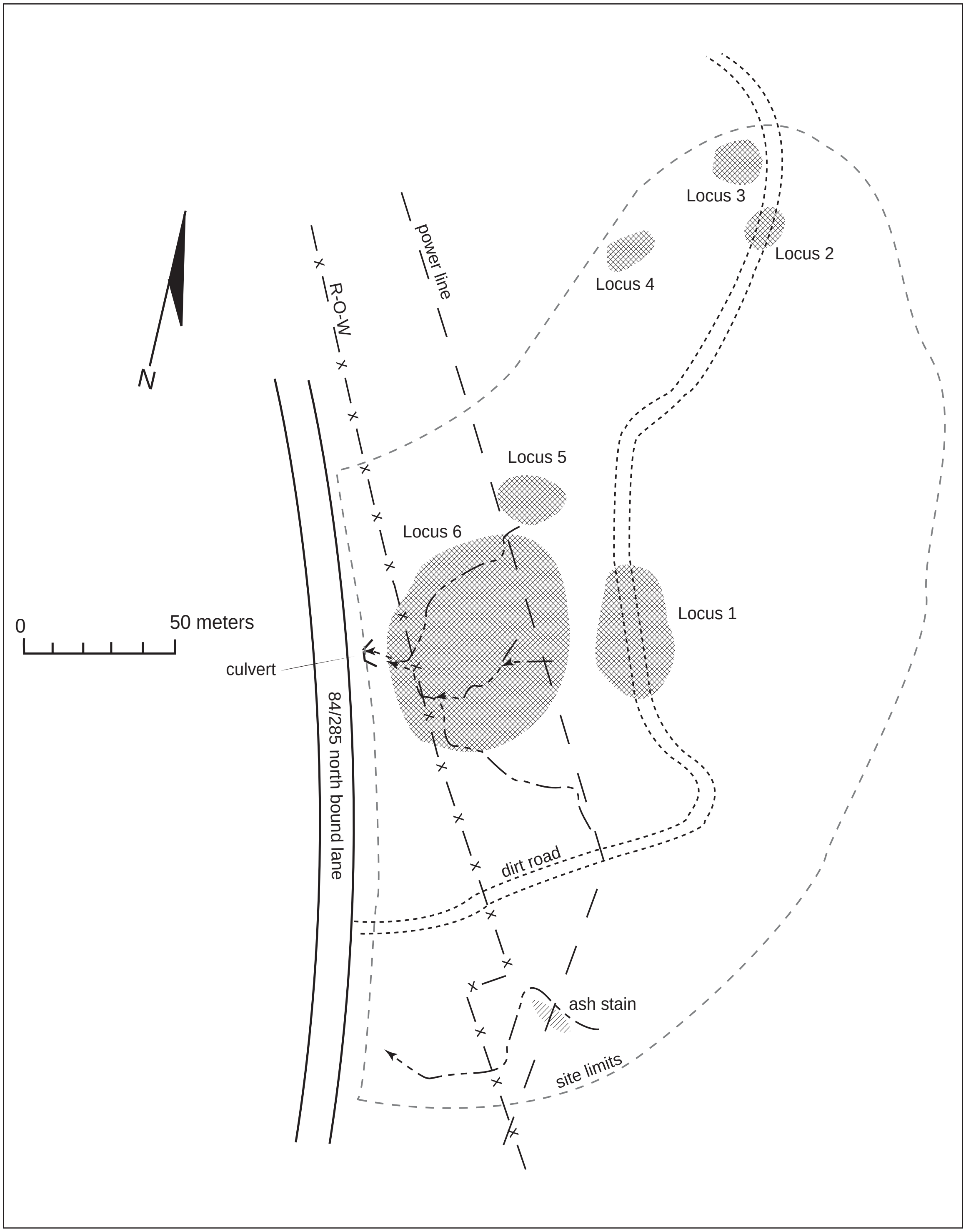

Figure 4. LA 89021: site map.

> . . . LBA could find no evidence of Santa Fe Black-on-white, only Kwahe'e Black-on-white... The site rests on a small, low-lying hill/ridge slope surrounded by several deeply entrenched intermittent washes . . . The simple and sparse scatter of chipped stone and mostly grayware/whiteware ceramics suggests a limited activity function for the site, possibly associated with subsistence activities.

Hohmann et al. (1998) do not mention LA 108397. They do, however, record LA 111348, which they describe as:

> . . . three dense areas of surface artifacts associated with dark grayish brown soil and a rock pile feature distributed along an alluvial slope and plain adjacent to a large arroyo. Between these three concentrations, surface artifacts are widely scattered. Site LA 89021 is located approximately 42 meters west of Site LA 111348.

The three concentrations of artifacts and features (Areas A, B, and C) recorded by Hohmann et al. (1998) at LA 111348 correspond to Adams's (1995) Loci 1 and 2 within LA 108397. Thus, Hohmann et al. re-recorded, as LA 111348, a portion of LA 108397.

Based on the evident overlapping of sites LA 89021, LA 108397, and LA 111348, Lakatos (2000a) recommended that the three sites, and their records, be combined under the number LA 89021. That recommendation was implemented by the staff of the New Mexico State Historic Preservation Division's Archeological Records Management Section (ARMS), and is followed by Hannaford and Blinman (2003a:24–25), who describe LA 89021 as follows:

> Site Description: LA 89021 is a large multicomponent site with Archaic, Developmental, and Coalition period occupations. LA 108379 and LA 111348 are inactive duplicate LA numbers for this site. The Archaic component is characterized by buried paleosols exposed in arroyo cuts. A major arroyo cut adjacent to the right-of-way contains a dense charcoal layer located 1.0 to 1.5 m below the surface and visible in at least a 30-m-diameter area. Several other deep charcoal layers and discrete features are exposed in arroyo cuts across the site. These deep paleosols may be related to similar deeply buried deposits investigated at LA 111333 directly west of the highway. The deep deposits also are apparent at LA 138960 directly west of the highway from LA 89021. The existing highway appears to have truncated the site, and deeply buried cultural material may be preserved below the highway.
>
> The Developmental/Coalition period occupation is characterized by at least six artifact concentrations associated with at least six rock alignment and ash-stain features. A moderate scatter of sherds and lithic artifacts covers the entire site area, and additional surface and buried features can be expected across the site.

Figure 4 is a map of LA 89021, adapted from Hannaford and Blinman (2003b). It includes, within the site, the area originally recorded as LA 89021 and the area and features recorded and re-recorded as LA 108397 and LA 111348.

In summary, LA 89021 is a large site comprised of a buried Archaic component(s) associated with paleosols, and a prehistoric Puebloan component dating to the Late Developmental, and perhaps the Coalition period. The latter is represented by at least six concentrations of sherds and chipped stone artifacts associated with ash- and charcoal-stained soil and sediment and, in some cases, rock alignments that may represent structural remains.

LA 89021 extends into the fenced portion of the U.S. 84/285 right-of-way. Further, because the actual right-of-way boundary deviates to the east from the fence line through the site, additional portions of the site extend into actual right-of-way. Given that LA 89021 is cut

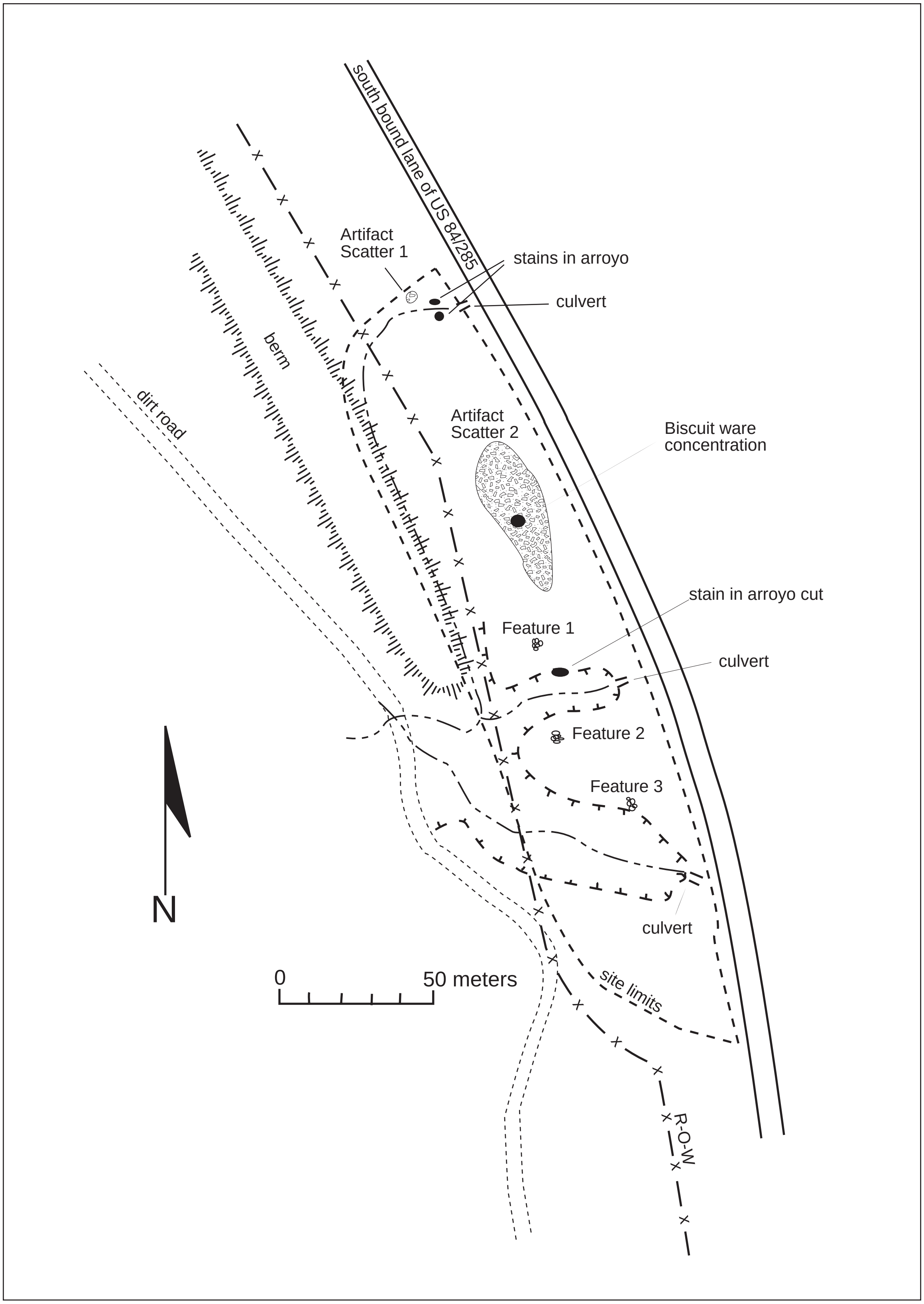

Figure 5. LA 138960: site map.

by arroyos, additional portions of the site may also be present within drainage CME (construction maintenance easement) locations that could extend beyond actual and fenced rights-of-way.

LA 138960

LA 138960 was recorded during a re-survey of the Pueblo of Tesuque Grant portion of the U.S. 84/285 right-of-way (Hannaford and Blinman 2003a). Hannaford and Blinman (2003a:27–28) provide the following description of the site:

> Site Description: LA 138960 is . . . very similar to LA 111333 located just to the south. The sites are actually connected by a diffuse scatter of surface sherds. Arroyos on the north and south site boundaries expose charcoal-rich paleosols at a depth of about 1 m below the surface. This is probably a continuum of a similar Archaic period paleosol investigated at LA 111333. This may also be related to the paleosol exposed in arroyo cuts at LA 89021 directly east of U.S. 84/285. The archaeological investigations at LA 111333 suggest that similar deeply buried Archaic features including hearths, roasting pits, and associated lithic artifact assemblages can be expected at the site. A berm west of the right-of-way fence contains lithic artifacts apparently exposed during blading associated with the berm construction.
>
> Puebloan occupations are represented by Late Developmental period and Classic period artifact scatters. These artifact scatters may represent habitation occupations masked by the dense growth of trees and duff covering the ground. The Developmental occupation is represented by 100s of sherds, while the Classic period has a recorded sherd assemblage in the tens. However, this may simply be a result of exposure. Three rock piles were recorded on the site away from the artifact scatters. Feature 3 is a hearth of unknown temporal affiliation. The other two rock piles are of unknown function and temporal affiliation

Figure 5 is a map of LA 138960, adapted from Hannaford and Blinman (2003b). Most of LA 138960 is located within the existing fenced right-of-way of U.S. 84/285; the portion of the site extending west of the fenced right-of-way is within a proposed right-of-way expansion CME for the planned U.S. 84/285-CR 73 interchange.

3
A PLAN FOR DATA RECOVERY INVESTIGATIONS AT LA 84927, LA 89021, AND LA 138960

Jeffrey L. Boyer, James L. Moore, and Steven A. Lakatos

Detailed theoretical frameworks for the investigation of both prehistoric (Boyer and Lakatos 2000; Moore et al. 2002) and historic occupations (Moore 2000a) have been created for the U.S. 84/285 highway construction project as a whole. The proposed investigations of LA 84927, LA 89021, and LA 138960 represent an extension of those frameworks to cultural resources within an expanded portion of the construction zone. This section provides a recapitulation of the research orientation that has been developed for the project as a whole.

A Common Perspective for Data Recovery Investigations at Prehistoric Sites in the U.S. 84/285 Santa Fe to Pojoaque Corridor

Jeffrey L. Boyer and Steven A. Lakatos

Data recovery investigations of the prehistoric components are intended to contribute to the process of systematically evaluating observations and interpretations made by Fred Wendorf and Eric Reed (1955) some 45 years ago. These observations and interpretations led Wendorf and Reed to propose an alternative chronological and developmental framework that differed considerably from the Pecos Classification, the dominant framework for examining Puebloan sites and assemblages, then and now. For Santa Fe to Pojoaque Corridor data recovery investigations, we consider the implications of the Wendorf and Reed "reconstruction" and the results of past research in the Tewa Basin and the northern Rio Grande region.

In Search of Wendorf and Reed

In 1955, Fred Wendorf and Eric Reed published their "alternative reconstruction" of the prehistoric cultural sequence of the northern Rio Grande region of New Mexico (Wendorf and Reed 1955), based on negotiated alterations to Wendorf's (1954) earlier "reconstruction." They defined the region as bounded approximately by the New Mexico-Colorado border on the north, the Pueblo of Isleta on the south, the Canadian River on the east, and the drainages of the Rio Puerco of the East and the Rio Chama on the west. Regarding the region's prehistory, Wendorf and Reed (1955:133) state:

> Although the Spanish accounts indicated that this area was one of the major centers of Pueblo population in 1540, it seems clear that such conditions were a comparatively recent development in the prehistoric past. Archaeological surveys indicate that during much of the time that the great population and cultural centers of the San Juan and Little Colorado drainages were developing and reaching a climax, the northern Rio Grande was a peripheral area in both population and cultural development.

Their perception of the "peripheral" nature of the northern Rio Grande region, relative to the San Juan and Little Colorado regions, led Wendorf and Reed (1955:133–134; emphasis added) to the following conclusion:

> . . . many of the diagnostic criteria used in chronologically arranging the sites found farther west in New Mexico and Arizona appear late or not at all in the Rio Grande. It is apparent, therefore, that the existing conditions . . . generally employed to categorize the San Juan Anasazi remains in the Four Corners area **could be used in the northern Rio Grande only with considerable modification . . .**

This conclusion is echoed by Peckham, whose review of the history of Rio Grande archaeology and of differences between archaeology in the Rio Grande region and the Four Corners leads him to state:

> It was a matter of some controversy, and the problem was more than just terminological. The Pecos classification worked moderately well in the San Juan Basin of northwestern New Mexico where ruins were abundant and, with the notable exception of Chaco Canyon, fairly consistently reflected the scheme developed at Pecos. The Rio Grande region just didn't fit. No matter how hard Rio Grande archaeologists tried to adjust their interpretations to the Pecos classification, their field work suggested that prior to Pueblo IV evidence of cultural development was either missing, truncated, or inconsistent, **and only occasionally corresponded to that in the west.** (Peckham 1984:275–276; emphasis added)

Wetherington (1968:71; emphasis added) went a step farther in stating, bluntly,

> With the archeological revelation of a distinct Anasazi pattern of culture along the Rio Grande, as well as unique enclaves in more peripheral areas, the Pecos Classification has reached the limit of area-wide applicability and **its growing pains have become afflictions of senility.**

With this situation in mind, Wendorf and Reed (1955:134) proposed "a chronological framework designed specifically for the developments" in the prehistory of the northern Rio Grande. This framework is the core of their "alternative reconstruction." A review of recent synthetic and project-specific literature suggests that the Wendorf and Reed reconstruction has been dealt with in three ways. Some researchers have accepted the reconstruction, either as-is or with some modifications (see, for instance, Wetherington 1968; McNutt 1969; Skinner et al. 1980; Peckham 1984 [who calls it the Rio Grande Classification]; Cordell et al. 1994; Post 1996; Crown et al. 1996 [but only for the Pajarito Plateau]).

Others have rejected the Wendorf and Reed reconstruction. Some refer only to the Pecos Classification, with modifications to conform the periods to temporal data from the Rio Grande Valley (see, for instance, Ellis 1975; Cordell 1978, 1979; Fosberg 1979; Hunter-Anderson 1979a, 1979b; Cordell 1984; Franklin 1992). Cordell and Plog (1978) argue against using any "normative" classification. Later, Cordell (1989; Cordell and Gumerman 1989) proposes an entirely different framework based on a macroregional, pan-Southwest perspective. This framework has not gained acceptance in the region.

Finally, some researchers have attempted to correlate the Wendorf and Reed reconstruction with the Pecos Classification. In these attempts, the Wendorf and Reed reconstruction is usually identified by reference to the Pecos Classification rather than as a different temporal and developmental framework (see, for instance, Biella and Chapman 1977a, 1977b; Biella 1979; Quinn 1980; Stuart and Gauthier 1981; Anschuetz 1995; Anschuetz et al. 1997).

By implication, researchers who accept the Wendorf and Reed reconstruction appear to also accept the notion, posited by Wendorf and Reed, that developments in the northern Rio

Grande region were sufficiently different from those in the San Juan Basin and Four Corners regions to justify examining them within a different framework. In contrast, those who reject the Wendorf and Reed reconstruction, appear to reject the same notion. The later position suggests that developments in the northern Rio Grande region were sufficiently similar to those in regions to the west to warrant examining them all within the same framework. In this position, the Rio Grande is an Anasazi subregion and developments in the subregion are viewed in light of regional trends. The same position is taken by those researchers who correlate the Wendorf and Reed reconstruction with the Pecos Classification. In essence, these researchers also see the northern Rio Grande as an Anasazi subregion. They appear to be willing to accept some differences in subregional trends, as described by subregional frameworks such as the Wendorf and Reed reconstruction. At the same time, they attempt to correlate the trends, particularly their timing, with the Pecos Classification, which, by inference, describes and integrates developments across the entire region.

It is apparent, however, that the Wendorf and Reed reconstruction involves more than a chronological framework within which to describe local or regional trends. The patterns that Wendorf and Reed observed in the archaeological record reflect more than archaeological trends needed to merely define chronological sequences. They also reflect regional and intraregional trends in social relations, community structure, architectural structures and features, economy and subsistence strategies, artifact assemblage compositions, and material technologies. As such, the Wendorf and Reed reconstruction potentially provides the bases for testable models of northern New Mexican prehistory. However, the reconstruction, and particularly the archaeological patterns on which it is based, has not been well tested. None of the references cited above present a systematic examination of the observed patterns to determine their validity or assess their relationships to the reconstruction.

Instead, a review of the literature cited above suggests to us that disagreements about the applicability of the reconstruction are more often based on apparently conflicting paradigms. Within these paradigms, data gathered both before and since Wendorf and Reed presented their reconstruction are interpreted to represent different conclusions: "Archaeological knowledge of the past is totally dependent upon the meanings which archaeologists give to observations on the archaeological record" (Binford and Sabloff 1982:149). It seems apparent to us that modifying, rejecting, or ignoring the Wendorf and Reed reconstruction falls less on purposeful testing of the patterns on which the reconstruction was predicated than on perceived paradigmatic disagreements.

It is certainly true that archaeology as a field of scholarship has undergone significant paradigmatic changes since the mid 1950s. The most profound change was the rejection, beginning in the 1960s, of culture-historical studies in favor of explicitly theoretical and, often, nonhistorical interpretations of data. We see this as the root of the perceived paradigmatic conflicts, in that the Wendorf and Reed reconstruction is clearly culture-historical in nature, and invoking culture-historical causes for patterns in the archaeological record has been seen as nonexplanatory since the beginning of the theoretical "revolution" in the 1960s. In the northern Rio Grande region, research since the 1960s has most often been guided by culture-ecological and processual paradigms.

We would not pretend to denigrate the contributions made by research directed by these or other paradigms. However, we view in the more recent (post-1965) research, including our own (see, for instance, Boyer et al. 1994; contributions in Boyer and Urban 1995), a usually implicit, sometimes explicit accepting as-is or with modifications, rejecting, and even ignoring the Wendorf and Reed reconstruction (see the references cited above). At the same time we see a noticeable absence in the same research, including our own, of explicit testing of the patterns documented by Wendorf and Reed. We find this a confusing situation.

Those who accept the reconstruction as-is or with modifications, apparently do so as a viable (pre)historic sequence without considering the implications. Absorbing the interpretations of data and the culture-historical sequence based on one paradigm without explicitly testing the validity of the data or the relationships of the data to the original paradigmatic model is incoherent. Similarly, those who explicitly reject by ignoring or by correlating the reconstruction apparently do so on the basis of paradigmatic disagreement, also without explicitly testing the validity of the data or the relationships of the data to the original paradigmatic model.

This is certainly not to argue that other paradigms should be rejected in favor of a return to a strict cultural-historical research. We would argue, however, that:

- if the archaeological record as it was understood in 1955 was such that Wendorf and Reed saw the need to differentiate the northern Rio Grande region from the San Juan Basin and Four Corners regions, and

- if explicit testing of the archaeological patterns observed by Wendorf and Reed and fundamental to their reconstruction has not been performed, but

- additional data have been gathered in the 45 years since presentation of their reconstruction, then

responsible scholarship should include attempts to examine data gathered before and after publication of the reconstruction. Examination of these data should focus on determining:

- whether the data patterns observed by Wendorf and Reed are specific to and embedded in their culture-historical paradigm and cannot be verified with the addition of more recent data. If this is the case, then their reconstruction lacks validity, particularly in light of the paradigm within which it was defined because its historical-temporal bases would be invalid. Alternatively, examination of the data might reveal

- that the data patterns can be verified, independently of the paradigm within which they were first observed. If so, then they can profitably be interpreted within the frameworks of other paradigms. In this scenario, we are also concerned about whether the data patterns retain temporal patterning, as observed by Wendorf and Reed.

Toward that end, archaeological data recovery efforts at prehistoric sites in the Santa Fe to Pojoaque Corridor Project area are aimed at testing the Wendorf and Reed reconstruction by examining the accuracy of the data patterns that they observed. It is beyond the scope of any single project to definitively gather, analyze, and interpret all the data needed for an undertaking of this nature. However, data recovery at the prehistoric sites in the project area provides an opportunity, particularly when combined with the results of other nearby projects, to address the validity of the reconstruction.

We admit that this approach has a certain cultural-historical emphasis, in that we would seek to validate or refute the Wendorf and Reed reconstruction. Their reconstruction is, at its heart, the definition of regional chronological periods using patterns of artifact assemblages, architectural structures and construction, and site structure that were presumed to be normative to the periods they defined. As we noted earlier, however, we are not calling for a return to strictly culture-historical research, nor will the data recovery efforts in the Santa Fe to Pojoaque Corridor Project area focus on normative interpretations of data or data patterns. The point made by Binford and Sabloff (1982:147) is well taken:

> When doing culture-historical research, one normally needs only to recover a sufficient sample of artifacts to permit a "cultural" assessment of the remains. This means that no real understanding of internal differentiation or organizational variability among components of a single system will be revealed by carrying out normal, traditional archaeological work.

Rather, we are concerned with validating the data patterns observed by Wendorf and Reed in order to determine whether those patterns can profitably be used to examine questions other than regional chronology—questions of inter- and intra-regional social relationships, community formations and structures, architectural structures, economic strategies, ideological practices, ethnic identities, and other issues. Those issues can be addressed using a variety of paradigmatic and theoretical perspectives.

Examining the Archaic Components

James L. Moore and Jeffrey L. Boyer

Excavations at LA 111333 revealed the presence of several buried paleosols that were unsuspected from surface examination of the site (Moore 2003). The paleosols were associated with Archaic occupations that were separated from the later Classic period component at LA 111333 by strata of naturally deposited alluvium that represent considerable time depth, and that effectively seal the Archaic deposits. It is important to note that buried Archaic strata, often represented by charcoal-stained soil and hearths but lacking much in the way of associated artifact assemblages, seem to be fairly common in Santa Fe County. Indeed, as the descriptions of LA 89021 and LA 138960 show, the buried Archaic component at LA 111333 is not a unique occurrence in the project area, but may merely represent one of many ancient buried temporary campsites, suggesting that this part of the Tesuque Valley could have been a favored locale for repeated short-term occupation by Late Archaic peoples. But what is the Archaic, a time period or a type of adaptation to demographic and environmental conditions? This question is addressed in the next section.

The Nature of the Archaic

The term "Archaic" has been used in the Southwest to denote both a period of time and a stage of cultural development. Characteristics that are generally used to separate the Archaic from the later Pueblo occupations/periods include a high level of residential mobility, the use of the atlatl/dart weapons system, heavy reliance on hunting and gathering for subsistence needs, limited use of corn horticulture late in the period or adaptive stage, and absence of pottery. However, discoveries in the past 10 to 15 years have begun to blur the boundary between Archaic and Pueblo adaptations in some parts of the Southwest. The boundary between the Archaic and Paleoindian periods or adaptive systems had already begun to break down, with some researchers beginning to suggest that certain Paleoindian traditions represented more of a generalized hunter-gatherer adaptation than the more traditional big-game hunters.

The first evidence of a pre-Pueblo adaptation was recognized in the 1890s by Richard Wetherill, who coined the term "Basketmaker" for these predecessors of the pottery-making, village-dwelling farmers of the northern Southwest (Blackburn and Williamson 1997). The Basketmakers were also recognized as predecessors to the Pueblos at the first Pecos Conference in 1927. During that meeting a preliminary and, in many ways, arbitrary, temporal scheme was laid out for the Pueblo area. The Pecos Classification began with Basketmaker II, leaving space for a hypothetical Basketmaker I period. Though the latter term was never used, it was clear at the dawn of Southwestern archaeology that there had been nonpottery-making predecessors to the Pueblos.

Vierra (1994) presents an overview of the development of the Archaic concept in the Southwest, and we will not repeat that discussion here. Vierra (1994:17) also recognizes the difficulty involved in the dual use of the Archaic concept, with an implied conflict between those who use it in a culture-historical framework concerned with traditions and those who use a cultural-ecological approach that focuses on adaptation. In this study we opt for the latter concept. We define the Southwestern Archaic as an adaptation to local environmental and demographic conditions marked by a high degree of residential mobility, lack of permanent or semipermanent residential nodes, and dependence on hunting and gathering for subsistence needs. The use of pottery and specific weapon systems do not enter into the equation. Limited horticulture may have been used to supplement wild food resources, but domesticates did not represent a subsistence focus. This very specific definition is necessary because of what we have been learning concerning the Archaic over the last few decades.

Changing Views of the Archaic

The first detailed discussion of the Archaic occupation of northern New Mexico was presented by Irwin-Williams (1973), based on research conducted in the Arroyo Cuervo District in the north-central part of the state. Though considered preliminary at the time, Irwin-Williams (1973) presented a temporal scheme detailing changes in hunter-gatherer adaptations for that area that stretched from the end of the Paleoindian period to the beginnings of a settled farming lifestyle. Subsequent researchers have expanded Irwin-Williams's scheme, applying it rather indiscriminately throughout northern New Mexico and into southern Colorado and northeastern Arizona.

These applications seem primarily based on the presence of similar projectile point styles throughout this region, intimating that the use of similar points connotes some sort of cultural connection. Though the presence of similar styles of projectile points over a large region is certainly indicative of a widespread communication system, it does not necessarily mean that there was cultural continuity across the area. Indeed, similar projectile point styles were used across a region that extended from California to west Texas, and from the Great Plains to northern Mexico. From the linguistic and cultural diversity of the groups found in this region historically, there seems to be little chance that there was any sort of ethnic uniformity across the region at the time these point styles were in use.

A good example of problems inherent in equating similarities in projectile point styles with cultural uniformity can be seen on Cedar Mesa in southeast Utah. This is the area where the Basketmaker concept was developed by Richard Wetherill in the 1890s (Matson 1991:xi), and was later applied to similar finds throughout the northern Southwest. Matson (1991) evaluates several explanatory models for the Basketmaker II adaptation, and concludes that a population dependent on maize horticulture migrated from southeast Arizona to northeast Arizona about 1000 B.C. Though there are many material cultural similarities between this population and the contemporary inhabitants of southwest Colorado (including projectile points), there are also important differences, particularly in house styles and basketry manufacturing techniques. Thus, Matson (1991) concludes that different ethnic groups were present in these areas. A few similarities are not sufficient to equate ethnic identity between regions, especially when important and deep-rooted differences are also discernable.

Projectile points are simply not good cultural markers, and are only barely adequate temporal markers in a regional sense. For instance, contracting-stem dart points, which mostly date to the Middle Archaic (ca. 3800 to 1800 B.C.) in New Mexico, appeared later in the Great Basin and through time, spread from southeast to northwest across that region (Holmer 1986). In this instance we can see how a specific projectile point style may have originated in one area and spread through part of the communication system over time. This implies that dates for projectile points in one area can only be applied with great care to another, more distant region.

The same is true of the very concept of the Archaic. Simply because this type of adaptation existed between ca. 5500 and 400 B.C. in north-central New Mexico does not mean that it prevailed at the same time in all parts of the Southwest. A generalized hunter-gatherer focus almost certainly succeeded the Paleoindian big-game hunting–mixed foraging adaptation at an earlier time in some areas than in others. Similarly, the transition to sedentary farming began at widely varying times across the region. This is why it is important to use the concept of the Archaic in an adaptational rather than temporal sense, because the cultural, environmental, and demographic factors that resulted in major adaptational changes that eventually become visible in the archaeological record varied from area to area.

The Southwestern Archaic is considered to come to an end when sedentary farming villages began forming. This occurred at various times across the Southwest, and in a variety of ways. The earliest farming villages found to date are in southern Arizona. These villages date to at least 1000 B.C., and a settled lifestyle dependent on farming may have begun even earlier in that area, since canals that potentially date as early as 1200 B.C. have been found (Doyel and Fish 2000:7). Though Roth (1996:37) feels that the Late Archaic occupants of southern Arizona were not yet fully sedentary farmers, they were also no longer mobile hunter-gatherers. As discussed earlier, Matson (1991) feels that early farmers migrated from southern Arizona to northeastern Arizona, which would have effectively truncated the Archaic occupation of that region. It also suggests a greater time depth for settled farming villages in southern Arizona, which appears to be borne out by recent finds.

Complicating this picture is the possibility that early farmers actually migrated into southern Arizona rather than developing out of a Late Archaic base. Early proponents of this hypothesis are summarized in Haury (1976:352). Originally proposing that the Hohokam developed out of the Late Archaic population, Haury (1976:352) eventually joined the migrationists, proposing that the early Hohokam migrated into southern Arizona from Mexico by 300 B.C. Recently, combining paleolinguistic reconstruction with new archaeological data, Hill (2001) explains the northward spread of farming out of Mexico by proposing that it was carried by migrants belonging to the Proto-Uto-Aztecan language family, arriving in southern Arizona by perhaps as early as 1500 B.C. If this hypothesis is correct, then the movement of Uto-Aztecan speakers into northeastern Arizona was probably part of the same process. Archaeologists still tend to see the development of early farming villages as a lengthy in situ process, and Hill's (2001) discussion does not provide evidence for the replacement of the indigenous Archaic population by new peoples. Thus, there is no agreement as yet concerning who established the early farming villages in southern Arizona, though there is no question that they are present during what is still considered to be the Late Archaic period.

So, are these early farming villages Archaic because they lack pottery, or are they something else? By our definition, they would be the latter if a significant reliance on farming was demonstrated. Since canals were used to water fields at a very early date, this would seem to be the case. The transition to sedentary farming villages was under way and, though the population was probably still fairly mobile during certain seasons, it is difficult to consider their lifestyle part of an Archaic pattern. Logistically based seasonal mobility anchored to semi-permanent villages is suggested for the Mesilla phase (A.D. 200 to 500–1100) of the southern Jornada Mogollon (Hard 1983). A similar pattern of seasonal movement out of farming villages to logistical camps is suggested for the Late Archaic occupants of the Tucson Basin (Roth 1996). A major difference between these situations is the presence of pottery in Mesilla phase sites and its absence in the Late Archaic of the Tucson Basin. Though pottery has traditionally been associated with the development of a farming economy and the end of an Archaic life style, this association may no longer be tenable in parts of the Southwest. Preceramic farmers may have been proto-Hohokam, proto-Mogollon, or proto-Pueblo, but they were no longer Archaic hunter-gatherers.

Thus, farming villages either began developing in parts of the Southwest before pottery was introduced, or they represent migrants from the south who lacked pottery in their toolkits. In either case, heavy dependence on maize farming signified the end of the Archaic, either as the result of a significant decrease in residential mobility caused by the increasing importance of farming in the subsistence system, or because the hunter-gatherers were exterminated, forced out, or absorbed by newly arrived farmers. Though as yet unsubstantiated for southern Arizona, the migration hypothesis seems to be strongly supported for northeast Arizona and southeast Utah (Matson 1991).

So, what does this discussion mean to the northern Rio Grande? Hill (2001:929) proposes two explanations for the presence of farmers belonging to other language groups in the Southwest that have a history of farming nearly as long as that of the Uto-Aztecans in Arizona. The first is that those language groups may have originally been much more widespread, originating in Mesoamerica like the Proto-Uto-Aztecans. In this scenario, communities that might have provided direct evidence of links to Mesoamerica were eliminated in the sixteenth century during the immediate postcontact period. A second, and more likely possibility, is that one or all of the Tanoan, Keres, and Zuni languages represent the original Archaic inhabitants of the region. In this scenario, one or more of these groups adopted agriculture from the Uto-Aztecans and it subsequently spread throughout the region. In essence, the second scenario would have created a frontier situation in which the migrants arrived possessing farming techniques and, presumably, a social organizational system that allowed them to form small villages that were fairly cohesive and permanent in location, yet flexible enough to permit seasonal movement to logistical camps. The natives—in this case the indigenous Archaic population—had three basic choices in how they would deal with the presence of newcomers in their midst: they could drive them off, move away, or adapt to their presence. Considering the existence of three linguistic isolates in the Southwest in addition to the widespread Uto-Aztecan language family, the indigenous inhabitants would appear to have adapted to the newcomers by adopting farming technology, necessitating changes in their social organizational systems as well.

While this discussion may seem to be wandering away from the focus of this chapter, it is really setting up our next point. Similar questions have been posed for the northern Rio Grande. The northern Rio Grande is thought to have lacked a farming population until the Late Developmental period, ca. A.D. 850 or 900 (Post and Hannaford 2002). The rather sudden appearance of a full-blown farming adaptation at that time could be considered evidence for migration into the area, and the northern San Juan region is often considered the most likely source of that population. However, significant differences have been noted between contemporary settlements in the northern Rio Grande and San Juan regions. Others, most notably Wendorf and Reed (1955), have proposed an indigenous development of farming communities that does not rely on migration from the San Juan region. Which of these views is more likely?

We feel that the formation of farming communities in the northern Rio Grande was a local development rather than the result of migration from another region. However, whether this means that local hunter-gatherers began settling into farming villages or that their development represented a continuing northward movement of proto-Tanoan farmers that either forced the indigenous hunter-gatherers out of the region or absorbed them remains unclear. Thus, the Late Archaic occupation of the northern Rio Grande represents a critical yet poorly understood time period, as is the case with most of the rest of the Southwest. What is known is that hunter-gatherers occupied much of the northern Rio Grande until fairly late, a situation that Post (2002; following Matson 1991) refers to as the "latest Archaic." The Archaic lifestyle seems to have lasted into the A.D. 800s or 900s in our study area—much later than elsewhere in the northern Southwest. Indeed, there may be no Early Developmental period in the Tewa Basin because that area lacked a sedentary farming population before the beginning of the Late Developmental period.

For this reason, aceramic sites in the study area assume added importance if they represent late hunter-gatherer camps. The Early Developmental period may be the tail end of Archaic adaptations in the northern Rio Grande. Whether those late hunter-gatherers quickly adopted a sedentary farming lifestyle complete with pottery manufacture and deep, well-constructed pithouses in the A.D. 800s or 900s is questionable, though not outside the realm of possibility. What is more likely is that they were absorbed by farmers moving into the area, and that those farmers were their cultural and linguistic cousins. We may never be able to absolutely resolve which (if either) of these possibilities is correct, but we may be able to establish some continuity or lack of continuity between the Late Archaic and early farming populations.

Archaic Site Types

Boiled down to basics, there are three types of Archaic sites: collapsed surface artifact scatters, stratified rockshelters, and buried cultural zones. The first type tends to be the most common, and can range in size from a few artifacts with or without an associated feature to scatters of artifacts and deflated features covering hectares. The small end of the scale usually represents single short-term occupational episodes, while sites at the other end are probably evidence for repeated uses of favored locales over time, compressed by deflation and mixed into palimpsests that may be impossible to decipher. The other types are much rarer, and are often found accidentally or only under the most fortuitous of circumstances. Occupied rockshelters only occur under certain geological conditions—rock escarpments are necessary, and the rock must be of a type that will form stable overhangs when eroded. Since useable space in a rockshelter is dictated by the extent and form of the overhang, sequential occupations in this type of site tend to be on top of one another. While the level of preservation in rockshelters is often quite good, and this type of site can yield a wide range of tools and subsistence-related materials that are rarely recovered from open-air locales, there is often a great deal of mixing that makes it difficult to sort out what materials belonged to which occupation. This can create a situation similar to that found in compressed Archaic sites in which connections are difficult to make between specific features and artifacts.

Buried cultural zones are the third general type of Archaic site found in the northern

Southwest. While this type is rarer than compressed surface scatters, they are somewhat more common than rockshelters. Unfortunately, discovery of this site category is often fortuitous—a dark stratum is noted in an erosional channel or cutbank, subtle stains are found on the ground surface, or buried deposits are encountered beneath a later component that occurs near the surface. Archaic sites comprised of buried cultural zones are important to archaeological interpretation because they often represent discrete occupational episodes rather than a mixture of materials deposited during several different uses of the same locale. When a series of buried cultural zones occur in a small area we may be able to study patterns of land use through time, looking for changes that occurred in response to variation in climatic and demographic patterns.

Late Archaic Sites

Post and Hannaford (2002) discuss in detail the Archaic occupation of the Santa Fe area, which we summarize here. Late Archaic sites dating between ca. 1800 and 1 B.C. are common on the Santa Fe piedmont, but no good evidence for farming has been found in that area before A.D. 850–900. A fair amount of evidence has been recovered concerning the Archaic occupation of the Santa Fe area between ca. 1800 and 800 B.C. Several sites excavated along the Santa Fe River have yielded the remains of houses, thermal features, and toolkits reflecting dependence on hunting and gathering (Dilley et al. 1998; Lakatos et al. 2001; Post 1996, 2002; Schmader 1994). Examination of these sites suggested that populations regularly moved in and out of the Santa Fe area during the second millennium B.C., with site clusters near water sources as well as near the juniper and grass plains and at the edge of the higher elevation piedmont (Post and Hannaford 2002:11).

Late Archaic sites containing structural remains probably represent residential camps that reflect a generalized hunting-gathering adaptation, and often seem to be cold-season camps that were occupied for extended periods of time near juniper-piñon woodlands (Post and Hannaford 2002:12).

The later part of the Late Archaic (800–1 B.C.) is more poorly represented by excavated houses, thermal features, and diverse artifact assemblages. Two examples of residential camps cited by Post and Hannaford (2002:12) are considerably less substantial than those that date between 1800 and 800 B.C. This suggests that the Santa Fe area may have been used differently in the later part of the Late Archaic:

> . . . residential mobility may have increased during the late stages of the Late Archaic, perhaps in response to less predictable climate and resource availability and abundance. A change in seasonal mobility or territorial extent may partly explain the low frequency of Late Archaic sites between 800 B.C. and 1 A.D. It is also possible that there was a shift in settlement locations within the Santa Fe area that has not been detected by archaeological investigations. (Post and Hannaford 2002:12)

Thus, there may have been considerable variation in the way Late Archaic peoples used the Santa Fe area between the first and second halves of that long, poorly understood period. This variation might also be expected to occur in our study area in the southern Tewa Basin, which is adjacent to the region discussed by Post and Hannaford (2002).

The period between A.D. 1 and 850 or 900 has been referred to as “the latest Archaic” (Matson 1991; Post and Hannaford 2002:12). The transition from hunting and gathering to farming is usually thought to have occurred during this period, but is poorly known for the

Santa Fe area. Post and Hannaford (2002:12) feel that the scarcity of evidence for this transition suggests that farming did not begin until A.D. 850 or 900 in the Santa Fe area. This may have been partly due to climatic conditions, which were not conducive to farming in the area before A.D. 800 (Post and Hannaford 2002:19).

If this argument is correct, Early Developmental period use of the Santa Fe area and Tewa Basin should be represented by temporary camps occupied by hunter-gatherers rather than farming settlements. But were those hunter-gatherers an indigenous population that had not yet adopted farming, or were they Early Developmental farmers that simply used this region seasonally for hunting and gathering? Fortunately, each of these possibilities would result in different land-use patterns that might be distinguishable if enough sites from the proper time period were studied: Pueblos using the region seasonally for hunting and gathering would not be expected to establish cold-season camps because they should have returned to their main residences for that season. The occurrence of aceramic cold-season camps in the northern Rio Grande would suggest the continued presence of a nonfarming Archaic population.

Though only a few Archaic sites have been excavated in the Tewa Basin to date, they augment information from the Santa Fe area. Lent (1991) excavated LA 51912, a Late Archaic site near San Ildefonso Pueblo that contained a pit structure and two extramural activity areas. Radiocarbon dates for LA 51912 suggested an occupation between 540 ± 70 B.C. and A.D. 110 ± 70 (Lent 1991:i). This site appears to represent a single occupational episode, and was probably used during the cold season, though perhaps not during the coldest months of the year (Lent 1991:64–65). No evidence of domesticated plant use was recovered, though it should be noted that preservation was generally poor.

Moore (2001) excavated LA 65006, a stratified Archaic site near San Ildefonso Pueblo that contained several buried cultural strata reflecting at least three occupations that were fairly widely separated in time. The earliest occupation was the most extensive, and dated between ca. 1429 and 1053 B.C. During this occupation, LA 65006 served as a workshop where large general purpose bifaces were manufactured in anticipation of future need. Though areally extensive, this occupation appears to have been of short duration and by a single band. Extensive deposition around hearths of debris from tool manufacturing activities led to the sequential formation of multiple activity areas. Floral remains indicate that this occupation occurred in the fall.

The second occupation of LA 65006 was between ca. 1150 and 800 B.C. No dates were obtained for the third component, but it was the latest evidence of Archaic use. The manufacture of large general purpose bifaces was an important task in these later occupations, but the remains left by these uses of the site were not as extensive as those of the first component. The second occupation was also during the fall, but no evidence for season of occupation was available for the third component. Components 2 and 3 represent a different type of occupation for this site. Hearths were larger than they were in the first occupation, suggesting more intensive use. Large amorphous charcoal stains were encountered in Components 2 and 3 that either represented formal middens or badly deteriorated structures, with the latter being more likely. In either case, a longer occupational duration is inferred.

In contrast to Late Archaic sites from the Santa Fe area, some evidence of corn was recovered from LA 65006, but is difficult to interpret. The only corn macrofossils came from a Classic period Pueblo hearth on the surface of the site that penetrated down into the top of deposits associated with the latest Archaic occupation. Two corn pollen grains were recovered from soil strata associated with the earliest occupational zone, but no comparable corn macrofossils were found in that component. One corn pollen grain came from stream-laid sediments that truncated Component 1, and the second came from adjacent cultural deposits. Was the corn pollen grain in the stream deposits intrusive from the adjacent cultural stratum or vice-versa? Were both corn pollen grains intrusive from the Classic period feature? Neither of these questions could be answered with any certainty, and in the absence of corn macrofossils, we were forced to conclude that they were probably not associated with the Late Archaic occupation.

A site excavated by Skinner et al. (1980) near Nambé Falls is an excellent local example of a latest Archaic occupation. Site X29SF2 contained a large ephemeral pit structure with numerous internal features that was radiocarbon dated A.D. 400 ± 60 and A.D. 610 ± 80. An earlier radiocarbon date was also derived for this structure, but is probably anomalous. Considering the potential for old wood dates from simple charcoal samples (Smiley 1985), this structure may even date a few hundred years later. Small corner-notched arrow points were recovered from X29SF2, and corn was the most common carbonized plant remain. The radiocarbon dates and projectile points from this site easily fit expectations for an Early Developmental period occupation, but X29SF2 was aceramic and the pit structure was Archaic in form and construction techniques. Indeed, the pit structure at X29SF2 was very similar to Archaic pit structures excavated in the Tierra Contenta subdivision of Santa Fe (Schmader 1994). Also found at Tierra Contenta were two aceramic sites with pit structures that closely resembled those of the Archaic, but dated to the late 800s and contained no evidence for the use of corn (Schmader 1994).

Perhaps the first find of an Archaic site in the Tesuque Valley was made by Miller and Wendorf (1958) at the north edge of the Rio Tesuque very near LA 111333. LA 3297 occurred as a gray-stained horizon containing two probable hearths (Miller and Wendorf 1958:186). An uncorrected radiocarbon date of 275 ± 250 B.C. in addition to an En Medio point fragment indicate that these deposits date to the Late Archaic period.

Though only a few Archaic sites have been excavated in the Tewa Basin, survey results suggest that sites representing this long temporal or adaptational period are common in the region. Post (2001) conducted a sample survey in the southwest Tewa Basin, examining 1,700 acres in 16 parcels. This study recorded 115 sites, 64 of which contain Archaic components. Although temporally diagnostic artifacts were rare, making it difficult to assign dates to most sites, buried cultural deposits were noted in 39 Archaic components. This suggests that buried Archaic deposits may be much more common than is usually thought. Survey and testing along NM 502 in Los Alamos Canyon at the west edge of the Tewa Basin documented six or seven Archaic site components and five quarries that were probably used during several time periods, including the Archaic (Moore 1993; Moore and Levine 1987). One of the sites in this sample was subsequently excavated, and has already been discussed (LA 65006).

Finally, survey along U.S. 84/285 near the Tesuque Y recorded sites with characteristics that are remarkably similar to LA 3297 and LA 111333. Hohmann et al. (1998) recorded three sites in this area (LA 108379, LA 111334, and LA 111348). As discussed in Chapter 2, Lakatos (2000a) collapsed LA 108379 and LA 111348 into LA 89021, a site that was previously recorded in that location; LA 111334 was found to have been originally recorded as LA 6562. Thus, we return to the original site designations in this discussion. During the reexamination of LA 6562, site boundaries were expanded to include several thermal features exposed in the east edge of the U.S. 84/285 road cut. Though defined as a Late Developmental period Pueblo site during survey (Hohmann et al. 1998), the additional buried thermal features could be indicative of an underlying Archaic horizon at LA 6562. A similar situation pertains at LA 89021 and LA 138960—surface remains are indicative of a Pueblo occupation, but a deeply buried charcoal horizon noted in arroyo cuts may represent underlying Archaic remains.

Research Orientation for the Archaic Components

The preceding discussion suggests several research issues that might be addressed with data from LA 84927, LA 89021, and LA 138960 at both regional and site-specific levels. In addition to having the potential to answer some questions about specific time periods or occupational types, excavation data can also help to refine research concerns for future studies.

Archaic Research Issue 1: What date(s) can be assigned to the Archaic remains at the three sites?

Temporal information is critical to understanding where LA 84927, LA 89021, and LA 138960 fit in the occupational sequence of the Tewa Basin, how they relate to other sites in the area, and what the different occupational areas represent. Because of the similarity of deposits at LA 84927, LA 89021, and LA 138960 to those described for the nearby LA 3297 and LA 111333 and the depth at which they occur at the sites, we assume that the three sites were occupied during the Late Archaic period. However, different periods of use could be represented.

Accurate dating of Archaic components at LA 84927, LA 89021, and LA 138960 is one of the basic building blocks of this study. In order to more fully address the other research issues developed in this section, we will need to obtain multiple dates from different contexts. Experience gained at LA 65006 near San Ildefonso Pueblo suggests that radiocarbon samples comprised of scattered charcoal fragments collected from throughout a cultural stratum are often inaccurate (Moore 2001). Thus, as we did at LA 111333, we will target features for radiocarbon sampling, unless large fragments of charcoal representing single pieces of wood are available. Multiple samples will be obtained from each possible occupational area, if available. Considering Smiley's (1985) assessment of radiocarbon sample precision and accuracy, we will target carbonized remains of annuals or the outer layers of construction elements, should these types of samples be available. Charcoal from fuel wood will also be collected for analysis, especially from features. However, we realize that this type of sample often represents a period of decades, sometimes centuries, of wood growth. As a last resort, we will collect bulk soil samples containing powdered charcoal from features and paleosols if no better materials are available for sampling.

Archaeomagnetic samples, if available, will also be obtained. While we do not expect to be able to date features at the three sites using archaeomagnetic samples, they will help expand the current data base and may be comparable to the small array of samples already obtained from other Archaic sites. Artifacts with temporally defined stylistic variation may also help provide dates, though it is more likely that dates currently assigned to specific artifact styles will be evaluated and refined in light of radiocarbon dates.

Given the results of data recovery at LA 111333 (Moore 2003), we expect that various occupational areas might be defined during data recovery at LA 84927, LA 89021, and LA 138960 that will yield somewhat different dates falling within a general cultural period. We will assess the relationships between multiple radiocarbon dates from different parts of the sites to evaluate the possibility that feature and artifact clusters represent discrete occupational episodes and determine the likelihood that one or more populations are represented.

Archaic Research Issue 2: What part(s) of an Archaic settlement system is represented by the *remains at LA 84927, LA 89021, and LA 138960?*

Considering the types of Archaic remains found by excavation in the Santa Fe and Tewa Basin areas, a range of possibilities exists for what will be uncovered at the three sites. Hunter-gatherers use different site types and occupational strategies to exploit the landscape encompassed by the territory through which they range. Two basic hunter-gatherer subsistence strategies have been identified, and each probably used somewhat different types of sites. Binford (1980) defines two basic hunter-gatherer organizational systems—one in which consumers move to resources (foragers), and a second in which resources are moved to consumers (collectors). Data presented by Irwin-Williams (1973) suggests that Early Archaic hunter-gatherers were foragers, with the transition to a collector-organized system beginning during the Middle Archaic and dominating by the Late Archaic. However, neither this sequence nor a division into foragers and collectors is necessarily clear-cut. For example, Vierra (1990:63) feels that Southwestern Archaic hunter-gatherers "may have implemented a foraging strategy from spring to fall, and a collector organized strategy during the winter. That is, groups were residentially mobile from spring to fall, mapping onto exploitable resources; while during the winter they utilized stored foods, making logistical trips to food caches and for hunting."

With this in mind, it is possible that there was a seasonal fluctuation between foraging and collecting, even during the Late Archaic. The structure of an Archaic site, the range of artifacts found there, and the activities reflected by the assemblage can provide information on the type of use pattern represented. If sufficient data are available we may be able to distinguish between forager and collector functions for various occupational areas at LA 84927, LA 89021, and LA 138960.

Site types can be broken down into two basic categories, though there may be considerable variety within each category. Residential sites (base camps) tend to be the most common type of Archaic site found, and represent locales where a band lived for a period of time ranging from a single night to a season. Resource extractive locales are places where materials were gathered for transport to a base camp. Since most activities that extract resources from the environment leave few material remains behind, most resource extractive locales are archaeologically invisible. Exceptions to this include quarries, where debris was generated during the extractive process. Locations where floral or faunal foods were collected may only be marked by a low density scatter of chipped stone artifacts accumulating over a long period as the area was periodically harvested.

Fuller (1989:18) feels that field camps comprise a third type of site used by hunter-gatherers. Field camps are essentially short-term residential locales used by task-specific groups while collecting resources that will be returned to the base camp for storage. Resources are sometimes cached at field camps for later recovery and movement to the base camp. This type of site may be very difficult or impossible to distinguish from short-term base camps used by foragers.

In general, foragers inhabit base camps for a short period, ranging out from them to exploit resources on an encounter basis. Collectors inhabit base camps for longer periods, exploiting surrounding resources through day trips and sometimes through the use of short-term field camps. Collectors use storage features to cache resources at their base camp in preparation for seasons of limited food availability, a strategy that is not employed by foragers (who simply move on). Thus, small Archaic sites containing few or no thermal features, no evidence of structural remains, and a small array of chipped and/or ground stone artifacts may be indicative of a foraging focus. More extensive sites containing an array of thermal and storage features, small temporary structures, and a comparatively large amount of debris may be indicative of a collector strategy.

There are exceptions to these very general expectations. The earliest component at LA 65006 near San Ildefonso Pueblo fits several of the characteristics for a collector camp, but lacked some of the more critical criteria (Moore 2001). Although that site contained multiple thermal features and thousands of artifacts, there was no evidence of a structure or storage features, and our analysis suggested a short-term, special-purpose use. In some ways this component was logistical in nature, with obsidian obtained in the Jemez Mountains being processed into large bifaces for ease of transport. However, in other ways it was a simple foraging camp, with evidence of some local hunting and gathering but no storage of resources. Thus, each component at a site must be carefully evaluated to determine how it fits the model, remembering that there were no strict rules concerning how a camp should look and what activities could be performed there.

Three theoretical forager and collector site types were identified above—residential base camps, field camps, and resource extractive locales. The last of these is presumed to be archaeologically invisible except under certain rare circumstances. A foraging residential base camp should reflect a wide range of maintenance, production, and food-processing activities without a heavy investment in habitation or storage features. Structural remains, if present, should be ephemeral and indicative of short-term use. Collector residential base camps, on the other hand, should not only contain evidence of a wide range of activities, they should also demonstrate a corresponding investment in habitation and storage structures, indicative of a comparatively lengthy occupation. Field camps associated with a collector adaptation should reflect temporary occupancy by a small group engaged in specialized activities. Therefore, a few specialized activities should be represented, storage features should be absent (unless the site was used as a cache), and structures (if present) should be ephemeral.

A potential problem in applying this model involves separating foraging camps occupied for short periods from field camps used by collectors. Both should exhibit evidence of short-term occupation; the range of activities visible in the artifact assemblage might be quite limited for both. In many cases, these types of sites may be indistinguishable. The problem can be dealt with through analysis of the chipped stone assemblage.

The manufacture of general purpose bifaces reflects a mobile lifestyle, and more commonly occurs at residential base camps than at field camps or resource-extractive locales. Kelly (1988:731) defines three types of bifaces: (1) those used as cores as well as tools; (2) long use-life tools that can be resharpened; and (3) tools with specific shapes and functions. Each type of biface may be curated, but for different reasons and in different ways. Use of bifaces as cores is conditioned by the type and distribution of raw materials. When suitable raw materials are abundant and tools are used in the same location as the raw materials they are made from were procured, an expedient flake technology can be expected, with little use of bifaces as cores (Kelly 1988:719). When local raw materials are scarce or of poor quality, bifaces can help overcome the difficulties involved in using materials that are obtained at a distance from the location in which they are used (Kelly 1988:719). When raw material scarcity is extreme, mobility is low, or a specific bifacial tool is required for activities performed away from the residential base camp, there may be some use of bifaces as cores as well as extensive rejuvenation of bifacial tools (Kelly 1988:720).

Bifaces with long use lives may be manufactured under a variety of conditions, "[i]n particular, tools designed for use on long search-and-encounter (as opposed to target specific) logistical forays will be under greater pressure to be designed to meet a variety of needs and tasks (e.g., cutting or scraping tools) and thus will need to be bifacial. This requirement can be relaxed for the equipment of target-specific forays" (Kelly 1988:721). Bifaces may also be manufactured as by-products of the shaping process, and illustrate the importance of the haft to which the tool was attached (Kelly 1988:721). This type of biface might be more frequently maintained or replaced at residential rather than logistical sites (Kelly 1988:721).

Using these concepts, Kelly developed a model to aid in distinguishing between residential and logistical or field camp sites. The model has not been rigorously tested, but it does provide a series of predictions that can be applied to a chipped stone artifact assemblage. When combined with other data sets such as feature type and placement, the number and diversity of activities represented, and the types of resources being exploited, the applicability of the model to a site can be assessed. For example, if residential features are present but chipped stone analysis suggests that the site served as a logistical site or field camp, the model may be incorrect. However, if the residential pattern predicted by both Kelly's model and site structure are in agreement, the model may be tentatively accepted as valid.

The subsurface ash- and charcoal-staining and potential presence of features at LA 84927, LA 89021, and LA 138960 suggest that these locales may have primarily served as residential base camps. The probable Late Archaic date for these deposits suggests that a collector subsistence strategy should be found if Irwin-Williams's (1973) reconstruction is correct. However, if Vierra's (1990) evaluation of the Late Archaic is more accurate, the type of strategy identified will be dependent on the season of occupation. As with our work at LA 111333, evaluation of deposits, features, and artifacts from LA 84927, LA 89021, and LA 138960 will focus on determining how various parts of the sites functioned in a Late Archaic settlement system.

If the sites or portions of the sites represent a foraging focus, we would expect to find evidence for warm-season use. This may include ephemeral shelters lacking internal heating features. There will be no evidence of storage features, and a wide range of activities should be reflected in fairly small artifact assemblages. The types of floral and faunal materials recovered should also reflect warm-season use. If storage features are present and a limited range of activities is represented in the artifact assemblages, we will consider the possibility that field camps associated with a collecting strategy are represented. As this discussion suggests, a wide range of data will be needed to address this research issue. Information on how structures and features were built and interrelated will be needed, as will detailed data on artifact type and function, and the types of foods that were consumed.

Archaic Research Issue 3: What can the spatial organization of LA 84927, LA 89021, and LA 138960 tell us about how these locations were used through time?

Three areas containing ash- and charcoal-stained cultural deposits, features, and artifacts were identified at LA 111333 (Moore 2003). Each area appears to represent an occupational locale, but whether these locales were all used at once or represent repeated visits to the same general area is uncertain. The former possibility could represent a large macroband base camp, while the latter would reflect a sporadic use of the same general area over time by one or more groups. Since only fairly small Archaic base camps have been identified by excavation in the Santa Fe area and Tewa Basin to date, the latter pattern is expected. Indeed, large Archaic macroband camps could be an artificial construct of the archaeological record and may not have occurred at all. This is due to the way in which locations were repeatedly occupied. We anticipate similar distributions of features, deposits, and artifacts at LA 84927, LA 89021, and LA 138960, given their proximity to LA 111333 and the similarities of deposits at the sites.

Vierra (1985) has examined the process of site reoccupation using ethnographic and archaeological data. In summary, several factors appear to affect the decision to reoccupy previously used sites. Sites might be reused if the selection of suitable alternate locations is limited: "Certain site functions demand much more specific requirements. The more specific the requirements are, and the more limited the number of locations which meet those requirements, the more frequently these advantageous positions will be reused" (Vierra 1985:64).

In general, logistical sites tend to be reoccupied more often than residential locations, especially when hunting is dependent on the planned intercept of game rather than unplanned or unanticipated encounters (Vierra 1985:64). Locational requirements for residential sites are often more flexible, resulting in less need to reoccupy the same spot (Vierra 1985:65). There were also two very good reasons for not reoccupying old residential locations: hygiene and health, and resource depletion (Vierra 1985). Old camps contain unsanitary debris and garbage that can cause infection and sickness as well as parasitic infestation. The zones around them have also been depleted of useable resources, and may require several years to recover sufficiently to allow successful exploitation to again occur. When the same area is reused, new camps tend to be located near, even adjacent to, rather than on top of old camps (Vierra 1985:65).

This pattern is replicated archaeologically. Vierra (1985:183–184) found that multicomponent sites containing Archaic and Pueblo materials in the San Juan Basin did not represent a blending of materials, as might be expected when specific areas were reoccupied. Rather, later occupations were structurally distinct, and appear to represent use of adjacent areas. Camilli (1989) found evidence of similar site reoccupation patterns on Cedar Mesa in southeast Utah. While smaller sites appear to represent single-use locales, larger sites contain evidence of overlapping occupations. Eschman (1983) studied site structure at LA 19374 in the San Juan Basin, and concluded that, "The overall extent of these cultural deposits . . . appears to be the result of multiple, overlapping occupations over a considerable time period" (Eschman 1983:379). Thus, when camps were reused, the exact locations were rarely reoccupied. New camps were instead placed in adjacent areas, at times overlapping earlier deposits. This produced sites of large areal extent with artifact densities similar to those of single occupation sites.

In the cases cited above, Archaic strata were mostly deflated and compressed, forming areally extensive but thin deposits. At LA 111333 we found a different situation—deposits that are buried and uncompressed, providing us with a clearer picture of how a specific area was reused through time. If our assessments of LA 84927, LA 89021, and LA 138960 are correct, we would expect potential occupational zones to reflect similar types of use, provided those occupations occurred during the same general season. There should be little or no overlap between occupational areas, and there should be redundancy in the types of structures, features, and activities represented.

If these expectations are not upheld, we must consider alternate interpretations. Variation in the type of remains occurring in each potential occupational zone could indicate that repeated uses of the same general area occurred during different seasons and do not represent the same site function. If different site functions are suggested for locales that reflect the same season of use, a basic forager pattern might be represented in which site use and longevity were dependent on the array of resources available in a particular year.

Locational information and data on artifact type and distribution will be needed to address this research issue. By imposing a system of grid units over the sites we will be able to control for location and artifact distribution, providing data amenable to a variety of analytical methods. Analysis of all recovered artifacts will provide information on the types of activities they represent, which can be combined with the distributional analysis. In addition to these data needs, information on seasonality (discussed later) and dating (discussed earlier) may be critical.

Archaic Research Issue 4: Do economic data from LA 84927, LA 89021, and LA 138960 reflect a similar Archaic subsistence orientation to that of the Santa Fe area?

Excavated Late and latest Archaic sites in the Santa Fe area demonstrate a reliance on wild floral and faunal foods. This subsistence pattern may not be replicated in the Tewa Basin. The few corn pollen grains recovered from LA 65006 near San Ildefonso Pueblo were of questionable origin, but the possibility that they indicate Late Archaic use of corn in the Tewa Basin cannot be ruled out from these data, just as it cannot be confirmed. There is a much clearer picture at X29SF2 near Nambé Falls, where numerous corn macrofossils were recovered in a latest Archaic context. Corn seems to have been part of the subsistence system in the Tewa Basin before it was used in the Santa Fe area, but the time depth of that differentiation is unclear.

Though corn was probably part of the latest Archaic (ca. A.D. 1 to 850 or 900) subsistence system in the Tewa Basin, this cannot yet be confirmed for the Late Archaic (ca. 1800 to 1 B.C.), based on current data. Since the buried occupational zones at LA 84927, LA 89021, and LA 138960 probably date to the Late Archaic, based on results from LA 111333, determining whether corn was an integral part of the subsistence system at that time is of critical importance. The absence of corn in a Late Archaic cold-season camp would indicate a close resemblance to the generalized foraging pattern visible in Late Archaic sites of the Santa Fe area. If corn macrofossils are found, however, this would represent a major departure from the Santa Fe pattern, and could indicate different subsistence opportunities, perhaps resulting from variation in climatic patterns allowing corn horticulture in the Tewa Basin, but not in the Santa Fe area.

Corn macrofossils are needed to confirm the use of corn in this area; the presence of corn pollen would not be as conclusive. This is because each of the three sites have later prehistoric Puebloan components and LA 138960, like LA 111333, may have been used for farming during the Classic period, an assumption that is addressed in a later section of this chapter. If corn was grown near the modern ground surface during the Classic period, pollen grains could have penetrated deeply into underlying sediments through bioturbation, potentially contaminating those deposits. Thus, unless an extremely high concentration of corn pollen is recovered from a context where contamination from later occupations would be unlikely, the presence of a few corn pollen grains would not be used to press the argument that corn was part of the Late Archaic subsistence system unless corn macrofossils were also recovered. Contexts from which corn pollen might be obtained and not considered evidence of contamination includes pollen washes from ground stone artifacts found cached upside down, sealed or trash-filled storage features, or deeply buried paleosols.

We expect to recover information suggesting a generalized hunting-gathering subsistence system involving the consumption of locally available wild plant and animal foods. In addition, we feel it is likely that these subsistence items were supplemented by limited corn horticulture. Thus, the expected pattern would be similar to that of the Basketmaker II adaptation in the San Juan Basin. Most of the food consumed at LA 84927, LA 89021, and LA 138960 should represent foraging and hunting activities, with corn providing a predictable and storable resource that would have allowed longer stays in cold-season camps, requiring less movement around the landscape during that period of potential food shortages.

Subsistence data will be obtained from three sources. Faunal remains will hopefully provide information on the types of animals that were exploited for subsistence needs.

Macrofloral materials should be recoverable using flotation analysis, and all contexts that appear able to provide this type of information will be sampled. Finally, pollen analysis may provide a more limited view of the subsistence system. In particular, pollen washes from ground stone artifacts may provide subsistence data that will augment information provided by flotation analysis.

Archaic Research Issue 5: During what time(s) of the year were LA 84927, LA 89021, and LA 138960 used by Archaic people?

As most of the other research issues discussed thus far should have made clear, determining the season of occupation represented by the Late Archaic remains at LA 84927, LA 89021, and LA 138960 is of critical importance to this study. Because the sites are similar to probable cold-season camps in the Santa Fe area in location, amount of charcoal present, and extent of cultural deposits, we assume that these sites also represent cold-season occupations. This possibility should be testable with information recovered by excavation at the sites.

If the three sites were occupied during cold seasons, one or more definable structures should be present. Because we will only be able to examine portions of the sites within the U.S. 84/285 project limits, the absence of structures within project limits will not necessarily mean that none were present at the sites. Structures could occur in sections of the sites outside project limits, and we may only encounter materials representing associated activity areas or rubbish disposal. If structures occur, they will probably be ephemeral and difficult to define because they should have been built in shallow pits without formal floor or walls. One or more thermal features should occur within each structure, there may be evidence of post holes for interior roof supports, and interior storage pits may be present. The occurrence of structures that lack internal thermal features and storage pits may be evidence for occupation during the warm season, and are not expected to occur.

Information on the season of occupation may also be obtained through study of macrofloral remains recovered from flotation samples. If a cold-season occupation is indicated, evidence for the processing of plant foods available in late summer or fall is expected. Plant foods available in the spring or early summer are not expected, unless there is evidence that they were stored in anticipation of future need. In particular, we expect corn macrofossils to occur, providing that this domesticate was available for use by site occupants.

Some evidence for seasonality may also be available from faunal remains, provided enough identifiable bone is obtained to allow analysis of subsistence patterns. If a cold-season occupation is reflected, we would expect evidence of 6-month-old artiodactyls, an absence of hibernating species like prairie dogs, and perhaps the presence of bird species that winter in the area. However, Archaic sites rarely yield well-preserved faunal remains, and the bone recovered from this type of site is usually either burned or very small unidentifiable fragments. Thus, faunal analysis may augment information available from structural remains and macrofloral fossils, but by itself is unlikely to provide data that are strongly indicative of seasonality.

In order to adequately assess occupational seasonality we must also recover information on structure and feature type and interrelationship as well as macrofloral materials.

Archaic Research Issue 6: What is the potential significance of a cluster of Late Archaic sites?

This question is closely tied to Research Issue 3, but expands that inquiry beyond any single site. A cluster of Late Archaic sites implying repeated occupations of a specific area over time suggests that some aspect of that location kept drawing people back. We are able to establish a relative degree of contemporaneity between LA 3297 (Miller and Wendorf 1958) and LA 111333 (Moore 2003), using both chronometric and geomorphological data. Preliminary examination of subsurface geomorphology at LA 89021 and LA 138960 suggests that the same paleosol features are present at those sites as were present at LA 3297 and LA 111333. In turn, we suspect that Archaic deposits associated with those paleosols at LA 89021 and LA 138960 (and probably at LA 84927) are approximately contemporaneous with those at LA 3297 and LA 111333.

If, as we suspect, LA 84927, LA 89021, and LA 138960 contain several small cold-season base camps dating to the Late Archaic period, some factor must have been drawing people back to that location. One way in which to explore this possibility is to examine subsistence-related remains from each site in order to look for a common factor. The presence of corn macrofossils in all three sites could be indicative of a favorable climatic regime in the area for farming. In this case, corn plots may have been planted nearby and left with little or no tending until harvest, at which time the people who had planted the corn returned, gathered their harvest, and stored it. This may have supplemented other food resources available in the area, allowing site occupants to remain in one place for an extended period of time during a season of food shortages. If this is the case, corn would be represented by husk and stalk fragments in addition to cobs, kernels, and cupules.

In the absence of corn, other plant foods may have provided a surplus that would permit a relatively long-term and repeated occupation of one locale. Piñon nuts are one such resource, and a heavy presence of shells or whole nuts might be indicative of this type of focus. Other factors may also have been at work. Perhaps the Rio Tesuque provided a dependable supply of water and foods available only in a riparian environment. Unfortunately, at this time we have no good idea what factor(s) might have led to repeated occupation of this area by Archaic populations. Hopefully, data recovered from LA 84927, LA 89021, and LA 138960, combined with those obtained from LA 111333, will provide clues concerning the advantage conveyed by this occupational pattern.

This research issue will be addressed with data similar to those used in other inquiries discussed above. Indeed, this research issue is closely linked to most of those other inquiries. Analysis of site structure should help determine the pattern of occupation represented by the Archaic remains at the sites. If a pattern of repeated cold-season base camp occupation is demonstrated, subsistence information will be examined to determine whether it can shed light on why this locale was repeatedly occupied. Environmental data (including a reconstruction of the local environment derived from analysis of geomorphology and pollen samples) will be used to augment and amplify these data.

Archaic Research Issue 7: Can the Late Archaic occupants of the northern Rio Grande be linked to the region's later Pueblo population?

This research issue may be the most difficult to address, but it links the study of this site to the research emphasis of the U.S. 84/285 Santa Fe to Pojoaque Corridor Project (Boyer and Lakatos 2000). In the discussion of their Preceramic period (ca. 15,000 B.C. to A.D. 600), Wendorf and Reed (1955:134–138) presented only brief descriptions of specific artifacts and assemblages. They include Paleoindian artifacts from Sandia Cave and the Estancia Valley. They also include assemblages we now recognize as Archaic: Renaud's (1942, 1946) "Rio Grande Points" from the northern Taos Valley, Bryan's (1939) "Los Encinos Culture" artifacts from the Rio Chama Valley, the "Atrisco Points" (Campbell and Ellis 1952; Agogino 1952, 1953), Dick's (1943) aceramic assemblages from the Santa Ana and Albuquerque areas, and artifacts from Manzano and Isleta Caves (Hibben 1941). In their subsequent discussion of the Developmental period, Wendorf and Reed (1955:139) observed a scarcity of ceramic/pit structure sites contemporaneous with Basketmaker III and Pueblo I sites in the San Juan/Colorado Plateau region, and stated, “Some of the ‘preceramic’ material described above may actually represent, in part, occupation into this period.” They could not characterize or summarize the materials we have come to call Archaic, however, and concluded “Undoubtedly these nonceramic and preceramic finds in the Northern Rio Grande represent a considerable span of time. However, an evaluation of their significance in relation to the development of later ceramic cultures must await correlation with datable geological deposits and the establishment of a local stratigraphy” (Wendorf and Reed 1955:138).

Wetherington (1968) does not mention pre-Developmental period sites in his discussion of northern Rio Grande prehistory. Recognizing that there was no northern Rio Grande equivalent of Basketmaker, however, he relies on a migration scenario, probably from the San Juan/Colorado Plateau, to explain the appearance of Puebloan sites in the Developmental period. Similarly, McNutt (1969) does not mention pre-Developmental period sites, and relies on migration to explain the appearance of Puebloan sites. Dickson (1979) rejects the migration notion, apparently based on a conceptual disagreement with diffusionist models. While his survey did record several “possibly Archaic lithic sites” (i.e., aceramic sites), Dickson does not describe them because of “as yet unresolved problems of the Early Man and Archaic manifestations in the northern Rio Grande region.” He does not specify the nature of those problems. Finally, Peckham (1984) also focuses entirely on Puebloan developments in the region, relegating the Archaic to a period between 5500 B.C. and A.D. 400, “when small, nomadic groups of hunters-gatherers explored the area and became familiar with its terrain, available resources, and climate” (Peckham 1984:276).

Neither Wendorf and Reed nor the later proponents and elaborators of their framework for northern Rio Grande prehistory were able to characterize the preceramic period, because, from the 1950s into, apparently, the 1980s, the sites and assemblages attributable to this period did not show the sorts of obvious patterning of artifacts and site structure that allowed normative characterization of later Puebloan developments. This is, it appears, a primary reason that pre- and aceramic sites received little attention until the late 1960s and early 1970s—they were almost impossible to examine within a normative cultural-historical paradigm. How does one classify a site with no diagnostic artifacts? The exceptions to this situation were obvious Paleoindian sites (i.e., those with known Paleoindian artifacts), which were spectacularly old (from a New World perspective), had impressive artifacts, sometimes with the remains of big animals, and were, therefore, more amenable to normative classification.

Irwin-Williams’s (1973) definition of the Oshara tradition allowed, for the first time, a true cultural-historical examination of the Archaic, because she attached dates to artifacts, creating a chronological sequence linked to diagnostic artifacts. Unfortunately, that is the focus of many archaeologists’ use of the Oshara tradition. Irwin-Williams’s contributions regarding seasonality of resources and group mobility, formation, and organization, and how those factors are related archaeologically, have been given less attention than whether one can distinguish a Bajada from a San Jose point. Archaeologists bent on creating and recreating cultural-historical sequences for purposes of classification have, in the northern Rio Grande, replaced Wendorf and Reed’s Preceramic period with Irwin-Williams’s Oshara tradition. On one hand, this is not unreasonable, since the Preceramic period was only poorly described and not at all understood in 1955—witness the difficulty with which Wendorf and Reed identified the period—and it encompassed a huge time span. Thus, by using the Paleoindian “sequence” of point types, and the Oshara tradition phases, archaeologists have been able to carve the Preceramic period into chewable bites—smaller periods of time associated (hopefully) with diagnostic artifacts. This is not unlike the approach taken by those archaeologists who reject the Wendorf and Reed Classification in favor of the Pecos Classification, or who want to superimpose the latter upon the former, in order to cut the Developmental period into smaller units. On the other hand, the same problems incurred by correlating sequences appear in this situation, but earlier in the sequences. By not resolving issues of data patterns and paradigmatic lenses, the Oshara tradition became a set of time periods, each identified primarily by a single projectile point style, into which sites and assemblages could be placed.

Interestingly, however, actual studies of Archaic sites in the northern Rio Grande have tended to examine them in a more ahistorical sense, in light of archaeological, ethnographic, and ethnohistorical research on historic and modern hunter-gatherers. Perhaps because archaeologists recognize that the Archaic, however it is defined in terms of economy, settlement, and other factors, took place over a long time, they seem not to feel constrained by time in the actual study of Archaic sites. One gets the impression that Archaic sites are often viewed just as Archaic sites, not within the continuum of time. Yet, surely we must concede that the demise of Pleistocene megafauna had impacts on hunter-gatherer bands that were different than the impacts brought on by the advent of horticulture, or the bow and arrow, or pottery—impacts on needs and uses for specific resources, access to those resources, mobility strategies for bands, parts of bands, and groups of bands, intra- and inter-band relationships, emphasizing and de-emphasizing aspects of world view and group identity.

Still, even if we define the Archaic in an "adaptational" rather than a temporal sense, the time period during which Archaic "adaptations" dominated the sociocultural-economic milieu of the Southwest, including the northern Rio Grande, was a long one, several millennia, during which the Archaic populations of the region developed the deep, canonical aspects of their cultural information and the inscribed behaviors that manifested them (sensu Rappaport 1979; Whitehouse 1992, cited in Buikstra et al. 1998:92). Those aspects provide the opportunity to look for evidence of continuities between Archaic and Puebloan populations.

Can We Link Archaic and Puebloan Populations?

The transition from Archaic to Pueblo in the northern Rio Grande, both temporally and "adaptationally," has been examined by Post (2002; Akins et al. 2000; Post and Hannaford 2001), based primarily on the results of data recovery investigations near Peña Blanca and on the piedmont north of the Santa Fe River. Although preliminary in its conclusions, Post's research suggests that the advent of corn horticulture was a significant factor in changes involving group mobility and organization (Post 2002:3), which we would expect to be important in the development of early Puebloan communities. However, the processes of development of communities of semisedentary horticulturalists from bands of mobile hunter-gatherers—the changes in economy, mobility of bands and parts of bands, organization of bands, and other aspects of society and culture—have not been defined. As a consequence, the archaeological literature for the northern Rio Grande tends to reflect a break between discussions of the Archaic, however it is defined, and subsequent Puebloan developments, as though they were unrelated. This was certainly true of the early proponents and elaborators of the Wendorf and Reed reconstruction, as we noted earlier (although Wendorf and Reed, themselves, did not discount continuity between the Preceramic and Developmental periods). Probably, this is due to the perceived distance, in terms of economy, settlement, and social organization, between Archaic and Puebloan systems. It seems obvious, however, that either there was continuity between Archaic and Puebloan peoples, temporally and socioculturally, or there was not, and that this should be testable.

In his examinations of northern Rio Grande pit structures, Lakatos (2000b, 2002) has shown that there is considerable continuity in the presence and orientation of several pit structure characteristics and features. These characteristics and features are present across the entire region, and persist through time from the earliest formal pit structures in the seventh century to historic kivas. Persistence of this order, spanning the northern Rio Grande for well over a millennium, in the face of the numerous small- and large-scale disruptions of Puebloan life in the region, shows that the characteristics and features, and the cultural behavior behind them, is deeply embedded in Tanoan culture. They comprise an "emblematic footprint" that conveys "canonical information about ethnicity or cultural identity" (Lakatos 2000b:11). That is, in Whitehouse's (1992; cited in Buikstra et al. 1998:92) terms, the behavior is inscribed in Tanoan culture, and it conveys canonical (Rappaport 1979:179–184) cultural information. Canonical information is deep, embedded, and provides the foundation to a people's world view. It is changed only with difficulty, because to do so signals changing understanding of deeply held world view issues: who we are, where we came from, how we relate to ourselves and our world, etc. In turn, canonical information is conveyed, both to those who hold it and those who do not, by way of inscribed behavior, behavior that is closely linked to the information, so that its presence is understood to convey the linked information. Repetition of inscribed behavior ensures that information is conveyed consistently and accurately.

It is with this in mind that Lakatos (2000b:11–12) is able to argue that "Local populations living in the northern Rio Grande during the Developmental period, and into the Coalition and Classic periods, share [the] same architectural pattern . . . Symbolizing cultural identity, in the form of pit structure architecture, connects the past to the present and the present to the future. With the building of each new structure, from Pecos to the Pajarito, their world view is reconfirmed." He concludes by asserting, "It is this persistent pattern, along with the absence of wing wall, benches, antechambers, recesses, and pilasters, which sets Rio Grande Developmental period pit structure architecture apart from the BM III to P III pit structures of the Four Corners and the San Juan Basin" (Lakatos 2000b:12). In other words, northern Rio Grande pit structure architectural patterns constitute inscribed behavior that conveys canonical information from Tanoan culture. Further, differences between inscribed behavior in the northern Rio Grande and inscribed behavior related to pit structures in the San Juan/Colorado Plateau region indicates that different cultural information was being conveyed; in effect, those differences convey differences in cultural identity.

It seems unlikely to us, and certainly testable, in any case, that canonical information like that being persistently conveyed from the earliest Developmental period structures to historic kivas was not present among those people of the northern Rio Grande who pursued an Archaic lifestyle, both before and following the advent of farming, bows and arrows, pottery, formalized structures, and other hallmarks of Puebloan developments. That is, of course, unless those people were rapidly supplanted or absorbed by farming immigrants holding a world view whose canonical information and inscribed behaviors quickly overshadowed those of the "natives." After all, if we view the Archaic in a temporal sense (our own definition notwithstanding), it lasted for some six millennia, which was plenty of time to develop some deeply embedded canonical information, and behavior to go with it.

If the "natives" of the northern Rio Grande were Tanoans, which seems likely (Moore 2002b), then early Puebloan economy, settlement, and social organization spread through the region, from north to south (Lakatos 2000b, 2002), by expansion of a Puebloan population over the "native" Archaic population, or by diffusion of farming, pottery, and "permanent" architecture through the “native” Archaic population, or both. In any case, that spread happened on a Tanoan base, as the Tanoans have likely been in the region the longest. Thus, the economic, settlement, social organizational, and, no doubt, ideological, changes associated with the spread of Puebloan developments across the northern Rio Grande were likely grafted to existing Tanoan ideology and world view, and became expressed in Tanoan ways.

Investigations of Archaic sites in the northern Rio Grande, even those like LA 84927, LA 89021, and LA 138960 that are considerably older than the Archaic-Puebloan transition beginning in the sixth or seventh centuries A.D., provide us with opportunities to examine Tanoan economy, settlement and land use, and social organization before the Tanoans became Pueblos. As such, Archaic sites do not provide information only about hunter-gatherers who occupied the region, mostly before the period in which we can recognize Puebloan sites. That is, Archaic sites in the northern Rio Grande are not just about the Archaic. They are about the Tanoan Archaic. They provide us with opportunities to investigate continuities and discontinuities between Tanoan hunter-gatherers and Tanoan farmers, between Tanoan mobility and Tanoan sedentism, between Tanoan bands and Tanoan communities. They provide us with the opportunity to determine whether canonical information, conveyed by inscribed behavior, such as that in Developmental period and later Tanoan architecture and communities, was present in Archaic Tanoan life or was brought to them along with corn, pottery, and pit structures—that is, how deeply embedded is that information? In turn, comparison of Archaic sites and assemblages in the northern Rio Grande with those in the San Juan/Colorado Plateau region may help us understand whether the ethnic-cultural differences that Lakatos sees in the “emblematic footprints” of northern Rio Grande and San Juan pit structures were also present among Archaic peoples of the two regions.

Clearly, even should they contain numerous structures, features, and artifacts, LA 84927, LA 89021, and LA 138960 will not provide all the information needed to adequately address this issue. Nonetheless, we anticipate that the sites will provide opportunities to obtain site structural and artifactual data that will be valuable for understanding the Archaic in the northern Rio Grande, both as itself and as the precursor to the region’s Puebloan developments. The types of data needed to implement this part of the study include, but may not be limited to, detailed plans of dated Archaic structures and features. Ideally, several Archaic structures and features will be encountered at the sites, from which we can derive information about the individual structures and features, and about their relationships to each other and to artifacts recovered from the site. However, we will not limit the consideration of this research issue to only these sites. Rather, we will collect data from Archaic pit structures, features, and artifacts that have been excavated in the northern Rio Grande for which sufficient information exists. These data will be compared with information derived from Archaic sites excavated in the San Juan Basin in order to compare and contrast any patterns that might be identified. In turn, these results can be compared with patterns derived from studies of early Puebloan sites in order to determine whether there is a continuity of canonical information encoded in structure form and layout and in site structure that might be indicative of a similar continuity in population. Though the results of this analysis may not be conclusive, they may help direct us toward the collection of ancillary data that will help in the pursuit of this goal.

Developmental Period Puebloan Communities in the Northern Rio Grande Region

Jeffrey L. Boyer

An important issue for research in the northern Rio Grande region involves understanding prehistoric Puebloan social structure. Archaeologists working in the region discuss and debate the changing natures and levels of Puebloan social structure, including processes and results of community formation and population aggregation (see, for instance, contributions in the volume edited by Wills and Leonard [1994], and Crown et al. 1996). However, much of this work centers on Coalition and Classic period communities, and definitive research into the nature(s) of Developmental period (and earlier) communities has been lacking (see Adler 1993; Boyer 1994, 1995).

Understanding the dynamics of Developmental period Puebloan society is critical if we are to address the changes that seem evident between the numerous small, pithouse and surface structure sites at Developmental period sites, the small, and sometimes large, pithouse and room block Coalition period sites, and the large, compact, aggregate communities of the Classic period. The Santa Fe to Pojoaque Corridor Project area provides an excellent opportunity to explore the structure and dynamics of Developmental period Puebloan society and search for evidence of early Puebloan community structure.

Defining Prehistoric Communities

Wills and Leonard (1994:xiii) state that "southwestern archaeologists understand 'community' to mean a residential group whose members interact with one another on some regular basis." This broad definition, they argue, has led to two perspectives. In one, individual sites are studied as single communities. In the second, individual sites are grouped into "political communities" defined by "intersettlement mechanisms for making social or economic decisions." They go on to state, in archaeologically practical terms, that "Although political communities are conceived of as socioeconomic systems, they are generally recognized by spatial clusterings of sites" (Wills and Leonard 1994:xiv). Following Breternitz and Doyel (1987), Wills and Leonard suggest that within these clusters of (contemporaneous) sites, there should be a hierarchy of sites with different functions within the community. However, they observe that "clear-cut" evidence of functional site hierarchies has been hard to come by, particularly in terms of artifactual assemblages, and that as a consequence, archaeologists have tended to focus on architectural forms and features thought to represent communal facilities (Wills and Leonard 1994:xiv).

Following Johnson's (1982, 1984) scalar stress model of community decision-making structure, Kintigh (1994) describes two community forms: nonaggregated and aggregated communities. The difference between the two is not in residential proximity, but in the size of the community in number of households and the consequent level of community decision-making structure. Smaller, nonaggregated communities should consist of no more than about 6 to 14 households and be characterized by consensus decision-making. Above this number of households, consensus decision-making is unwieldy and these larger, aggregated communities are characterized by decision-making structures involving leadership. The development of such higher-level community structures should be accompanied, Kintigh (1994:137–138) argues, by clusters of sites and types of communal architecture. One might presume, then, that nonaggregated communities may not be as easily distinguished by site clusters and should not have communal architecture, although Kintigh does not make these characterizations.

Adler (1994:98) defines communities as "the consistently highest level of integrative organization on the social landscape" and "the most consistent resource access institution on the local level." He then argues that we must distinguish between communities and settlements. Settlements are "spatially identified cluster(s) of habitation features" (Adler 1994:99) that can consist of single or multiple households (Adler 1993:337). Settlements are internally integrated through the use of "low-level" integrative facilities: ". . . the term 'low-level' . . . refer[s] to those facilities that serve to integrate only a portion of a community" (Adler 1993:335; also Adler and Wilshusen 1990:135). In contrast, "high level facilities are utilized for social activities involving larger groups and are often used to integrate one or more communities" (Adler 1993:335; Adler and Wilshusen 1990:135).

There appears to be a correlation between Kintigh's nonaggregated communities and Adler's settlements. Nonaggregated communities are small, generally less than 14 households, and are characterized by low-level consensus decision making. Settlements are characterized by low-level integrative facilities, which are, cross culturally, most common in population groups of four to twelve households (Adler 1993:338). These facilities are usually used both for residential and ritual integrative activities. There is correspondence in the sizes of these two types of household groups and they are characterized by low-level integrative and group decision-making activities and facilities. We see, then, that a presumption that nonaggregated communities are not necessarily spatially clustered and do not have communal facilities is probably false. Adler describes settlements as spatially defined and as having integrative facilities.

If nonaggregated communities can be correlated with settlements, then Kintigh's aggregated communities may be correlated with Adler's communities. Remember that aggregation, in Kintigh's terms, does not necessarily reflect residential proximity. Instead, aggregation refers to community integration through formal, "higher-level" (Kintigh's term) decision-making structure involving leadership. Whatever form this structure takes, it "probably requires a substantial population aggregate for its persistence" (Kintigh 1994:133), although Kintigh also states that "communities composed of substantially more than six households must have some higher-level decision-making structure." In Adler's model, communities are the highest level of consistent integration of settlements. Integration is accomplished through "high-level" (Adler's term) facilities, which are likely to be used almost exclusively for ritual, integrative activities and rarely for residential activities (Adler 1993). Adler (1993:336) states that ritually specialized facilities appear when a community surpasses about 200 individuals. If we arbitrarily assume a range of five to ten individuals in a household, Adler's figures translates to communities of 20 to 40 households, substantially more than Kintigh's maximum figure of 14 households in nonaggregated communities. Thus, we see a possible size correlation between Kintigh's aggregated community and Adler's community and a correlation between the need for high-level decision making and the presence of high-level community integration facilities.

Archaeological Evidence: Defining Puebloan Community Structure in the Taos Valley

Using his model of community structure and facilities, Adler (1993) examined excavated Late Developmental period sites in the Taos Valley for evidence pointing to community organization:

> . . . because from early on in the prehistoric sequence, the Anasazi of the northern Rio Grande appear to have inhabited dispersed settlements that were parts of larger, scattered communities, we should expect some form of integrative facility during the Developmental phase. (Adler 1993:336)
> Based on ethnographic data from dispersed agricultural groups similar to those residing in the Taos

> area prior to A.D. 1200, as well as archaeological investigations of dispersed Anasazi settlement systems elsewhere in the Southwest, it is likely that each pit structure settlement was integrated into a larger, local community and that several such communities may have existed in the Taos area during this time. (Adler 1993:337)

Adler's review of published data revealed that about 25 percent of excavated pithouses had floor features identified as sipapus, features "commonly assigned a ritual function" by archaeologists (Adler 1993:338). Adler's argument is that, if these features were associated with ritual activity, then structures containing them may be assumed to have had different functions than structures without them. Since the excavated pithouses with sipapus have no other "ritually significant" (Adler's term) features that distinguish them from pithouses without sipapus, Adler classifies the pithouses with sipapus as low-level integrative facilities, which is to say that they probably served as habitations and part-time integrative facilities. His figures suggest that 25 to 30 percent of Developmental period pithouses contained "ritually associated" features and, therefore, probably served as "integrative spaces" (Adler 1993:338).

The implications of Adler's argument for Developmental period sites are twofold. First, "the pre-A.D. 1200 Anasazi in the Taos area did not lack social integrative facilities. Certain of the early pit structures were utilized for a range of ritually integrative and domestic activities" since "early general-use integrative pit structures probably did double duty as domestic structures, but as is borne out by a cross-cultural perspective, it is not unusual for domiciles to serve as ritual and social integrative spaces" (Adler 1993:341, 342). Adler is arguing that the presence of "ritually associated" features at some pithouses points to the use of these pithouses as low-level, part-time, social integrative facilities and that, since such facilities are characteristic of communities or portions of communities ("settlements") having some minimal internal integration, they are evidence for low-level community integration during the Developmental period. Although his argument may run afoul of Wills and Leonard's (1994:xiv–xv) concern over tautological identification of communities and integrative features, in this case, Adler's perspective provides important corroboration for Boyer's (1994) identification of two Developmental period communities based on architectural and artifactual patterns.

Boyer's (1995) review of published data from the Taos Valley shows that sipapus are present at about 19 percent of excavated pithouses, a slightly lower ratio than Adler's. Further, those pithouses are divided between the two "communities." The two in the northern community are nonremodeled pithouses; that is, they were built, occupied, and abandoned. This is also true of two in the southern community. The other two in the southern community had sipapus associated with one of two floors in the pithouse. At one site, the sipapu was associated with the upper, second floor; no sipapu was found associated with the first floor. At the other site, the sipapu was associated with the lower, first floor, but no sipapu was present in the second floor. This suggests a change in the functions of both of these pithouses. If Adler's model is correct, one pithouse was used as an integrative facility prior to but not after its remodeling, while the other pithouse was used as an integrative facility after but not before its remodeling. Interestingly, the two sites, which are located across a small arroyo from each other, are the only two pithouse sites in the southern community that have yielded evidence of substantial remodeling. Although we do not know whether the two sites were contemporaneous, their proximity to one another and their similar remodeling episodes begs the question: were the two sites related in some way so that, during remodeling, their "ritually associated" features and functions were exchanged? Obviously, we cannot answer the question, but the possibility is tantalizing. If Adler's model is correct, we may be seeing that, at least in some cases, these low-level integrative facilities were treated differently than "regular" pithouses (Boyer et al. 1994).

Boyer's (1995) review also suggests that some pithouse sites were treated differently than others in terms of abandonment and post-abandonment processes. Importantly, they are the sites whose pithouses had sipapus. In addition, the structures of some sites indicate that Adler is incorrect when he contends that "specialized ritual facilities that served as integrative spaces for entire communities" were not present in the Taos Valley during the Developmental period (Adler 1993:341). Evidence that includes differential site complexity, presence of substantial surface structures, pithouse remodeling or replacement, and presence of storage vessels points to

> the development of facilities integrating larger portions of communities than those integrated by single pithouses with sipapus. Further, in the possible evidence for remodeling and integrative functional replacement of structures . . . we may be seeing the development of relatively long-term use of specific locations for community integrative activities. (Boyer 1995:118)

The second implication of Adler's argument for Developmental period sites is that "the archaeological record does not indicate the construction of specialized ritual facilities that served as integrative spaces for entire communities during the pre-A.D. 1220 period in the Taos area . . ." (Adler 1993:341). In this regard, examination of published data on two sites, one in the northern community and the other in the southern community, reveals several similarities between sites.

First, they are the only excavated sites in their respective communities with the amount of complexity (multiple pithouses, surface structures, other features) found during excavation. This does not, of course, mean that they are the only such sites in existence, only that no others have been excavated. However, the fact that no others have been excavated, either by choice (academic field schools) or by chance (contract-salvage projects), suggests that such sites are not common. Second, at both sites, there is evidence for the replacement of pithouse and surface structures. Third, multiroom adobe surface structures are present at both sites, in contrast to other excavated sites from this phase.

The dearth of hearths in surface rooms probably precludes their use, with one exception in each case, for habitation. The presence of cists and ceramic jars suggests room use, instead, as storage facilities. Finally, a later, large pithouse at one site has a sipapu, while there is evidence that the later features at the other site are associated with a circular adobe floor. This does not, of course, clearly identify the adobe floor as a "ritual" feature (nor are "sipapu" holes clearly identified as such), but the feature's description as a large, bounded, prepared surface suggests an open public area whose function was certainly different than other extramural activity areas and whose presence was not common at similar sites (see Adler and Wilshusen 1990:135). In turn, this suggests that the activities that took place there were not common to all Developmental period sites.

Finally, the later features at both sites include features that may be considered unusual: a much larger than average pithouse with a sipapu at one and an extramural, prepared adobe surface at the other. Taken together, these patterns indicate that the two sites functioned in ways not common to Developmental period sites, even those with sipapus. We may suggest that these sites served as integrative facilities for communities or portions of communities larger than those served by single pithouses with sipapus. This is not to suggest that either site included "ritually specialized facilities" (Adler's term), since the artifactual assemblages recovered from the sites do not seem to differ significantly from other Developmental period sites. However, Adler seems to argue not for a complete dichotomy between low-level generalized and high-level specialized integrative facilities but for a continuum between one and the other:

> As the size of communities increased, we should expect both an increase in the number of smaller, generalized integrative facilities and the addition of larger, ritually specialized facilities, the latter appearing when community populations surpassed 200 individuals. Additionally, if the size of use-groups associated with the smaller integrative facilities increased through time, we should see an increase in the average size of this class of general-use facility. (Adler 1993:336; see Adler and Wilshusen 1990:143)

Thus, although Adler may not see evidence of Developmental period ritually specialized facilities integrating entire communities, we may, at the two "different" sites, see evidence for the development of facilities integrating larger portions of communities than those integrated by single pithouses with sipapus. Further, in the possible evidence for remodeling and integrative functional replacement of structures, we may be seeing the development of relatively long-term use of specific locations for community integrative activities. This is in keeping with expectations for the establishment of communities on frontiers. In a diachronic view of the colonization gradient of frontier settlement (Casagrande et al. 1964), some locations begin as dispersed settlements and, for a variety of reasons, change from level to level of community establishment and stability. The relatively lengthy use a specific location as a community facility points to a degree of community stability not seen at single pithouse sites with short occupations, no remodeling, and no reoccupations. The latter are indicative of considerable mobility among frontier households while the former may represent focal points for communities or portions of communities of mobile households.

In this regard, the presence of adobe surface structures that were probably used for storage rather than for habitation is interesting. Boyer (1994) observes that internal storage features are not common in Taos area Developmental period pithouses. On the other hand, since Taos Gray sherds far outnumber painted sherds at these sites and since Taos Gray vessels are usually jars, it is possible that ceramic jars were the most common storage feature at single-pithouse sites (Boyer 1994:462). This is consistent with fairly mobile households prepared to move their stored goods with them. However, it is hard to reconcile with the long-term food storage needs being addressed at later, large pueblos where households are thought to have occupied "suites" of two to 25 rooms, depending on the size and make-up of the household. Most of these rooms were storage rooms (Holschlag 1975; Lowell 1991; Lightfoot 1992). Thus, we may speculate that the number of ceramic jars found at Developmental period sites would not accommodate the long-term food storage needs of the households occupying those sites. If so, then perhaps the surface structures at Developmental period sites represent storage facilities for multiple households. This would suggest that these sites served to integrate communities or portions of communities through more than decision-making and ritual-social activities.

Ethnographic Evidence: Population and Community Organization at Picuris Pueblo

In 1965, Bernard Siegel reported on his observations of changing social organization at Picuris Pueblo, a small Tiwa-speaking community in north-central New Mexico (Siegel 1965; also Siegel 1959). The community was apparently quite large in the sixteenth and seventeenth centuries A.D. (see Schroeder 1974 for a historical overview of the community). However, its population began to drop following the Pueblo Revolt of 1680, the reoccupation of New Mexico by Europeans in the 1690s, and self-imposed exile at El Cuartelejo in what would become western Kansas between 1696 and 1706. From an estimated, and probably somewhat exaggerated, high of 2,000 to 3,000 residents before the 1680 Revolt, only about 360 Picuris returned from Kansas in 1706. In the 1700s, the population fluctuated between a high of about 400 (in 1744) and a low of 212 (1788) and climbed back to 320 by 1821. By the mid 1800s, however, population had dropped to 143 (1860) and into the 120s in the 1870s. Between 1890 and 1940, the population stayed between about 90 and 110. Since then, the population of the Picuris community has climbed slightly, although the number of residents is not as high as the number of enrolled tribal members. As an example, Schroeder (1974) records the population in 1974 as 164, while Brown (1974) states that the population, in the same year, was only 75. Siegel summarizes the impact of continued population decrease as follows:

> . . . it is not surprising that one should find, in relation to these events, much evidence of sharply reduced organizational efficiency in social life and a corresponding increase in the abandonment or curtailment of fundamental institutionalized activities. (Siegel 1965:199)

Siegel then describes several aspects of mid-late twentieth-century Picuris community structure that reflect decreasing population:

1. Complexity of community socioreligious structure decreased. Specifically, fewer kivas (Adler's "integrative facilities") were in use through time, apparently because fewer people were involved in kiva activities and because kinship in the smaller community became more integrated (Siegel 1965:200, 202). Associated with this situation was a dramatic decrease in the number and kind of ritual ceremonies performed (compare Parson [1939:216–222] with Siegel [1965:202]).
2. Decreased complexity also involved lessened importance and authority placed community structural authority and hierarchy. Specifically, the authority of the cacique ("highest ranking priest-head"— Siegel's term) eroded, and the community council, which had consisted of elder members of the kivas, was changed to include all male household heads, even those who were young and relatively inexperienced in community affairs (Siegel 1965:200, 202). Associated with this situation was a significant lack of division and factionalism within the Picuris community, particularly when compared to the much larger and more complex community at Taos Pueblo (compare Siegel [1965:204–205] with Katz [1974]).
3. Brown (1974; see also Brown 1999) reports the same changes in twentieth-century Picuris community structure, although he ascribes them to changing economic forces and strategies, particularly the impact of wage labor and national government welfare programs and the attendant loss of subsistence agricultural and foraging strategies. By reconstructing Picuris community organization prior to 1900, using archaeological and ethnohistorical data, Brown is able to contrast late nineteenth-century and late twentieth-century community structure. With regard to decreasing complexity in socioreligious structure, as observed by Siegel (1965), Brown (1974:334–335) notes that late nineteenth-century Picuris was characterized by a significant degree of ritual specialization. This was evident in the presence of directional moiety groups and several "ceremonial groups" (Brown's term; kiva and inter-kiva groups), their facilities (kivas), and their activities throughout the year. After about 1910, membership in the "ceremonial groups" began to decrease and the groups finally dissolved as young men left the village and older men died (which result-

ed in population decrease, despite Brown's objections). Interestingly, as the kiva groups dissolved, "ownership" (Brown's term) of the facilities, which had been vested in the members of each group, passed to the community as a whole. The number of kivas in use decreased through time, as did the number and variety of ritual ceremonies (Parsons 1939; Siegel 1965; Brown 1974, 1999).

With regard to changing community structural authority and hierarchy, Brown (1974:335–336) argues that pre-1900 Picuris had a relatively complex authority structure, with both sacred and secular hierarchies (although secular authority—the governor and his officers—was legitimized by sacred authorities). As the community decreased in size during the 1900s, authority became vested in a council of household heads rather than of the headmen of the kiva groups. Finally, the cacique died and was not replaced. Instead, community authority passed from the sacred head (the cacique) to the secular head (the governor). This diminished the division between sacred and secular authority. Although it may appear that this marked the end of sacred authority in the Picuris authority, we should note that (1) the governor was still selected by the council, as he had been in the past, and (2) the governor acquired responsibility for the community's ritual features and structures.

In addition to these aspects of community structure, Brown (1974) also observed two other changes at Picuris. First, he points out that, "Law and order, which was maintained through such traditional sanctions as fines, community work, public whippings, and banishment, is now possible only with the assistance of federal and state law enforcement agencies" (Brown 1974:320). Second, he records a significant change in settlement and land use:

> In 1900, two places of residence were maintained by many households, a house within the pueblo occupied during the winter months and a second house in the fields occupied during the farming season. This settlement pattern, compact for the winter and dispersed for the summer, reflected the economic activities of the community. With a shift in emphasis from subsistence farming and hunting to wage work in the 1930s, many of the summer houses were abandoned and only the residences were maintained. With the growing importance of the welfare programs since 1948, the few summer houses which were occupied between 1930 and 1948 have been abandoned also and are only for storage today. (Brown 1974:331–332)

In contrast to Brown's assertion that these changes were the result of shifting economic forces and strategies, Katz (1974) ascribes the same aspects of community organization at Taos Pueblo to responses to population density and frequency of interaction within the village. Concerning sanctions used to maintain order in the community, Katz describes them as parts of a community-wide "posture of restraint":

> Any personal assertiveness is disapproved; unanimity in government decisions is assumed. A Taos who distinguishes himself in any way, in dress, speech, accumulation of wealth, or who seeks prestigious positions within the pueblo, earns disapproval and become the subject of sanctions such as gossip, accusations of witchcraft, whipping, vandalism of his property, or "accidental" death. (Katz 1974:309)

Another series of mechanisms for coping with crowded conditions at Taos involves different ways to maintain personal privacy, including using land outside the village:

> One other way that the Taos use the space outside the wall is by retreating to their summer houses. Traditionally, there have always been a few one-room houses which were used by some Taos families for several weeks in the summer when their agricultural activities demanded a large part

> of their time. These houses were located within the pueblo land, but most were outside the wall. In the past fifty years, however, more and more Taos have used the land to build summer houses. Frequently these houses would be built with a large number of more spacious rooms than existed in their residences within the wall. In the past ten years, it has become increasingly popular for some Taos to use these "summer" residences throughout the year, although they never relinquish their ownership in their original residences. (Katz 1974:312–313)

The residents of Taos were subjected to the same sorts of external forces impacting their economic-subsistence strategies as were the residents of Picuris during the twentieth century. How, then, do we rectify Brown's observations that community sanctions against inappropriate behavior and the use of summer field houses both decreased at Picuris during the same years that Katz argues they were firmly in place and, in the case of summer field houses, became more prevalent at Taos? The obvious answer is that the population of Picuris declined during this time, while that of Taos did not (see Bodine 1979). Population density at Picuris would also have declined, as would frequency of personal interaction. Consequently, social mechanisms used to cope with relatively high population density fell into disuse through time.

Implications for Defining Simple Puebloan Communities

Both Siegel (1965) and Brown (1974) see the changes evident in Picuris community structure since about 1900 as symptomatic of the "disorganization" (Siegel's term) of traditional Picuris society. In this view, the features of the larger, more complex, form of the pre-1900 Picuris community, including large, multistory buildings in the village (like Taos), summer fieldhouses near farming fields, subsistence agricultural and foraging economic strategies, a directional moiety structure, multiple kivas with several kiva and inter-kiva societies, numerous ritual activities throughout the year organized and maintained by the different societies, a community council consisting of the elder members of the kiva societies and a cacique, "secular" community officers selected by the council, and community mechanisms for enforcing appropriate behavior, were the norm. Consequently, the changes since 1900 represent the lamentable disintegration of normal, traditional Picuris society and community structure.

An alternative view is that the changes observed by Siegel and Brown reflect only the disintegration of the most complex forms of Picuris society and community structure, and that they reflect reversion to simpler social structural forms. This view is supported by a significant statement made by Brown:

> n spite of these dramatic changes, the residents of Picuris continue to speak their own language, along with Spanish and English, and are able to maintain an identity independent of their Spanish-American neighbors and an orientation separate from the surrounding dominant Anglo-American culture. (Brown 1974:320)

That is, while the students of Picuris see in the twentieth century changes the disintegration of the Picuris community, the Picuris have maintained their language and their cultural "orientation" (a point also made by Siegel [1965:204]), two factors that distinguish them from their Euroamerican neighbors. In other words, the Picuris community has changed dramatically in size, architecture, settlement, ritual complexity, and social structure, but has maintained its identity. This suggests that cultural identity is not as strongly tied to community and social structural forms as anthropologists might expect.

More significantly, for this discussion, it reveals that Puebloan communities can have much simpler structural forms than we might expect based on the forms of historic and modern Pueblo communities. If we take the view that as Picuris' population declined, the community maintained its identity while reverting to simpler and simpler forms (see Hegmon et al. [1998] and Nelson [1999] for archaeological examples of the same argument from the Mimbres region), then the Picuris example provides us with several possible characteristics of simpler Puebloan community forms. In turn, those characteristics can be expected to be revealed archaeologically.

The most significant characteristic is that the communities will be small and relatively simple and unorganized in form, particularly when compared to larger, more complex communities. When we consider the Picuris example in combination with the conclusions drawn by Kintigh (1994) and Adler (1993), also from ethnographic data, we should expect to see this situation reflected in the following ways:

- Simple communities should have relatively dispersed settlement patterns. Both Siegel and Brown point out that twentieth-century residence at Picuris changed from mostly matri- and patrilocal to neolocal and that the practice of building houses directly adjoining those of family members has been replaced by the practice of building new, unadjoined houses within the village.
- Archaeologists consistently refer to communities as spatial clusters of sites (Breternitz and Doyel 1987; Adler 1993; Wills and Leonard 1994). That is, communities are characterized by relative residential proximity; the actual measure of proximity and, so, the spatial size of a community is conditioned by the degree of sedentism, the economic and population stability of the households comprising the community, and the structure and integration of the community. Still, it should be possible to identify clusters or concentrations of sites making up a community.
- For the Developmental period, we may expect to see clusters of pithouse sites. The geographical definition of such clusters may be difficult to ascertain. However, following Adler's (1994:99) assertion that communities reflect "consistent resource access . . . on a local level," we may expect that sites in clusters representing communities will have similar suites of structural, feature, and artifactual characteristics (Boyer 1994).
- Simple communities should show a relative lack of standardization in community form (placement of residential and other sites) and size (number of contemporaneous residential and other sites). Archaeologically, we should not expect to see standardized forms such as plazas (even without contiguous structures). We should expect that there will be large clusters of sites or structures and small clusters of sites or structures. Bearing in mind Kintigh's (1994) and Adler's (1994) apparent limits on community sized, we can expect simple communities to consist of less than 14 contemporaneous residential structures. Assessment of these conditions requires chronometric establishment of contemporaneity.
- Simple communities should contain relatively few "integrative facilities," simply because the communities consist of relatively few people that need to be integrated. Archaeologically, we should expect to see few facilities that we would define as kivas (by presence of features or suites of features and by evidence for differential treatment during use and abandonment), relative to the number of associated, contemporaneous, residential structures or sites.
- Further, simple communities should show a relative lack of standardization in the presence and form of ritual-related features and structures associated with community integrative facilities. In the terms of Rappaport (1979) and Buikstra et al. (1998), standardization in these features and structures should be related to the kind of information (canonical or index) contained in them and the kind of messaging (inscriptive or incorporative)

used to access and convey that information.

- Simple communities should show little evidence of intracommunity hierarchical authority and of ritual specialization. This is related to the expectation, mentioned earlier, of finding relatively few integrative facilities in a community. Additionally, we should expect to see few examples of "high-level integrative facilities" (Adler's term), facilities that served full-time ritual and integrative functions, and may have integrated multiple communities.
- Finally, simple communities should show little or no evidence of intercommunity integration or hierarchical authority. This is related to the absence of high-level integrative facilities. However, as Boyer (1995) suggests, repeated or long-term use of certain locations, including feature and structural remodeling or replacement as well as relatively high frequencies of noncontemporaneous residential and other sites or structures, may indicate the growth of communities and community centers and the development of high-level integrative facilities. In effect, evidence for repeated or long-term use of specific locations may show that the location itself was an established community center and functioned as a high-level integrative facility.

Studying Puebloan Communities in the Tewa Basin

The preceding discussions of the identification of Puebloan communities suggest a series of questions concerning the U.S. 84/285 Santa Fe to Pojoaque Corridor sites.

1. Do the project area Puebloan sites represent spatial clusters or parts of spatial clusters of sites?

This is an important issue for defining Developmental period Puebloan communities and points to the significance of the project area sites. At these sites, we have the opportunity to explore two sides of this issue. Comparing the results of other survey and excavation projects in the southern Tewa Basin will provide data on site distributions. These data will be used to determine whether the project area sites are site clusters or parts of site clusters. At the same time, we will use architectural and artifactual data obtained from excavation to define and assess similarities and differences between the individual sites in the project area and between the project area sites and those examined in nearby project areas. Specific discussions of the analyses of architectural and artifactual materials are found in following chapters of this data recovery plan. If survey and excavation data point to spatial distributions representing site clustering, and if clustering of architectural and artifactual data can be defined, we will be seeing evidence of community organization during the Developmental period.

2. Do the Santa Fe to Pojoaque Corridor sites provide evidence of integrated access to resources?

Adler (1994:99) describes the community as "the most consistent resource access institution on the local level." This is strongly related to the excavation aspect of question 1. Specifically, if the project area sites were parts of communities that functioned, at least in part, to integrate access to resources, we should expect to see significant similarities in access to and use of local and regional resources within site clusters and differences between site clusters. We may also expect to see significant differences in access to and use of local and regional resources between the project area site clusters and those in nearby project areas, if there are actual differences in availability of specific resources. Examples of resource access include raw materials for chipped stone and ground stone tools, while examples of resource use include the kinds of tools made from these materials, the extent of expedient versus purposeful tool manufacture and use, and the extent of tool reuse and recycling. Raw materials for ceramic manufacture is another example, as is the use of local and regional faunal and floral resources. Specific discussions of the analyses of these materials are found in following chapters.

3. Do the U.S. 84/285 Santa Fe to Pojoaque Corridor sites show evidence of community integration?

Several questions are involved here. First, do some sites show evidence of low-level integrative use? Adler's (1993) research suggests that this should be seen primarily in the presence of pithouse features recorded as sipapus, and that these features should not be common at contemporaneous structures or sites. If more than one have sipapus, we may be seeing evidence for more than one subcommunity group or for use of different integrative facilities through time. Accurate chronometric dates are critical in this regard; collecting chronological materials is discussed in a following chapter.

The next question is: do some sites show evidence of higher-level integrative use? Specifically, based on the earlier discussion of sites with increased architectural and site structural complexity, do sites that have surface structures yield evidence of a level of community integration above that served by a single pithouse with a sipapu? Do these sites show evidence of both habitation and "ritual" use? Do the artifactual assemblages from these sites differ from other site assemblages in terms of the activities represented at the sites? Are there intrasite differences in the architecture, features, and artifacts that point out functional differences? And, is there structural and artifactual evidence that the surface structures at these sites were used as community storage locations (storage cists, bins, buried jars, high frequencies of jar sherds)? How many rooms are present, how many have hearths, and how many have internal storage features? How do the room-with-hearths/room-without-hearths ratios compare with studies of sizes of households and "architectural suites" at larger pueblos (Holschlag 1975; Lowell 1991; Lightfoot 1992)?

Finally, are integrative facilities distinguishable by differences in treatment both during and after use? We may expect that structures serving as integrative facilities were more likely to have been remodeled or replaced on-site or nearby, and that they are less likely to have been systematically cleaned and stripped of usable materials at the time of abandonment than those structures that were apparently used only as habitation sites.

Conclusions

Taken together, data obtained in pursuit of answers to these questions will be valuable for defining Developmental period communities by providing information on several aspects of communities. They will also be valuable in examining the level(s) of community integration during the Developmental period. Understanding Developmental period communities, including their sizes, levels of integration, and nature of integration, is critical for accurately examining post-Developmental period communities in the region. For instance, the transition from dispersed pithouses to small pueblos has often been characterized as a process of population aggregation (see Crown and Kohler 1994; Crown et al. 1996). However, if the dispersed pithouses were, in fact, integral parts of communities, then the transition from a community of, let us say, 12 pithouse households to three households in a 10-room pueblo could represent, in a certain sense, population fragmentation. If the three households in the 10-room pueblo actually continue to be part of a larger community comprised of several small pueblos, then we have a potentially significant change in community integration and structure. Why do some households decide to congregate in a single location? If remodeling and structure replacement at integrative sites show relatively long-term use of a specific location for integrative activities, do the locations of small pueblos reflect the locations of earlier pithouse-community integrative facilities? Do the number of households congregated in a small pueblo represent the number of households formerly integrated in a small pithouse community? Does population congregation represent fragmentation of an earlier community or formalization of earlier integrative relationships? In order to begin to answer these questions, we must understand the natures of Developmental period communities, their sizes, and levels of integration. These issues are a primary research focus for the Santa Fe to Pojoaque Corridor sites.

Examining the Classic Period Components

James L. Moore

Models of Field Structure Use

Recent analyses of Pueblo field structures have focused on several potential uses in addition to the obvious agricultural function. Preucel (1990) feels that they developed in response to increasing competition over arable land caused by population growth and aggregation. He defines four patterns of population circulation between residential villages and farmland (Preucel 1990). In a daily circulation pattern, farmers moved between their residence and fields on a daily basis, and overnight stays were unnecessary. A periodic circulation pattern occurred when occasional stays of at least a night were needed. Seasonal circulation entailed an absence from the permanent residence for at least an entire season. Finally, a long-term circulation pattern was represented by absence from the main residence for more than a year. This discussion is only concerned with the first three of these patterns.

In general, daily circulation occurred when fields were near the permanent residence and overnight or longer stays were not required. Periodic circulation probably occurred when fields were somewhat more distant from the residence and overnight stays were sometimes necessary. Both of these patterns were associated with the use of fieldhouses, which were fairly insubstantial structures that could be used as shelters during the work day or when overnight stays were required. More substantial structures would be required for a seasonal circulation pattern, and in this study are categorized as farmsteads to distinguish them from fieldhouses. These circulation patterns are not mutually exclusive in a settlement system. Some fields may have only needed to be visited daily for maintenance while others may have required stays of longer duration because of distance from the main residence, threat of predation, or higher labor costs resulting from use of water and soil control features.

Seasonal circulation generally (but not always) was associated with use of distant fields by farmers living in large aggregated communities where competition for farmland was severe. As Preucel (1990) notes, the concept of dual residence is central to this pattern, in which more than one residential locale was occupied and rights and interests were maintained in more than one habitation. Villages and hamlets represent permanent nodes of residence, while seasonally occupied locales were fieldhouses and farming communities. It should be noted that Preucel's (1990) study does not distinguish between fieldhouses and farmsteads as does this analysis.

Preucel's (1990) model considers patterns of population circulation between fields and villages to be the result of two processes—population growth and aggregation, and distance of fields from the main residence. Other models consider these processes to be less important. Kohler (1989) feels that use of field structures was as closely related to land tenure as it was to population circulation. Thus, many field structures may have been built as visual representations of vested rights in farm land. When built in areas containing land of low value, field structures may evidence signs of only light use and should contain few artifacts and features. In contrast, when built in areas of valuable farm land there should be evidence of long and heavy use. Thus, rather than suggesting circulation patterns, the features and assemblages contained by these sites are more representative of the value of land and the longevity of its use.

In addition to these models, Orcutt (1990) feels that field structure location may be related to environmental conditions that affected the distribution of arable land. She divided field structures at Bandelier into large and small categories. More large field structures were expected to occur in canyon bottoms because those areas contain the best arable land. Smaller field structures were expected on mesa tops because those areas had lower farming potential. However, the actual pattern was quite different from her expectations. Large field structures dominated mesa tops, while there was a nearly even split between small and large structures in canyon bottoms. She suggests that this might be because use of canyon bottom lands was at a maximum, requiring more farming in mesa-top fields that required intensive care, possibly including water conservation. Orcutt (1990) also concluded that the distance model presented by Preucel seemed to apply to her study at Bandelier, but did not explain all field structure locations. Tests of Kohler's ideas concerning field structures as visible signs of land tenure did not turn out as expected either. Thus, field structure locations were not completely explained by the environmental model, circulation patterns, or land tenure.

It is unlikely that field structures had only a single function in prehistoric farming systems. All three of these models are probably applicable to one degree or another. Distance from the main residence seems to have been an important aspect of field structure use, but the close proximity of some structures to villages suggests that land tenure concerns were also at work. The distribution of arable land across the landscape was also an important aspect of field structure use, and was closely related to both of the other models.

Unfortunately, these models are based on survey data alone, and environmental processes like soil erosion and aggradation that are totally unrelated to cultural use could be affecting archaeological remains. Site sizes can be both enhanced and concealed by these processes. In addition, dates can only be based on associated diagnostic artifacts, which may be sparse or nonexistent. Further, it is difficult to accurately assign a pattern of use from surface indications alone.

All small structural sites are considered field structures rather than residences in these studies, and this may be an incorrect assumption. Preucel (1990) conjectures that seasonal circulation patterns were present on the Pajarito Plateau in the Early Coalition period, but were extremely limited. Some field structures were identified, but the settlement system was dominated by hamlets (population aggregates lacking ritually integrative features), with a few villages (population aggregates containing ritually integrative features) and no farming communities (seasonally used communal dwellings) being represented. Seasonal circulation first became important in the Late Coalition period, though hamlets still dominated and only a few villages and farming communities occurred. The importance of seasonal circulation increased dramatically during the early Classic period with villages, field structures, and farming communities increasing in abundance and hamlets becoming rare. Finally, during the late Classic period the pattern of seasonal circulation remained unchanged, with hamlets continuing to be rare and the occurrence of farming communities decreasing.

This is a very interesting pattern, but it is flawed by a lack of corroborating excavation data. This is demonstrated by the results of a detailed study of sites in Cochiti Reservoir. Biella (1979) indicates that small sites of one to three rooms were used during both the Pueblo III and Pueblo IV occupation of that area. The Pueblo III period (A.D. 1100 to 1300) overlaps the Late Developmental and Coalition periods of the Rio Grande sequence, while Pueblo IV (A.D. 1300 to 1540) overlaps the Late Coalition and Classic periods. Significant differences were noted between small structural sites in these periods. Excavation showed that most small Pueblo III structural sites were well built, with plastered floors and mortared walls. Internal hearths were found in all but one of the structures in this category, and small bins and cists occurred in about half. In contrast, most small Pueblo IV structures had dry-laid masonry walls that often incorporated boulders. A few pit rooms were also represented, and were the only rooms to contain plastered floors. Hearths were found in about half of these structures, but were mostly represented by simple burned areas on unprepared floors rather than the formal features found in Pueblo III structures. In the few Pueblo IV sites containing two or three rooms, there was a tendency for one room to evidence slightly more labor input, with some coursing in walls, and some mortaring of walls or plastering of floors.

These data led Biella (1979) to conclude that the small Pueblo III structures represented habitations occupied by single commensal groups. In contrast, the small Pueblo IV structures seem to have been occupied seasonally. While the Pueblo III sites were suitable for cold-weather use, this was rarely true of the Pueblo IV sites. Thus, a significant difference in the use of this class of site through time was demonstrated by excavation. This type of distinction is usually impossible to discern when only survey data are used, and a similar pattern might be obscured in studies based on surface data alone. Thus, the few field structures identified by Preucel (1990) as evidence of limited seasonal circulation during the Coalition period might actually be small residential sites, similar to those excavated at Cochiti Reservoir.

Models of field structure use based solely on survey data should be applied with caution, but they are useful and can be tested with greater accuracy as excavation data become available. Unfortunately, the excavation of a single farmstead will not allow a comprehensive test of any model. However, by determining the type of use pattern exhibited by the Classic period component at LA 138960, we will be able to compare it with the extant models and, hopefully, determine what pattern of use is represented by this small site component. As more data on excavated field structures become available, these models (as well as others that might be developed) can be more carefully evaluated and their accuracy assessed.

Fieldhouse or Farmstead

The behavioral aspect of interest for the Classic period component at LA 138960 is the use of small sites. Pilles and Wilcox (1978:1) define small sites as those "whose size and artifactual assemblage suggest a limited temporal occupation by a small group of people, gathered at the locality to carry out a specific, seasonally-oriented set of activities."

In a Pueblo context, small sites reflect sets of activities that may or may not have also been performed at the primary residence. By studying small sites, it may be possible to isolate material traces that are indicative of discrete activities. Recognition of such traces can be an invaluable adjunct to the investigation and analysis of more permanent sites, where specific tool kits inevitably become mixed and obscured by later activities. More importantly, sites like LA 138960 represent part of the general Puebloan adaptive system. If only major villages are studied, our conclusions concerning prehistoric life will be skewed. By studying sites of all types we can develop a more accurate picture of prehistoric life.

The small size and location of the Classic period component at LA 138960 suggest that it was used by persons involved in agricultural pursuits. Sites of this nature are usually defined as fieldhouses. Unfortunately, this term has been applied to remains ranging from ephemeral clusters of rubble associated with sparse lithic and ceramic artifact scatters to substantial masonry structures of one to three rooms with associated middens. This tends to obscure variation in settlement systems and patterns of land use over time. Where one end of the continuum may represent ephemeral structures used for shelter during the work day or for overnight stays of limited duration by task-specific groups, the other suggests residence by an entire family for a season or more while engaged in farming. This variation may be indicative of the relationship of inter- and intragroup competition for arable land, the distribution of land suitable for cultivation, and the relative importance of farming in the subsistence system.

Preucel (1987:3–4) characterizes the Puebloan agricultural system as a network of permanently and seasonally occupied nodes. Villages and hamlets represent permanent nodes from which individuals circulated while fulfilling economic, cultural, and social needs. While much of the population may have resided at other locations during part of the year, these segments of the settlement system are considered permanent because they represent the nodes from which circulation originated. Villages were characterized by relatively large populations, and contained features related to systems of ritual integration. Like villages, hamlets contained larger populations than seasonally occupied nodes, but lacked ritually integrative elements like kivas. Hamlets were closely linked to villages through kin ties, and though they were occupied on a permanent basis, the population circulated between the two as social and ritual duties needed to be performed. Two types of seasonally occupied nodes are recognized—farming communities and fieldhouses (Preucel 1987:3–4). The former are small communities occupied during the growing season by more than one extended family group. Historically, many farming communities have become permanently occupied hamlets. Fieldhouses were small residences occupied during the growing season by nuclear families, and exhibit a tremendous variability in form. Both types of seasonal nodes lack ceremonial features.

This model is interesting because it provides for the use of multiple residences on a yearly basis rather than presuming that all activities originated at the primary locus of residence (village). Ethnographically, this seems to have been the norm. Bandelier (1892:15–16) noted that:

> Cultivable soil need not be in the immediate neighborhood of a village, or be contiguous to it. A pueblo might be, as is Acoma today, ten or even fifteen miles from its fields. The custom of emigrating en masse to these fields in summer, leaving at home only a small portion of the people to guard it, explains why we find ruins in places where the nearest tillable patch is quite distant.

While Bandelier's application of this process to prehistoric sites may be questionable, it was quite common in the historic pueblos:

> . . . there is the same tendency to huddle together in winter for protection and shelter, the same inclination to a change of abode in the summer, in every pueblo from Taos to Isleta, from Nambé to Zuñi and the Moquis. In summer, as is well known, the pueblos are nearly deserted. The Zuñis move to Pescado, to Aguas Calientes, to Nutria, etc., at distances of ten to twenty miles away; all the other tribes emigrate into their fields, leaving but a few families at home, until the time comes for housing the crops. Then the return begins, one after another the summer ranchos are abandoned; their inmates move the few household utensils they have taken with them in spring back to their original quarters . . . (Bandelier 1890:313–314)

Unfortunately, ethnographic observations like these must be applied to prehistoric sites with great care. For example, it is possible that historic farming communities and hamlets developed as village movement became circumscribed by Spanish Colonial law. By giving land ownership a legal definition, the ability of villages to relocate became restricted. The decision to move a settlement no longer belonged to villagers, but was now the purview of the colonial government. Thus, development of farming communities and hamlets may have been a function of European law rather than custom. Since the village could not relocate to a more suitable area, new locales were occupied seasonally and people returned to the main village after harvest.

Conversely, the use of farming communities and hamlets may have begun during the prehistoric period, and could represent an outgrowth of the development of large and closely integrated villages. The concentrated population of a large village would require at least the same amount of farmland as would a dispersed population of the same size; however, concentrating farmers in one location required some to cultivate distant fields. As the distance of fields from the village increased, so did the need for a nearby temporary residence. This need had an economic basis—as the distance to fields increased, so did the amount of time spent in travel. Additionally, the further fields were from the village, the more vulnerable they were to predation, both by animals and other humans. At times, groups of farmsteads may have formed dispersed communities, linked by kinship ties and membership in the same ritually integrated population (village). Eventually, such dispersed communities could become more closely integrated and form a hamlet, residing permanently away from the main village while maintaining kinship and ritual ties. Finally, when relocation became necessary or desirable, hamlets may have formed nuclei for new villages.

Little of this can be addressed by investigations at one site. However, this discussion does provide a perspective for examining information gathered from LA 138960. A small site represents only part of the settlement and adaptive system in which the occupants participated. Thus, it cannot be studied in a vacuum; regional data must be integrated with information obtained by more intensive studies to provide a comprehensive picture of the settlement and adaptive system. Dating will be critical in determining whether LA 138960 represents part of the traditional Pueblo settlement system or is indicative of changes caused by the imposition of a new legal and economic system by Spanish settlers. Another important question that must be addressed is where this site fits in the Pueblo settlement system—was it used on an erratic basis by a task-specific group, or was it a seasonal residence occupied by a nuclear family? Until specific dates and function are assigned, it will not be possible to understand the role it played in the Pueblo settlement and adaptive system.

Fieldhouses versus Farmsteads

Bruce Moore (1978, 1980) presents detailed discussions of Pueblo fieldhouses, or seasonally utilized farm shells (SUFS). He defines SUFS as architectural shells used seasonally by farmers for agrarian activities, which generally occur within or in close visual proximity to fields (Moore 1978:10). Wilcox (1978:25–26) essentially agrees with this definition, describing fieldhouses as architectural components of the subsistence-settlement system used as temporary residences located near or within fields or gardens and used during the growing season. They may contain storage facilities, but this is not necessary. These definitions make two aspects of the SUFS concept quite clear—they are located near or on agricultural land, and they are temporarily occupied.

Wilcox notes two important distinctions. First is the difference between fieldhouses and farmsteads. Fieldhouses are occupied seasonally by part of a family, and farmsteads serve as year-round residences for entire families (Wilcox 1978:26). A second distinction is made between temporary and masonry fieldhouses. The latter may have appeared coincident with the development of water and soil control systems, reflecting greater labor investment in agriculture (Wilcox 1978:28). It is possible that both types of features (masonry fieldhouses and water and soil control systems) correlate with increased frequency of field use and an attendant reduction in the fallow cycle, as well as with changes in the land tenure system (Wilcox 1978:28).

This distinction is important, and has been modified for this discussion. Rather than representing year-round occupation by a single family, farmsteads are a variety of seasonally occupied farming shells. In our model, year-round residency at a site suggests it was a permanent node and should be considered part of a dispersed community or hamlet. This distinction demonstrates an interpretive problem in Pueblo archaeology. Small structural sites are often recorded individually and considered to be independent occupational units, particularly when they contain a kiva. However, provided their basic function has not changed significantly in the last six to eight hundred years, kivas were used by organizations whose membership crosscut a range of kin groups and they reflect ritually integrative mechanisms at a community rather than kinship level. Just as every discrete group of rooms in a large village does not contain ritual space, it is not necessary for every room block in a dispersed community to have a kiva. Studies in the San Juan Basin (Marshall et al. 1979; Powers et al. 1983) and at Mesa Verde (Rohn 1977, 1989) have identified dispersed communities comprised of noncontiguous room blocks, many lacking kivas. Rather than reflecting a "rejection of the cheek-by-jowl existence of communal living" (Wilcox 1978:26 citing Bloch 1966:11), small permanent pueblos more likely represent segments of dispersed communities, whether kivas are present or not. Thus, small structural sites lacking kivas cannot be assumed to have functioned as fieldhouses or farmsteads. Only by looking for evidence of seasonal residence by task-specific groups or families can these varieties of SUFS be distinguished from small room blocks belonging to a dispersed village.

Moore (1978:10, 1980:9–10) has presented two lists of characteristics defining SUFS that can be combined into a model of expected SUFS attributes, which can be tested and refined by ethnographic and archaeological data. Though a rigorous test is beyond the scope of this study, the fit of observations made during data recovery to the expected pattern can be examined, and comparisons can be made to earlier studies of field structures that also used this model (Moore 2001; Moore et al. 2002). The following variables comprise the model:

1. Site morphology and composition: Though SUFS may vary in morphology and composition, no more than three rooms should be present. Each room should share at least one wall with another room. At least one room should be large enough to permit occupation by at least one adult. Floor areas should be (roughly) no larger than that of contemporaneous habitation rooms in the same settlement system. The structure should be isolated; no other contemporaneous architectural unit should be present.
2. Ritual architecture: Kivas and other ritual features should be lacking. As temporary components of the settlement system, SUFS lack ritual functions.
3. Site location: SUFS should be located where their view of nearby fields is unimpaired.
4. Material remains: The range of activities reflected in the artifact assemblage at a SUFS should be limited relative to habitation sites or villages.
5. Pattern of use: One or more of three patterns of use should be evident: (a) daily, where overnight use is restricted to the period of crop ripening; (b) seasonal, with continuous use during the farming season; (c) throughout the year by travelers.

SUFS exhibiting evidence of daily use by task-specific groups with limited overnight stays (pattern a) are fieldhouses, while those evidencing seasonal occupation by entire family groups (pattern b) are farmsteads. Occasional use by travelers and wayfarers (pattern c) should be archaeologically invisible since transitory overnight use normally leaves few material remains behind.

Other aspects of SUFS are more amenable to study at the regional level, but are mentioned because they are important to understanding the model. Moore (1978:11) feels that SUFS result from inconvenience rather than site aggregation, with the perception of inconvenience being sufficient reason to construct them; site aggregation alone is not a satisfactory explanation for their use. Additionally, SUFS and other small sites were extensions of the village. As such, villages cannot be studied in isolation; they are inextricably linked to support sites located around them, and no single site is representative of the entire adaptive system. Finally, SUFS probably contributed to social stability. Besides providing shelter for farmers, SUFS may have served as refuges for people who were weary of some aspect of village life and needed to escape from domestic tensions. This ability may have acted as a safety valve, preventing conflict and stress from building to the point where fissioning was the only alternative. At the very least, this mechanism may have slowed the process of group disintegration. However, it is doubtful that the resolution of conflict was responsible for the development of SUFS; rather, it is more likely that this function originated after they came into use.

Testing the Model

The test implications listed below should help determine whether LA 138960 was a fieldhouse, a farmstead, or part of a dispersed community. While it is unlikely that each test implication can be examined in detail with data from only one site, enough information should be recovered to allow an evaluation of site function relative to the SUFS model.

1. Site morphology and composition:
   If LA 138960 was a fieldhouse, the following characteristics are expected:
   a. A field shelter should be present. Possible types include shades, ramadas, or small structures. If a structure is present it should contain at least one and no more than three rooms.
   b. If more than one room is present, each should share at least one wall with another room.
   c. At least one room should be large enough to permit occupation by at least one adult.
   d. Floor areas in rooms should be consistent with the average for contemporaneous villages of the same settlement system or cultural tradition.
   e. There should be no other contemporaneous structures present.
   f. Evidence of substantial architectural effort should be absent. Structures should lack full-height masonry or adobe walls. Architecture should be unsuitable for cold season use.

   If LA 138960 was a farmstead:
   a. More than three rooms may be present.
   b. If multiple rooms are present, each should share at least one wall with another.
   c. One or more rooms should be large enough to permit occupation by more than one adult.
   d. Floor areas in rooms should be consistent with the average at contemporaneous villages of the same settlement system or cultural tradition.
   e. There should be no other contemporaneous structures present; however, detached

shades or ramadas providing exterior work space may be associated.

f. Evidence of substantial architectural effort may be present. Structures might possess full-height masonry or adobe walls. Architecture may be suitable for cold-season use.

If LA 138969 was part of a dispersed community:

a. The number of rooms in individual structures will vary considerably—while there may be as few as one or two rooms present, there can also be more than three.
b. If multiple rooms are present, they may not form a contiguous room block.
c. One or more rooms should be large enough to permit occupation by more than one adult.
d. Floor areas in rooms should be consistent with the average at contemporaneous villages of the same settlement system or cultural tradition.
e. Other contemporaneous structures should be located nearby.
f. Evidence of substantial architectural effort should be present. Structures should possess full-height masonry or adobe walls. Architecture should be suitable for cold-season use.

Though subjective judgments are included in this set of characteristics (how much space is required by a single adult?), most are quite specific. Excavation of the structure and examination of the site for evidence of features that were not visible during surface inspection will facilitate comparison of observed site morphology with expected patterns.

2. Ritual architecture:

Ritual architecture will be absent if the site was a fieldhouse or farmstead. Ritual objects related to farming may occur, but are not expected. If LA 138960 was part of a dispersed village, kivas and other ritual features may be present and generalized ritual objects might be recovered.

3. Site location:

Land with agricultural potential should be located in direct line of sight with the structure if LA 138960 was a fieldhouse or farmstead. If it was part of a dispersed village, arable land should occur nearby but will not necessarily be in direct line of sight.

4. Material remains:

The artifact assemblage should reflect a limited range of activities related to farming and equipment maintenance if the site was a fieldhouse. Trash should be surficial or restricted to shallow subsurface deposits. Material remains will be more substantial if the site was a farmstead. A midden should be located near the structure, and a range of activities suggesting occupation by an entire family should be reflected in the assemblage. Material remains should be even more substantial if the site was part of a dispersed village. A midden should be located 5+ m away from the structure, and a range of activities suggesting occupation by at least one family should be reflected in the assemblage.

5. Pattern of use:

A limited-use pattern should be evident if LA 138960 was a fieldhouse, reflecting daily use with occasional overnight stays. There should be evidence of continuous occupation for at least a season if it was a farmstead. Evidence of year-round occupation should be present if the site was part of a dispersed village.

This last characteristic is perhaps the most difficult characteristic to study, because the two use patterns proposed for SUFS may be indistinguishable from one another and, in some cases, from year-round occupancy. Fieldhouses should produce the fewest remains. Food preparation tools may be present, but food processing tools should be rare or nonexistent. Thus, manos and metates should be absent, and if present should demonstrate low cost and have little value beyond their immediate use. Artifacts associated with farming or tool maintenance may occur. Evidence of hunting or wild plant gathering might be present, but the processing of these foods should have occurred elsewhere unless they were used immediately after collection. Small animal remains should predominate in the faunal assemblage, reflecting hunting in fields to eliminate small herbivores or omnivores. Hearths should be outside the structure and designed for food preparation rather than heating. No human burials should occur at fieldhouses.

Farmsteads should contain artifacts reflecting a wide range of food preparation, tool production, and maintenance activities. Architecture suitable for cold-season use and interior hearths built for heating and cooking may occur, but ritual objects and features should be absent. There should be evidence of food processing as well as preparation—manos and metates might be present; in particular, if they would be broken or evidence little investment in manufacture. Trash disposal patterns may be less standardized and more haphazard than at sites occupied year-round. Middens should be shallow and may be very near the structure. There should be evidence of the consumption of a wide range of animal types and sizes. Human burials will be rare if they occur at all. Burial of more than a single individual is not expected, and the site may have been abandoned immediately after an inhumation occurred.

Year-round occupancy should be reflected by a wide range of food preparation, tool production, and maintenance activities in the assemblage. Architecture should be suitable for cold as well as warm-season use, and interior hearths should have been built for heating and cooking. Ritual architecture or objects may be present. Trash disposal should be standardized, with middens located 5+ m from the structure; trash deposits may be deep. There should be evidence of the consumption of a wide range of animal types and sizes. One or more human burials may occur, with placement in rooms, middens, or both. Site abandonment immediately after an inhumation occurred is not expected.

Data Required to Test the Model

Data needed to test this model for determining whether the Classic period component at LA 138960 represents a fieldhouse or a farmstead include architectural style and building techniques, feature types and placement, occupational date, range of activities performed, seasonality, location of fields, and the types and distribution of other components of the contemporary settlement system. Intensive investigations during data recovery should provide most of the requisite information. The exception to this are data concerning the contemporary settlement system, which must be obtained from other sources such as survey, testing, and excavation projects, such as that conducted at the adjacent site of LA 111333.

Architectural data will be recovered by totally excavating any structural remains than may still be present. Surface stripping and augering will be used to examine areas where external features that were not identified during earlier investigations might exist. Chronometric data will be recovered when available, and may include radiocarbon, tree-ring, and archaeomagnetic samples in addition to temporally diagnostic ceramic and lithic artifacts. By using several chronometric techniques to provide dates it should be possible to determine whether some of the results are erroneous. Inconsistent dates could reflect site reoccupation, use of old wood in fires, collection of artifacts from earlier sites for reuse, or the presence of an earlier component.

At least some information on subsistence and range of activities performed should be available from feature deposits and the artifact assemblage. However, testing results suggest that the artifact assemblage is very limited in size and the materials reflect the range of activities. Few data reflecting subsistence are expected to be recovered. Both of these expectations are related to the presumed function of this component, as well as the extent of damage sustained prior to testing. Ground stone tools used for processing vegetal foods may be present, but are not expected. The chipped stone assemblage should reflect a narrow range of activities related to farming tool maintenance and perhaps hunting. Ceramic artifacts should reflect food consumption and perhaps preparation, but no evidence for food storage should be present.

Floral and faunal remains can provide data on activities occurring at the site as well as seasonality. If faunal remains are recovered it may be possible to suggest whether hunting was restricted to fields (rodents and small herbivores), occurred throughout the area (small to large animals including nonherbivores), or occurred in another part of the settlement system (limited body parts represented). Floral remains may be obtained by taking flotation samples from features and cultural deposits. The presence of wild plant foods is indicative of collecting activities and can help determine the season of occupation as well as the relative importance of such foods in the diet. Faunal remains can also provide information on seasonality and the importance of wild dietary supplements. These data can help determine whether the site was occupied seasonally or year-round, and could be of critical importance in determining whether LA 138960 was indeed a fieldhouse.

If LA 138960 was a fieldhouse, fields should have been located near or next to the structure. As the site is at the edge of a perennial stream valley, the most likely location for fields is on the floodplain next to the stream, but that area is unfortunately outside project limits and cannot be investigated. Studies of Pueblo farming in other areas indicate that rather than concentrating farming efforts in one zone, Pueblo farmers tended to spread their fields across the landscape to take advantage of the generally patchy distribution of adequately watered arable soils, and to ensure that no single disaster would destroy an entire crop (Bradfield 1971; Moore et al. 2002). Studies near Taos and Pecos have shown associated surface artifact scatters adjacent to field structures with agricultural fields (Moore 1994; Moore et al. 2002). The surfaces of both of these fields were covered by diffuse scatters of lithic and ceramic artifacts lacking features, and in both cases analysis of subsurface sediments showed that these areas were used for growing corn. Though a similar diffuse surface artifact scatter was not found in association with LA 138960, a small nearby site (LA 111332) contains two clusters of artifacts (Hohman et al. 1998). LA 111332 may represent fields associated with LA 111333 and LA 138960. Because LA 111332 is outside the project limits and therefore is unavailable for study, samples for pollen analysis were taken from backhoe trench profiles at LA 111333. A similar strategy will be pursued at LA 138960.

4
DATA RECOVERY FIELD METHODS

Jeffrey L. Boyer, James L. Moore, and Steven A. Lakatos

This chapter provides a general overview of the techniques that will be used during data recovery investigations. The same general methods will be used to examine LA 84927, LA 89021, and LA 138960 as are used in examinations of all sites in the U.S. 84/285 Santa Fe to Pojoaque Corridor Project area. Each site has unique characteristics, however, and it is usually necessary to tailor investigative techniques to individual cases. This may include selecting certain areas for excavation, how areas around features are treated, and whether or not mechanical equipment is used. For more detailed coverage of project excavation methods, the reader is referred to the project field manual (Boyer et al. 2000).

General Field Methods

Horizontal Provenience: The Grid System

The first step in excavation will be to establish a Cartesian grid system across the site. The main site datum, usually designated as the intersection of 100 N and 100 E or 500 N and 500 E lines in the grid, will be used to reference all horizontal and vertical measurements. The main datum will only be moved if it is in an area that will be affected by excavation, or if it is removed or damaged during the time between investigation phases. A plan of the site will be prepared, illustrating the locations of excavation areas, structures, and features.

Surface collection and excavation units will be linked to the grid system. These units will be identified by the grid lines that intersect at their southwest corners. The basic excavation units will be 1-by-1-m grid units unless they are not the most efficient unit of excavation. This is particularly true in structures. Removing fill from structures, except when on or just above floor, by grid units may provide greater levels of horizontal and vertical control than are needed or desired. In addition, it can be very time consuming. While it is necessary and important to know what sediment stratum is represented, the grid location may not be as meaningful. Of course, both horizontal and vertical controls are important when deposits reflect specific cultural activities. Thus, excavation units may differ in size depending on the nature of the deposits being investigated.

It must also be remembered that grid systems are artificially imposed over sites. They are simply constructs used to provenience cultural materials and features so that their original relationships can be preserved for later study. Rarely do features conform to a grid system. When features are large it may be desirable to excavate by grid unit to obtain detailed data on placement of materials within them. However, excavation in grid units is often awkward in small features, especially when they extend into one or more units. Thus, features, rather than the grid units in which they occur, will usually be treated as independent excavation units.

Vertical Provenience: Strata and Levels

Two methods will be used to record vertical excavation units: strata and levels. Soil and sediment strata will be assigned unique numeric designations as they are encountered, and descriptions of each will be recorded on individual forms. Since the surface represents an arbitrary layer with no thickness, it will be designated Stratum 0 at each site. In order to track the sequence of strata from one area to another, each vertical excavation unit will also be assigned a level number, beginning with the surface. Again, since the surface is an arbitrary level with no thickness, it will be designated Level 0. The first vertical excavation unit will be labeled Level 1, the second Level 2, and so on. Since stratum and level numbers represent two completely different series, stratum numbers may not be in sequence as excavation proceeds downward, while level numbers will always be in sequence.

Just as the grid system will be linked to the main datum, so will all vertical measurements. All measurements will be made in meters below datum (mbd) to avoid problems encountered when dealing with both positive (below datum) and negative (above datum) measurements. Vertical measurements will be made consistent by assigning the main datum at each site an arbitrary elevation of 10.00 mbd. 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.

Before it is possible to delimit the extent and nature of soil or sediment strata, it is usually necessary to examine them in cross section. This requires the excavation of exploratory units, which will consist of 1-by-1-m grid units excavated in arbitrary 10 cm vertical levels. When natural divisions—soil or sediment strata—have been defined, they will be used to delimit the boundaries of a level. Outside exploratory grid units, strata will be used as the main units of vertical excavation. Exceptions may include noncultural deposits and cultural strata that are very thick and need to be subdivided to provide greater provenience control.

Vertical treatment of deposits will vary according to their nature. Cultural deposits will be carefully excavated to preserve as much of the vertical relationship between materials as possible. Although the relationship among artifacts in noncultural deposits is rarely meaningful, horizontal and vertical control will be maintained when appropriate. For example, abandoned structures were sometimes used for trash disposal, filling with debris discarded by the inhabitants of nearby houses that were still occupied. Conversely, others were simply left open to the elements, filling naturally with a combination of wind-blown soil and colluvial sediments. Cultural materials will usually be present in both cases, yet they have completely different meanings. Trash represents materials that were purposely discarded, and can often be separated by strata to determine the sequence of deposition. This may allow researchers to look for minute changes in the artifact assemblage. Artifacts in naturally deposited strata rarely have any similar meaning. Cultural deposits require careful excavation to preserve the relationship between artifacts discarded at different times. Noncultural deposits tend to be jumbled, and relationships between artifacts are almost always obscured because they were moved from their original contexts and redeposited.

Thus, accurate vertical controls may be unnecessary in some cases. While we will always attempt to excavate cultural deposits by stratum, that level of control will only be attempted in noncultural strata if it appears that it will provide data of potential importance to site interpretation. Excavation by strata is considered optimal in cultural deposits because soil layers tend to represent specific depositional episodes.

Augering

Soil augers can be effectively used to examine areas, at depth, with minimal effort and impact to archaeological structures, features, and deposits. Thus, we will make use of this technique to examine parts of sites to determine whether features or structures are present. In particular, systematic auger transects along the established Cartesian grid system will be used to examine parts of sites that exhibit no or ambiguous surface signs of structures or features. The interval between auger tests and the portions of sites investigated using this technique will be determined by the project director or site supervisor. When potential feature locations are encountered, more intensive excavation techniques can then be applied to investigate them. Soil removed from auger holes will be screened to determine whether cultural materials are present. Auger tests will be recorded on individual forms.

Recording Excavation Units

The excavation of a grid unit, or any other type of excavation unit, will begin by filling out a form for the surface that provides initial depths (mbd) and other pertinent information. Ending depths in mbd for each succeeding level will be recorded on relevant forms, providing a record of all excavations. A Grid Unit Excavation Form will be completed for each level, including the surface, and will describe the soil or sediment matrix, inventory cultural materials recovered, and provide other observations considered important by the excavator or site supervisor, including depths, stratum, and level. The description of the soil or sediment matrix should include information on cultural and non-cultural inclusions, presence of building rubble, evidence of disturbance, and how artifacts are distributed if variations are noticed.

Recovery of Cultural Materials

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. For instance, if chipped stone, ceramic, and bone artifacts are recovered from the same level in the same grid unit or the same stratum in the same room quadrant, they will all be identified by the same FS number. Any samples taken from that level or stratum will also receive the same number. The FS number will be the primary tool that will allow for maintenance of the relationships between recovered materials and associated spatial information.

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, as will at least a sample of soil from both cultural and noncultural strata in structures, as detailed later. Two sizes of screen, 1/4-inch and 1/8-inch mesh, will most often be used. While artifacts are usually large enough to be recovered by 1/4-inch mesh, some are too small to be retrieved by that size screen. These remains can also 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 -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 (such as hearths and ash pits) should be screened through 1/8-inch mesh, as should all soil and sediment at floor or living surface contacts. Other potential applications of this recovery method include culturally deposited strata and activity areas.

Cultural materials from certain types of strata will only be recovered by visual inspection. As discussed in more detail later, only a sample of soil or sediment from noncultural strata will be screened to recover cultural materials. Rather than simply ignoring artifacts from unscreened strata, however, cultural materials observed during excavation will be collected for analysis. While data from these proveniences may not be useful for some statistical analyses, they can be used to characterize site activities and spatial and temporal subdivisions of the site.

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, and should contain at least two liters of soil. 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.

Specific Field Methods: Structures, Features, and Extramural Areas

Most excavation will be accomplished using hand tools. However, in some cases it may be preferable to use mechanical equipment to expedite the removal of non-cultural deposits. Thus, it is possible that mechanical equipment will be used to strip noncultural overburden from buried extramural cultural strata, or in areas lacking surface remains. However, fill will be removed from structures by hand to avoid potential damage to remaining architectural elements. Methods of excavation will vary depending upon whether a structure, a feature, or an extramural area is being examined.

Structures

Individual numeric designations will be assigned to structures on a site, as well as to the rooms they contain. Excavation within rooms will begin by digging an exploratory trench, in 1-by-1-m grid units, from one wall to the center of, or completely across, a room. Soil and sediment in each unit will be screened through 1/4-inch mesh. Due to safety concerns, exploratory trenches will not exceed 1 m in depth. Below 1 m, adjacent unit(s) or quadrant(s) may be removed to provide room to avoid collapse. Exploratory trenches will be excavated by grid units to provide controlled samples and cross sections of the deposits. In some cases, this procedure will be repeated, perpendicular to the initial trench, to provide additional information on the filling processes. The exploratory cross section(s) will be profile mapped and the nature of the fill defined. Remaining fill will be excavated by quadrant. Quadrant boundaries will be determined by the locations of grid lines or exploratory trench(es) and, thus, may not always be the same size.

At least one quadrant, whether cultural or noncultural in nature, will be excavated by the defined strata. This method will provide a sample of materials associated with these strata, allowing for a more comprehensive understanding of the filling sequence. Recognizing that quadrants are rarely equal in size, the quadrant(s) selected for sampling will usually be the largest, in order to maximize the number of artifacts recovered from each stratum. However, a smaller quadrant may be chosen if defined strata are better represented. Factors determining quadrant selection include the presence of representative strata, obtaining a representative sample of associated materials, and the discretion of the site supervisor. For example, if a structure is filled with cultural deposits, more than one quadrant might be sampled. Remaining fill will be removed without screening, though artifacts will be collected when observed.

Excavation will halt between 5 and 10 cm above the floor to prevent damage to its surface during excavation. At this time, the grid system will be reestablished to permit more systematic sampling of materials near or in direct contact with the floor. This arbitrary layer, commonly referred to as floor fill, will be removed by grid unit and screened through 1/8-inch mesh. Finer control in recovering materials from these contexts is necessary since they are the most likely to have been deposited at or soon after the time of abandonment.

Following complete excavation of a structure, architectural details will be recorded on a series of forms. Building elements encountered during excavation should also be included. In particular, any roof elements found during excavation should be mapped and described. Samples of roof material, if encountered, should be collected for species identification. Descriptions of individual rooms will include information on wall dimensions, construction materials and techniques, and associated features. In addition, scaled plan and profile maps of each structure will be drawn, detailing the locations of rooms and internal features, artifacts found in direct contact with floors, and any other details considered important. A series of 35-mm black-and-white photographs will be completed for each structure showing its overall form, individual rooms, construction details, and the relationship of features with other architectural elements. In addition, photographs may be taken during excavation when warranted and 35-mm color slides may be taken at the discretion of the site supervisor.

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.

Features less than 2 m in diameter may be excavated differently than features greater than 2 m in diameter. After defining the horizontal extent of a feature less than 2 m in diameter, 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 scale 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.

Features greater than 2 m in diameter may be excavated by grid unit. The number of excavated grid units will be kept to a minimum and excavated by defined soil strata whenever possible. A sample of the feature fill, in this case one or more grid units, will be screened through -inch mesh; otherwise 1/8-inch mesh will be used. At least two perpendicular scale profiles will be drawn, and forms that describe, in detail, the shape and content will be completed. Features greater than 2 m in diameter that are not treated in this way will be excavated using the same methods applied to features less than 2 m in diameter. The method of excavation selected for a particular feature will be left to the discretion of the site supervisor.

Extramural Excavation Areas

Areas outside structures or around features like hearths, were often used as work areas. Thus, certain zones may be examined to determine whether work areas can be defined. Excavation in these zones will proceed by grid unit. Most soil and sediment encountered during these investigations will be screened through 1/8-inch mesh, though a smaller-sized mesh may be used to sample certain areas. Plans of each extramural area investigated will be drawn, detailing the excavation limits and location of any features.

Special Situations

Sensitive Materials

This category pertains to the discovery of culturally sensitive materials or objects of religious importance. At this time, the only special situations we can anticipate are human burials. Appendix 2 presents a plan for treatment and disposition of human remains, should they be encountered at the sites.

In accordance with the plan, human remains would be excavated using standard archaeological techniques, including definition of the burial pit, use of hand tools to expose skeletal materials, mapping and photographing the positions of the skeleton and grave goods.

After human remains or other sensitive materials are uncovered, no person will be allowed to handle or photograph them except as part of data recovery and repatriation efforts. Photographs of sensitive materials related to data recovery efforts will not be released to the media or general public.

Unexpected Discoveries

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. Procedures that will be followed in the event of an unexpected discovery will vary with the nature and extent of the find. Small features, structures, or cultural deposits that were not anticipated will be excavated according to the procedures outlined above. On the other hand, finds that have the potential to significantly alter the scope and intent of this plan will require consultation with the NMSHTD, the State Historic Preservation Division, the Bureau of Indian Affairs, and the Pueblo of Tesuque.

5
DATA RECOVERY STRATEGIES FOR LA 84927, LA 89021, AND LA 138960

Jeffrey L. Boyer

Our knowledge of LA 84927, LA 89021, and LA 138960 is limited to observations of surface materials and arroyo bank exposures. Consequently, data recovery excavations at the sites will proceed in phases oriented toward:

1. Assessing the nature, depth, and extent of deposits at each site, and
2. Recovering data from the components represented at each site.

Specific data recovery strategies for each site are listed below.

LA 84927

Phase 1: Site preparation and preliminary investigations.

1. Establish site grid (includes clearing trees within project limits, as needed).
2. Systematic surface artifact location within project limits will be used to identify areas of higher and lower artifact frequency.
3. Systematic artifact collection outside concentration areas (areas of higher surface artifact frequency).
4. Systematic augering, conducted in 4-m offset transects, will be used to locate buried deposits, features, and structures.
5. Preliminary site mapping.

Phase 2: Excavation of Developmental period structures, features, and deposits.

1. Concentrations of higher artifact frequency and areas where augering reveals buried deposits, features, or structures will be examined using hand excavation techniques, as discussed in Chapter 4.
2. Features, structures, and deposits will be excavated using hand techniques discussed in Chapter 4.
3. Continued site mapping.

Phase 3: Examination of possible buried Archaic deposits.

1. Mechanical equipment will be used to excavate a single trench within the existing right-of-way, to expose subsurface stratigraphy and to search for buried paleosols.
2. The trench will be inspected and profiles of the trench or selected portions of the trench will be drawn.
3. If features or evidence of cultural materials are found associated with paleosols in the trench, mechanical equipment will be used to remove sediments and soils above the paleosols, to expose the features or other cultural materials and facilitate their excavation.
4. Features, structures, and deposits will be excavated using hand techniques discussed in Chapter 4. Excavation will focus on recovery of materials amenable to chrono-

metric dating, primarily radiocarbon dating, in order to correlate paleosols and occupations at LA 84927 with those at other nearby sites.
5. Completed site mapping.
6. Following completion of hand and mechanical excavations, all excavation areas will be backfilled.

LA 89021

Phase 1: Site preparation and preliminary investigations.

1. Establish site grid (includes clearing trees within project limits, as needed).
2. Systematic surface artifact location within project limits will be used to identify areas of higher and lower artifact frequency.
3. Systematic artifact collection outside concentration areas (areas of higher surface artifact frequency).
4. Systematic augering, conducted in 4-m offset transects, will be used to locate buried deposits, features, and structures.
5. Preliminary site mapping.

Phase 2: Excavation of Puebloan structures, features, and deposits.

1. Concentrations of higher artifact frequency and areas where augering reveals buried deposits, features, or structures will be examined using hand excavation techniques, as discussed in Chapter 4.
2. Features, structures, and deposits will be excavated using hand techniques discussed in Chapter 4.
3. If no structures or features are defined, the "surface" component(s) of the site will be examined through excavation of no more than 30 1-by-1-m units. The number, configurations, and locations of the units will be determined by the site supervisor, based on surface artifact frequencies.
4. Continued site mapping.

Phase 3: Examination of possible buried Archaic deposits.

1. Banks of existing arroyos will be examined to identify subsurface stratigraphy, including buried paleosols. Profiles of the arroyos or selected portions of the arroyos will be drawn.
2. Mechanical equipment will be used to excavate trenches within the project limits, to expose subsurface stratigraphy and to search for buried paleosols. Trenches will be located approximately 10 m apart, parallel to the existing right-of-way fence.
3. The trenches will be inspected and profiles of the trenches or selected portions of the trenches will be drawn.
4. If features or evidence of cultural materials are found associated with paleosols in the trenches, mechanical equipment will be used to remove sediments and soils in 5-by-5-m blocks above the paleosols, to expose the features or other cultural materials and facilitate their excavation.
5. Features, structures, and deposits will be excavated using hand techniques discussed in Chapter 4. Excavation will focus on recovery of materials amenable to chronometric dating, primarily radiocarbon dating, in order to correlate paleosols and occupations at LA 89021 with those at other nearby sites.
6. Completed site mapping.

7. Following completion of hand and mechanical excavations, all excavation areas will be backfilled.

LA 138960

Phase 1: Site preparation and preliminary investigations.

1. Establish site grid (includes clearing trees within project limits, as needed).
2. Systematic surface artifact location within project limits will be used to identify areas of higher and lower artifact frequency.
3. Systematic artifact collection outside concentration areas (areas of higher surface artifact frequency).
4. Systematic augering, conducted in 4-m offset transects, will be used to locate buried deposits, features, and structures.
5. Preliminary site mapping.

Phase 2: Excavation of artifact concentrations, including possible Classic period fieldhouse structure and possible Developmental period surface and subsurface structures.

1. Concentrations of higher artifact frequency and areas where augering reveals buried deposits, features, or structures will be examined using hand excavation techniques, as discussed in Chapter 4.
2. Features, structures, and deposits will be excavated using hand techniques discussed in Chapter 4.
3. If no structures or features are defined, the “surface” component(s) of the site will be examined through excavation of no more than 30 1-by-1-m units. The number, configurations, and locations of the units will be determined by the site supervisor, based on surface artifact frequencies.
4. Continued site mapping.

Phase 3: Examination of possible buried Archaic deposits.

1. Banks of existing arroyos will be examined to identify subsurface stratigraphy, including buried paleosols. Profiles of the arroyos or selected portions of the arroyos will be drawn.
2. Mechanical equipment will be used to excavate trenches within the project limits, to expose subsurface stratigraphy and to search for buried paleosols. Trenches will be located approximately 15 m apart, perpendicular to the existing right-of-way fence.
3. The trenches will be inspected and profiles of the trenches or selected portions of the trenches will be drawn.
4. If features or evidence of cultural materials are found associated with paleosols in the trenches, mechanical equipment will be used to remove sediments and soils in 5 m by 5-m blocks above the paleosols, to expose the features or other cultural materials and facilitate their excavation.
5. Features, structures, and deposits will be excavated using hand techniques discussed in Chapter 4. Excavation will focus on recovery of materials amenable to chronometric dating, primarily radiocarbon dating, in order to correlate paleosols and occupations at LA 138960 with those at other nearby sites.
6. Completed site mapping.
7. Following completion of hand and mechanical excavations, all excavation areas will be backfilled.

6
ARTIFACT ANALYSES AND RESEARCH ISSUES

James L. Moore, C. Dean Wilson, Eric Blinman, Mollie S. Toll, Pamela McBride, and Nancy J. Akins

Because data recovery investigations at LA 84927, LA 89021, and LA 138960 are part of a larger project, artifact analyses will be fit into the existing research framework whenever possible. That analytical framework is detailed in Boyer and Lakatos (2000) and Moore et al. (2002). General analytical procedures and research issues from those discussions are summarized and restated here.

Native American Ceramics

C. Dean Wilson, James L. Moore, and Eric Blinman

Ceramic data will contribute to the research goals through frequencies of ceramic types and attributes for pottery from individual components, structures, and features (see Wilson [2000] and Moore et al. [2002:100–109] for extensive discussions of analysis and interpretive procedures for the project). Specific contributions will include support for dating inferences, discussions of ethnic affiliation, production and exchange patterns, and functional inferences from vessels assemblages. In order to examine these issues, a variety of data will be recorded for both attribute classes and ceramic type categories.

Attribute categories used in this study will be those employed in recent OAS projects in the northern Rio Grande (Wilson 2003). These categories include temper type, paint type, surface manipulation, postfiring modification, and vessel form. Other studies planned for subsamples of sherds 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 contains a large amount of embedded information. Ceramic types, as used here, refer to groupings identified by various combinations of paste and surface characteristics with known temporal, spatial, and functional significance. Sherds are initially assigned to specific production 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.

While a number of Rio Grande pottery types, and especially historic Tewa ceramic types have been formally defined and described (Batkin 1987; Frank and Harlow 1990; Harlow 1973; Mera 1939), many of these type definitions are based on whole vessels and tend to emphasize the organization of decoration. These types are often distinguished from each other by characteristics such as overall design field or shape that are only observable in complete vessels. Such distinctions are of limited use in studies of pottery from archaeological assemblages, which tend to be dominated by plain ware sherds. Thus, this analysis will include the definition and use of sherd-based categories that are more suitable for sherd collections. These informal type categories are designed to preserve as much temporal and traditional information as possible when sherd attributes are inadequate for confident assignment to a formal type.

A major ceramic contribution to the research goals of the project will be to developing site chronologies. The historical development of ceramic classifications in the Southwest has emphasized temporally correlated attributes in type definitions, but studies of attribute change independent of type can improve potential dating resolution (Blinman 2000). Other dating techniques (principally tree-rings, stratigraphic superposition, and historic records) have served to calibrate the patterns of ceramic change. The resulting regional chronologies allow the analyst to infer date ranges for ceramic assemblages from otherwise undated contexts, including both components and individual proveniences. Such dating contributions can be circular in that aspects of temporal change in pottery are used to establish the chronological framework for the study of the meaning of that change (Blinman 2000), and ceramic dates will be routinely compared against other sources of chronology to both detect errors and refine regional chronologies.

Temper and paste characterizations, along with any direct evidence of production (raw materials, tools, unfired pottery, or firing failures) provide an opportunity to examine issues associated with trends in the production and exchange of vessels. Binocular microscope observations of temper and paste will be the majority data source for these characterizations. Petrography will be used to confirm and refine resource and characterizations. Depending on sample characteristics, more precise paste characterizations may be warranted to distinguish regional production tracts. These patterns in turn will support inferences of social interactions within and between communities, both in terms of formal models of production and consumption and in terms of social networks and alliances. These issues are relevant to the reconstruction of prehistoric cultural patterns. Embedded within production and exchange interpretations are issues of the ethnicity of pottery production. While some studies have attempted to distinguish similar pottery forms produced by different ethnic groups though rim shape, surface manipulation, or temper size, there is considerable overlap in such attributes. Ultimately, detailed examination of pottery resources and manufacturing techniques will be required to argue any ethnic affiliation of pottery recovered from the site collections.

Functional qualities of vessel assemblages can be inferred from sherd data through the use of basic ware categories 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. However, such distinctions are not as easy to make for plain ware body sherds from historic northern Rio Grande vessels, because polishing on both sides is common in vessels of a variety of forms. Thus, while body sherds from many decorated vessels can be confidently assigned to basic vessel forms, many plain but polished utility ware body sherds can only be assigned to a series of descriptive categories representing combinations of surface treatments. In these wares, rim sherds will provide more specific information about vessel form.

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.

Detailed analysis of any whole vessels that might be recovered will provide more specific information about the use of pottery containers. Attributes that will be examined include shape, overall size, thickness, and wear and sooting patterns. Attempts will also be made to compare and relate patterns noted in sherd and vessel-based distributions. While sherds often reflect the context of pottery discard, the occurrence of complete vessels may provide information concerning actual loci of use.

Chipped Stone Artifacts

James L. Moore

The primary contributions of chipped stone analyses to the research goals will derive from data on material selection, reduction technology, and tool use (see Moore [2000c] and Moore et al. [2002] for more complete discussion of research issues and analysis techniques). 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 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 analytic 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. Analytic 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. Within historic assemblages, raw material selection had an additional functional consideration in that cherts and flints are the only materials suitable for fire-making.

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, multi-functional, and readily modifiable. Sedentary groups did not necessarily need to consolidate tools into a multi-functional, 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; 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

James L. Moore

The primary but not exclusive contribution of ground stone analysis data to the research goals will be through support of functional inferences (see Moore [2000d] and Moore et al. [2002] for more complete discussion of research issues and analysis techniques). 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 (Eric Blinman, pers. comm. 2003).

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 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.

Botanical Remains

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

Botanical data (macrobotanical and pollen) will provide information concerning subsistence strategies for both prehistoric and historic components of the sites. Assumptions, recommendations, and procedures for both field sampling and laboratory analysis are detailed for the

U.S. 84/285 project as a whole by Toll and McBride (2000) and Moore et al. (2002), and these are abstracted here.

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 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 generally wasted on strata such as trash fill, roof fall, and middens.

Floral studies provide direct evidence of the patterning of daily economic activities, contributing an informative layer of details to the emerging picture of subsistence emphases in the prehistoric and historic occupations in the northern Rio Grande Valley. Several lines of evidence suggest that the practice of farming in the northern Rio Grande Valley approached a model of mixed horticulture with hunting and gathering in the Developmental period, rather than intensive agriculture. Site locations on low terraces over major tributaries suggest settlement in relation to water and arable land, and cultigens have been found to be common in flotation samples but are not ubiquitous. It is not until after the Developmental period that more aggregated settlements and agricultural features such as checkdams and extensive gravel mulch fields suggest a determined effort to support significant human populations by farming. Despite this expectation of increasing agricultural dependence, the currently meager regional floral database reveals no significant differences between Developmental results and flotation sample results from subsequent occupations in the northern Rio Grande Valley. The components of LA 84927, LA 89021, and LA 138960 provide an opportunity to expand the comparative data sets and to examine the issue of prehistoric agricultural reliance on both local and regional levels. If components are determined to be nonresidential (such as fieldhouses), they will be valuable additions to the growing picture of the entire settlement systems.

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. Detailed sampling recommendations for the U.S. 84/285 project as a whole are presented in Toll and McBride (2000).

Botanical studies of archaeological deposits at LA 84927, LA 89021, and LA 138960 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 and James L. Moore

Faunal remains will contribute information concerning the animal elements of the local and regional environment, hunting strategies, dietary content, and food preparation techniques. Research topics and analysis procedures relevant to the U.S. 84/285 archaeological project as a whole are detailed by Akins (2000a) and Moore et al. (2002). Remains from LA 84927, LA 89021, and LA 138960 will contribute to the question of changing degrees of agricultural dependence from Archaic through Classic period occupations. If occupations are determined to be nonresidential (such as fieldhouses), the assemblages will contribute to our understanding of the seasonal logistics of the subsistence economy, including an assessment of the garden hunting model.

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).

Conventional views of northern Rio Grande prehistory generally hold that Developmental period populations depended primarily on agriculture (Wendorf and Reed 1955:142). However, there is a growing recognition that data from early Developmental sites indicate that economies were still predominantly hunting and gathering, with increasing dependence on horticulture (Anschuetz et al. 1997:94). Yet, the data to test either proposition are slim and they remain largely untested.

While the data are scant, some aspects consistently disagree with the garden hunting model outlined above. The number of taxa exploited is relatively high, consistent with exploitation of the immediate environment. However, the paucity of cottontail rabbits, which are the hallmark of the Southwestern garden hunting strategy, and the relative abundance of artiodactyl remains may suggest a different strategy. In areas where the garden hunting model fits well, artiodactyl indices (a measure of relative proportions of lagomorphs and artiodactyls calculated by dividing the combined counts of artiodactyls and large mammals by this sum plus the counts for lagomorphs) start low and increase over time, presumably with respect to agricultural commitment. For Chaco Canyon, the indices begin at 0.13 in early Basketmaker III assemblages and increase to 0.39 in Pueblo III assemblages (Akins 1999:11). For the Dolores Program sites from southwestern Colorado, the index starts higher at 0.58 for the A.D. 600 to 720 period, falls dramatically to 0.20 between A.D. 720 and 800, and eventually rises to 0.42 (Neusius 1986:214–253). Sites excavated in San Juan Basin and Rio Puerco drainage for the Transwestern Pipeline Project have indices that fall between 0.00 and 0.03 for all periods (Brown and Brown 1993:354–366). On the West Mesa of Albuquerque, Basketmaker sites have low indices (0.04) increasing to 0.08 and 0.32 at the Coors Road site (Sullivan and Akins 1994:141).

Indices for LA 103919 near Nambé start at 0.67 and increase to 0.97. The index for LA 835 is 0.94. Figures in this range are more typical of sites where agriculture was not the primary subsistence strategy or where the area was fairly marginal for agriculture and a greater emphasis was placed on hunting and gathering. An example of the former is LA 3333 in the Galisteo Basin, with an index of 0.83. The excavated portion of the site, which dates about A.D. 1200, consists of expedient pit structures that were maintained with minimal effort, abandoned, and filled with trash, suggesting intermittent, probably seasonal use by relatively mobile groups who used maize but not to the extent found in most Anasazi sites. Rabbits comprise only 10.4 percent of the assemblage, compared to 28.9 percent artiodactyl and 31.2 percent unidentified large forms (Akins, in prep.). San Antonio (LA 24), in Tijeras Canyon east of Albuquerque, is probably an example of the latter. Assemblages dominated by late black-on-white wares and a few early glaze wares have a fairly high artiodactyl index at 0.59, decreasing to 0.42 in deposits dominated by middle glaze wares, and increasing to 0.91 in those containing late glazes mixed with Hispanic occupation deposits dominated by domestic sheep (Akins, in press).

Our current information on faunal subsistence practices in the U.S. 84/285 project area does not support a model of even moderately intensive agricultural dependence at an early date. While it is possible that this is entirely an artifact of the small number of assemblages studied and poor preservation of small animal remains, the consistency within these samples suggests otherwise. The data may support Cordell's (1989:307) view that during the Developmental period the region was inhabited by groups pursuing a mixed strategy comprised of hunting, gathering, and horticulture with little constraint on group mobility, rather than an assumption of heavy reliance on agriculture (e.g., Wendorf and Reed 1955:142). Additional data from Archaic, Developmental, and Classic period components at LA 84927, LA 89021, and LA138960, especially if from nonhabitation contexts, will be valuable opportunities to test and further develop the emerging model of subsistence organization and degree of agricultural reliance.

Analyzed specimens will be identified using the Office of Archaeological Studies comparative collection supplemented by those at the Museum of Southwest Biology, when necessary. 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 implemented for the U.S. 84/285 project analyses are described in detail in Akins (2000a). They 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 misleading inflation of counts that can result from fragmentation and partial carcasses.

Human Remains

Nancy J. Akins and James L. Moore

All archaeological sites within the U.S. 84/285 project area have the potential to yield human remains as burials and to a lesser extent as isolated elements. This potential is correlated with the population size and occupation duration of the site components. Survey indications of the natures of the LA 84927, LA 89021, and LA 138960 occupations suggest that the Developmental period components may be residential, while the Archaic and Classic period components may be nonresidential. The probabilities of encountering human remains are higher in the former situation than in the latter. In any case, however, the components represent multiple time periods, and any human remains would contribute substantially to our understanding of changes through time within the prehistoric occupations.

Treatment protocols for archaeological human remains are governed by laws and regulations that are in turn determined by land status. Since LA 84927, LA 89021, and LA 138960 are located on Pueblo of Tesuque land, the Native American Graves Protection and Repatriation Act (25 U.S.C. 3002, 1990) states that any human remains and associated funerary objects, sacred objects, or objects of cultural patrimony belong to the lineal descendants or if the lineal descendants cannot be ascertained, to the tribe on whose land the objects were discovered. These groups must be consulted before any items are excavated or removed. The criteria for determining lineal descent (43CFR10.14) are fairly rigorous. Lineal descendants are individuals who can trace their ancestry directly without interruption by means of the traditional kinship system of the appropriate tribe. Consultations will be completed with Tesuque Pueblo concerning any human remains, funerary objects, sacred objects, or objects of cultural patrimony that might be encountered. All aspects of discovery, recovery, analysis, and final disposition will be agreed on before excavation begins. Steps of the consultation process and disposition are provided in Appendix 2.

Detailed descriptions of both field and laboratory procedures for human remains are discussed by Akins (2000b) and Moore et al. (2002), and those descriptions are abstracted here.

Life history information from the study of human remains can be extremely valuable when integrated into broader research perspectives on topics such as subsistence, diet, and demography (Martin 1994). Descriptions of mortuary treatment place the individual into a social context, which adds additional and valuable information concerning social, demographic, and economic conditions (Brown 1995:7; Larsen 1995:247). Recent mortuary analyses have approached a variety of topics, ranging from individual, gender, ethnic, political, and social identity, to interpersonal conflict, resource control, labor and organization, ritual and meaning, social inequality, trade, population dynamics, and residential patterning (Larsen 1995:260). Advances in analytic approaches provide important insights on heath, diet, genetic relationships, microevolution, and population characteristics, including questions of cultural affiliation between present and past groups (Buikstra and Ubelaker 1994:1). These potentials have moved studies of human remains from the position of descriptive appendixes to important elements of research programs.

Even the most basic analyses of human remains have the potential to contribute significant information on life during prehistory. Multiple indicators of age and sex can support conclusions of these aspects of identity. Human bones and teeth record conditions during life as well as at death (Goodman 1993:282). Several indicators of physiological stress are routinely monitored to assess general health. These include adult stature, which may result from undernutrition, and subadult size, which can indicate the timing of stress events. Sexual dimorphism tends to decrease with increased stress, or over time, increases with greater divisions of labor. Enamel defects, hypoplasias, or pitting are associated with specific physiological disruptions and can be relatively accurately assigned an age of onset. Dental asymmetry begins in utero and reflects developmental stress, while dental crowding can be nutritional or genetic. Dental caries reflect refined carbohydrates in the diet and can lead to infection and tooth loss. Dental abscessing can become systemic and life-threatening. Osteoarthritis and osteophytosis can indicate biomechanical stress. Osteoporosis, related to calcium loss and malnutrition, can be acute to severe during pregnancy and lactation, and can also affect the elderly. Porotic hyperostosis is related to iron deficiency anemia and leaves permanent markers. Periosteal reactions result from chronic systemic infections (Martin 1994:94–95). Although limited by the quality of preservation of bone and the integrity of the interment, all of these observations can be made without invasive or destructive analyses.

Prior to the initiation of the U.S. 84/285 project, detailed descriptive data were available for only a single mortuary population from the Nambé area (Akins 2003). The biological information on this small population is consistent with a settled group, largely dependent on agriculture. Indications of nutritional deficiency, infectious disease, or parasitism are high (50 percent for the children and 71 percent for the combined population plus an orbit that was not from any of the burials). Dental hypoplasias are generally attributed to stressful episodes such as those caused by malnutrition and infectious disease but can also be hereditary anomalies or result from localized trauma (Buikstra and Ubelaker 1994:56). All but one of the LA 103919 individuals have one or more teeth with up to three lines, suggesting that episodic stress was fairly common. Timing of the stress episodes is slightly later than that usually attributed to weaning stress between 2.5 and 4.0 years of age (Stodder 1984:78). In this population, over half the lines were developed after age three, possibly suggesting prolonged weaning or low resistance to infection. Dental caries, which are considered diagnostic of carbohydrate quality and quantity, dental abscesses, and the amount of attrition are all high in this population. Rates generally increase along with the horticultural component of the diet (Stodder 1989:181). In stature, the females fall within the range reported for the Southwest. The male, however, is larger than the means reported for a number of sites (Stodder 1989:185). All three females have healed cranial lesions. Degenerative joint disease (DJD) is prevalent in the three oldest individuals. All three have slight to moderate amounts of DJD in most joints and two have considerable development of osteophytes in the lower spine and disc herniations in the lower thoracic spine.

Metric observations indicate that the females spent a good deal of their time grinding corn as two of the three have greater maximum diameters of the humerus than the male, a large individual. Femur shaft shape is an indication of strength and of mobility. Smaller, more circular indices (midshaft anterioposterior diameter; midshaft mediolateral diameter) are associated with decreased mobility while higher ratios are characteristic of hunter-gatherers (Bridges 1996:118). All three females have essentially round femoral cross sections (1.04, 1.00, 1.07), while the male's is flattened mediolaterally (0.67), suggesting a sedentary group committed to agriculture. Mortuary treatment was similar in that all were found in pits, all were flexed or semiflexed, and all but one had their head oriented to the east. Other details differed and suggest no standard treatment.

One of the primary issues to be addressed by the U.S. 84/285 studies concerns the nature of the prehistoric occupations. Were residents a fairly mobile group who were seasonally sedentary or were residents more settled agriculturalists who inhabited the area on a permanent or a seasonal basis? If they were relatively mobile but seasonally sedentary, was this a recent adaptation to the Rio Grande environment or part of a long-term strategy modified by increasing population, acceptance of domestic plants as part of the subsistence system, or other factors? If they were relatively settled, but new to the area, what can the human burials tell us about their previous strategies and contemporary adaptations?

The existing picture outlined above is somewhat contradictory, indicating a complex and interesting situation. The human burials have all the hallmarks of a long-settled agricultural group. Yet other kinds of data, particularly the fauna, are more consistent with a relatively mobile strategy where hunting large mammals played a larger role than is found at most settled agricultural communities. Reconciling these divergent interpretations will require detailed comparisons with a variety of populations where the human adaptation is more straightforward. Populations from the La Plata area (settled agriculturalists), the Galisteo Basin (a late but mobile population), Peña Blanca (an Early Developmental population), San Antonio (an agricultural group who relied more on hunting), and published summary information (e.g., Stodder 1989) will provide the basis for these comparisons.

To address the nature of Late Developmental adaptation in the northern Rio Grande region, the study of any human remains recovered will be addressed as four basic areas of inquiry. The first concerns the evidence for mobility or the degree of sedentism and agricultural commitment of the groups who lived at the project area sites. Mortuary practices, simple metric measurements, demographic structure, indications of general heath and nutrition, and dental wear and carries frequencies all can give us some indication of the diet and mobility. Other methods, that require destruction of small pieces of bone, can provide fairly accurate indications of the diet of prehistoric populations. Strontium/calcium ratios characterize the amount of meat consumed by individuals, as does a broad spectrum of trace elements found in bone. Stable carbon isotope ratios in bone and tooth apatite are used to measure the dietary importance of maize (Buikstra and Ubelaker 1994:168–169).

The second question concerns whether the prehistoric inhabitants were recent migrants into the area, if so, from where, and who they were related to. Eric Reed (Wendorf and Reed 1955:153, 161) believed that the type of cranial deformation provided a clue to population movements. He suggested that because vertical occipital deformation rarely appeared in populations from the Rio Grande until fairly late, after A.D. 1300, its origin was to the west or from the Mesa Verde area and its presence was a mark of the arrival of immigrants from those areas.

Since Reed's time, the focus of study has shifted from cultural modifications such as cranial deformation to studies of genetic similarities based on metric and nonmetric variation. Interest in determining the genetic relationships between prehistoric groups has a long history in the Southwest. As early as 1931, Alex Hrdliçka published cranial measurements for a number of Southwestern prehistoric populations. Relying on population means, he concluded that there were two basic groups but no physical subdivisions related to "cultural taxonomic divisions" (Corruccini 1972:373).

A few of the more recent studies utilizing multivariate techniques have included groups that are later in time but could be related to the Developmental period population in the Rio Grande. Mackey's study of cranial measurements found relatively close relationships between those from Puye, Hopi, and Jemez, while a population from the Cochiti area was quite distant (Mackey 1977:480–481). A slightly later study with additional populations found Puye most closely related to those from San Cristobal and Kuaua, while an Arroyo Hondo population was closest to those from Pindi and Pecos Mission (Mackey 1980:175, 178). Schillaci et al. (1998, table 2, fig. 4) find that burials from Otowi are most closely related to Neil Judd's Pueblo Bonito burials, followed by those from Pot Creek near Taos. All of these interpretations must be qualified by variable sample sizes and by the comparison of populations dating to different time periods.

These studies suggest that cranial morphometrics have the potential to provide data on the origins and affinities of any human burials recovered by this project. Data collected by the author and by Michael A. Schillaci on additional populations will be used to assess these relationships. Data on nonmetric variation will be collected but at present, so little comparative material is published, it will serve mainly to provide baseline data for the area.

DNA analysis, a destructive analysis method, is a more precise method to determine affinities among modern, historic, and prehistoric groups (Buikstra and Ubelaker 1994:170). However, the limited application to other prehistoric populations makes it difficult to reach any conclusions. Another destructive analysis method which requires a small amount of bone and dental enamel (1 g each), compares stable strontium isotope ratios to assess whether individuals were raised in the area in which they were buried. Strontium signatures in the teeth reflect the time when the tooth was developed while the signature in bone constantly changes as bone remodels. If the signatures are different, movement from an isotopically distinct location can be inferred (Buikstra and Ubelaker 1994:172). Collection of samples for destructive analysis studies will be considered, but only following consultations with potential descendant groups.

A third objective is to assess the overall success of the group in terms of general health patterns within a comparative framework. Basic data will be compared to other populations, particularly those from the Southwest, to assess the relative success of these individuals and this particular adaptation.

Finally, a regional view of northern Rio Grande mortuary practices, beyond that outlined by Wendorf and Reed (1955) will be developed. According to Wendorf and Reed, burial during the Developmental period was flexed inhumation (1955:142). During the Coalition period, it was usually flexed inhumation, with some extended burials recorded but not precisely dated (Wendorf and Reed 1955:146). The same pattern was found during the Classic period: flexed inhumation with minor percentages or exotic examples of extended burials (Wendorf and Reed 1955:153). Surely, the shifting influences and population influxes proposed by Wendorf and Reed (1955:161), as well as changes in settlement pattern and population densities, should be reflected in the burial practices.

Burial excavation procedures will meet professional archaeological standards. This generally includes the identification of a burial pit and careful removal of fill within the pit. When possible, half the fill will be removed to provide a profile of the fill in relation to the pit and the burial. The pit, pit fill, burial goods, and burial will be examined and recorded in detail on an OAS burial form with special attention paid to any disturbance that may have taken place. Scaled plans and profiles and photographs will further document the burial and associated objects. Flotation and pollen samples will be taken from all burials. Disarticulated or scattered remains will be located horizontally and vertically, drawn, and photographed. Any associated materials and the potential cause of disturbance or evidence of deliberate placement will be recorded in detail.

Analysis methods will follow the procedures and conventions set out in Standards for Data Collection from Human Skeletal Remains (Buikstra and Ubelaker 1994). This comprehensive system focuses on the need to gain the maximum amount of comparable information by recording the same attributes using the same standards.

Chronometrics

James L. Moore

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 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. The multiple components of LA 84927, LA 89021, and LA 138960 will pose particular challenges for both isolating and dating the individual occupations. Several categories of chronometric data are potentially available from these sites, including dateable artifacts, radiocarbon samples, archaeomagnetic samples, and tree-ring samples. Each category can provide useful and important temporal information, but there are also problems associated with each. Various types of samples will be collected under different circumstances, as detailed below.

Artifact Dating

At least three categories of artifacts have the potential to provide dates, including pottery, chipped stone, and bone. It is likely that only pottery will provide the dating resolution needed to address research issues posed for Puebloan remains. Ceramic types that have been dated by tree-ring correlations can be especially useful, and an attempt will also be made to seriate the local ceramic sequence. If any of the components yield independent and high-precision chronometric results, this should help fine-tune both the prehistoric and historic ceramic sequence, and may improve the accuracy of dates assigned by pottery associations.

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.

Certain chipped stone materials are somewhat more useful for dating sites. The physical properties of obsidian allow it to be dated, but the results are often questionable and open to interpretation. This type of analysis is based on the tendency of obsidian to absorb moisture at a relatively constant rate, depending on certain factors. The first of these factors is source. Obsidians from different flows vary in composition and absorb moisture at different rates. This problem can be overcome by certain tests (such as x-ray refraction) that provide information on the elemental makeup of obsidians, allowing them to be assigned to sources with known hydration rates (if a match exists). Temperature and soil moisture also effect the rate at which obsidian absorbs moisture. By placing sensors on or next to sites to monitor variations in soil moisture and temperature over time, enough information can be gathered to take these effects into consideration.

However, even when obsidians are sourced and environmental information gathered, this dating method is fraught with potential problems (see Boyer [1997] for an examination of obsidian hydration dates from Developmental period sites). Foremost among them is determining what event is being dated. Obsidian is perhaps the best material available in the Southwest for production of chipped stone tools, and does not occur naturally in the Pojoaque area. Obsidian had to be imported, and therefore represents a desirable resource on abandoned sites. Thus, much of the obsidian on our sites may potentially have been salvaged from earlier sites in the area. Depending on where an artifact is sampled, analysis could date either period of use.

Many problems are associated with obsidian hydration analysis. This method may be used, but only when other types of chronometric data are unavailable. Since it appears that obsidian found on the surface or at shallow depths hydrates at different rates than specimens that are deeply buried where soil temperature and moisture content are more constant, analysis of samples from less than a meter deep is considered undesirable. If cultural deposits are that deep, it is unlikely that obsidian will be the only temporally sensitive material present. Thus, this material will only be used to provide chronometric information in extreme cases.

Bone is the third category of artifacts that can potentially provide temporal information. Like wood, bone contains a radioactive isotope of carbon that is amenable to accurate dating. However, floral specimens are better suited for this type of analysis, and it is unlikely that we will need to submit any bone for radiocarbon dating.

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 tossed a few bugs into the system. 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 absorb carbon. Samples of wood submitted for dating may contain numerous rings, each representing growth in a different year. Thus, rather than measuring a single event (when the tree died or was cut down), the dates of a series of growth years are averaged. 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 wood can be preserved for a long time in the Southwest, even when it is not in a protected location. Thus, wood used for fuel 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.

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 carbon-14 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. 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 obtaining only bark and outer rings instead of sending in a large lump of charcoal. This is often difficult and time consuming, but provides dates that are much more reliable.

We will only obtain radiocarbon samples in certain circumstances. Samples of fuel woods will not be submitted unless there are no other temporally sensitive materials available. Construction wood is the best type of material for radiocarbon dating, especially when it comes from small elements like latillas and lintels. Large elements, like vigas and posts, may be sampled, but it must be remembered that they were often salvaged from older structures and reused. Thus, they may be dating the occupation of another structure and not the one being investigated. Construction wood would be sampled as outlined above. Only bark (if available) and outer rings will be obtained. In general, these materials are more accurately dated by dendrochronology. However, deteriorated wood often does not survive the process of removal in good enough shape or with enough rings to make that type of analysis possible, and not all types of wood can be used for tree-ring dating. Radiocarbon samples may be obtained in these cases. The only other samples that may be considered for radiocarbon analysis are those that contain materials from annuals, or twigs and leaves from trees.

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 and hematite. 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 moves 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. Boyer's (1997) examination of chronometric dates from Developmental period sites in the Taos Valley showed that archaeomagnetic dating provided the best control for determining the ages of individual and groups of sites. 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.

Tree-Ring Dating

This method was developed in the early twentieth century, and is based on the tendency of growth rings in certain types of trees to reflect the amount of moisture available during a growing season. In general, tree-rings are wide in years with abundant rainfall, and narrow when precipitation levels are low. These tendencies have been plotted back in time from the present, in some cases extending over several thousand years. An absolute date can be obtained by matching sequences of tree-rings from archaeological samples to master plots.

This is the most accurate dating technique available because it can determine the exact year in which a tree was cut down. However, once again it is necessary to determine what event is being dated.

Because the reuse of wooden roof beams was common in the prehistoric and historic Southwest, it is not always possible to determine whether a date derived from a viga is related to the construction of the structure within which it was found, or to a previous use. Clusters of similar dates in roofing materials are usually, but not always, a good indication that the approximate date of construction is represented. Isolated dates may provide some information, but are often of questionable validity.

Another problem associated with tree-ring dating concerns the condition of the sample being analyzed. In order to apply an accurate date to an event (in this case, the year in which a tree stopped growing), the outer surface of the tree is needed. An exact date can be obtained only when the outer part of a sample includes the bark covering of the tree, or rings that were at or near the tree's surface. In addition, enough rings must be present to allow an accurate match with the master sequence. It is often possible to provide a date when only inner rings are present, but this will not be a cutting date.

Even considering the potential problems associated with this technique, it represents the best method available for dating sites in the Southwest. Samples of construction materials that appear to contain enough rings for analysis will be collected. Latilla and lintel fragments would be the best specimens for collection, since it is less likely that they were salvaged from earlier dwellings and reused. Since building materials were often salvaged from pithouses at the time of abandonment or soon after that event, few tree-ring samples will probably be available from these sites.

REFERENCES CITED

Acklen, John C., G. M. Brown, D. G. Campbell, A. C. Earls, M. E. Harlan, S. C. Lent, G. McPherson, and W. N. Trierweiler

1990 *Archaeological Survey Results for the Ojo Line Extension Project*, vol. 1. Archaeological Report No. 7. Public Service Company of New Mexico, Albuquerque.

Acklen, John C., Christopher A. Turnbow, and Dorothy Larson

1997 Conclusions and Recommendations. In *Ole*, vol. 3, Analysis, edited by John C. Acklen. TRC Mariah Associates and Public Service Company of New Mexico, Albuquerque.

Adams, Kathleen A.

1995 *Cultural Resource Survey of a Proposed Transmission Line Relocation and Upgrade on Tesuque Pueblo, Santa Fe County, New Mexico.* MAI Project 1301. Mariah Associates, Inc., Albuquerque

Adler, Michael

1993 Why is a Kiva? New Interpretations of Prehistoric Social Integrative Architecture in the Northern Rio Grande Region of New Mexico. *Journal of Anthropological Research* 49:319-346.

1994 Population Aggregation and the Anasazi Social Landscape. In *The Ancient Southwestern Community: Models and Methods for the Study of Prehistoric Social Organization*, edited by W. H. Wills and R. D. Leonard, pp. 85-101. University of New Mexico Press, Albuquerque.

Adler, Michael, and Richard H. Wilshusen

1990 Large-Scale Integrative Facilities in Tribal Societies: Cross-Cultural and Southwestern U.S. Examples. *World Archaeology* 22(2):133-146.

Agogino, George A.

1952 The Santa Ana Preceramic Site: A Report on a Cultural Level in Sandoval County, New Mexico. *The Texas Journal of Science* 1:32-37.

1953 The Santa Ana Preceramic Sites. *El Palacio* 60(4):131-140.

Ahlstrom, Richard V.

1985 The Interpretations of Archaeological Tree-Ring Dates. Unpublished Ph.D. dissertation, University of Arizona, Tucson.

Akins, Nancy J.

1999 Chacoan Anasazi Animal Use. Paper prepared for the Chaco Economy and Ecology Synthesis Group workshop, Tucson.

2000a Faunal Remains: Issues and Analyses. In *The Santa Fe to Pojoaque Corridor Testing Project: Archaeological Data Recovery from Five Sites and a Data Recovery Plan for the Prehistoric Sies Along U.S. 84/285 North of Santa Fe, New Mexico*, by J. Boyer and S. Lakatos, pp. 133-137. Archaeology Notes No. 265. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2000b Human Remains: Research Issues, Treatment, and Analysis. In T*he Santa Fe to Pojoaque Corridor Testing Project: Archaeological Testing Results from Five Sites and a Data Recovery Plan for the Prehistoric Sites along US 84/285 North of Santa Fe, New Mexico*, edited by Jeffrey L. Boyer and Steven A. Lakatos, pp. 149-156. Archaeology Notes 265. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2003 Human Remains. In *Excavations at LA 103919, A Developmental Period Site near Nambé Pueblo, Santa Fe County, New Mexico*, by Stephen Lentz. Archaeology Notes 199. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

in prep. LA 3333 fauna. Manuscript in possession of the author, Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

in press *Excavations at San Antonio de Padua, LA 24, NM 14, Bernalillo County, New Mexico.* Archaeology Notes 231. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Akins, Nancy J., Stephen S. Post, and C. Dean Wilson
2000 Life at the Edge: Early Developmental Period Mobility and Seasonality in the Northern Middle Rio Grande Valley. Paper presented at the Sixth Occasional Anasazi Symposium, Farmington.

Allen, Joseph W.
1972 *The Tsogue Highway Salvage Excavations near Tesuque, New Mexico.* Laboratory of Anthropology Notes No. 73. Museum of New Mexico, Santa Fe.

Allen, Joseph W., and Charles H. McNutt
1955 A Pit House Site Near Santa Ana Pueblo, New Mexico. *American Antiquity* 20(3): 241-255.

Andrefsky, William, Jr.
1998 *Lithics: Macroscopic Approaches to Analysis. Cambridge Manuals in Archaeology.* Cambridge University Press, Cambridge, United Kingdom.

Anschuetz, Kurt F.
1986 *Archaeological Excavation of Two Human Burials Within the U.S. 285 Right-of-Way at Pojoaque Pueblo, Santa Fe County, New Mexico.* Laboratory of Anthropology Notes No. 353. Museum of New Mexico, Santa Fe.

1995 *Archaeological Test Excavations at LA 21963/21964: Studies of a Middle to Late Developmental Habitation Site in the City of Santa Fe Historic District.* Southwest Report 359. Southwest Archaeological Consultants, Santa Fe.

Anschuetz, Kurt F., John C. Acklen, and David V. Hill
1997 Prehistoric Overview. In *Ole*, vol. I, *Context*, edited by John C. Acklen. TRC Mariah Associates and Public Service Company of New Mexico, Albuquerque.

Anschuetz, Kurt F., Timothy D. Maxwell, and John A. Ware
1985 *Testing Report and Research Design for the Medanales North Project, Rio Arriba County, New Mexico.* Laboratory of Anthropology Notes No. 347. Museum of New Mexico, Santa Fe.

Athearn, Frederic J.
1974 *Life and Society in Eighteenth-Century New Mexico, 1692-1776.* Ph.D. dissertation, Department of History, The University of Texas at Austin. University Microfilms International (no. 74-24,825), Ann Arbor, Michigan.

Bannon, John Francis
1963 *The Spanish Borderlands Frontier, 1513-1821*. Holt, Rinehart, and Winston, Inc., New York (1974 edition by University of New Mexico Press, Albuquerque).

Batkin, Jonathan
1987 *Pottery of the Pueblos of New Mexico, 1700-1940.* The Taylor Museum of the Colorado Springs Fine Arts Center. Colorado Springs.

Biella, Jan V.
1979 Changing Residential Patterns among the Anasazi, A.D. 750-1525. In *Archeological Investigations in Cochiti Reservoir, New Mexico*, vol. 4, *Adaptive Change in the Northern Rio Grande Valley,* edited by Jan V. Biella and Richard C. Chapman, pp. 103-144. Office of Contract Archeology, University of New Mexico, Albuquerque.

Biella, Jan V., and Richard C. Chapmam
1977a Survey of the Cochiti Reservoir: Presentation of Data. In *Archaeological Investigations in Cochiti Reservoir, New Mexico,* vol. 1, *A Survey of Regional Variability,* edited by J. V. Biella and R. C. Chapman. University of New Mexico, Office of Contract Archeology, Albuquerque.

1977b Significance of Cultural Resources in Cochiti Reservoir. In *Archeological Investigations in Cochiti Reservoir, New Mexico,* vol. 1, *A Survey of Regional Variability,* edited by Jan V. Biella and Richard C. Chapman, pp. 295-316. Office of Contract Archeology, University of New Mexico, Albuquerque.

Binford, Lewis R.
1980 Willow Smoke and Dogs Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45:4-20.

Binford, Lewis R., and Jeremy A. Sabloff
1982 Paradigms, Systematics, and Archaeology. J*ournal of Anthropological Research* 38(2):137-153.

Blackburn, Fred M., and Ray A. Williamson
1997 *Cowboys and Cave Dwellers: Basketmaker Archaeology in Utah's Grand Gulch.* School of American Research Press, Santa Fe.

Blinman, Eric
2000 The Foundations, Practice, and Limitations of Ceramic Dating in the American Southwest. In *It's About Time: A History of Archaeological Dating in North America*, edited by Stephen E. Nash, pp. 41-59. University of Utah Press, Salt Lake City.

Bloch, M.
1966 *French Rural History: An Essay on its Basic Characteristics*. University of California Press, Berkeley.

Bodine, John J.
1979 Taos Pueblo. In *Handbook of North American Indians*, vol. 9, *Southwest*, edited by A. Ortiz, pp. 255-267. Smithsonian Institution, Washington, D.C.

Boyer, Jeffrey L.
1994 Occupying the Taos Frontier: The Valdez Phase and Valdez Phase Sites. In *Studying the Taos Frontier: The Pot Creek Data Recovery Project*, by Jeffrey L. Boyer, James L. Moore, Daisy F. Levine, Linda Mick-O'Hara, and Mollie S. Toll, pp. 379-424. Archaeology Notes 68. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

1995 Anasazi Communities on the Taos Frontier: Introduction to Data Recovery on Blueberry Hill. In *The Blueberry Hill Road Testing Project: Results of Archaeological Test Investigations at 20 Sites and a Plan for Data Recovery Investigations at 12 Sites along Blueberry Hill Road, Taos County, New Mexico,* edited by Jeffrey L. Boyer and Sonya O. Urban. Archaeology Notes 182 (manuscript). Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

1997 *Dating the Valdez Phase: Chronometric Reevaluation of the Initial Anasazi Occupation of North-Central New Mexico.* Archaeology Notes 164. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2003 *A Plan for Additional Data Recovery at LA 391, U.S. 84/285 Santa Fe to Pojoaque Corridor, Santa Fe County, New Mexico.* Archaeology Notes 312. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Boyer, Jeffrey L., Nancy J. Akins, and Jessica Badner
2002 *Preliminary Report on Human Burials Recovered from LA 391, U.S. 84/285 Santa Fe to Pojoaque Corridor, Santa Fe County, New Mexico*. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Boyer, Jeffrey L., and Steven A. Lakatos
1997 Archaeological Clearance Letter for the Pojoaque South Project, US 84/285, Santa Fe County, New Mexico. On file at the Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Boyer, Jeffrey L., and Steven A. Lakatos, editors
2000 *The Santa Fe to Pojoaque Testing Project: Archaeological Testing Results from Five Sites and a Data Recovery Plan for the Prehistoric Sites along U.S. 84/285 North of Santa Fe, New Mexico.* Archaeology Notes 265. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Boyer, Jeffrey L., James L. Moore, and Steven A. Lakatos
2001 *U.S. 84/285 Santa Fe to Pojoaque Corridor: Preliminary Results of Data Recovery Investigations at Five Sites near Cuyamungue, Santa Fe County, New Mexico.* Archaeology Notes 296. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Boyer, Jeffrey L., James L. Moore, Daisy F. Levine, Linda Mick-O'Hara, and Mollie S. Toll
1994 *Studying the Taos Frontier: The Pot Creek Data Recovery Project.* Archaeology Notes 68. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Boyer, Jeffrey L., and Sonya O. Urban, compilers and editors
1995 *The Blueberry Hill Road Testing Project: Results of Archaeological Test Investigations at 20 Sites and a Plan for Data Recovery Investigations at 12 Sites along Blueberry Hill Road, Taos County, New Mexico.* Archaeology Notes 182 (manuscript). Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Bradfield, Maitland
1971 *The Changing Pattern of Hopi Agriculture.* Royal Anthropological Institute, Occasional Papers No. 30. London.

Breternitz, Cory D., and David E. Doyel
1987 Methodological Issues for the Identification of Chacoan Community Structure: Lessons from the Bis Sa'ani Community Study. *American Archaeology* 3:183-189.

Bridges, Patricia S.
1996 Skeletal Biology and Behavior in Ancient Humans. *Evolutionary Anthropology* 112-120.

Brown, Donald N.
1974 Social Structure as Reflected in Architectural Units at Picuris Pueblo. In T*he Human Mirror: Material and Spatial Images of Man*, edited by M. Richardson, pp. 317-338. Louisiana State University Press, Baton Rouge.

1999 Picuris Pueblo in 1890: A Reconstruction of Picuris Social Structure and Subsistence Activities. In *Picuris Pueblo Through Time: Eight Centuries of Change at a Northern Rio Grande Pueblo,* edited by M. A. Adler and H. W. Dick, pp. 19-42. William P. Clements Center for Southwestern Studies, Southern Methodist University, Dallas.

Brown, James
1995 On Mortuary Analysis–with Special Reference to the Saxe-Binford Research Program. In *Regional Approaches to Mortuary Analysis,* edited by Lane Anderson Beck, pp. 3-26. Plenum Press, New York.

Brown, Marie E., and Kenneth L. Brown
1993 Subsistence and Other Cultural Behaviors as Reflected by the Vertebrate Faunal Remains. In *Across the Colorado Plateau: Anthropological Studies for the Transwestern Pipeline Expansion Project, Subsistence and Environment*, vol. 10, edited by Joseph C. Winter, pp. 327-381. Office of Contract Archeology and Maxwell Museum of Anthropology, Albuquerque.

Bryan, Kirk
1939 Stone Cultures Near Cerro Pedernal and Their Geological Antiquity. *Bulletin of the Texas Archeological and Paleontological Society* 11:9-45. Abilene.

Buikstra, Jane E., Douglas K. Charles, and Gordon F. M. Rakita
1998 *Staging Ritual: Hopewell Ceremonialism at the Mound House Site, Greene County, Illinois.* Kampsville Studies in Archeology and History, No. 1. Center for American Archeology, Kampsville.

Buikstra, Jane E., and Douglas H. Ubelaker
1994 *Standards for Data Collection form Human Skeletal Remains.* Research Series No. 44. ArkansasArcheological Survey, Fayetteville.

Camilli, Eileen L.
1988 Lithic Raw Material Selection and Use in the Desert Basins of South-Central New Mexico. *The Kiva* 53:147-163.

1989 The Occupational History of Sites and the Interpretation of Prehistoric Technological Systems: An Example from Cedar Mesa, Utah. In *Time, Energy, and Stone Tools*, edited by R. Torrance, pp. 17-26. Cambridge University Press. Cambridge, Mass.

Campbell, John Martin, and Florence Hawley Ellis
1952 The Atrisco Sites: Cochise Manifestations in the Middle Rio Grande Valley. *American Antiquity* 17(3):211-221.

Carrillo, Charles M.
1997 *Hispanic New Mexican Pottery: Evidence of Craft Specialization 1790-1890.* LPD Press. Albuquerque, New Mexico.

2003 A History Of Santa Rosa De Lima De Abiquiú. In *Adaptations on the Anasazi and Spanish Frontiers: Excavations at Five Sites Near Abiquiú, Rio Arriba County, New Mexico,* by J. Moore, J. Boyer, and D. Levine. Archaeology Notes 187. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Casagrande, Joseph B., Stephen I. Thompson, and Phillip D. Young
1964 Colonization as a Research Frontier: The Ecuadoran Case. In *Process and Pattern in Culture: Essays in Honor of Julian H. Steward,* edited by R. Manners, pp. 281-325. Aldine Publishing, Chicago, Illinois.

Condie, Carol J.
1987 The Nighthawk Site (LA 5685), a Pithouse Site on Sandia Pueblo Land, Sandoval

County, New Mexico. In *Secrets of a City: Papers on Albuquerque Area Archaeology in Honor of Richard A. Bice*, edited by A. V. Poore and J. Montgomery, pp. 63-76. Papers No. 13. Archaeological Society of New Mexico, Albuquerque.

Connor, Seymour V., and Jimmy M. Skaggs
1977 *Broadcloth and Britches: The Santa Fe Trade*. Texas A & M University Press, College Station.

Cordell, Linda S.
1978 *A Cultural Resources Overview of the Middle Rio Grande Valley, New Mexico.* USDA Forest Service and USDI Bureau of Land Management, Santa Fe and Albuquerque.

1979 Prehistory: Eastern Anasazi. In *Handbook of North American Indians*, vol. 9, *Southwest*, edited by Alfonso Ortiz, pp. 131-151. Smithsonian Institution, Washington, D. C.

1984 *Prehistory of the Southwest.* Academic Press, New York.

1989 Northern and Central Rio Grande. In *Dynamics of Southwestern Prehistory,* edited by Linda S. Cordell and George J. Gumerman, pp. 293-335. Smithsonian Institution, Washington, D. C.

1995 Tracing Migration Pathways from the Receiving End. In *Special Issue: Migration and the Movement of Southwestern Peoples*, edited by Catherine M. Cameron. *Journal of Anthropological Archaeology* 14:203-211.

Cordell, Linda A., David E. Doyle, and Keith W. Kintigh
1994 Process of Aggregation in the Prehistoric Southwest. In *Themes in Southwest Prehistory,* edited by George J. Gumerman, pp. 109-133. School of American Research, Santa Fe.

Cordell, Linda S., and George J. Gumerman
1989 Cultural Interaction in the Prehistoric Southwest. In *Dynamics of Southwestern Prehistory,* edited by Linda S. Cordell and George J. Gumerman. Smithsonian Institution, Washington, D. C.

Cordell, Linda S., and Fred Plog
1978 Escaping the Confines of Normative Thought: A Reevaluation of Puebloan Prehistory. *American Antiquity* 44(3):405-429.

Corruccini, Robert S.
1972 The Biological Relationships of Some Prehistoric and Historic Pueblo Populations. *American Journal of Physical Anthropology* 37:373-388.

Crown, Patricia L., and Timothy D. Kohler
1994 Community Dynamics, Site Structure, and Aggregation in the Northern Rio Grande. In *The Ancient Southwestern Community: Models and Methods for the Study of*

Prehistoric Social Organization, edited by W. H. Wills and R. D. Leonard, pp. 103-117. University of New Mexico Press, Albuquerque.

Crown, Patricia L., Janet D. Orcutt, and Timothy A. Kohler
1996 Pueblo Cultures in Transition: The Northern Rio Grande. In *The Prehistoric Pueblo World, A.D. 1150-1350,* edited by Michael A. Adler, pp. 188-204. University of Arizona Press, Tucson.

Dean, Jeffrey S., and Gary S. Funkhouser
1995 Dendroclimatic Reconstructions for the Southern Colorado Plateau. In *Climate Change in the Four Corners and Adjacent Regions: Implications for Environmental Restoration and Land-Use Planning,* edited by W. Waugh, pp. 85-104. Mesa State College, Grand Junction, Colorado.

Dick, Herbert W.
1943 Alluvial Sites of Central New Mexico. *New Mexico Anthropologist* 6, 7(1):19-22.

Dickson, Bruce D.
1979 *Prehistoric Pueblo Settlement Patterns: The Arroyo Hondo, New Mexico, Site Survey.* Arroyo Hondo Archaeological Series, vol. 2. School of American Research Press, Santa Fe.

Dilley, Michael, David Barsanti, and Matthew Schmader
1998 *Archaeological Investigations at Three Sites in Tierra Contenta Phase 1B, Santa Fe.* Rio Grande Consultants, Albuquerque, New Mexico.

Doyel, David E., and Suzanne K. Fish
2000 Prehistoric Villages and Communities in the Arizona Desert. In *The Hohokam Village Revisited,* edited by D. Doyel, S. Fish, and P. Fish, pp. 1-35. Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Fort Collins, Colorado.

Dutton, Bertha P.
1963 *Sun Father's Way: The Kiva Murals of Kuaua, a Pueblo Ruin, Coronado State Monument, New Mexico.* University of New Mexico Press, Albuquerque.

Ellis, Florence H.
1975 Life in the Tesuque Valley and Elsewhere in the Santa Fe Area During the Pueblo II Stage of Development. *Awanyu* 3(2):27-49.
1987 The Long Lost "City" of San Gabriel del Yunque, Second Oldest European Settlement in the United States. In *When Cultures Meet: Remembering San Gabriel del Yunque Oweenge,* pp. 10-38. Sunstone Press, Santa Fe, New Mexico.

Ellis, Richard N. (editor)
1971 *New Mexico Past and Present.* University of New Mexico Press, Albuquerque.

Eschman, Peter N.
1983 Archaic Site Typology and Chronology. In *Economy and Interaction Along the Lower*

Chaco River, edited by P. Hogan and J. Winter, pp. 375-384. Office of Contract Archeology and Maxwell Museum of Anthropology, University of New Mexico. Albuquerque.

Espinosa, J. Manuel
1988 T*he Pueblo Indian Revolt of 1696.* University of Oklahoma Press, Norman.

Fiero, Kathleen
1978 *Prehistoric Garden Plots along the Lower Rio Chama Valley: Archeological Investigations at Sites LA 11830, LA 11831, and LA 11832, Rio Arriba County, New Mexico.* Laboratory of Anthropology Notes No. 111E. Museum of New Mexico, Santa Fe.

Forbes, Jack D.
1960 *Apache, Navajo, and Spaniard.* University of Oklahoma Press. Norman.

Fosberg, Stephen
1979 Geologic Controls of Anasazi Settlement Patterns. In *Archeological Investigations in Cochiti Reservoir, New Mexico,* vol. 4, *Adaptive Change in the Northern Rio Grande Valley,* edited by Jan V. Biella and Richard C. Chapman, pp. 145-168. Office of Contract Archeology, University of New Mexico, Albuquerque.

Frank, Larry, and Francis H. Harlow
1990 *Historic Pottery of the Pueblo Indians 1600-1800* (second edition). Schiffer Publishing, Ltd. West Chester, Pennsylvania.

Frank, Ross H.
1992 From Settler to Citizen: Economic Development and Cultural Change in Late Colonial New Mexico, 1750-1820. Ph.D. dissertation. Department of History, University of California at Berkeley. University Microfilms International, Ann Arbor, Michigan.

Franklin, Hayward H.
1992 Survey and Testing Ceramics from Tesuque Pueblo. Manuscript prepared for Quivira Research, Albuquerque.

Fuller, Steven L.
1989 *Research Design and Data Recovery Plan for the Animas-La Plata Project.* Four Corners Archaeological Project Report No. 15. Complete Archaeological Service Associates. Cortez, Colorado.

Gabin, Vickie L., and Lee E. Lesperance
1977 *New Mexico Climatological Data: Precipitation, Temperature, Evaporation, and Wind Monthly and Annual Means, 1850-1975.* W. K. Summers and Associates, Socorro, New Mexico.

Glover, Vernon J., and John McCall
1988 The Santa Fe Railway. In *Pecos: Gateway to Pueblos and Plains,* edited by J. Bezy

and J. Sanchez, pp. 112-117. Southwest Parks and Monuments Association, Tucson, Arizona.

Goodman, Alan H.
1993 On the Interpretation of Health from Skeletal Remains. *Current Anthropology* 34(1)281-288.

Hackett, Charles W. (editor)
1937 *Historical Documents Relating to New Mexico, Nueva Vizcaya, and Approaches Thereto, to 1773* (vol. 3), translated by A. Bandelier and F. Bandelier. Carnegie Institution, Washington D.C.

Hammack, Nancy S., Alan Ferg, and Bruce Bradley
1983 *Excavations at Three Developmental Period Sites Near Zia and Santa Ana Pueblos, New Mexico.* CASA Papers No. 2. Complete Archaeological Service Associates, Cortez, Colorado.

Hammond, George P., and Agapito Rey
1966 *The Rediscovery of New Mexico 1580-1594: The Explorations of Chamuscado, Espejo, Castaño de Sosa, Morlete, and Leyva de Bonilla and Humana.* University of New Mexico Press, Albuquerque.

Hannaford, Charles A., and Eric Blinman
2003a *An Archaeological Resources Inventory and Relocation Project in Advance of Highway Reconstruction along U.S. 84/285 from the Santa Fe Opera House Road to Cuyamungue, Santa Fe County, New Mexico.* Archaeology Notes 322. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Hannaford, Charles A., and Eric Blinman
2003b *An Archaeological Resources Inventory of Road Easement and Temporary Construction Permit Areas in Advance of Highway Reconstruction along U.S. 84/285 from the Santa Fe Opera House Road, Tesuque Flea Market, to Cuyamungue, Santa Fe County, New Mexico.* Archaeology Notes 324. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Hard, Robert J.
1983 A Model for Prehistoric Land Use, Ft. Bliss, Texas. *American Society for Conservation Archaeology Proceedings*, pp. 41-51.
1986 Ecological Relationships Affecting the Rise of Farming Economies: A Test from the American Southwest. Unpublished Ph.D. dissertation, University of New Mexico, Albuquerque.

Harlow, Francis H.
1973 *Matte-Paint Pottery of the Tewa, Keres, and Zuni Pueblos.* Museum of New Mexico Press, Santa Fe.

Haury, Emil W.
1976 *The Hohokam: Desert Farmers and Craftsmen.* The University of Arizona Press, Tucson.

Hayes, Alden C., Jon N. Young, and A. Helene Warren
1981 *Excavation of Mound 7, Gran Quivira National Monument, New Mexico.* USDI National Park Service, Publications in Archaeology 16. US Government Printing Office, Washington, D. C.

Hegmon, Michelle, Margaret C. Nelson, and Susan M. Ruth
1998 Abandonment and Reorganization in the Mimbres Region of the American Southwest. *American Anthropologist* 100(1):148-162.

Hewett, Edgar L.
1953 *Pajarito Plateau and its Ancient People.* School of American Research and University of New Mexico Press, Albuquerque.

Hibben, Frank (Franklin) C.
1941 *Evidences of Early Occupation in Sandia Cave, New Mexico, and Other Sites in the Sandia-Manzano Region.* Smithsonian Miscellaneous Collections 99(23). Washington, D.C.

1975 *Kiva Art of the Anasazi at Pottery Mound.* KC Publications, Las Vegas.

Hill, Jane H.
2001 Proto-Uto-Aztecan: A Community of Cultivators in Central Mexico? *American Anthropologist* 103:913-934.

Hohmann, John W., Margaret Davis, Joel D. Irish, Donald C. Irwin, and Christine H. Virden
1998 *Phase I (Class III) Archaeological Survey of 22.4 Kilometers (14 Miles) along U.S. 84/285, Santa Fe to Pojoaque, Santa Fe County, New Mexico.* Cultural Resource Group Clearance Report No. 48. Louis Berger and Associates, Inc., Santa Fe.

Holmer, Richard N.
1986 Common Projectile Points of the Intermountain West. In *Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings,* edited by C. Condie and D. Fowler, pp. 89-115. University of Utah Anthropological Papers No. 110. Salt Lake City.

Holschlag, Stephanie L.
1975 Pot Creek Pueblo and the Question of Prehistoric Northern Tiwa Household Organization. Unpublished Ph.D. dissertation, Washington State University, Pullman.

Hunter-Anderson, Rosalind
1979a Explaining Residential Aggregation in the Northern Rio Grande: A Competition Reduction Model. In *Archeological Investigations in Cochiti Reservoir, New Mexico,* vol. 4, *Adaptive Change in the Northern Rio Grande Valley,* edited by Jan V. Biella and Richard C. Chapman, pp. 169-175. Office of Contract Archeology, University of New Mexico, Albuquerque.

1979b Observations on the Changing Role of Small Structural Anasazi Sites in the Northern Rio Grande. In *Archeological Investigations in Cochiti Reservoir, New Mexico,* vol. 4, *Adaptive Change in the Northern Rio Grande Valley,* edited by Jan V. Biella and

Richard C. Chapman, pp. 177-186. Office of Contract Archeology, University of New Mexico, Albuquerque.

Irwin-Williams, Cynthia
1973 *The Oshara Tradition: Origins of Anasazi Culture.* Contributions in Anthropology 5(1). Eastern New Mexico University, Portales.

Ivey, James E.
1993 Seventeen Century Mission Trade on the Camino Real. In *El Camino Real de Tierra Adentro,* compiled by G. Palmer, J. Piper, and L. Jacobson, pp. 41-67. New Mexico Bureau of Land Management Cultural Resources Series No. 11. Albuquerque.

Johnson, Gregory A.
1982 Organizational Structure and Scalar Stress. In *Theory and Explanation in Archaeology,* edited by C. Renfrew, M. J. Rowlands, and B. A. Seagraves, pp. 389-421. Academic Press, New York.

1984 Decision-Making Organization and Pastoral Nomad Camp Size. *Human Ecology* 11(2):175-199.

Katz, Pearl
1974 Adaptations to Crowded Space: The Case of Taos Pueblo. In *The Human Mirror: Material and Spatial Images of Man,* edited by M. Richardson, pp. 300-316. Louisiana State University Press, Baton Rouge.

Kelley, Vincent C.
1979 Geomorphology of the Española Basin. In *New Mexico Geological Society Guidebook: Santa Fe Country (30th Field Conference),* pp. 281-288. University of New Mexico, Albuquerque.

Kelly, Robert L.
1985 Hunter-Gatherer Mobility and Sedentism: A Great Basin Study. Unpublished Ph.D. dissertation, Department of Anthropology, University of Michigan, Ann Arbor.
1988 The Three Sides of a Biface. *American Antiquity* 53(4):717-734.

Kennedy, Michael D.
1998 *Archaeological Investigations of Five Sites in the Santa Fe National Cemetery, Santa Fe, New Mexico.* Rio Grande Consultants, Albuquerque.

Kent, Susan
1989 Cross-Cultural Perceptions of Farmers as Hunters and the Value of Meat. In *Farmers as Hunters: The Implications of Sedentism,* edited by Susan Kent, pp. 1-17. Cambridge University Press, Cambridge.

Kintigh, Keith W.
1994 Chaco, Communal Architecture, and Cibola Aggregation. In *The Ancient Southwestern Community: Models and Methods for the Study of Prehistoric Social*

Organization, edited by W. H. Wills and R. D. Leonard, pp. 131-140. University of New Mexico Press, Albuquerque.

Kohler, Timothy A.
1989 Fieldhouses and the Tragedy of the Commons in the Anasazi Southwest. Paper presented at the 54th annual meeting of the Society for American Archaeology, Atlanta, GA.

Kohler, Timothy A. (editor)
1990 *Bandelier Archaeological Excavation Project: Summer 1989 Excavations at Burnt Mesa Pueblo.* Reports of Investigations 62. Department of Anthropology, Washington State University, Pullman.

Lakatos, Steven A.
2000a Letter report to Mr. F. Craig Conley, Environmental Program Manager, New Mexico State Highway and Transportation Department, March 6, 2000. NMSHTD No. MIP-084–6(59)177.

2000b Pit Structure Architecture of the Developmental Period (A.D. 600-1200). Paper presented at the Sixth Occasional Anasazi Symposium, Farmington, New Mexico.

2002 What is a Rio Grande Kiva? Origin and Development of Rio Grande Pit Structures. Paper presented the 67th annual meeting of the Society for American Archaeology, Denver.

Lakatos, Steven A., Steven S. Post and Jesse B. Murrell
2001 *Data Recovery Results from Two Archaeological Sites along North Ridgetop Road, Santa Fe, New Mexico.* Office of Archaeological Studies, Archaeology Notes 290. Museum of New Mexico, Santa Fe.

Lancaster, James W.
1983 An Analysis of Manos and Metates from the Mimbres Valley, New Mexico. Unpublished M.A. thesis, University of New Mexico, Albuquerque.

Lang, Richard W.
1992 *Archaeological Excavations at Dos Griegos, Upper Cañada de los Alamos, Santa Fe County, New Mexico: Archaic through Pueblo V.* Southwest Report 283. Southwest Archaeological Consultants, Santa Fe.

1993 *The Sierra del Norte Sites: Processing and Use at Flint Quarries of the Lower Santa Fe Range, New Mexico.* Southwest Research Series 241. Southwest Archaeological Consultants, Santa Fe.

1995 *Investigations of Limited Activity Sites at Bishop's Lodge in the Santa Fe Foothills.* Southwest Research Series 284. Southwest Archaeological Consultants, Santa Fe.

Lange, Charles H.
1968 *Cochiti Dam Archaeological Salvage Project,* Part 1: *Report on the 1963 Season.* Research Records No. 6. Museum of New Mexico, Santa Fe.

Larsen, Clark Spencer
1995 Regional Perspectives on Mortuary Analysis. In *Regional Approaches to Mortuary Analysis*, edited by Lane Anderson Beck, pp 247-264. Plenum Press, New York.

Larson, Dorothy L., and Robert Dello-Russo
1997 Site Structure. In *Ole*, vol. III, *Analysis*, edited by John C. Acklen. TRC Mariah Associates and Public Service Company of New Mexico, Albuquerque.

Lent, Stephen C.
1991 *The Excavation of a Late Archaic Pit Structure near Orowi, San Ildefonso Pueblo, New Mexico.* Archaeology Notes No. 52, Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Levine, Frances E., John C. Acklen, Jack B. Bertram, Stephen C. Lent, and Gale McPherson
1985 *Archeological Excavations at LA 16769.* Public Service Company of New Mexico Archeological Report No. 5. Public Service Company of New Mexico, Albuquerque.

Lightfoot, Ricky R.
1992 Archaeology of the House and Household: A Case Study of Assemblage Formation and Household Organization in the American Southwest. Unpublished Ph.D. dissertation, Washington State University, Pullman.

Linares, Olga F.
1976 "Garden Hunting" in the American Tropics. *Human Ecology* 4(4):331-349.

Lowell, Julie C.
1991 *Prehistoric Households at Turkey Creek Pueblo, Arizona.* Anthropological Papers of the University of Arizona, No. 54. University of Arizona Press, Tucson.

Lucas, Mary Beth
1984 Norton-Tesuque 115 Kv Transmission Project Earth Resources Technical Report. Ms. on file, Public Service Company of New Mexico, Albuquerque.

Mackey, James
1977 A Multivariate, Osteological Approach to Towa Culture History. *American Journal of Physical Anthropology* 46:477-482.
1980 Arroyo Hondo Population Affinities. In *The Arroyo Hondo Skeletal and Mortuary Remains*, by Ann M. Palkovich, pp. 171-181. School of American Research Press, Santa Fe.

Maker, H. J., H. E. Dregne, V. G. Link, and J. U. Anderson
1974 *Soils of New Mexico.* New Mexico State University Agricultural Experiment Station Research Report No. 285. Las Cruces.

Marshall, Michael P., John R. Stein, Richard W. Loose, and Judith E. Novotny
1979 *Anasazi Communities of the San Juan Basin.* Public Service Company of New Mexico and New Mexico State Historic Preservation Division, Albuquerque.

Martin, Debra L.
1994 Patterns of Health and Disease: Stress Profiles for the Prehistoric Southwest. In *Themes in Southwest Prehistory,* edited by George J. Gumerman, pp. 87-108. School of American Research Press, Santa Fe.

Martin, Paul S.
1963 *The Last 10,000 Years.* University of Arizona Press, Tucson.

Matson, R. G.
1991 *The Origins of Southwestern Agriculture.* The University of Arizona Press, Tucson.

McKenna, Peter J.
1992 *Cultural Resource Survey: Auger Tests for Watertable Monitoring at Tesuque, Nambe, Pojoaque, and Santo Domingo Pueblos, New Mexico.* Report TE92-055. USDI Bureau of Indian Affairs, Albuquerque Area Office, Albuquerque.

McNutt, Charles H.
1969 *Early Puebloan Occupations at Tesuque Bypass and in the Upper Rio Grande Valley.* Anthropological Papers No. 40. Museum of Anthropology, University of Michigan, Ann Arbor.

Mera, H. P.
1935 *Ceramic Clues to the Prehistory of North Central New Mexico.* Technical Series Bulletin No. 8. Laboratory of Anthropology, Museum of New Mexico, Santa Fe.

1939 *Style Trends of Pueblo Pottery in the Rio Grande and Little Colorado Cultural Areas from the 16th to the 19th Century.* Memoirs of the Laboratory of Anthropology 3. Museum of New Mexico, Santa Fe.

1940 *Population Changes in the Rio Grande Glaze Paint Area.* Technical Series Bulletin No. 9. Laboratory of Anthropology, Museum of New Mexico, Santa Fe.

Miller, John P., and Fred Wendorf
1958 Alluvial Chronology of the Tesuque Valley, New Mexico. *Journal of Geology* 66(2):177-194.

Moore, Bruce
1978 Are Pueblo Field Houses a Function of Urbanization? In *Limited Activity and Occupation Sites,* edited by A. Ward, pp. 9-16. Center for Anthropological Studies, Contributions to Anthropological Studies 1. Albuquerque.

1980 *Pueblo Isolated Small Structure Sites.* Ph.D. dissertation, Southern Illinois University. University Microfilms (no. 8017423). Ann Arbor, Michigan.

Moore, James L.
1993 *Archaeological Testing at Nine Sites along NM 502 Near San Ildefonso, Santa Fe County, New Mexico.* Archaeology Notes No. 35. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

1994 Prehistoric Agriculture in the Taos District. In *Studying the Taos Frontier: The Pot Creek Data Recovery Project*, by J. Boyer, J. Moore, D. Levine, L. Mick-O'Hara, and M. Toll, pp. 425-457. Archaeology Notes 68. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

1996 Analysis of the Santa Teresa Chipped Stone Artifact Assemblages. In *Archaeological Investigations in the Southern Mesilla Bolson: Data Recovery at the Santa Teresa Port-of-Entry Facility.* Archaeology Notes 188. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2000a *Archaeological Testing Report and Data Recovery Plan for Two Historic Spanish Sites along U.S. 84/285 between Santa Fe and Pojoaque, Santa Fe County, New Mexico.* Archaeology Notes 268. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2000b Physical Environment. In T*he Santa Fe to Pojoaque Corridor Testing Project: Archaeological Testing Results from Five Sites and a Data Recovery Plan for the Prehistoric Sites along U.S. 84/285 North of Santa Fe, New Mexico,* edited by Jeffrey L. Boyer and Steven A. Lakatos, pp.7-10. Archaeology Notes 265. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2000c Chipped Stone Artifacts: Research Issues and Analysis. In *The Santa Fe to Pojoaque Corridor Testing Project: Archaeological Testing Results from Five Sites and a Data Recovery Plan for the Prehistoric Sites along U.S. 84/285 North of Santa Fe, New Mexico,* edited by Jeffrey L. Boyer and Steven A. Lakatos, pp. 115-120. Archaeology Notes 265. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2000d Ground Stone Artifacts: Research Issues and Analysis. In *The Santa Fe to Pojoaque Corridor Testing Project: Archaeological Testing Results from Five Sites and a Data Recovery Plan for the Prehistoric Sites along US 84/285 North of Santa Fe, New Mexico,* edited by Jeffrey L. Boyer and Steven A. Lakatos, pp. 121-126. Archaeology Notes 265. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2001 *Prehistoric and Historic Occupation of Los Alamos and Guaje Canyons: Data Recovery at Three Sites Near the Pueblo of San Ildefonso.* Archaeology Notes 244. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2002a *Historic Occupation of the Glorieta Valley in the Seventeenth and Nineteenth Centuries: Excavations at LA 76138, LA 76140, and LA 99029.* Archaeology Notes No. 262. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2002b Rethinking Thirteenth to Fourteenth Century Migration into the Northern Rio Grande. Paper presented in the Symposium: Papers Honoring the Contributions of Cynthia Irwin-Williams to American Archaeology. 67th annual meeting of the Society for American Archaeology, Denver.

2003 *The Tesuque Y Project: Preliminary Results of Data Recovery Investigations at LA 111333 at the North Tesuque Y, Santa Fe County, New Mexico.* Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Moore, James L., Jeffrey L. Boyer, and Daisy F. Levine
n.d. *Adaptations on the Anasazi and Spanish Frontiers: Excavations at Five Sites near Abiquiu, Rio Arriba County, New Mexico.* Archaeology Notes 187. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Moore, James L., Jeffrey L. Boyer, and H. Wolcott Toll
2002 *The Tesuque Y Site: Archaeological Testing Results and a Plan for Data Recovery at LA 111333, U.S. 84/285 Santa Fe to Pojoaque Corridor, Santa Fe County, New Mexico.* Archaeology Notes 316. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Moore, James L., and Daisy F. Levine
1987 *An Archaeological Survey of Proposed Adjustments and Realignments to State Road 4, Santa Fe County, New Mexico.* Laboratory of Anthropology Notes No. 408. Museum of New Mexico, Santa Fe.

Moorhead, Max L.
1958 *New Mexico's Royal Road: Trade and Travel on the Chihuahua Trail.* University of Oklahoma Press, Norman.

Nelson, Margaret
1999 *Mimbres during the Twelfth Century: Abandonment, Continuity, and Reorganization.* University of Arizona Press, Tucson.

Neusius, Sarah W.
1986 The Dolores Archaeological Program Faunal Data Base: Resource Availability and Resource Mix. In *Dolores Archaeological Program: Final Synthetic Report*, compiled by David A. Breternitz, Christine K. Robinson, and G. Timothy Gross, pp. 199-303. Bureau of Reclamation, Engineering and Research Center, Denver.

Noyes, Stanley
1993 *Los Comanches: The Horse People, 1751-1845.* University of New Mexico Press, Albuquerque.

OAS (Office of Archaeological Studies)
1994a *Standardized Lithic Artifact Analysis: Attributes and Variable Code Lists.* Office of Archaeological Studies Archaeological Notes No. 24b. Museum of New Mexico, Santa Fe.

1994b *Standardized Ground Stone Artifact Analysis: A Draft Manual for the Office of Archaeological Studies.* Office of Archaeological Studies Archaeological Notes No. 24a. Museum of New Mexico, Santa Fe.

Orcutt, Janet D.
1990 Field Houses, Communities, and Land Use on the Pajarito Plateau. Paper presented in the symposium Small Sites in the Big Picture, 55th Annual Meeting of the Society for American Archaeology. Las Vegas, Nevada.

1991 Environmental Variability and Settlement Changes on the Pajarito Plateau, New Mexico. *American Antiquity* 56(2):315-332.

Parry, William J., and Robert L. Kelly
1987 Expedient Core Technology and Sedentism. In *The Organization of Core Technology*, edited by J. Johnson and C. Morrow, pp. 285-304. Westview Press, Boulder.

Peckham, Stewart
1954 A Pueblo I Site Near San Felipe Pueblo, New Mexico. In *New Mexico Highway Salvage Archaeology* 1(4):41-51. Museum of New Mexico, Santa Fe.

1957 Three Pithouse Sites Near Albuquerque, New Mexico. In *New Mexico Highway Salvage Archaeology* 3(12):39-70. Museum of New Mexico, Santa Fe.

1984 The Anasazi Culture of the Northern Rio Grande Rift. In *New Mexico Geologial Society Guidebook, 35th Field Conference: Rio Grande Rift, Northern New Mexico*, pp. 275-281. New Mexico Bureau of Mines and Mineral Resources, Socorro.

Pilles, Peter J., Jr., and David R. Wilcox
1978 The Small Sites Conference: An Introduction. In *Limited Activity and Occupation Sites*, edited by A. Ward, pp. 1-5. Center for Anthropological Studies Contributions to Anthropological Studies 1, Albuquerque, New Mexico.

Pilz, Wayne B.
1984 Norton-Tesuque 115 Kv Transmission Project Biotic Resources Technical report. Ms. on file at Public Service Company of New Mexico, Albuquerque.

Post, Stephen S.
1996 *Las Campanas de Santa Fe Sunset Golf Course, and Estates IV, Estates V, and Estates VII Excavations.* Archaeology Notes 193. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

1997 Archaeological Clearance Letter for Phase 2 of the Northwest Santa Fe Relief Route, Santa Fe County, New Mexico. On file at the Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

1999 *Excavation of LA 61315 and LA 61321 along the Northwest Santa Fe Relief Route (State Road 599), Phase 3, Santa Fe County, New Mexico.* Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2001 *The Archaic Sites Project: A Sample Archaeological Inventory of the Former Santa Fe Ranch Lease, Taos Field Office, Bureau of Land Management, Santa Fe County, New Mexico.* Santa Fe Northwest Advisory Council Report No. 2, Santa Fe, New Mexico.

2002 Linking Early Occupations of the Northern Rio Grande: The Northwest Santa Fe Relief Route (NM 599) and Peña Blanca (NM 22) Projects in Northern New Mexico. Paper presented at the 67th Annual Meeting of the Society for American Archaeology, Denver, Colorado.

Post, Stephen S., and Charles A. Hannaford
2002 *Data Recovery Plan for LA 134297, Located at Gonzales Elementary School, 851 West Alameda, Santa Fe, New Mexico.* Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Powers, Robert P., William B. Gillespie, and Stephen H. Lekson
1983 *The Outlier Survey: A Regional View of Settlement in the San Juan Basin.* Reports of the Chaco Center No. 3. National Park Service Division of Cultural Research, Albuquerque, New Mexico.

Pratt, Boyd C., and David H. Snow
1988 *The North Central Regional Overview: Strategies for the Comprehensive Survey of the Architectural and Historic Archaeological Resources of North Central New Mexico* (Vol. 1). New Mexico Historic Preservation Division, Santa Fe.

Preucel, Robert W.
1987 Settlement Succession on the Pajarito Plateau, New Mexico. *The Kiva* 53:3-33.
1990 *Seasonal Circulation and Dual Residence in the Pueblo Southwest: A Prehistoric Example from the Pajarito Plateau, New Mexico.* Garland Publishing. New York.

Quinn, Kathleen H.
1980 Prehistoric Anasazi Settlement and Subsistence Patterns in the Taos Region, New Mexico: An Alternative Perspective, A.D. 900-1400. Unpublished Master's thesis, The Catholic University of America, Washington, D. C.

Rappaport, Roy A.
1979 The Obvious Aspects of Ritual. In *Ecology, Meaning, and Religion*, by R. A. Rappaport, pp. 173-221. North Atlantic Books, Berkeley.

Reed, Erik K.
1949 Sources of Upper Rio Grande Pueblo Culture and Population. *El Palacio* 56:163-184.

Renaud, Etienne B.
1942 R*econnaissance Work in the Rio Grande Valley, Colorado and New Mexico.* University of Denver Department of Anthropology Archaeological Series No. 3, Denver.

1946 *Archaeology of the Upper Rio Grande Basin in Southern Colorado and Northern New Mexico.* University of Denver Department of Anthropology Archaeological Series No. 6, Denver.

Reynolds, S.E.
1956 *Climatological Summary, New Mexico: Temperature 1850-1954; Frost 1850-1954; and Evaporation 1850-1954.* Technical Report 5. New Mexico State Engineer's Office, Santa Fe.

Rohn, Arthur H.
1977 *Cultural Change and Continuity on Chapin Mesa.* The Regents Press of Kansas, Lawrence.

1989 Northern San Juan Prehistory. In *Dynamics of Southwest Prehistory,* edited by L. Cordell and G. Gumerman, pp. 149-177. Smithsonian Institution Press, Washington, D.C.

Roth, Barbara J. (editor)
1996 *Early Formative Adaptations in the Southern Southwest.* Monographs in World Archaeology No. 25. Prehistory Press. Madison, Wisconsin.

Sando, Joe S.
1979 The Pueblo Revolt. In *Handbook of North American Indians,* vol. 9, edited by A. Ortiz, pp. 194-197. Smithsonian Institution Press, Washington, D.C.

Sayles, E. B.
1983 *The Cochise Cultural Sequence in Southeastern Arizona.* Anthropological Papers No. 42. University of Arizona, Tucson.

Schaafsma, Polly
1992 *Rock Art in New Mexico.* Museum of New Mexico Press, Santa Fe.

Schaafsma, Polly, and Curtis F. Schaafsma
1974 Evidence of the Origins of the Pueblo Katchina Cult as Suggested by Southwestern Rock Art. *American Antiquity* 39(4):535-534.

Scheick, Cherie L.
1991 *A Research Design for the Investigation of Limited Activity Sites at Las Campanas de Santa Fe*. Draft Report. Southwest Report 287. Southwest Archaeological Consultants, Santa Fe.

Schillaci, Michael A., Erik G. Ozolins, and Thomas C. Windes
1998 A Multivariate Analysis of Craniometric Variation Among Ten Prehistoric Pueblo Indian Populations. Paper presented at the 71st Annual Pecos Conference, Pecos.

Schlanger, Sarah H.
1991 On Manos, Metates, and the History of Site Occupations. *American Antiquity* 56:460-474.

Schmader, Matthew, F.
1994 *Archaic Occupations of the Santa Fe Area: Results of the Tierra Contenta Archaeological Project.* Rio Grande Consultants, Albuquerque.

Scholes, Frances V.
1930 The Supply Service of the New Mexico Mission in the Seventeenth Century. *New Mexico Historical Review* 5:93-115, 186-210, 386-404.

1942 Church and State in New Mexico, 1610-1650. *Historical Society of New Mexico,* Publications in History, vol. 7. University of New Mexico Press Albuquerque.

Schroeder, Albert H.
1974 *A Brief History of Picuris Pueblo, A Tiwa Indian Group in North Central New Mexico.* Series in Anthropology, No. 2. Adams State College, Alamosa.

Schroeder, Albert H., and Don Matson, editors
1965 *A Colony on the Move: Gaspar Castano de Sosa's Journal*. School of American Research, Santa Fe.

Siegel, Bernard J.
1959 Some Structure Implications for Change in Pueblo and Spanish New Mexico. In *Intermediate Societies, Social Mobility, and Communication*, edited by V. F. Ray, pp. 37-44. American Ethnological Society, Seattle.

1965 Social Disorganization at Picuris Pueblo. *International Journal of Comparative Sociology* 6:199-206.

Simmons, Marc
1979 History of Pueblo-Spanish Relations to 1821. In *Handbook of North American Indians*, vol. 9, edited by A. Ortiz, pp. 178-193. Smithsonian Institution Press, Washington, D.C.

Simmons, Marc, and Frank Turley
1980 *Southwestern Colonial Ironworking.* Museum of New Mexico Press, Santa Fe.

Skinner, S. Alan, C. Shaw, C. Carter, M. Cliff, and C. Heathington
1980 *Archaeological Investigations at Nambe Falls.* Research Report 121. Archaeological Research Program, Department of Anthropology, Southern Methodist University, Dallas.

Smiley, Francis E., IV
1985 *The Chronometrics of Early Agricultural Sites in Northeastern Arizona: Approaches to the Interpretation of Radiocarbon Dates.* Ph.D. Dissertation, University of Michigan. University Microfilms International (8520986), Ann Arbor.

Snow, David H.
1993 Purchased in Chihuahua for Feasts. In *El Camino Real de Tierra Adentro*, compiled by G. Palmer, J. Piper, and L. Jacobson, pp. 133-146. New Mexico Bureau of Land Management Cultural Resource Series No. 11. Albuquerque.

Speth, John D., and Susan L. Scott
1989 Sedentism and Prehistoric Animal Procurement Among Desert Horticulturalists of the North American Southwest. In *Farmers as Hunters: The Implications of Sedentism*, edited by Susan Kent, pp. 80-95. Cambridge University Press, Cambridge.

Steen, Charlie R.
1977 *Pajarito Plateau Archaeological Survey and Excavations.* Report LASL-77-4. Los Alamos Scientific Laboratory, Los Alamos.

Steen, Charlie R., and Frederick C. V. Worman
1978 *Excavations on Mesita de los Alamos.* Report LA-7043-MS. Los Alamos Scientific Laboratory, Los Alamos.

Sternberg, Robert S.
1990 The Geophysical Basis of Archaeomagnetic Dating. In *Archaeomagnetic Dating*, edited by J. Eighmy and R. Sternberg, pp. 5-28. The University of Arizona Press, Tucson.

Stodder, Ann Lucy Weiner
1984 Paleoepidemiology of the Mesa Verde Region Anasazi: Demography, Stress, Migration. Unpublished Master's thesis, University of Colorado, Boulder.

1989 Bioarcheological Research in the Basin and Range Region. In *Human Adaptations and Cultural Change in the Greater Southwest*, by Alan H. Simmons, Ann Lucy Wiener Stodder, Douglas D. Dykeman, and Patricia A. Hicks, pp. 167-190. Research Series No. 32. Arkansas Archeological Survey, Fayetteville.

Stuart, David E., and Rory P. Gauthier
1981 *Prehistoric New Mexico: A Background for Survey.* Historic Preservation Bureau, Santa Fe.

Stubbs, Stanley A.
1954 Summary Report on an Early Pueblo Site in the Tesuque Valley, New Mexico. *El Palacio* 61(2):43-45.

Stubbs, Stanley A., and William S. Stallings, Jr.
1953 *The Excavation of Pindi Pueblo, New Mexico.* Monographs of the School of American Research no. 18. Museum of New Mexico Press, Santa Fe.

Suess, Hans E.
1986 Secular Variations of Cosmogenic C^{14} on Earth: Their Discovery and Interpretation. *Radiocarbon* 28:259-265.

Sullivan, Richard B., and Nancy J. Akins
1994 *Archaeological Investigations at LA 15260; The Coors Road Site, Bernalillo County, New Mexico.* Archaeology Notes 147. Museum of New Mexico, Office of Archaeological Studies, Santa Fe.

Thoms, Alston V.
1977 A Preliminary Projectile Point Typology for the Southern Portion of the Northern Rio Grande Region. Unpublished Master's thesis, Texas Tech University, Lubbock.

Toll, Mollie S., and Linda Huckell
1996 Guidelines for Standardizing Collection of Zea mays Morphometric Data: or How to Get the Most Out of Your Maize. Paper prepared for the 5th Southwest Paleoecology Workshop, Flagstaff, Arizona.

Toll, Mollie, and Pamela J. McBride
2000 Botanical Remains: Research Issues and Analysis. In T*he Santa Fe to Pojoaque Corridor Testing Project: Archaeological Testing Results from Five Sites and a Data Recovery Plan for the Prehistoric Sites along U.S. 84/285 North of Santa Fe, New*

Mexico, edited by Jeffrey L. Boyer and Steven A. Lakatos, pp. 127-133. Archaeology Notes 265. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

Tuan, Yi Fu, Cyril E. Everard, Jerold G. Widdison, and Ivan Bennett
1973 *The Climate of New Mexico* (revised edition). New Mexico State Planning Office, Santa Fe.

Turnbow, Christopher A.
1997 Projectile Points as Chronological Indicators. In *Ole*, vol. II, *Artifacts,* edited by John C. Acklen. TRC Mariah Associates and Public Service Company of New Mexico, Albuquerque.

Vierra, Bradley J.
1985 Hunter-Gatherer Settlement Systems: To Reoccupy or Not To Reoccupy, That is the Question. Unpublished M.A. Thesis, University of New Mexico, Albuquerque.

1990 Archaic Hunter-Gatherer Archaeology in Northwestern New Mexico. In *Perspectives on Southwestern Prehistory,* edited by P. Minnis and C. Redman, pp. 57-67. Westview Press. Boulder, Colorado.

1994 Archaic Hunter-Gatherer Archaeology in the American Southwest. In *Archaic Hunter-Gatherer Archaeology in the American Southwest*, edited by B. Vierra, pp. 5-61. Eastern New Mexico University, Contributions in Anthropology 13(1), Portales.

Viklund, Lonyta
1988 *A Predictive Model for Archaeological Remains in Santa Fe.* Southwest Report 211. Southwest Archaeological Consultants, Santa Fe.

Wendorf, Fred
1954 A Reconstruction of Northern Rio Grande Prehistory. *American Antiquity* 56(2):200-227.

Wendorf, Fred, and Erik Reed
1955 An Alternative Reconstruction of northern Rio Grande Prehistory. *El Palacio* 62:131-173.

Wetherington, Ronald K.
1968 *Excavations at Pot Creek Pueblo.* Report No. 6. Fort Burgwin Research Center, Taos.

Whitehouse, H.
1992 Memorable Religions: Transmission, Codification, and Change in Divergent Melanesian Contexts. *Man* 27(4):777-797.

Wilcox, David R.
1978 The Theoretical Significance of Fieldhouses. In *Limited Activity and Occupation Sites*, edited by A. Ward, pp. 25-32. Center for Anthropological Studies Contributions to Anthropological Studies 1, Albuquerque, New Mexico.

Wills, Wirt H., and Robert D. Leonard (editors)
1994 *The Ancient Southwestern Community: Models and Methods for the Study of Prehistoric Social Organization.* University of New Mexico Press, Albuquerque.

Wilson, C. Dean
2000 Ceramic Artifacts: Testing Results, Research Issues, and Analysis. In *The Santa Fe to Pojoaque Corridor Testing Project: Archaeological Testing Results from Five Sites and a Data Recovery Plan for the Prehistoric Sites along U.S. 84/285 North of Santa Fe, New Mexico*, edited by Jeffrey L. Boyer and Steven A. Lakatos, pp. 115-120. Archaeology Notes 265. Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2003 LA 103919 Ceramics. In *Excavations at LA 103919, a Developmental Period Site near Nambé Pueblo, Santa Fe County, New Mexico*, by Stephen C. Lentz. Archaeology Notes 199. Office of Archaeological Studies, Museum of New Mexico, Santa Fe. In press.

Winship, George P.
1896 *The Journey of Coronado, 1540-1542*. Fulcrum Publishing, Inc. (1990 edition), Golden, Colorado.

Worman, Frederick C. V.
1967 *Archaeological Salvage Excavations on the Mesita del Buey, Los Alamos County, New Mexico.* Report LA-3636. Los Alamos Scientific Laboratory, Los Alamos.

APPENDIX 2. TREATMENT OF SENSITIVE MATERIALS: HUMAN REMAINS AND ASSOCIATED OBJECTS

Nancy J. Akins, Eric Blinman, and Jeffrey L. Boyer

Following the intent of the Office of Cultural Affairs Policy on Collection, Display and Repatriation of Culturally Sensitive Materials (MNM Rule 11, adopted November 1, 1991), revised by Museum of New Mexico Collections Policy (‘ 11, approved May 20, 1999), all human remains are sensitive materials, as are associated funerary objects. These should be treated with the utmost respect and handled as little as possible. Under MNM Collection Policy (‘ 11-B, 4), the general public will be restricted from viewing and photographing human remains or associated funerary materials.

LA 84927, LA 89021, and LA 138960 are located on Pueblo of Tesuque lands. For archaeological sites on tribal lands, the Native American Graves Protection and Repatriation Act (NAGPRA; 25 U.S.C. 3002 [1990]) states that any human remains and associated funerary objects, sacred objects, or objects of cultural patrimony belong to the lineal descendants, or if lineal descendants cannot be ascertained, to the tribe on whose land the objects were discovered. These groups must be consulted before any items are excavated or removed from tribal land. The criteria for determining lineal descent are fairly rigorous (43 CFR 10.14). Lineal descendants are individuals who can trace their ancestry directly without interruption by means of the traditional kinship system of the appropriate tribe. Discussions with representatives of the Pueblo of Tesuque have resulted in the following guidelines for the treatment of human remains:

1. Upon any discovery of human remains, the designated representatives of the Pueblo of Tesuque will be contacted immediately, followed by the highway department representative, and the Bureau of Indian Affairs. Excavation will proceed to the extent necessary to establish that the human remains are archaeological and not part of a crime scene. That determination will be made in consultation with the Pueblo of Tesuque representatives, and a schedule for excavation will be discussed. If immediate full excavation is not possible, the immediate area of the discovery will be secured and covered, and full excavation will be deferred until it can be completed within a day.

2. Following consultation, full excavation will proceed when removal can be substantially completed within a work day, so as to minimize the risk of vandalism or other damage to the remains. Human burials are considered to be site features, for the purposes of excavation, and will be excavated according to procedures discussed in Chapter 4. No human remains will be left exposed in the field overnight or over a holiday or weekend without consultations with Pueblo of Tesuque representatives and without arrangements to maintain the security of the remains. The excavation will be fully documented with drawings and photographs, and only Tesuque representatives and official OAS staff will be allowed to take photographic images. All images will remain the property of the Pueblo of Tesuque.

3. Grave goods will be excavated simultaneously with the human remains. They will be documented with the burial, and a written inventory of all grave goods will be prepared dur-

ing excavation. That inventory will be submitted to Pueblo of Tesuque representatives upon the removal of the grave goods from the field.

4. Following completion of excavation, the human remains and grave goods will be conveyed to the secure facilities of the OAS, where they will be prepared for reburial. The reburial schedule will be determined by Pueblo of Tesuque representatives at the time the remains are excavated. Preparation will include surface cleaning, measurements, visual observations, and laboratory photographs. No destructive analyses will be permitted. Analyses of human remains will follow the procedures set out in Standards for Data Collection from Human Skeletal Remains (Buikstra and Ubelaker 1994).

5. Reburial will take place at a location and in a manner to be determined in consultation with representatives of the Pueblo of Tesuque. That location will be as near as possible to the original excavation location while considering issues of security, disturbance of archaeological deposits, and anticipation of future agents of disturbance. An inventory of each reburial (including grave goods) will be provided to the Pueblo of Tesuque, along with detailed documentation suitable for use by law enforcement officials should the human remains or grave goods ever be disturbed in the future. The reburial location will be identified in the confidential state archaeological site records (ARMS) as a reburial site, insuring that its preservation needs will be considered if any future development is proposed in the area of the reburial location.

6. All observations concerning human remains and grave goods that are carried out by OAS staff will be recorded in a separate report. That report will be provided to the Pueblo of Tesuque and to other appropriate agencies and individuals, but will not be distributed to the general public. Human remains and grave goods will be referred to in the general site report, but they will not be illustrated with photographs or given detailed exposure without the express permission of the Pueblo of Tesuque.

7. If isolated human bone is not recognized at the time of excavation and is discovered during the course of laboratory analysis, Pueblo of Tesuque representatives will be contacted immediately, as will the NMSHTD and the BIA. The isolated bone will be reburied as described above (see number 5).

8. These guidelines may be amended during the course of excavation by the action of the Pueblo of Tesuque Council.

In addition to human remains and associated objects, members of the Pueblo of Tesuque regard all ancestral materials to be worthy of reverent treatment, even if not having explicit sacred status. As such, the excavation of LA 84927, LA 89021, and LA 138960 will encounter objects of cultural patrimony or sacred objects. OAS personnel directing excavations at the three sites will bring any unusual artifacts and materials to the attention of Pueblo of Tesuque representatives during the course of excavation. All excavated artifacts and materials recovered from Pueblo of Tesuque land will remain under the control of the Pueblo of Tesuque during the processes of excavation and analyses, and may be subject to review and examination by Pueblo of Tesuque representatives at any time. No artifacts or other materials recovered from Pueblo of Tesuque land will be removed from Pueblo of Tesuque land without express written permission.

OAS staff will be permitted to document excavations on Pueblo of Tesuque land using film and digital photography. However, no personal photographs may be taken. All photographic images will remain the property of the Pueblo of Tesuque, although the OAS may use the photographic records for research purposes during analytical processes. The OAS may request permission to use images in the report of the results of excavations. Final disposition of records and images will be determined by the Pueblo of Tesuque in consultation with the OAS.