MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

ARCHAEOLOGICAL TEST EXCAVATIONS AND DATA RECOVERY PLAN FOR LA 86774 AND LA 86780 AT THE SANTA TERESA PORT-OF-ENTRY, DONA ANA COUNTY, NEW MEXICO

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ADMINISTRATIVE SUMMARY

Testing at two sites near the International Border for the Santa Teresa Port-of-Entry facility demonstrated that both have the potential to provide information on local prehistory. Both sites are entirely within the facility's construction limits. LA 86774 is a scatter of lithic and ceramic artifacts on private land. It contains at least two buried features including a hearth and probable pit structure. LA 86780 was exposed by blading conducted by the landowner several years before testing. Erosion has exposed an extensive scatter of lithic and ceramic artifacts and 13 features including 3 charcoal stains, 9 concentrations of burned rock, and a possible pit structure. Most of the site is on private land, with less than .1 percent along the south edge extending onto BLM land. A temporary road right-of-way situated on BLM land next to the border at the south edge of LA 86780 was also examined.

The only diagnostic artifacts at either site were brown ware sherds, providing estimated dates of A.D. 200 or 500 to 1600+. Because potentially important subsurface cultural features and deposits were encountered at both sites, a plan for scientific recovery of data was developed. Included in the plan are a discussion of local prehistory and environment, a research orientation, site descriptions, and field strategies.

MNM Project No. 41.533
ARPA Permit No. 21-8152-92-6
Archaeological Excavation Permit No. SE-80
Mechanical Excavation Permit dated 5-15-92

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INTRODUCTION

At the request of the Governor's Office, the Historic Preservation Division, and the General Services Division, the Office of Archaeological Studies of the Museum of New Mexico conducted test excavations at two sites in southern Doña Ana County, New Mexico. The sites are located adjacent to the International Boundary between the United States and Mexico, and are within construction limits for the proposed Santa Teresa Port-of-Entry facility. Test excavations were funded by the New Mexico State Highway and Transportation Department. Figure 1 shows the general project area.

LA 86774 and LA 86780 were recorded in 1990 by Batcho & Kauffman Associates during survey of 769 ha for the Port-of-Entry facility (Stuart 1990a). They were described as scatters of lithic, ceramic, and ground stone artifacts dating to the Formative period of the Jornada Mogollon. While LA 86774 seemed to be intact, LA 86780 was exposed by blading conducted several years before it was recorded. Subsequent erosion had exposed an extensive scatter of artifacts and features within the bladed area. The only temporally diagnostic materials found at either site were undifferentiated brown ware sherds, providing estimated dates of A.D. 200 or 500 to 1600+. Both sites were thought to be resource processing and procurement locales. Charcoal stains and burned rock concentrations were noted at LA 86780, but no features were found during survey at LA 86774. LA 86774 is on private land; LA 86780 is mostly situated on private land, with a small portion (less than .1 percent of total site area) extending onto land administered by the Bureau of Land Management. The latter consists of an 18.3-m-wide strip of land paralleling the International Border.

Field investigations were conducted between May 19 and June 6, 1992. The principal investigator was Timothy D. Maxwell; James L. Moore was project director. Field assistants included Laurel Wallace, Guadalupe Martinez, Lewis Kimmelman, Vernon Lujan, and Deborah Johnson. John Miller volunteered his services for part of the project and Ron Grimes of the New Mexico State Highway and Transportation Department operated the backhoe used for a substantial part of our studies. The report was edited by Robin Gould, and figures were produced by Ann Noble. Testing was conducted under Archaeological Excavation Permit SE-80, and by permission from Charles Crowder (letter of 5-14-92). Mechanical equipment was used under authorization of the Cultural Properties Review Committee (permit letter dated 5-15-92). Test excavations on BLM land was conducted under ARPA Permit No. 21-8152-92-6.

Both hand and mechanically excavated trenches were used to investigate subsurface deposits at these sites. Testing revealed that both sites have the potential to provide data on local prehistory, and a plan to recover this information was developed and is included in this report. The data recovery plan contains a research orientation and a strategy for implementing research goals through excavation and analysis. Specific site and assemblage attributes that may help to address the research questions are discussed. Also included are descriptions of the sites and testing results, a discussion of regional prehistory and history, and information on the local environment. Site location information is included as Appendix 1.

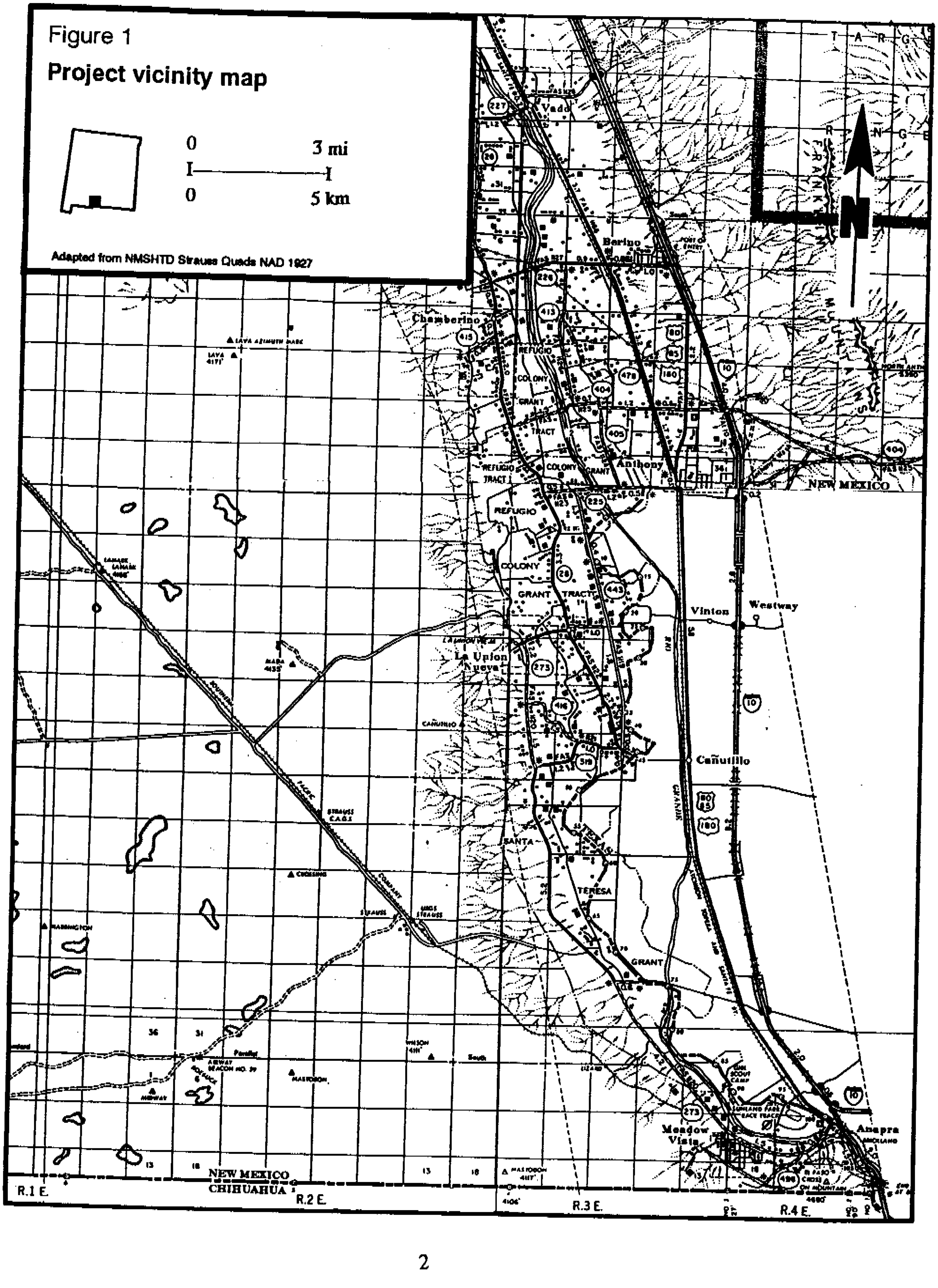
Figure 1
Project vicinity map
0
3 mi
0
5 km
Adapted from NMSHTD Strauss Quads NAD 1927
Vado
Berino
Chamberino
Anthony
NEW MEXICO
Vinton
Westway
La Union
Canutillo
Anapra
Meadow Vista
NEW MEXICO
CHIHUAHUA
R.1 E.
R.2 E.
R.3 E.
R.4 E.

PREHISTORY OF THE REGION

Paleoindian

The earliest occupation of the Southwest was during the Paleoindian period, which contains three broad temporal subdivisions: Clovis (10,000-9500 to 9000 B.C.), Folsom (9000-8500 to 8500-8000 B.C.), and Plano (8300-8000 to 5500-5000 B.C.) (Agogino 1968; Irwin-Williams 1965, 1973; Irwin-Williams and Haynes 1970; Neuman 1967). In the past, Paleoindians have been classified as big-game hunters, but recent research has changed this. Evidence suggests that the Clovis people were generalized hunter-gatherers (Stuart and Gauthier 1981:31). Folsom and Plano groups turned increasingly toward the specialized hunting of migratory game, particularly bison. This shift may have been caused by the extinction of megafauna and changes in vegetation patterns caused by late Pleistocene environmental shifts.

Archaic

The Archaic tradition emerged at the end of the Paleoindian period and was based on the use of a broad range of plant and animal foods. The source of this population is unresolved. While Haury (1983) and Stuart and Gauthier (1981) feel that it developed locally out of a Paleoindian base, Irwin-Williams (1965, 1973) and Irwin-Williams and Haynes (1970) feel that Archaic peoples moved into a vacuum caused by the retreat of Paleoindians onto the Plains. This period is sometimes also referred to as Preceramic, because the manufacture of pottery is often used to separate it from later periods.

Four Archaic traditions are defined--western, southern, northern, and southeastern (Irwin-Williams 1979). The western Archaic is the Pinto-Amargosa of southern California and western Arizona. The southern tradition is the Cochise, extending from northern Chihuahua to southeastern and central Arizona and southwestern and central New Mexico (MacNeish and Nelken-Turner 1983). The Oshara is the northern tradition, and occupies southern Colorado and northern New Mexico. The southeastern tradition is the Chihuahua, which extends from Chihuahua into south-central New Mexico (MacNeish and Beckett 1987).

Irwin-Williams (1979:38) considers the principle feature of these broadly related traditions to be a low-level but large-scale communication system, reflected by the rapid spread of subsistence elements and the sharing of stylistic elements over large areas. Moore (1980) agrees with this, concluding that what are usually considered separate traditions may simply be variations within a widespread communication system. On the basis of assemblage similarities, Irwin-Williams (1979) concludes that the Oshara and Pinto-Amargosa complexes form the ends of a population continuum, possibly reflecting a common cultural derivation. The Cochise is considered relatively distinct, while the Chihuahuan tradition seems to be more closely related to the Cochise than the Oshara (MacNeish and Beckett 1987).

The Chihuahua Tradition is summarized and described by MacNeish and Beckett (1987). Their tentative sequence contains four periods: Gardner Springs complex (6000 $\pm$ 500 to 4000

± 300 B.C.), Keystone phase (4000 ± 300 to 2500 ± 200 B.C.), Fresnal phase (2500 ± 200 B.C. to 900 ± 200 B.C.), and Hueco phase (900 ± 200 B.C. to A.D. 250 ± 200) (MacNeish and Beckett 1987:10-16). The Gardner Springs complex is poorly defined, and is represented by small sites containing Jay, Bat Cave, Aboloso, and Bajada points. The economy seems to have been based on hunting and gathering, and site locations suggest a degree of seasonal scheduling.

The Keystone phase is better represented by excavated materials. Diagnostic projectile points include Pelona, Todsen, Amargosa, and Amalgre types from excavated contexts, with the addition of Langtry, Shumla, Trinity, and Bat Cave types from surface contexts. There is some evidence of seasonal scheduling during this period, and a pithouse excavated at Keystone suggests a degree of sedentism. Squash seeds dating to 3434 B.C. were recovered at Todsen Shelter, suggesting that domesticates were present by that time. These people seem to have been mobile foragers, forming macrobands during the winter (and perhaps summer), and living in microbands during the rest of the year.

Better survey and excavation data is available for the Fresnal phase. Diagnostic projectile points include the Fresnal, Augustín, Chiricahua, Nogales, Todsen, La Cueva, Maljamar, San Jose, and possibly Pedernales types. Domesticates included corn (Chapalote and local proto-Maiz de Ocho) and pumpkins. Evidence suggests that pithouses or base camps were occupied along the Río Grande, with other zones being exploited seasonally.

The Hueco phase was the first to be described (Lehmer 1948), and MacNeish and Beckett (1987) have added more data to that base. Diagnostic projectile points include the San Pedro, Hatch, Hueco, and Fresnal types. A number of domesticates were used including corn (Chapalote, local proto-Maiz de Ocho, Maiz de Ocho, and Pima-Papago), squash, beans, and amaranth. A logistically organized society is suggested, with task groups operating out of macroband camps situated along rivers (MacNeish and Beckett 1987). However, this is conjectural, and the data could also reflect a mixture of logistically organized cold season and forager-organized warm season occupations.

Jornada Mogollon

The post-Archaic occupation of south-central New Mexico is the Jornada Mogollon, and was first described by Lehmer (1948). Three phases were defined, spanning the period between A.D. 900 and 1400. These phases are often collectively labeled the Formative period (O'Laughlin 1980; Ravesloot 1988a; Stuart 1990a). Lehmer's (1948) scheme remained essentially unmodified until the 1970s when large-scale studies were undertaken in the Hueco Bolson of southwest Texas (Whalen 1977, 1978). Later research has built upon and further refined this base. These refinements include changes in both the temporal scheme and the settlement-subsistence systems proposed during earlier studies.

Mesilla Phase (ca. A.D. 200 or 500 to 1100)

Lehmer (1948) considered the Mesilla phase an outgrowth of the Hueco phase, and dated it between A.D. 900 and 1100. It was characterized as the "first pottery-making, village-dwelling horizon in south-central New Mexico" (Lehmer 1948:78). Farming was assumed to be of primary importance, despite the lack of domesticates in the sites he investigated (Lehmer 1948:76). These assumptions have been questioned by other researchers.

Whalen (1977, 1978) initially extended the Mesilla phase to at least A.D. 400, renaming it the Pithouse period and proposing a generalized settlement-subsistence system. Settlement was in small villages found in all environmental zones. The subsistence system was at least partially based on agriculture, but hunting and gathering were also major components (Whalen 1978:38). A relatively small population was suggested, and Whalen (1978:14) noted that Archaic and Mesilla camps were very similar in size, placement, and general artifact assemblage and density. Pottery is less common on Mesilla phase sites than on those of later periods, suggesting a lower level of occupational intensity and ceramic vessel use (Whalen 1978:24).

While some departure from Lehmer's scheme was evident in Whalen's early work, many similarities remained. The Mesilla phase was still viewed as the first pottery- and pithouse-using occupation of the region. While a more generalized subsistence pattern was proposed, farming was still considered to be a major part of the subsistence system. These views were further refined in later studies.

In those studies, Whalen (1980a, 1981) extended the Mesilla phase back to 0 B.C./A.D. and divided it into early (0 A.D./B.C. to A.D. 600) and late (A.D. 600 to 1100) periods based on ceramic differences. Round pit structures were used throughout the phase, though square structures appeared near the end of the late period (Whalen 1981:80). Based on a concentration of sites on the floor of the Hueco Bolson rather than in areas amenable to agriculture, Whalen (1981:83) concluded that farming was a supplement to hunting and gathering through most of this phase. The subsistence system was similar to that of the Archaic, and only toward the end of the phase is there evidence of movement away from that pattern (Whalen 1980a:368). The increasing importance of farming in the subsistence system may have led to establishment of more permanent settlements on basin margins, which are the optimal farming zones (Whalen 1981:88, 1986:80). In general, the Mesilla phase is summarized as follows:

> the generalized Pithouse adaptation appears to have been a very stable, long-lived one. It is evident that Pithouse populations became larger, more sedentary, and certainly more agricultural as the period progressed. (Whalen 1980a:368)

Currently, many authors view the early Mesilla phase as simply an elaboration of the Archaic pattern (Batcho et al. 1985; Carmichael 1985a; O'Laughlin 1980; Ravesloot 1988a). The excavation of Archaic pit structures at Keystone Dam illustrates the problems associated with using traits like structure type to separate and define phases of cultural development (Carmichael 1985a; O'Laughlin 1980). However, there are obvious differences between the Archaic and early Mesilla phase, as there are between the early and late parts of the Mesilla phase.

O'Laughlin (1980:25) feels that the early Mesilla phase adoption of ceramics and the bow suggests either the addition of new resources to the subsistence base or changes in the use of previously exploited foods. A denser population is evident, and continues to grow throughout the phase. Carmichael (1985a:15) feels that reliance on farming also increased throughout the phase. He suggests that water availability is an important determinant of site placement until the late Mesilla phase, and summarizes the settlement system as follows:

> Most villages are situated along the Río Grande Valley or adjacent to small drainages in the mountains and foothills. ...Some late sites are located on alluvial fans, a pattern which becomes characteristic in the Pueblo period. The larger basins and the smaller mountain ranges appear to have been exploited through the use of short-term logistic camps. (Carmichael 1985a:15)

This discussion illustrates a continuing uncertainty about this phase. While some (O'Laughlin 1980; Whalen 1980a, 1981) place the beginning of the phase at ca. 0 B.C./A.D., others feel it began around A.D. 200 (Batcho et al. 1985; Ravesloot 1988a). O'Laughlin (1985:54) notes that the best evidence for early ceramics in the Hueco Bolson comes from a site that has been radiocarbon-dated to the sixth or seventh centuries; earlier dates are single samples from limited activity sites. This suggests that an A.D. 200 or earlier date for the beginning of the phase is questionable. Thus, in this discussion the Mesilla phase is considered to have begun between A.D. 200 and 500. Most authors agree with Lehmer's date of A.D. 1100 for the end of the phase, and significant changes in settlement and subsistence seem to have occurred at that time.

The main difference between early Mesilla and late Archaic material culture seems to be the addition of pottery and the bow. These new technologies suggest a subtle shift in the subsistence system, though what that shift entailed is as yet undetermined. However, the use of ceramic vessels may indicate the growing importance of short-term food storage and the bow may reflect a change in hunting patterns. The possibility that the early Mesilla phase was characterized by a larger population than was the late Archaic suggests that changes in the settlement-subsistence system may have been needed. Still, it is likely that subsistence continued to be based on hunting and gathering supplemented by horticulture until late in the phase.

Carmichael (1985a:15) suggests that semipermanent villages were situated along major streams. These sites may have been the loci of winter occupation for relatively large groups, and are probably also where crops were grown. If so, a small part of the population may have lived in these villages year-round, while the majority foraged elsewhere during the spring and summer. This pattern would allow crops to be tended and protected while also reducing pressure on riverine resources, making it possible for small groups to live year-round in that zone.

Continued population growth may have caused this pattern to begin changing by A.D. 900, as suggested by the location of a few villages on alluvial fans and changes in house form (O'Laughlin 1980:25; Whalen 1986:80). O'Laughlin (1980:25-26) notes that changes in settlement structure also occurred:

> A few communities seem larger than before and exhibit patterning of houses which implies a greater degree of integration of social groups and more permanent occupations than during the early part of this phase.

The location of villages along the Río Grande or in areas of temporary impoundment of mountain runoff suggests dependence on domesticated crops. O'Laughlin (1980:26) suggests that:

> Greater variability in site types indicates a change in the organization of activities with a slight decrease in residential mobility, an increase in the storage of subsistence goods, a differentiation of sites into habitation and special activity occupations, and a greater size of the social groups which were somewhat better integrated than during the early part of this phase.

Thus, the early Mesilla phase seems characterized by a very mobile population little removed from its Archaic roots. The residential pattern appears to have included macroband camps along permanent streams and microband camps positioned to exploit basin interiors. This is basically a forager pattern (Binford 1980). By the late Mesilla phase the population seems to have been more logistically organized. Residence may have been in relatively permanent villages situated in areas suitable for farming, with task-specific camps being established in other ecozones, including basin interiors. This suggests that there should be discernable differences between sites of these periods.

There are also differences between early and late Mesilla phase ceramic assemblages. Whalen (1980a:321-323) indicates that early Mesilla assemblages are dominated by an early variety of El Paso Brown and include intrusives such as Alma Plain and San Francisco Red. Late Mesilla assemblages are dominated by a late variety of El Paso Brown, with Mimbres Boldface occurring in small amounts. Some red or black painted decorations can occur on the late variety, but are rare. O'Laughlin (1985:66) suggests that the later complex may date as early as A.D. 850.

Doña Ana Phase (ca. A.D. 1100 to 1200)

While the Doña Ana phase was initially described by Lehmer (1948), it continues to be the most tenuously defined and least well known period of prehistoric occupation. Lehmer (1948) considered this phase to be transitional between the Mesilla and El Paso phases, and dated it ca. A.D. 1100 to 1200. Based on pottery from sites east of the Organ Mountains, Carmichael (1984:16) suggests that a date of A.D. 1150 to 1250 is more likely. In Whalen's (1977, 1978) early studies, no attempt was made to distinguish Doña Ana phase components because of the difficulties involved in discerning that period from survey data alone. Thus, Doña Ana components were combined with the later El Paso phase. In an overview of south-central New Mexico, Whalen (1980b) refers to the Doña Ana phase as the Transitional period, again combining it with the El Paso phase.

As originally defined, Doña Ana villages contain both pit structures and adobe pueblos. They can also be identified by the presence of certain pottery types including late El Paso Brown, early El Paso Polychrome, Mimbres Classic and corrugated wares, Chupadero Black-on-white, Three Rivers Red-on-terracotta, and St. Johns Polychrome. Carmichael (1984:16) notes that El Paso Bichrome and Playas Red also occur, and 91 percent of the Doña Ana phase sites in his study area on Fort Bliss contained El Paso Brown sherds (Carmichael 1985b:45). Thus, El Paso Brown is *not* only indicative of the Mesilla phase.

In general, most authors have viewed this period as a mere transition between pit structure and pueblo dwelling phases, and have ascribed little importance to it. This view is beginning to change. Batcho et al. (1985:16) suggest that Doña Ana phase villages represent the first intensive long-term settlements in nonriverine settings. O'Laughlin (1980:26) summarizes several important trends for this phase:

> ...small pueblos were built, the painting of ceramics begins, and settlements tend to concentrate in those areas most suitable for agriculture. There is also evidence for a major shift in populations from the southern portion to the northern portion of the area previously occupied during the Mesilla phase....This movement of populations may be in response to a decrease in effective precipitation during this phase.

Thus, major changes in both the settlement and subsistence seem to have occurred during this period.

Carmichael (1984, 1985a, 1985b, 1985c) determined that the Doña Ana settlement pattern contrasts markedly with that of the Mesilla phase. Rather than being distributed across the Tularosa Basin as earlier sites were, Doña Ana sites cluster in the runoff zone along lower alluvial fans (Carmichael 1984:18, 1985b:114). Major site concentrations seem to covary with the juxtaposition of playas and runoff areas (Carmichael 1985b:49). The presence of middens on many Doña Ana sites led him to conclude that they represent long-term residences (Carmichael 1984:18).

Rather than a transition between pit structure-dwelling and pueblo-dwelling periods, the Doña Ana phase seems to represent as intensive an occupation as the El Paso phase (Carmichael 1985a, 1985c). Carmichael (1984:24) states:

> Turning to a comparison of the Doña Ana and El Paso phases, it seems they are too similar for the former to be transitional to the latter in a developmental sense. In other words, the Doña Ana phase appears to exhibit many characteristics of the Pueblo period which are not supposed to have been fully expressed until later in the period around A.D. 1300.

Population growth may have provided impetus for the relocation of villages to areas amenable to agriculture as well as decreased residential mobility (Carmichael 1985b, 1985c).

Anschuetz (1990a) challenges these conclusions. Because most of Carmichael's work was based on survey data, he questions the distinctive nature of Doña Ana assemblages and the basic validity of this phase (Anschuetz 1990a:25). Lacking good temporal controls, the analytic procedures used to distinguish Doña Ana phase sites is questioned, as are his conclusions concerning the presence of adobe structures on sites containing possible trash-filled adobe borrow pits (Anschuetz 1990a:25-26).

Thus, while some authors view the Doña Ana phase as a period of transition between Mesilla and El Paso phases, others see it as a peak of occupational intensity equivalent to that of the El Paso phase. Still others consider it to be nearly impossible to distinguish on the basis of surface remains alone, and combine it with the El Paso phase. From the degree of confusion exhibited in the literature, it is likely that some combination of these views is more realistic. As cultural adaptation and change is dynamic rather than static, the idea of "transitional phases" is rather meaningless; cultures are always in transition from one state to another. In the traditional view, a transitional phase denotes change from simpler to more complex organization; in this case, from residency in pit structures to surface pueblos, and from hunting and gathering to reliance on farming.

In Carmichael's (1984, 1985a, 1985b, 1985c) nontraditional view, the Doña Ana phase represents an occupational peak, as does the later El Paso phase. These are peaks in population density that possess similar settlement and, presumably, subsistence systems. Long-term population growth is probably responsible for the peaks, and the start of a trend toward increasing importance of agriculture in the subsistence system is already visible in the late Mesilla phase, as evidenced by changes in house form and settlement patterns. Thus the "transition" began long before the temporal period encompassed by this phase.

Lacking more detailed information from excavation, the Doña Ana phase remains an enigma. While likely that it is not merely a transition between Mesilla and El Paso occupations, little else can be said. From available information, however, it is clear that Doña Ana phase sites are very similar to those of the later El Paso phase. The main differences seem to be the presence of pithouses in the Doña Ana phase and their absence in the El Paso phase (in the traditional view), and some variation in ceramic assemblages. The latter is probably more attributable to time differential than anything else, as trade wares seem to originate in the same areas during both periods. Finally, information available at this time suggests that the Doña Ana and El Paso settlement systems were similar, with minor differences perhaps reflecting continued population growth, increasing reliance on farming, or deterioration of prime farm lands.

El Paso Phase (ca. A.D. 1200 to 1400)

Lehmer (1948) noted few differences between the El Paso and Doña Ana phases. Rather, he felt that the "difference between the two phases is primarily one of time and of formalization of already existing patterns" (Lehmer 1948:82). Residence was in adobe pueblos, with room blocks grouped around plazas or in rows oriented east to west. Pithouses were thought to have been phased out by this time.

Whalen (1977, 1978) combined the Doña Ana and El Paso phases into the Pueblo period. Several differences between Mesilla and Pueblo period site structure and residential patterns were noted in the Hueco Bolson (Whalen 1977, 1978). The first large villages appeared during the Pueblo period, and were situated in areas suitable for farming. There was also an increased differentiation between residential sites and camps, suggesting an organization combining semisedentary villages and logistical camps. There seems to have been an increased reliance on farming after A.D. 1100, though hunting and gathering remained important parts of the subsistence system (Carmichael 1985a; Foster and Bradley 1984; O'Laughlin 1980; Whalen 1978, 1980b). Food storage facilities became more elaborate, ceremonial structures appeared, and there is evidence for increasing social complexity.

There also seems to have been increased contact with other regions during this time (Batcho et al. 1985; Whalen 1978). Where few exotic and nonutilitarian objects occur on Mesilla sites, El Paso sites occasionally contain marine shell from the Pacific and Gulf coasts, turquoise, copper bells, and decorated pottery from northern Mexico and southern New Mexico.

Ceramic assemblages are dominated by El Paso Polychrome, for which early and late varieties have been defined (Whalen 1980b). Common intrusives include Chupadero Black-on-white, Three Rivers Red-on-terracotta, Lincoln Black-on-red, Gila Polychrome, Agua Fria Glaze-on-red, Ramos Polychrome, Heshotauthla Glaze-polychrome, Arenal Glaze-polychrome, St. Johns Polychrome, and Playas Red Incised (Lehmer 1948:81).

Carmichael (1985a:16) noted minor differences between Doña Ana and El Paso settlement patterns in the Tularosa Basin. El Paso villages displayed an increased orientation toward location around playas on the basin floor, and less of a tendency to occupy alluvial fans. A similar Pueblo period pattern was noted in the Hueco Bolson, with residential sites moving to or below intermontane basin edges after A.D. 1100. Those zones are the best locations for farming because they are where mountain runoff is concentrated (Whalen 1981). After A.D. 1100, only camps are found on the basin floor (Whalen 1981). However, an exception to this pattern has been found in the Mesilla Bolson, where Batcho et al. (1985) excavated a square El Paso phase pit structure and several storage features. This site may represent a previously unrecognized aspect of the settlement system. Rather than a specialized resource extraction camp, it could represent a seasonal dwelling used as a base for exploiting local wild resources or as a fieldhouse.

El Paso villages do not appear to have been occupied after A.D. 1400. Only at the confluence of the Río Conchos and Río Grande does there seem to be an exception to this pattern (Kelley 1952). O'Laughlin (1980:26) suggests that the system collapsed because of environmental change, or because the Jornada area and the El Paso technological and social systems were simply not suited to long-term reliance on farming. Whatever the root cause, no evidence of sedentary farming populations is found in most of the Jornada area after ca. A.D. 1400.

Protohistoric

Most authors assume that this area was abandoned at the end of the El Paso phase. Unfortunately, most of the evidence for abandonment is negative. No sites from this area have been assigned a Protohistoric date, though Spanish *entrada* documents show that it was occupied by several groups including the Manso, Suma, Janos, Julimes, and Cholomes (Kelley 1952; Upham 1984). Rather than depopulation and reoccupation by groups unrelated to the Jornada Mogollon, Upham (1984, 1988) feels that a realignment of subsistence strategies occurred. In his opinion, the original inhabitants remained and adapted to changing environmental conditions (probably both physical and social) by switching to a generalized settlement and subsistence system. Thus, the Protohistoric economic and settlement systems were probably similar to those of the Archaic period or Mesilla phase.

The Manso occupied the study area during Protohistoric times, and were still living there in the late sixteenth century (Beckett 1984; Beckett and Corbett 1992). Drawing on the journals and reports of Spanish explorers, Beckett and Corbett (1992) provide a comprehensive discussion of this group. The Manso were hunter-gatherers who resided in wickiuplike huts. Their language was similar to that of the Jano and Jocome, and appears to have been of Sonoran derivation. Beckett and Corbett (1992) suggest that if the Manso were not making pottery at the time of contact, their sites would resemble those of the Archaic. Conversely, if they were making pottery their sites might be mistaken for those of the Mesilla phase.

The Manso are thought to be direct lineal descendants of the Jornada Mogollon. Beckett and Corbett (1992) note that a reevaluation of terminal dates for Chupadero Black-on-white and Glaze A, which occur on El Paso sites, potentially pushes the end of the El Paso phase to the Spanish contact period. They also note that a few late dates have been obtained from sites that contain brown wares in this area. Evidence for huts was found in one case. Manso rancherías are known to have existed around Santa Teresa in the Spanish Colonial period, and one of the late brown ware sites is near that area (Beckett and Corbett 1992).

The Manso were gathered into missions in the El Paso-Ciudad Juarez area over a number of years. Peace with all Manso bands was achieved by 1698, and the last Spanish Colonial record of an independent Manso population was dated 1711 (Beckett and Corbett 1992). By the 1760s there were too few Manso left to maintain a separate tribal organization, and they were essentially extinct as a tribe (Beckett and Corbett 1992).

Cultural Resources of the Study Area

Nelson (1980) summarizes Paleoindian finds in south-central and southwest New Mexico. No Clovis sites have been recorded; only isolated projectile points or points associated with later materials have been found. Folsom finds include isolated projectile points, small artifact scatters, and proveniences on multicomponent sites. The most common Plano finds are Plainview materials, and include Milnesand, Plainview, and Meserve points. Cody complex and Angostura materials are rare and include a few possible campsites and isolated projectile points. The only Paleoindian site recorded in the study area dates to the Folsom period (Ravesloot 1988b).

Several projects have studied cultural resources at Santa Teresa and the nearby Santa Teresa Airport, and their findings are of particular relevance to this discussion. Initial survey at Santa Teresa was reported by Ravesloot (1988c). About 2,280 ha were examined using both site-oriented and density-dependent approaches. The site-oriented survey examined 13 percent of the project area, while 50 percent of the rest was examined using a nonsite approach (Irwin-Williams and Ravesloot 1988). Only the results of the former are discussed here. A total of 68 sites containing 89 components was found. In addition, 198 isolated manifestations (IMs) were recorded, and contained 206 components. IMs were defined as discrete, low-density scatters containing multiple artifact types but lacking features; in this discussion they are considered sites. One Paleoindian component was found, and has already been discussed. Nineteen components were Archaic, 32 were Mesilla phase, and 10 were El Paso phase. Mixed ceramic assemblages were found on 11 components, suggesting occupation during more than one phase. A total of 111 components could not be dated. Numerous features were noted. Burned rock scatters and concentrations were found on 20 percent of the sites (as defined during survey), and hearths occurred on 5 percent. Scattered fragments of burned rock were found at all but 43 components.

Camilli et al. (1988) examined three parcels of BLM land scheduled for exchange, encompassing 6,310 ha. These parcels are adjacent to those examined by Ravesloot (1988c) at Santa Teresa. The entire area was sampled by transect to determine where high density remains were located. This was followed by intensive examination of a 14 percent sample in 800-by-800-

m and 400-by-400-m quadrats using a nonsite approach. Though no sites were defined, materials diagnostic of use during the Archaic period and Mesilla, Doña Ana, and El Paso phases were found. A total of 155 features were recorded, over half of which consisted of ash-stained soil indicative of pits or pit structures (Camilli et al. 1988:9-1). Several features were excavated as part of this project including ten pit structures, four possible pit structures, and numerous extramural hearths and pits (Roney and Simons 1988). Seven pit structures were radiocarbon-dated between 2310 B.C. and A.D. 1060, demonstrating residential use of the area during the Archaic period and Mesilla phase.

Eighteen other features were selected for excavation during a later study, and 28 additional features were defined while investigating these areas (O'Leary 1987). Forty of these features were excavated including 4 pit structures, 16 ash stains or hearths, and 3 roasting pits. Three pit structures were radiocarbon-dated to the late Archaic period. The fourth could not be precisely dated, but was associated with other features dating between the late Archaic period and late Mesilla phase. Dates were also obtained from 7 hearths lacking burned rock, and ranged between 840 ± 120 B.C. and A.D. 1470 ± 100. These dates suggest late Archaic to El Paso or Protohistoric occupations. Four hearths containing burned rock dated between A.D. 350 ± 60 and A.D. 1150 ± 70, or early Mesilla to El Paso phases. The roasting pits all dated to the late Archaic or early Mesilla phase (A.D. 20 ± 60 to A.D. 330 ± 701).

Elyea (1989) examined 175 of 394 ha of land excluded from the Santa Teresa exchange because they contained high densities of cultural materials (Camilli et al. 1988). Fifty-two prehistoric sites were defined. Most seem to represent multiple episodes of occupation, and document use of the area between the Paleoindian period and El Paso phase (Elyea 1989:18). Materials from the Paleoindian period included an isolated Cody complex-style projectile point base and a spurred end scraper. Archaic use was suggested by the presence of bifaces or biface reduction debris on 22 sites, 16 of which also contained El Paso phase materials. One site was dated to the early Mesilla phase, 3 were late Mesilla phase, and 36 were El Paso phase. Of the latter, 12 contained definite or suspected adobe structures, 6 had small middens and may represent seasonal field structures, and 18 had few or no features and probably represent ephemeral field facilities or special-use locales (Elyea 1989:18). Seven sites contained no diagnostic ceramics and were assigned a general Mogollon date, and 3 contained only lithic artifacts and were classified as unknown lithic or Mogollon.

Stuart (1990a) surveyed 830 ha for the Santa Teresa Port-of-Entry facility and beltway. Twenty-six sites and 144 isolated occurrences were found. All of the sites contained chipped and ground stone artifacts, and pottery was found on all but two. Only eight sites contained diagnostic ceramics, and dated to the Mesilla phase (n = 3), Doña Ana phase (n = 2), El Paso phase (n = 2), and mixed Mesilla-Doña Ana phase (n = 1). Two other El Paso phase sites were previously recorded and collected by Ravesloot (1988c). No Paleoindian or Archaic remains were found. LA 86774 and LA 86780 were both recorded by this survey, and were in an area that was previously defined as a low density scatter of artifacts containing no sites (Pierce and Durand 1988).

Two projects have examined cultural resources at the Santa Teresa Airport, which is a few kilometers north of the project area. Moore and Bailey (1980) surveyed 680 ha, finding 24 sites (containing 25 components) and 13 localities. In reexamining the data, all but 3 localities would now be considered sites. Only one component dated to the Mesilla phase; 7 contained El

Paso phase pottery, 13 contained unidentified brown wares, and 13 were undated scatters of lithic artifacts. Evidence of hearths, either scattered fragments or clusters of burned rock, were present on 24 components, and a possible pithouse was noted on one.

Batcho et al. (1985) tested 13 sites at the Santa Teresa Airport, 11 previously recorded by Moore and Bailey (1980), and 2 found during testing. Five hearths were investigated at NMSU 1380, originally defined as two undated lithic artifact scatters (OCA:FA:15 and 16). Testing found ash and charcoal stains associated with surface clusters of burned rock in four hearths, but only one produced enough material for a radiocarbon date. That feature dated ca. A.D. 1600, which is much later than was suspected from surface remains alone. A hearth at NMSU 1384 (OCA:FA:13), also recorded as an undated lithic artifact scatter during survey, dated to the fourteenth century. Two storage pits were found at NMSU 1386 (OCA:FA:20), and dated between A.D. 1320 and 1410. These dates were consistent with the El Paso phase designation assigned during survey. Perhaps the most significant discovery was at NMSU 1393 (OCA:FA:24) where a square pit structure, a large pit, and six small pits were found. While no dateable materials were recovered from the structure, pottery from the floor suggested an El Paso phase date.

A short distance east of the project area, Zamora (1992) excavated a small pit structure near Sunland Park. While the surface ceramic assemblage was indicative of an El Paso phase occupation, charcoal from the structure dated to A.D. 465 $\pm$ 60, suggesting a Mesilla occupation. Thus, it is likely that this site was a multioccupational locale.

ENVIRONMENT

Physiography and Geology

Southwest New Mexico and adjacent parts of Texas and Mexico are in the Mexican Highlands section of the Basin and Range province. Most of the mountains in this region were formed by uplift and trend from north to south. The East and West Potrillo Mountains are exceptions to this, and were formed by volcanism. The San Andres-Organ-Franklin chain that flanks the east side of the Río Grande Valley and the Doña Ana and Caballo Mountains to the north of the project area are cored by intrusive granitic to porphrytic bodies formed during Precambrian and Tertiary times (King et al. 1971).

The Potrillo volcanic field covers more than 900 sq km in south-central New Mexico (Hawley and Kottlowski 1969). It was formed during Quaternary times, and can be divided into three sections (Hawley and Kottlowski 1969; Hoffer 1969). The West Potrillo Mountains occupy the west section and comprise more than 80 percent of the field, containing at least 85 cinder cones. The central section covers 190 sq km and contains a series of maare including Kilbourne Hole, Hunt's Hole, Potrillo Maar, and various cones and basalt flows. Kilbourne Hole is the largest; it measures 3 km in diameter by 85 m deep, and is 40 km northwest of El Paso. The Black Mountain-Santo Tomás chain occupies the east section of the field and covers 39 sq km.

The project area is in the Mesilla Bolson, one of a series of downwarped basins that formed along the continental rift now occupied by the Río Grande (Chapin and Seager 1975). Three episodes of deformation contributed to development of the Río Grande depression (Chapin and Seager 1975:299). The first was during the late Paleozoic as the ancestral Rocky Mountains were formed, and the second was during the Laramide uplifts of late Cretaceous to middle Eocene times. These events created a north-trending tectonic belt. Chapin and Seager (1975:299) note that:

> the Río Grande rift is essentially a "pull-apart" structure caused by tensional fragmentation of western North America. Obviously, a plate subjected to strong tensional forces will begin to fragment along major existing zones of weakness and the developing "rifts" will reflect the geometry of the earlier structure.

Thus, the early deformations weakened the continental plate, causing it to split along the Río Grande depression. Downwarped basins formed as the plate pulled apart. The basins in south-central New Mexico were internally drained until early to mid-Quaternary times (Hawley and Kottlowski 1969).

The geologic history of the Río Grande Valley in New Mexico, Texas, and Chihuahua is summarized by Hawley and Kottlowski (1969). Major basins include the Palomas and Jornada del Muerto, and the Mesilla and Hueco Bolsons. Materials eroding from surrounding highlands began filling the basins during Tertiary times, continuing until the mid-Quaternary. These sources were supplemented by the ancestral upper Río Grande during the later stages of basin filling. That river extended from Colorado to northern Chihuahua by Kansan times, entering the Hueco Bolson through a gap between the Franklin and Organ Mountains during the early

Quaternary. The ancestral Río Grande seems to have been diverted from the Hueco Bolson into the Mesilla Bolson during the mid-Pleistocene. Until its integration with the lower Río Grande system, the upper Río Grande fed a series of lakes in west Texas, Chihuahua, and south-central New Mexico. Several mechanisms for integration of the two river systems have been proposed, including headward erosion and capture by the lower stream, spillover of the upper system, and tectonic uplift and subsidence. Whatever the cause, entrenchment of the river soon after integration of the systems seems to have halted deposition in the basins.

Soils

Information on soils is summarized from Bulloch and Neher (1980:34). Soils at both sites are of the Pajarito-Pintura complex, which occurs on nearly level to gently sloping terrain at an elevation of 1,220 to 1,370 m. Six soils are included in this complex, but it is dominated by Pajarito and Pintura soils, which comprise 45 and 35 percent of the complex, respectively. Areas of Harrisburg, Wink, Simona, and Onite soils are minor components, and make up the remaining 20 percent. Only major soils are discussed.

The Pajarito soil formed between dunes in mixed alluvium that was worked by wind. This soil is deep and well-drained, with moderately rapid permeability. The typical surface layer is a 36-cm-thick unit of light brown loamy fine sand. Under this is a reddish-yellow fine sandy loam subsoil, also 36 cm thick. Beneath the subsoil and extending to a depth of 2 m is a layer of brown loamy fine sand. While suitable for irrigation, this soil is primarily used for livestock grazing.

The Pintura soil formed in eolian deposits on dunes; it is deep and somewhat excessively drained, with rapid permeability. The typical surface layer is a 25-cm thick unit of light brown loamy fine sand. Under this is a light brown fine sand, which extends to a depth of 2 m. Available water capacity is very low, surface runoff is slow, and there is a very high soil blowing hazard. This soil is poorly suited to irrigated crops because of its low water-holding capacity.

Geomorphology

The visibility and preservation of cultural remains in this area are dependent on geomorphology. In order to fully assess the results of the testing program it is necessary to discuss the processes that shaped the landscape. This can help explain the surface and subsurface distribution of cultural materials.

As noted earlier, the Mesilla Bolson is a downwarped basin along the Río Grande rift, and is filled with consolidated and unconsolidated sediments of the Santa Fe group. These materials were eroded from surrounding uplands, and near the end of the fill sequence were also deposited by the ancestral upper Río Grande (Hawley and Kottlowski 1969; Hawley et al. 1969). The Fort Hancock formation contains materials deposited in the sealed basin, while the overlying Camp Rice formation contains fluvial materials deposited by the upper Río Grande as well as sediments from adjacent uplands (Hawley et al. 1969:55). The basin floor, which now holds the deeply entrenched Río Grande, is known as La Mesa or West Mesa. Much of this surface is now covered by a thin veneer of eolian sand (Hawley et al. 1969:58). The project area flanks the west edge of the Río Grande Valley.

Davis and Nials (1988) studied the geomorphology of the project area during an inventory of BLM land for the Navajo-Hopi relocation project. Three major zones were defined:

> Zone 1 is characterized by coppice dunes stabilized by... mesquite which are usually lying upon a deflated surface armored by pebbles. Zone 2 is characterized by flat-lying surficial sand with little relief; and Zone 3 is characterized by parabolic dunes with or without intervening blowouts, dominated by yucca. (Davis and Nials 1988:11)

Zones 1 and 3 covered most of their study area, with Zone 2 comprising only a small part of the west-central section (Fig. 2). These zones were further divided into subzones, which are listed in Table 1.

LA 86774 and LA 86780 are in Zone 3C, defined as an area of high-relief parabolic dunes (Davis and Nials 1988:19). The prehistoric topography is believed to have been similar to that of today, though modern sand covers more than 80 percent of the area. Zone 3C is characterized by unstable dunes and circular blowouts draped over relict deflation basins that are 10 to 15 m lower than surrounding areas and may date to the Pleistocene (Davis and Nials 1988:19). Archaeological visibility in Zone 3 was very poor except at the edge of blowouts. The unstable dunes are probably modern, and cover the terrain as it existed around 500 years ago (Davis and Nials 1988:20).

Table 1. Geomorphological Subzones in the Santa Teresa Area (Davis and Nials 1988:12)

Zone	Description	Subzone	Description
1	mesquite stabilized coppice dunes	A	Pleistocene deposit-floored blowouts
		B	partial sand sheetcover
		C	relict large-scale deflation basins
		D	escarpment edge coppice dunes
2	surface-sand with low relief	-	inactive sand sheet zone
3	parabolic dunes	A	yardang-linear blowout
		B	low-relief dunes
		C	high-relief dunes
		D	yucca coppice dunes
		E	mesquite-yucca-anchored coppice dunes

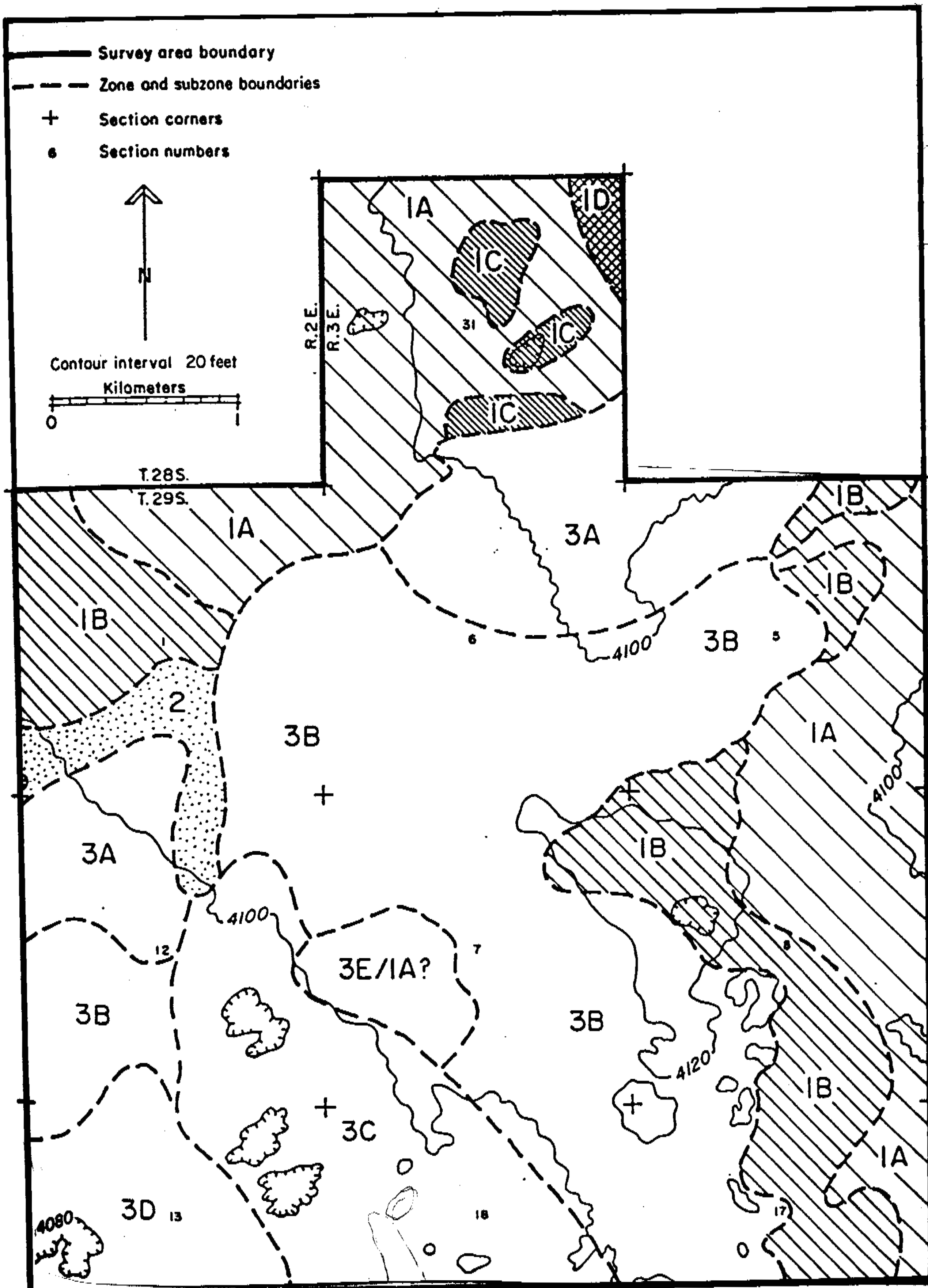

Figure 2. Davis and Nials's (1988:12) stratification of the project area showing site locations in relation to geomorphologic zones.

These zones were partially redefined during survey for the Santa Teresa Port-of-Entry facility (Fig. 3). Redefinition was based on examination of vegetation patterns, surface soils, and aerial photographs, and five zones were defined (Stuart 1990a:5-9):

1. Large coppice dunes anchored by mesquite with blowouts containing scatters of Santa Fe gravels, caliche nodules, and cultural materials. Two areas of Zone 1 were defined on ridge tops; this zone could not be correlated with any of Davis and Nials's (1988) zones.

2. Mixed parabolic and coppice dunes, dominated by the former. Contains isolated and small concentrations of mesquite anchored coppice dunes. Corresponds to portions of Davis and Nials's (1988) Zones 3B, 3C, and 3D.

3. Extensive parabolic dunes; corresponds to portions of Davis and Nials's (1988) Zones 3B and 3C.

4. Extensive linear dunes; corresponds to Davis and Nials's (1988) Zone 3A.

5. Over-grazed zone, which lacks vegetation other than mesquite and yucca. Not correlated with any of Davis and Nials's (1988) zones.

LA 86774 was in Zone 2 and LA 86780 was in Zone 3. Stuart (1990a:43) notes that LA 86780 was the *only* site found in Zone 3, and its discovery was attributed to mechanical disturbance, which exposed cultural materials.

During a later study for the Navajo-Hopi Land Exchange, Camilli et al. (1988) examined three parcels adjacent to Davis and Nials's (1988) project area. Davis and Nials's (1988) zones were reinterpreted and extended to those parcels. Though they criticize Davis and Nials (1988) because of the scale used and their conclusions concerning archaeological significance, they are in general agreement with that study.

Camilli et al. (1988) studied a larger area, concentrating on delineation of Davis and Nials' (1988) Zones 1 and 3. Zone 2 was eliminated when it was shown to be the result of downwind sediment dispersal from a single blowout (Camilli et al. 1988:2-12). They considered the subzones developed during the earlier study to be too detailed at a systems organizational level and overgeneralized at an episodic site occupational level (Camilli et al. 1988:2-12). Thus, subzones were not delineated.

It was concluded that Zone 1 resulted from erosion or deflation, while Zone 3 resulted from deposition or accretion (Camilli et al. 1988:2-14):

> Photointerpretation, particularly of those portions of these zones appearing south of the international border, reveals that the parabolic dunes comprising Zone 3 are derived from the transport of sediments by southwesterly winds which occur during the spring when soil moisture is low and thus sand mobility is highest. The sediments which actually make up the dunes of Zone 3 may be derived from bolsons to the southwest. Zone 3 is, then, an accretional zone where transported sediments are building a more or less continuous sand sheet, probably with little sediment removal at least at the present time.

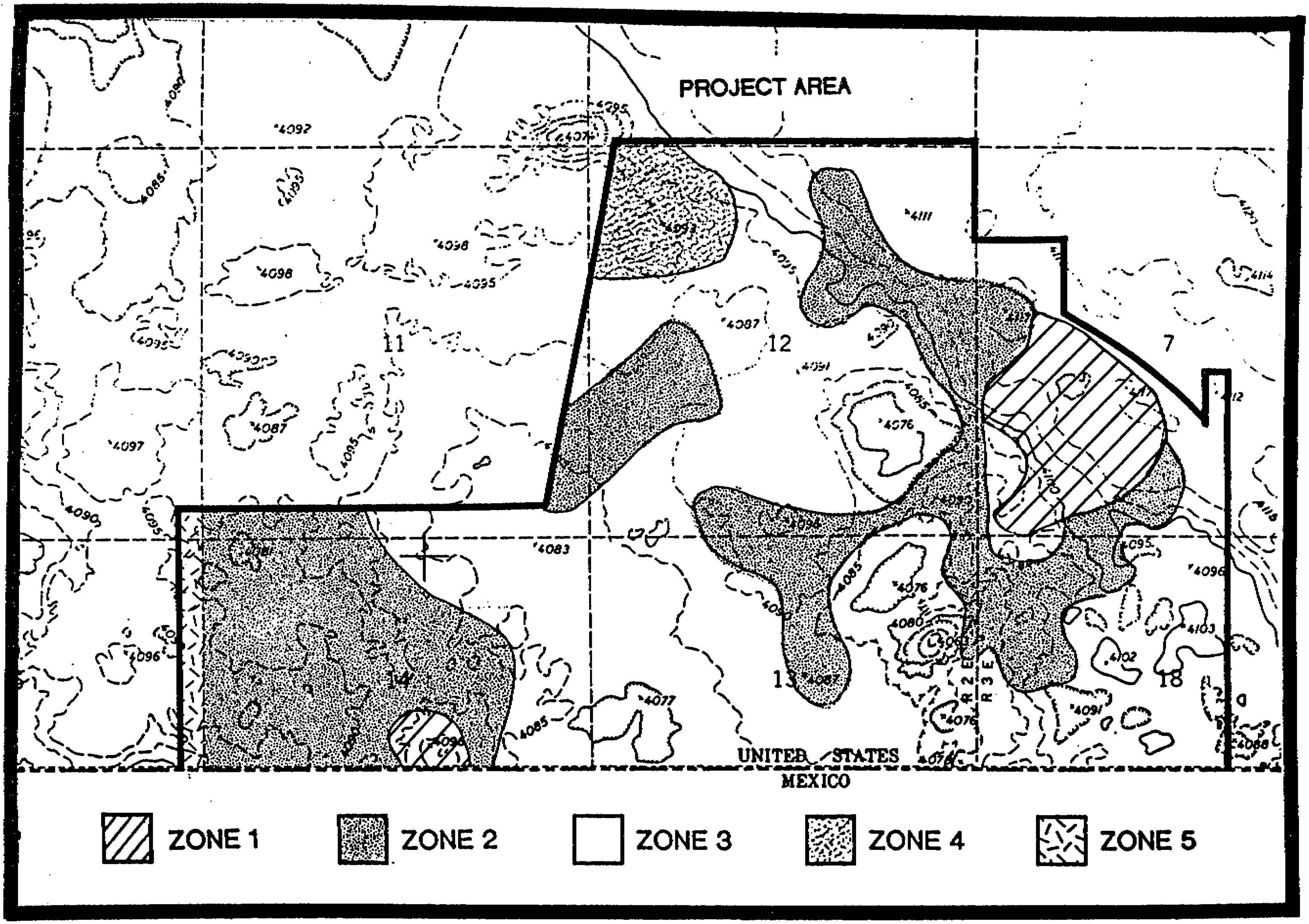

Figure 3. Stuart's (1990:6) redefinition of environmental zones in the study area.

> Zone 1, on the other hand, consists of relatively small accumulations in coppices, separated by larger and cleaner interdunal areas and thus is the site of two complementary processes--accumulation *and* removal.

While Zone 3 comprised about half the area examined by Davis and Nials (1988), it made up only 15 percent of the area studied by Camilli et al. (1988). Thus, mesquite-anchored coppice dunes are the dominant local landform, and parabolic dunes form a smaller component. In terms of archaeological visibility and integrity, they determined that the distribution of artifacts in Zone 1 may preserve the original horizontal patterning, but deflation has destroyed vertical proveniencing. The integrity of cultural materials in Zone 3 may be high, but archaeological visibility is much lower. Thus, even small amounts of cultural materials in that zone may accurately reflect shallow archaeological deposits (Camilli et al. 1988:2-15).

Following this survey, 40 features were excavated to satisfy the BLM's responsibilities for a land exchange (O'Leary 1987). A geomorphological study accompanied this work, focusing on coppice dune structure (Basabilvazo and Earl 1987). Three major units were defined--an uppermost layer of active eolian sand (DS II), a slightly indurated sandy unit (DS I), and a lowermost massively carbonate indurated clay-silt-sand unit (Qal_{cr}) (Basabilvazo and Earl 1987:2-8 to 2-9). The lowest unit is the Camp Rice formation of mid-Pleistocene age, which is also the highest terrace of the Río Grande. This surface is 300,000 years old and has been stable (except for eolian activity) since first deposited (Basabilvazo and Earl 1987:2-25). Long-term stability has led to development of a massive Stage IV caliche layer atop this surface. DS I represents eolian materials deposited between 2,850 and 15,000 years ago (Basabilvazo and Earl 1987:2-14 to 2-15). Most of the cultural materials were found at the top of this unit, and provided the upper depositional date. DS II is a modern deposit less than 100 years old (Basabilvazo and Earl 1987:2-15). DS I could have formed in as short a period as 100 years, as could DS II (Basabilvazo and Earl 1987:2-22). A period of over 2,000 years of relative surface stability and soil formation separates the deposition of these units.

By combining these studies, an interesting picture of local geomorphology begins to emerge. Most researchers have built upon the base provided by Davis and Nials (1988). Basabilvazo and Earl's (1987) study is an exception, but provides important supplementary information. According to Davis and Nials (1988), both sites are in a zone of high-relief parabolic dunes draped across relict deflation basins that may date to the Pleistocene. The current dunal instability is a modern event. While Stuart (1990a) also places LA 86780 in a zone of parabolic dunes, LA 86774 was in a zone of mixed parabolic and coppice dunes. This placement probably reflects modern conditions, with coppice dune formation occurring atop the more stable parabolic dunes. Reinterpretation of Davis and Nials (1988) environmental zones by Camilli et al. (1988) suggests that the parabolic dunes represent a zone of sand accretion, and potentially contain good vertical and horizontal integrity. Basabilvazo and Earl (1987) suggest that 2,000 years of relative stability followed deposition of their DS I unit and preceded deposition of the modern DS II unit.

These studies suggest that the parabolic dunes containing our sites were stable for a long time before erosion began 100 years ago. This area has a high potential for containing intact cultural features and deposits, which could be of much greater extent than is indicated by their surface expression. Thus, buried cultural remains can be expected. In fact, it is likely that there were few, if any, surface indications of LA 86780 before it was bladed, and cultural remains may not be restricted to the area that was recorded as the extent of this site.

Vegetation

The project area contains two communities--one dominated by mesquite and the other by yucca. A third community dominated by creosote occurs elsewhere on West Mesa, but is not found in the project area. The mesquite community is associated with active coppice dunes; mesquite, four-wing saltbush, and yucca act as anchors for coppice sand accumulation, and snakeweed, zinnea, and globemallow also occur on the dunes (Camilli et al. 1988:2-7). Deflation basins often contain stands of indigo, Mormon tea, and chamisa blanca (Camilli et al. 1988:2-7). The yucca community occurs on currently aggrading parabolic dunes. Besides soaptree yucca this community contains four-wing saltbush, Mormon tea, mesquite, snakeweed, sagebrush, zinnea, globemallow, hogpotato, senna, sunflower, unicorn plant, and prickly-pear. Sacaton grass and goatshead are common, and some grama grass is present (Camilli et al. 1988:2-7). Creosote dominates the third community; other common plants include mescat acacia, ocotillo, winterfat, and fluffgrass (Camilli et al. 1988:2-7).

LA 86774 is in a zone that contains a mixture of both the mesquite and yucca communities. There is little vegetation on LA 86780 due to mechanical removal of the upper 1 to 2 m of sand, but the adjacent landscape is dominated by the yucca community. The vegetation at these sites is much as described above. Common plants that do not occur on those lists are sand dropseed and spectacle pod. Bulloch and Neher (1980:34) note that Pajarito soils potentially support sand dropseed, black grama, mesa dropseed, three-awn grass, and seasonal forbs. The potential plant community for Pintura soils includes mesa dropseed, giant dropseed, bush muhly, sand sagebrush, four-wing saltbush, broom dahlea, and seasonal forbs (Bulloch and Neher 1980:34).

Most authors agree that the modern vegetation does not accurately reflect that of the past. Territorial survey records indicate that the mesas of southern New Mexico were dominated by grasslands until at least the 1880s (Dick-Peddie 1975; York and Dick-Peddie 1969). What is now Chihuahuan desert with occasional pockets of grama grass was once a mosaic of grassland-desert scrub (Dick-Peddie 1975:81). This change is generally blamed on large-scale cattle ranching. The former grasslands were dominated by black grama, blue grama, and side-oats grama. Other common plants included soaptree yucca, tobosa grass, bushmuhly, mesquite, four-winged saltbush, creosote, Mormon tea, sacahuista, prickly-pear, and cholla (Dick-Peddie 1975:83).

Camilli et al. (1988:2-13) indicate that some authors have questioned the idea that the modern vegetation appeared at the same time as the recent sand sheet. Noting that those authors feel there have been a number of oscillations between grassland and desert scrub in the last 4,000 to 5,000 years, they conclude:

> Fluctuations like the one evidenced by increasing aeolian erosion and the invasion of mesquite and other desert scrub over the last 100 years have probably occurred throughout most of the Holocene in the study area. If this is the case, then the archaeological materials there have all been subjected to a number of episodes of covering and uncovering. (Camilli et al. 1988:2-13)

Unfortunately, these are straw-man arguments, as both Dick-Peddie (1975) and York and Dick-Peddie (1969) are explicitly concerned with vegetation changes over only the last 100 or so years. In particular, their argument links modern ranching with deterioration of the grasslands that dominated southern New Mexico before the area was settled by immigrants from the United States. As they state: "The mesas of southern New Mexico were covered by grass in the middle of the last century" (York and Dick-Peddie 1969:165). The delicate nature of these grasslands was also noted: "...it is apparent that the replacement of grassland by desertscrub could be accomplished with very little modification of the environment" (Dick-Peddie 1975:81). Thus, the vegetation of this area is fragile and could be affected by variations in rainfall as well as intense human occupation.

Fauna

Numerous animal species are available, and were probably hunted prehistorically. Small game dominates the list of species; the most common large mammals available on the basin floor are pronghorn and mule deer. Medium and small mammals include black-tailed jack rabbit, desert cottontail, badger, coyote, kangaroo rat, skunk, and a variety of mice and rats (Moore and Bailey 1980; O'Laughlin 1980; Stuart 1990a; Whalen 1977). Various species of birds also occur including roadrunner, scaled quail, mourning dove, turkey vulture, raven, and several species of hawk (Moore and Bailey 1980; Stuart 1990a). Several snake and lizard species are also available including whiptail lizards, prairie rattlesnakes, western diamondback, and bull snake (Moore and Bailey 1980).

O'Laughlin (1980:20-22) defines three hunting patterns for the region: highland, lowland, and riverine. The highland pattern involved use of mountain zones, and was characterized by the hunting of deer and cottontails. While deer occur in all zones they are most common in the mountains, which contain sufficient browse for larger populations (O'Laughlin 1980:22). Because deer usually aggregate into herds only during the winter, they would have been mainly exploited in that season (O'Laughlin 1980:22). Cottontails were probably hunted year-round.

The lowland pattern exploited the bajada and basin floor zones. Mostly jackrabbits and some cottontails and pronghorns were available in these zones (O'Laughlin 1980:22); however, other small mammals and lizards were probably also consumed. Deer may have been available occasionally, but were not as common as in the mountains. The riverine pattern probably exploited the largest number of species, few of which occur in the project area. They included cottontail, jackrabbit, fish, spiny soft-shell turtle, and migratory water fowl (O'Laughlin 1980:22). Deer may have also been available occasionally, and beaver and muskrats were probably also hunted.

Climate

New Mexico is one of three areas in the United States that receives over 40 percent of its annual precipitation during the summer months (Tuan et al. 1973). Precipitation rates fluctuate greatly around the mean, and dry years are more frequent than wet years (Tuan et al.

1983). Though these oscillations are less severe than those occurring in humid regions, they are of greater significance because of the overall aridity of the region. With less precipitation to begin with, any reduction can seriously affect the biotic environment.

Summer rainfall in the Southwest follows a true monsoon pattern (Martin 1963). Moisture-laden winds flowing north from the Gulf of Mexico are the main source of summer moisture, and their movement is controlled by a high pressure system situated over the Atlantic Ocean. The amount of summer rainfall in the Southwest depends on the position of this system. When it is in a northward position, moist tropical air flows into the area and the summer is wet. When it is positioned southward the summer can be dry, a condition that may be caused by abnormally cold years in the north temperate latitudes (Martin 1963). Research in the San Juan Basin suggests that this pattern began during the early Holocene (Betancourt et al. 1983:215; Gillespie 1985:36).

Winter precipitation is derived from air masses originating in the extratropical regions of the Pacific Ocean or in Canada. While summer storms are generally short and intense, winter precipitation usually falls as snow, which melts slowly and soaks into the soil rather than running off as does most summer rain. Though all precipitation is beneficial to local biota, winter precipitation is more effective because it soaks into the ground and recharges soil moisture reserves.

The project area receives little annual precipitation, and has a relatively high mean temperature--it averages 203 mm of precipitation per year, and the mean temperature is 15.6 degrees C (Bulloch and Neher 1980:34). There is an average of 210 frost-free days annually (Bulloch and Neher 1980:34), usually beginning around March 30 and ending around November 10 (Tuan et al. 1973). Southern New Mexico has an annual evaporation rate of 2,400 mm and up to one-third of yearly precipitation may fall outside the growing season, conditions that create an extremely demanding environment (York and Dick-Peddie 1969:157). Rainfall records from north of the project area show that the wettest period of the year is between July and September, and the driest is between January and May (Gabin and Lesperance 1977:113). Average rainfall by month is illustrated in Figure 4 for the Lanark and Lanark A stations, which are both north of the project area.

Using modern figures, the project area is unsuitable for growing corn without supplementary water. Allessi and Power (1965:612) indicate that corn requires a minimum of 152 mm of water for germination, growth, and fruiting during the growing season. As the long growing season would allow farmers leeway in crop scheduling, by planting in June and harvesting in September they could have taken advantage of the maximum amount of moisture available during the growing season. The Lanark station received an average of 144 mm of rain during these months (between 1899 and 1912), while the Lanark A station averaged only 91.4 mm of rain for the same months (between 1912 and 1923). When these figures are combined, the growing season averaged 125.1 mm of rain between 1899 and 1923. This produces a deficit of 27 mm of rain below the *minimum* required for a successful corn crop. This deficit would have to be made up by moisture stored during the winter and spring, and those seasons are the driest parts of the year. Thus, it is likely that little farming was practiced in this area except during years of exceptionally high rainfall.

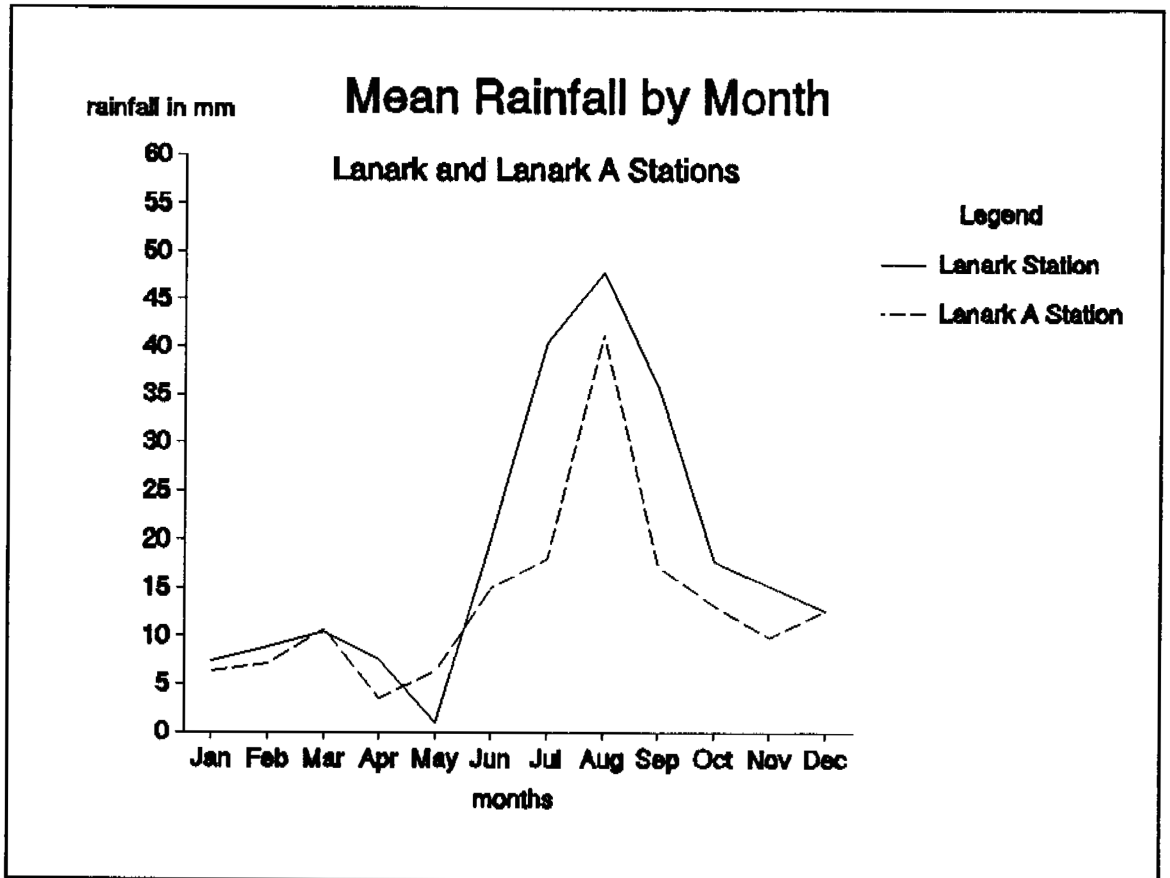

Figure 4. Average rainfall by month for the project area (from Gabin and Lesperance 1977:113-114).

Camilli et al. (1988:2-7 to 2-9) present a paleoclimatic reconstruction based on geologic, palynologic, faunal, and macrofloral data from southern Arizona and New Mexico, and west Texas. That discussion is summarized here. Three major shifts seem to have occurred during the Holocene. As the Pleistocene ended ca. 11,000 B.P., the dense mesic forests of the Late Wisconsin period were replaced by juniper/oak woodlands and grasslands. Until 8,000 B.P. the climate was characterized by a winter dominant precipitation pattern. Desert grasslands predominated in the area until 4,000 B.P., with desert shrub species appearing after 5,000 B.P.

While the middle Holocene Altithermal (ca. 8,000 to 4,000 B.P.) was originally characterized as a hot, dry period of widespread erosion (Antevs 1955), that interpretation has been challenged. Alternatively, a summer monsoonal rainfall pattern is thought to have developed during this time, creating moist conditions coupled with a period of warm weather. Precipitation levels decreased after 4,000 B.P., and the late Holocene was characterized by alternating periods of erosion and increased precipitation. Desert shrub/grassland is thought to have dominated during this period.

SITE DESCRIPTIONS AND TESTING RESULTS

Field Methods

All vertical and horizontal measurements originated at a main datum established on a high point between the sites. A system of 1-by-1-m grids was superimposed over both sites, and originated at that datum. Grid lines 500N and 500E intersected at the main datum, and the elevation of that point at ground level was set at 0.0 m. Both sites were included in the same grid system because their close proximity suggested they might be parts of the same cultural manifestation. Site surfaces were inspected to define the horizontal limits of artifact scatters, locate artifact clusters and features, and identify temporally and culturally diagnostic artifacts.

A plan of each site was produced using a transit. The plans include locations of test pits, collected surface artifacts, artifact concentrations, and current topographic and cultural features. Topographic contours were plotted to provide an accurate depiction of site structure in relation to the immediate physical environment. A combination of hand excavated test pits, surface stripping, mechanically dug trenches, and auger tests was used to investigate the sites. In addition, mechanically dug trenches were used to examine off-site parts of the facility as requested by the Historic Preservation Division. Artifacts were collected when recovered in a test pit or diagnostic of cultural or temporal affiliation.

Horizontal test units were 1-by-1-m grids, and were dug with hand tools. Excavation was conducted in arbitrary 10-cm levels unless natural stratigraphic breaks were found. When natural strata were defined they became the vertical units of excavation. Test pits ended when sterile strata or features were encountered. Auger tests were placed in the bottoms of test pits to verify that sterile strata were reached, and were used to investigate subsurface deposits on the BLM portion of LA 86780. Loose sand was stripped around surface features to define their horizontal dimensions. Soil removed from test pits, surface strips, and auger tests was screened through ¼-inch mesh hardware cloth. Artifacts recovered by screening were bagged, assigned a field specimen number, and transported to the laboratory for cleaning and analysis. A form describing the matrix encountered (and listing ending depths and field specimen numbers) was completed for each excavation unit. Mechanically dug trenches were used to examine more extensive subsurface profiles. Details of these procedures are provided in individual site discussions.

Excavation stopped when cultural features were found. Radiocarbon, pollen, and botanical samples were not collected during this phase of investigation. Profiles were only drawn when cultural strata or features were found in test pits. Soil colors were determined using a *Munsell Soil Color Chart*. Test pits were backfilled when excavation was finished. Cultural materials recovered during these studies are curated at the Laboratory of Anthropology, Museum of New Mexico. Field and analysis records are on file at the Archaeological Records Management System of the Historic Preservation Division.

LA 86774

LA 86774 was initially recorded as a scatter of 20 chipped stone and ceramic artifacts (Stuart 1990b). It covered 1,352 sq m and was situated directly north of a small playa in a zone of mixed parabolic and coppice dunes. This site was thought to be a small processing and procurement locale (Stuart 1990b). No features were noted, and artifacts were concentrated in two loci. Undifferentiated brown ware sherds were the only diagnostic artifacts found. As no rim or neck sherds were noted, this site was very generally dated between A.D. 200 and 1450.

Testing demonstrated that LA 86774 is much more extensive than originally thought, containing 200+ artifacts in a 1.28 ha area (Fig. 5). Cultural materials were distributed through a series of shallow deflational basins between mesquite-anchored hummocks, suggesting that they were exposed by eolian processes. Four artifact concentrations were noted; each was in a blowout, but not every blowout contained an artifact cluster. While chipped stone and ceramic artifacts comprised the bulk of cultural materials, a few fragments of ground stone and burned rock were also noted, suggesting a rather substantial occupation.

Three methods were used to investigate this site including test pits, auger tests, and mechanically dug trenches. Test pits were used to examine areas that might contain cultural deposits, and auger tests were confined to the bottoms of test pits. While most of the mechanically dug trenches were within the limits of the artifact scatter, two were placed outside that area to determine whether subsurface materials extended beyond the area defined by surface remains.

Test Pits and Auger Tests

Seven test pits comprising eight 1-by-1-m grids were excavated and are summarized in Table 2. Depths are the distance below ground surface rather than below datum.

Test Pit 1: 550N/533E. This grid was placed at the edge of a shallow deflational basin that contained a light scatter of artifacts in the southeast part of the site. It was excavated to determine whether subsurface deposits occurred, and was dug in four levels to a depth of 36 cm. An auger test in the bottom of the grid reached a depth of 2.22 m.

The only stratum encountered was a fine-grained light yellow-brown eolian sand containing a few pebbles. One lithic artifact was recovered from the upper part of the lowest level at a depth of .26 to .36 m. No cultural materials were recovered from the auger test.

Test Pit 2: 573N/570E. This grid was placed at the edge of a shallow deflational basin that contained a scatter of 40+ lithic and ceramic artifacts in the central part of the site. It was excavated to determine whether subsurface deposits occurred, and was dug in 7 levels to a depth of 67 cm. An auger test in the bottom of the grid reached a depth of 2.58 m.

The only stratum encountered was a fine-grained, light yellow-brown eolian sand. Only lithic artifacts were recovered: six on the surface, four from Levels 1 and 2, and four from Levels 4 through 6. Artifacts occurred to a depth of 57 cm. No cultural materials were recovered from the auger test.

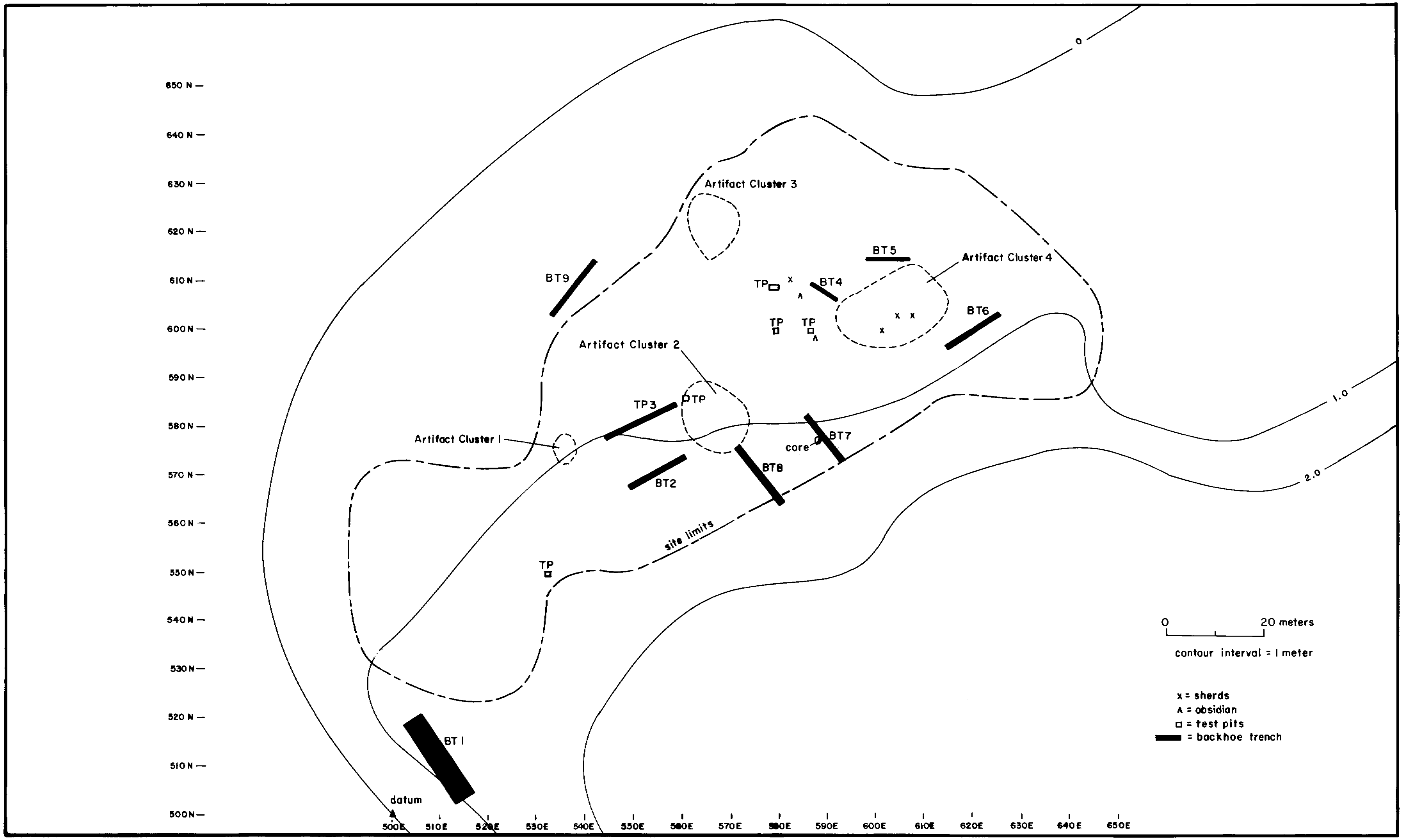

Figure 5. Plan of LA 86774.

Table 2. Test Pit Information for LA 86774

Grid	Depth	Level	Thickness	Cultural Materials
550N/533E	2.22 m	surface	.00 m	-
		1	.06 m	-
		2	.10 m	-
		3	.10 m	-
		4	.10 m	1 lithic
		auger test	1.86 m	-
573N/570E	2.58 m	surface	.00 m	6 lithics
		1	.07 m	3 lithics
		2	.10 m	1 lithic
		3	.10 m	-
		4	.10 m	2 lithics
		5	.10 m	2 lithics
		6	.10 m	1 lithic-
		7	.10 m	-
		auger test	1.82 m	-
586N/561E	2.59 m	surface	.00 m	1 sherd
		1	.08 m	1 sherd, 2 lithics
		2	.10 m	4 lithics
		3	.10 m	2 lithics, charcoal
		4	.09 m	1 lithic, charcoal
		5	.11 m	4 lithics, charcoal
		6	.09 m	-
		7	.10 m	-
		auger test	1.90 m	-
600N/587E	2.56 m	surface	.00 m	-
		1	.07 m	-
		2	.10 m	1 lithic, 1 sherd
		3	.10 m	-
		4	.20 m	1 lithic
		5	.20 m	-
		auger test	1.90 m	-

Grid	Depth	Level	Thickness	Cultural Materials
600N/600E	1.85 m	surface	.00 m	1 sherd
		1	.08 m	2 sherds, 1 lithic
		2	.12 m	1 burned rock
		3	.10 m	-
		4	.10 m	-
		auger test	1.45 m	-
601N/606E	2.17 m	surface	0	-
		1	.09 m	1 lithic
		2	.10 m	-
		3	.10 m	-
		4	.10 m	-
		auger test	1.78 m	-
609N/579E	.30 m	surface	.00 m	-
		1	.11 m	3 lithics
		2	.10 m	2 lithics
		3	.08 m	1 lithic, 1 ground stone frag., charcoal stain
609N/580E	.30 m	surface	.00 m	1 lithic
		1	.11 m	2 lithics
		2	.10 m	2 lithics
		3	.10 m	2 lithics, charcoal stain

Test Pit 3: 586N/561E. This grid was placed at the edge of a shallow deflational basin that contained a scatter of 40+ lithic and ceramic artifacts in the central part of the site. It was excavated to determine whether subsurface deposits occurred, and was dug in seven levels to a depth of 67 cm. An auger test in the bottom of the grid reached a depth of 2.59 m.

The only stratum encountered was a fine-grained light yellow-brown eolian sand. One sherd was found on the surface, 1 sherd and 13 lithic artifacts were recovered from Levels 1 through 5, and charcoal was noted in Levels 3 through 5. Cultural materials occurred to a depth of 48 cm. No cultural materials were recovered from the auger test.

Test Pit 4: 600N/587E. This grid was placed next to a shallow deflational basin that contained numerous surface artifacts in the north-central part of the site. It was dug to determine whether subsurface deposits occurred, and was excavated in four levels to a depth of 57 cm. An auger test in the bottom of the grid reached a depth of 2.56 m.

Two strata were encountered. The upper 37 cm contained a fine-grained, light yellow-brown eolian sand, which was underlain by a compact fine-grained yellow-brown sand. One sherd and one lithic artifact were recovered from Level 2, and one lithic artifact was found in Level 4. Cultural materials occurred to a depth of 37 cm. No artifacts were recovered from the auger test.

Test Pit 5: 600N/600E. This grid was placed within a shallow deflational basin that contained 75+ chipped and ground stone artifacts and burned rock in the east-central part of the site. It was excavated to determine whether subsurface deposits occurred, and was dug in four levels to a depth of 40 cm. An auger test in the bottom of the grid reached a depth of 2.56 m.

The only stratum encountered was a fine-grained, light yellow-brown eolian sand. One sherd was collected from the surface and two sherds, one lithic artifact, and one piece of burned rock were recovered from Levels 1 and 2. Cultural materials occurred to a depth of 20 cm. No artifacts were recovered from the auger test.

Test Pit 6: 601N/606E. This grid was placed within a shallow deflational basin that contained 75+ chipped and ground stone artifacts and burned rock in the east-central part of the site. It was excavated to determine whether subsurface deposits occurred, and was dug in four levels to a depth of 39 cm. An auger test in the bottom of the grid reached a depth of 2.17 m.

The only stratum encountered was a fine-grained, light yellow-brown eolian sand. One lithic artifact was recovered from Level 1; cultural materials were present to a depth of 9 cm. No artifacts were recovered from the auger test.

Test Pit 7: 609N/579-580E. These grids were placed in an interdunal area between deflation basins in the north-central part of the site. It was excavated to determine whether subsurface deposits occurred, and was dug in three levels to a depth of 30 cm. Excavation ended when a charcoal stain thought to represent a hearth was encountered. The stain measured .8 by .5 m, and extended into 610N/579E.

The only stratum encountered was a fine-grained, light yellow-brown eolian sand. Ceramic and lithic artifacts were recovered from Levels 1 through 3 in both grids, and charcoal was noted in Levels 2 and 3 in 609N/580E. As excavation ended near the top of a feature, it was impossible to determine how deep cultural deposits extended.

Mechanically Dug Trenches

Nine mechanically dug trenches were used to investigate the perimeter of the artifact scatter, shallow interdunal basins, and mesquite hummocks. Seven trenches were dug within the scatter and two were placed outside its limits; Table 3 contains summary information. With the exception of Trench 1, these excavations were all relatively shallow. Deeper trenching was considered unnecessary because the zone containing cultural materials was less than a meter below the surface. While the locations of potential features were noted, no trench profiles were drawn.

Table 3. Backhoe Trench Information for LA 86774

Trench	Length	Width	Depth	No. Stains
1	16.5 m	3.8 m	2.9 m	3
2	10.6 m	0.9 m	1.2 m	-
3	16.8 m	0.8 m	1.2 m	-
4	7.5 m	1.0 m	.9 m	1
5	8.3 m	1.0 m	1.0 m	-
6	12.0 m	0.9 m	1.2 m	-
7	12.3 m	1.0 m	1.1 m	-
8	14.1 m	0.9 m	1.1 m	-
9	13.9 m	1.0 m	1.5 m	-

Trench 1. This trench was the deepest and longest on either site. It was placed between the sites to determine whether cultural materials were distributed continuously across that area. Trench 1 was positioned just beyond the southwest edge of the surface artifact scatter, and was oriented northwest to southeast. Three ash stains were noted in the profile. Stain 1 was 2.5 m below ground surface and 5.3 m south of the trench's north end. It contained three small lenses of charcoal and ash, the largest of which measured 10 cm long by 2 cm thick.

The other stains were located next to one another at a depth of 1.2 m. Stain 2 was 1.07 m long by .40 m thick, and was 9.1 m south of the north end of the trench. Stain 3 was .45 m long by .30 m thick, and was 10.7 m south of the trench's north end. Several rodent burrows that contained ash were located directly south of these stains at depths ranging between 1.3 and 1.6 m. None of the stains were very dark, and it was impossible to determine what types of features were represented.

Trench 2. This trench was used to examine a semistabilized interdunal area at the southwest edge of the deflational basin that contained Artifact Cluster 2. It was oriented northeast to southwest and encountered no features or cultural materials.

Trench 3. This trench was used to examine a semistabilized interdunal area at the west edge of the shallow deflational basin that contained Artifact Cluster 2. It was oriented northeast to southwest, and encountered a probable pit structure that was .2 m long by .1 m thick. It was situated 2.2 m west of the trench's east end at a depth of 20 to 30 cm.

Trench 4. This trench was used to examine a mesquite-stabilized coppice dune at the northwest edge of the shallow deflational basin that contained Artifact Cluster 4. It was oriented northwest to southeast and encountered one ash and charcoal stain. Stain 4 was 2 m long by .2 to .3 m thick, and contained considerable amounts of ash and large chunks of charcoal. It was located in the center of the east wall of the trench, and the top of the stain was .4 to .5 m deep.

Trench 5. This trench was used to examine a mesquite-stabilized coppice dune at the north edge of the shallow deflational basin that contained Artifact Cluster 4. It was oriented east to west, and encountered no cultural features or deposits.

Trench 6. This trench was used to examine a mesquite-stabilized coppice dune and semistabilized interdunal area along the south and southeast edge of the shallow deflational basin that contained Artifact Cluster 4. It was oriented northeast to southwest and encountered no cultural features or deposits.

Trench 7. This trench was used to examine a mesquite-stabilized coppice dune at the southeast edge of the shallow deflational basin containing Artifact Cluster 2. It was oriented northwest to southeast and encountered no cultural features or deposits.

Trench 8. This trench was used to examine a semistabilized interdunal area at the southeast edge of the shallow deflational basin that contained Artifact Cluster 2. It was oriented northwest to southeast and encountered no cultural features or deposits.

Trench 9. This trench was used to examine a mesquite-stabilized coppice dune at the west edge of the shallow deflational basin that contained Artifact Cluster 3. It was oriented northeast to southwest and encountered no cultural features or deposits.

Artifacts Recovered during Testing

Artifacts collected from the surface include tools, a sample of sherds, and obsidian debitage (Table 4). All artifacts found in test pits were also collected. Four artifact classes are represented in this assemblage: pottery, chipped stone, ground stone, and burned rock. Chipped stone artifacts were recovered from every test pit. Sherds were common on the surface but were only found below the surface in three grids. Burned rock was scattered across the surface, but no concentrations were noted. Fragments of burned rock were recovered from four test pits. Only one ground stone tool was found in a test pit, and this matches the occurrence of that artifact class on the surface, where it was rare. Although no tabulation of surface artifacts was made, fewer than ten pieces of ground stone were noted.

Because the artifacts collected during testing represent a small sample of those present, only very basic conclusions can be made. This analysis is descriptive, and was concerned with determining lithic material type, cortex type, morphology, and function, and pottery type and vessel form. No temporally diagnostic artifacts were collected. The ceramic assemblage consists entirely of undifferentiated brown ware sherds, mostly fragments of jars. This could denote a date anywhere between A.D. 200 to 500 and 1600+. Two pieces of obsidian were recovered, but have not been submitted for dating.

Most of the chipped stone assemblage consists of igneous materials (69.2 percent). This category includes obsidian, three varieties of rhyolite (gray, red, and chertic), basalt, and undifferentiated igneous rocks. The rest of the chipped stone assemblage is comprised of sedimentary and metamorphic materials including cherts, siltstone, and quartzitic sandstone. Exotic materials constitute 12.8 percent of the assemblage and include obsidian and Pedernal chert. Waterworn cortex on two of these artifacts suggests that most of the exotics were obtained

Table 4. Summary of Collected Artifacts for LA 86774

Location	Level	Artifact Count and Type
point provenience	surface	1 obsidian core flake, nonwaterworn cortex
point provenience	surface	1 chert or silicified siltstone core or pulping plane, nonwaterworn cortex
point provenience	surface	1 obsidian core flake, waterworn cortex
point provenience	surface	1 undifferentiated brown ware sherd-jar
point provenience	surface	1 undifferentiated brown ware sherd-jar
point provenience	surface	1 undifferentiated brown ware sherd-jar
point provenience	surface	1 undifferentiated brown ware sherd-jar, smudged(?)
550N/533E	1	1 light brown chert angular debris
573N/570E	surface	1 rhyolite core flake, waterworn cortex 1 rhyolite angular debris, waterworn cortex 1 dark rhyolite core flake fragment 1 dark rhyolite angular debris 1 black chert core flake fragment, waterworn cortex
	1	1 basalt angular debris 1 dark rhyolite core flake 1 rhyolite angular debris
	2	1 tan chert core flake fragment, utilized
	4	2 basalt angular debris
	5	2 basalt angular debris
	6	1 basalt angular debris
586N/561E	surface	1 undifferentiated brown ware sherd-unknown vessel
	1	1 undifferentiated brown ware sherd-jar 1 igneous undifferentiated core flake, waterworn cortex 1 burned sandstone fragment
	2	2 dark rhyolite angular debris, waterworn cortex 1 fragment of sandstone 1 chertic rhyolite core fragment
	3	1 basalt angular debris 1 chertic rhyolite core flake
	4	1 dark rhyolite core flake fragment
	5	2 dark chertic rhyolite core fragments 1 dark rhyolite angular debris 1 yellow-brown siltstone angular debris
600N/587E	2	1 black chert core flake, waterworn cortex
	4	1 chertic rhyolite core flake fragment 1 undifferentiated brown ware sherd, unknown vessel, burned(?)

Location	Level	Artifact Count and Type
600N/600E	Surface	1 undifferentiated brown ware sherd
	1	1 light gray chert core flake 1 undifferentiated brown ware sherd, jar 1 undifferentiated brown ware sherd, unknown vessel
	2	1 igneous undifferentiated burned rock
601N/606E	1	1 yellow-brown chert core flake
609N/579E	1	1 Pedernal chert core flake fragment 2 burned sandstone fragments
	2	1 dark rhyolite core flake 1 burned sandstone fragment
	3	1 Pedernal chert early stage biface fragment 1 unidentified ground stone tool
609N/580E	surface	1 quartzitic sandstone burned rock fragment
	1	1 Pedernal chert core flake, waterworn cortex 1 quartzitic sandstone angular debris, waterworn cortex
	2	2 undifferentiated brown ware sherds, unknown vessels
	3	1 dark rhyolite core, waterworn cortex

from Río Grande gravels; however, cortex on one obsidian flake was not waterworn, indicating that it was obtained at or near the source. Except for a tool made from chert or silicified siltstone, cortex on other artifacts is waterworn. This suggests that most materials were obtained from gravel deposits, probably at the edge of West Mesa in the Río Grande Valley.

Only four tools were recovered: a Pedernal chert biface fragment, a utilized chert flake, a sandstone ground stone tool of unknown function, and a possible pulping plane made from chert or silicified siltstone. No evidence of tool manufacture was found; all flakes were derived from core reduction. Activities suggested by the lithic assemblage include general manufacture-maintenance, hide-working, and food processing-preparation.

Discussion

LA 86774 appears to be a multi-occupational residential site. The lack of a prepared floor or walls in the probable pit structure implies short-term occupancy. No depth was obtained for that feature, but it was at about the same level as the hearth in Test Pit 7. The presence of these subsurface features suggests that a buried occupational surface exists. Though no dateable artifacts were found, the lack of painted sherds and the types of features present suggest that it was occupied during the Mesilla phase. Doña Ana or El Paso phase use is unlikely; however, the possibility that it was occupied in Protohistoric times cannot be ruled out, as sites from that period are thought to resemble those of the Archaic or Mesilla phase (Beckett and Corbett 1992).

Thus, while LA 86774 probably represents a short-term Mesilla phase residential site, the possibility that it was occupied by a Protohistoric group such as the Manso cannot be ruled out.

Table 5 lists the depths at which artifacts were found in test pits. In the northeast part of the site they extended to a depth of about .8 m below datum (mbd). Test pits in the southwest part of the site contained artifacts to a depth of 1.45 to 1.68 mbd. Possible features in Trench 1 were at depths of about 2.2 and 3.5 mbd. Two explanations for this distribution can be suggested. First, it is possible that one occupation on an undulating ground surface that sloped to the southwest is represented. Second, and most likely, it is possible that multiple occupations at varying depths are represented. Two features (a hearth and possible pit structure) were associated with the shallow occupational level in the northeast part of the site. This level seems to date after A.D. 200 to 500. The middle occupational level contained no features, but the presence of charcoal in 586N/561E suggests that features may be present. It is interesting that the only sherd found below the surface in this test pit was from level 1. The near absence of pottery and the depth of these deposits relative to those in the northeast part of the site may be evidence of a Preceramic occupation. Stain 1 in Trench 1 is much deeper than other cultural materials, and is consistent in depth with features on LA 86780 that also seem to reflect an Archaic occupation.

Table 5. Elevations at which Artifacts Were Recovered in Test Pits on LA 86774 (mbd = meters below datum)

Grid No.	Artifact Types	Depths
550N/533E	1 lithic	1.56-1.66 mbd
573N/570E	4 lithics 5 lithics	1.08-1.28 mbd 1.38-1.68 mbd
586N/561E	13 lithics, 1 sherd	.92-1.45 mbd
600N/587E	2 lithics	.58-.78 mbd
600N/600E	2 sherds, 1 lithic, 1 burned rock	.37-.57 mbd
601N/606E	1 lithic	.67-.77 mbd
609N/579E	7 lithics, charcoal stain	.48-.80 mbd
609N/580E	3 lithics, 2 sherds, charcoal stain	.49-.80 mbd

While a minor occupation was suggested during survey, testing indicates that cultural remains are substantial, potentially representing up to three periods of occupation. While relatively intact features are present, the condition of cultural deposits is more problematic. Artifacts extended from the surface to depths of 30 to 60 cm in several grids. Rather than representing thick cultural deposits, it is likely that bioturbation and eolian processes caused the vertical sorting of artifacts, potentially mixing materials from more than one occupation. This phenomenon was noted during studies in the Tularosa Basin (Schutt 1992), and is discussed in detail later.

LA 86780

LA 86780 was initially recorded as a scatter of chipped stone, ground stone, and ceramic artifacts covering 4.7 ha (Stuart 1990c). Six features were noted, including five ash stains and a concentration of burned rock overlying an ash stain. This site is in an extensive area of parabolic dunes directly west of a small playa. It was the only site found in this zone, and was thought to be a processing and procurement locale (Stuart 1990c). Two loci were defined. Most of the artifacts and all of the features were in Locus 1, which was exposed in a large shallow basin. Locus 2 was a small cluster of artifacts separated from the main site by eolian sand deposits. Undifferentiated brown ware sherds were the only diagnostic artifacts found, providing a general date of A.D. 200 to 1450.

Testing demonstrated that LA 86780 is less extensive than originally thought, but contains more features than were noted during survey. The artifact scatter occupies roughly the same location assigned during survey, and it is likely that the original measurements simply overestimated its size. Artifacts and features are scattered across a shallow basin. A representative of the current land owner indicated that this is not a natural erosional feature; rather, this area was stripped with a brush rake and 1 to 2 m of sand were removed. Several burned rock concentrations and ash stains appear to be intact, and it is likely that sand was removed to within a few centimeters above the cultural deposits. Subsequent erosion has exposed the artifacts and features that now occupy the ground surface.

As currently defined, the site covers 2.8 ha and extends nearly to the International Border (Fig. 6). Thirteen features were defined, including four charcoal stains and nine burned rock concentrations. Features are not described individually, but are summarized in Table 6. While artifacts were scattered across the site, three concentrations were defined and are shown in Figure 6. An estimated 500+ surface artifacts were noted, mostly chipped stone debris. Several fragments of ground stone, representing both manos and metates, were also noted. Only four sherds were found--two undifferentiated brown ware sherds and two corrugated brown ware sherds. These were the only diagnostic materials recovered, and suggest a very general date of A.D. 200 or 500 to 1100. However, the paucity of sherds coupled with extensive disturbance of the sand deposits that formerly blanketed the area suggest that a ceramic period date is questionable.

Four methods were used to investigate this site including hand-excavated test pits, surface-stripping, auger tests, and mechanically dug trenches. Test pits were used to examine features and areas that might contain cultural deposits. Several features were surface-stripped to define their extent. Auger tests were placed in the bottoms of test pits, and were used to examine a temporary road next to the International Border. Mechanically dug trenches were used to examine the east edge of the artifact scatter and the temporary road right-of-way to determine whether buried cultural materials encompassed a larger area than was suggested by surface remains.

Test Pits

Six test pits comprising ten 1-by-1-m grids were excavated and are summarized in Table 7. Depths are the distance below ground surface rather than below datum.

Table 6. Summary of Surface Features on LA 86780

Feature no.	Feature Type	Size
1	cluster of small charcoal stains	2.5 x 2.5 m
2	concentration of burned rock and caliche	.3 m diameter
3	charcoal stain	.9 x .7 m
4	concentration of burned caliche	.5 x .4 m
5	concentration of burned caliche	.7 x .6 m
6	concentration of burned caliche	.3 m diameter
7	charcoal stain	.6 x .5 m
8	concentration of burned caliche	2.1 m diameter
9	concentration of burned caliche	.3 m diameter
10	concentration of burned caliche	.3 m diameter
11	concentration of burned caliche	1.0 x .45 m
12	concentration of burned caliche	.5 x .3 m
13	charcoal stain	.7 x .5 m

Test Pit 1: 280N/600E. This grid was placed in an area that contained a light scatter of surface artifacts in the south-central part of the site. That area seemed to have had less sand removed from it than elsewhere, and the test pit was excavated to determine whether intact cultural deposits remained. It was dug in three levels to a depth of 27 cm, and the only stratum encountered was a fine-grained, light yellow-brown eolian sand. No artifacts or cultural features were found.

Test Pit 2: 325N/547E. This grid was placed in a cluster of 20 to 30 lithic artifacts in the west-central part of the site. It was excavated to determine whether subsurface deposits occurred, and was dug in four levels to a depth of 38 cm. An auger test in the bottom of the grid reached a depth of 2.28 m.

The only stratum encountered was a fine-grained, light yellow-brown eolian sand containing a few pebbles. A piece of burned rock and a mano fragment were found in Level 1; thus, cultural materials occurred to a depth of 10 cm. No artifacts were recovered from the auger test.

Test Pit 3: 330-331N/530-531E. These three grids were used to investigate Feature 1, a cluster of several small charcoal and ash stains in the west-central part of the site. Grids 330-331N/530E were excavated in two levels to a depth of 14 to 18 cm, and 331N/531E was excavated in one level to a depth of 7 cm.

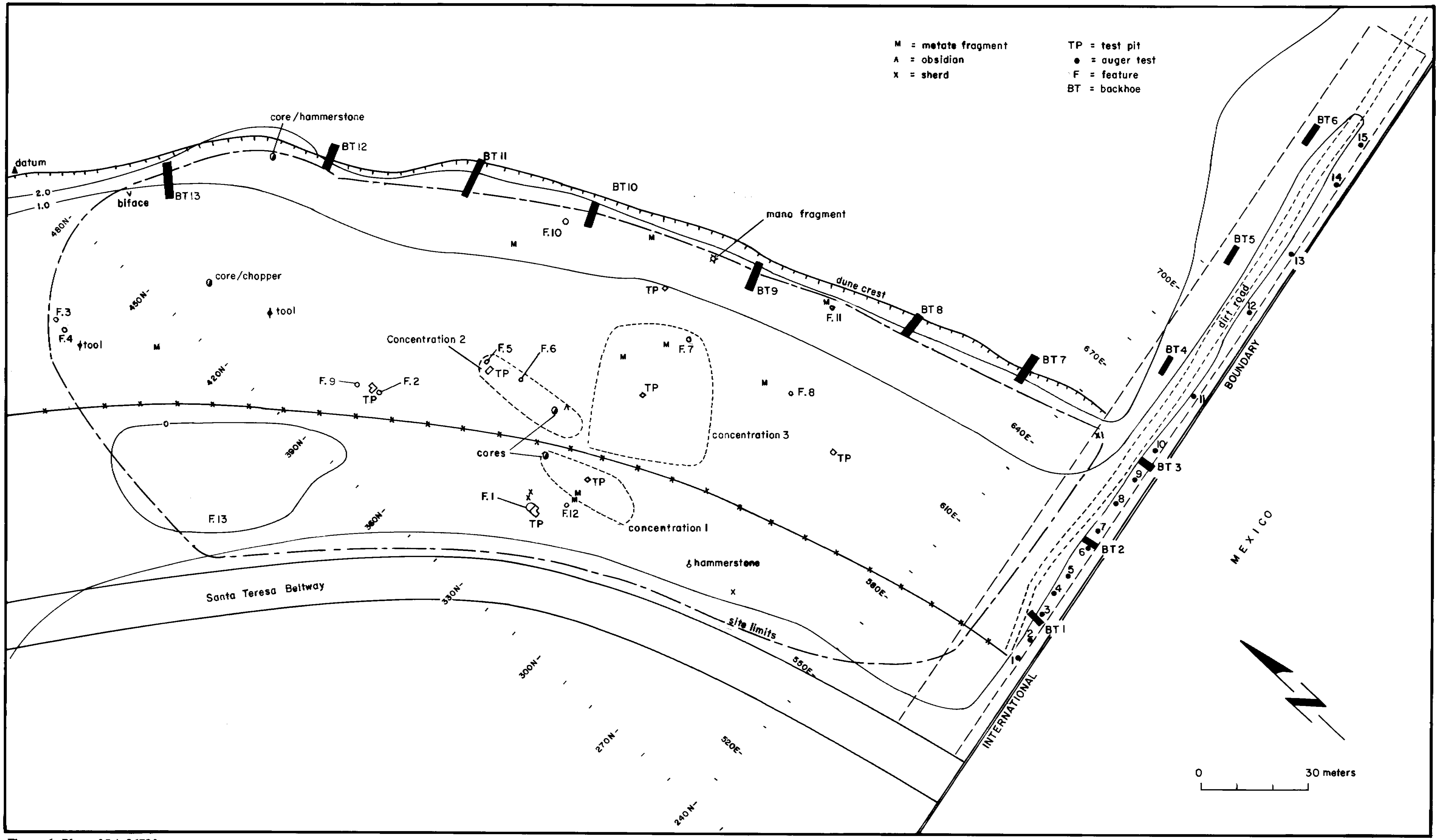

Figure 6. Plan of LA 86780.

Table 7. Test Pit Information for LA 86780

Grid	Depth	Level	Thickness	Cultural Materials
280N/600E	.27 m	surface	.00 m	-
		1	.07 m	-
		2	.10 m	-
		3	.10 m	-
325N/547E	2.28 m	surface	.00 m	-
		1	.08 m	1 burned mano fragment, 1 burned rock
		2	.10 m	-
		3	.10 m	-
		4	.10 m	-
		auger test	1.90 m	-
330N/530E	.18 m	surface	.00 m	-
		1	.09 m	charcoal stain[1]
		2	.08 m	charcoal stain[1]
331N/530E	.14 m	surface	.00 m	charcoal stain[1]
		1	.06 m	charcoal stain[1]
		2	.08 m	charcoal stain[1]
331N/531E	.07	surface	.00 m	-
		1	.07 m	charcoal stain
330N/575E	.08 m	surface	.00 m	1 lithic
		1	.08 m	-
346N/601E	.36 m	surface	.00 m	-
		1	.06 m	-
		2	.10 m	-
		3	.10 m	-
		4	.10 m	-
386N/524E	.04 m	surface	.00 m	-
		1	.04 m	1 piece of burned caliche
386N/525E	.04 m	surface	.00 m	14 burned rocks
		1	.04 m	charcoal stain, 3 pieces of burned caliche
387N/525E	.02 m	surface	.00 m	-
		1	.02 m	charcoal stain

[1]Presence of charcoal probably due to rodent activity.

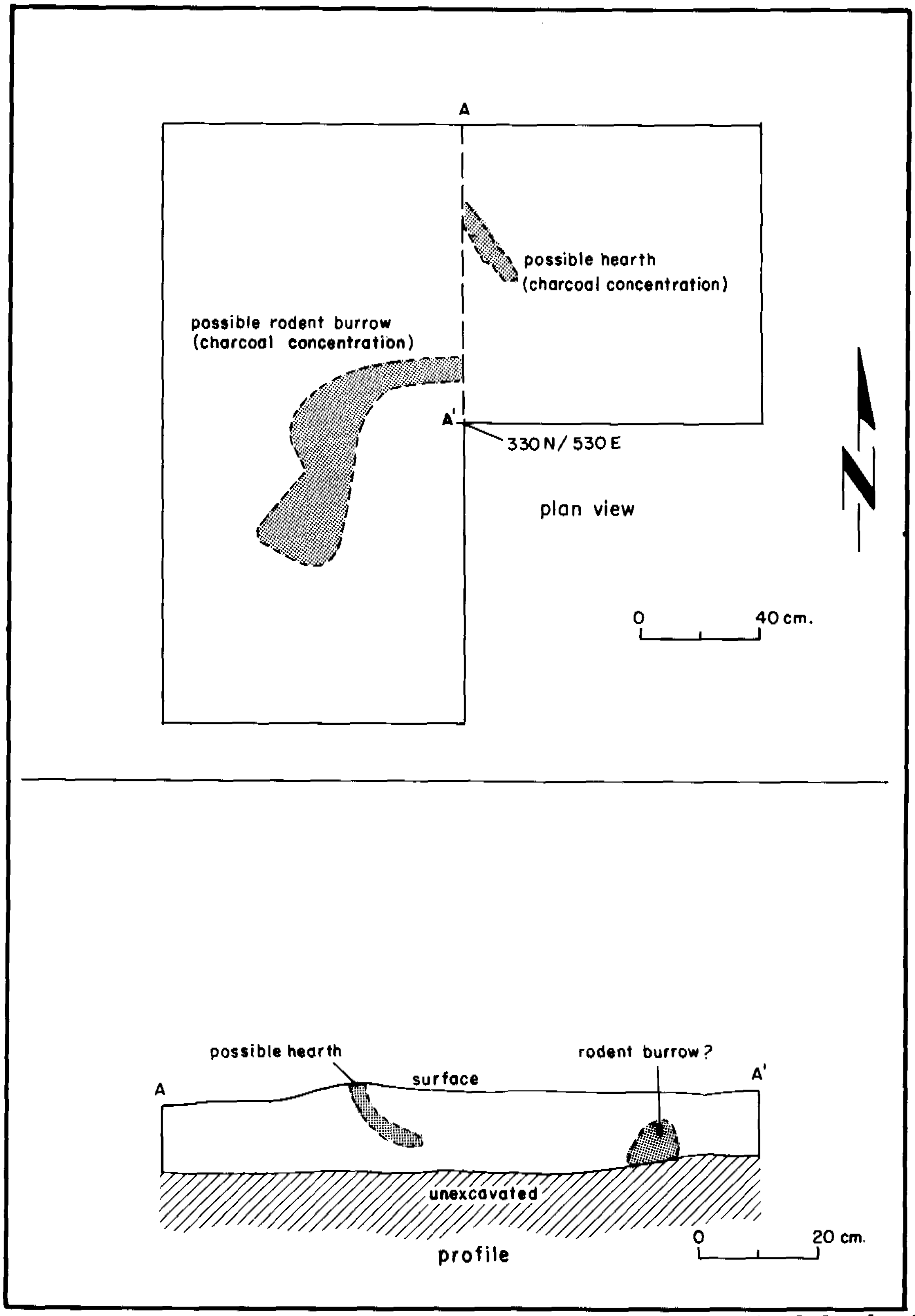

Figure 7. Plan of 330-331N/530-531E and profile of the east wall of 331N/530E showing the hearth and rodent burrow.

The only stratum encountered was a fine-grained light yellow-brown eolian sand containing occasional flecks of caliche. While no artifacts were recovered from these grids, charcoal stains were found in all three (Fig. 7). The remains of a basin-shaped hearth were noted in 331N/531E. The stain in 330-331N/530E appeared to be a rodent burrow.

Test Pit 4: 330N/575E. This grid was placed in a cluster of 100+ lithic artifacts in the central part of the site. It was dug to determine whether subsurface deposits occurred, and was excavated in one level to a depth of 8 cm. The only stratum encountered was a fine-grained, light yellow-brown eolian sand. Except for a lithic artifact on the surface, no cultural materials were found.

Test Pit 5: 346N/601E. This grid was placed in the east-central part of the site. That area seemed to have had less sand removed from it than elsewhere, and the test pit was dug to determine whether cultural deposits occurred. It was excavated in four levels to a depth of 36 cm.

The only stratum encountered was a fine-grained, light yellow-brown eolian sand. While no artifacts were recovered from this grid, a small stain was noted in the north wall at a depth of 21 cm. The stain measured 10 cm long by 2 cm thick, and was triangular in shape. It was not assigned a feature number as it appeared to be natural rather than a cultural burn or stain.

Test Pit 6: 386-387N/524-525E. These three grids were used to investigate Feature 5, a small burned rock cluster in the north-central part of the site (Fig. 8). They were dug to determine whether the burned rock concentration was more extensive than surface remains suggested, and whether an ash stain was present. Each grid was excavated in one level to depths of 2 or 4 cm.

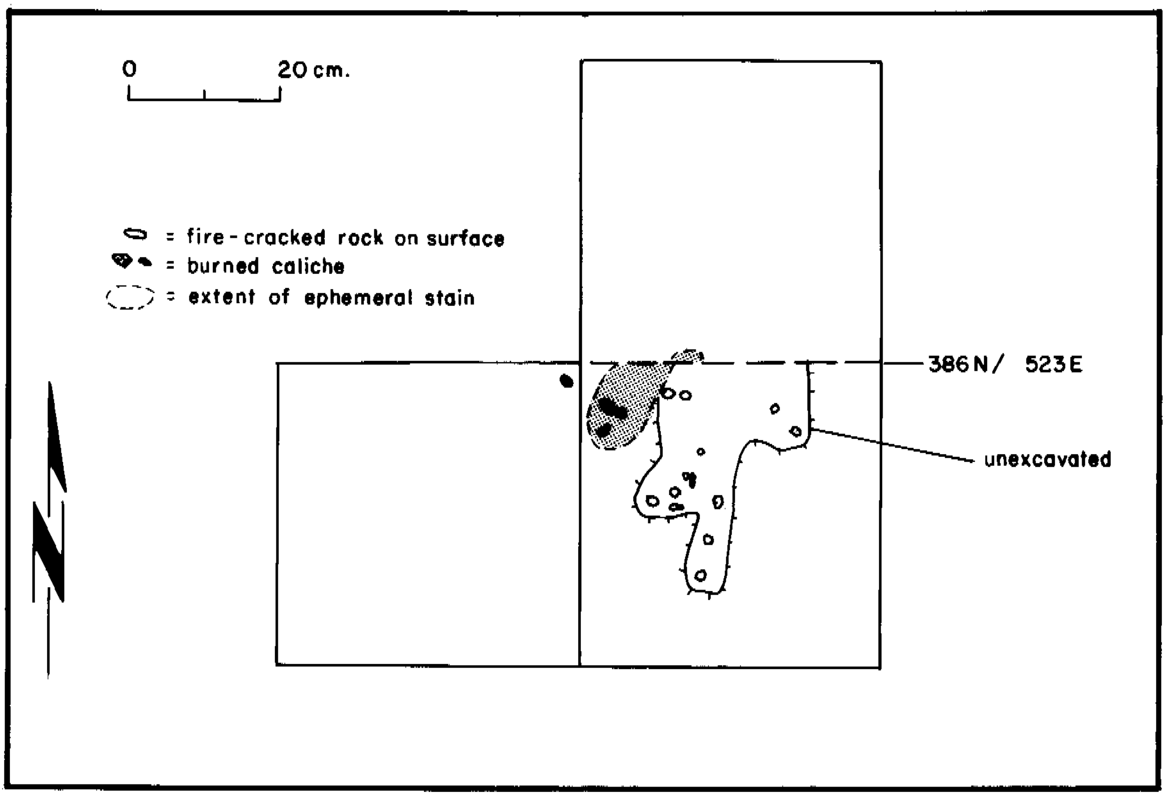

Figure 8. Plan of 386-387N/524-525E showing the location of burned rock and ash staining in Feature 2.

The only stratum encountered was a fine-grained light, yellow-brown eolian sand. A total of 14 pieces of burned rock were found on the surface, 3 pieces of burned rock were in Level 1 of 386N/525E, and one piece of burned rock was in Level 1 of 386N/524E. A light ash stain was noted under the burned rock in the northwest corner of 386N/525E, and it extended a few centimeters into 387N/525E. The stain may continue under the burned rock in 386N/525E, but that area was not investigated.

Surface-Stripped Areas

The area around four features was surface-stripped to define their horizontal extent and determine whether ash stains were associated with surface concentrations of burned rock. In most cases, stains were also probed to determine depth. Surface-stripped areas are discussed by feature number rather than grid designation.

Feature 4. Feature 4 was a surface concentration of burned rock measuring .5 by .4 m. A thin veneer of eolian sand was stripped away to reveal the base of the rocks. No stain was found, and no artifacts were recovered.

Feature 5. Feature 5 was a surface concentration of burned rock measuring .7 by .6 m. A thin veneer of eolian sand was stripped from a 4-sq-m area, revealing four stains (Fig. 9). Two surficial lithic artifacts were the only associated cultural materials. A 62-by-56-cm stain under the concentration of burned rock was designated Feature 5a. Feature 5b measures 42 by 36 cm, and contains several pockets of light-colored sand suggesting rodent or root disturbance. Feature 5c is the largest stain, and measures 86 by 56 cm. A pocket of light-colored sand nearly bisects the center of this feature, and probably represents a rodent burrow. This was the only stain probed for depth; it is 12 cm deep. Feature 5d measures 80 by 52 cm, but an extension to the west suggests disturbance, and dimensions of 58 by 52 cm are probably more accurate. Several pockets of light-colored sand in this stain suggest rodent disturbance.

Feature 7. Feature 7 was a stain measuring .6 by .5 m. A thin veneer of eolian sand was removed from the surface of this feature, showing that it is a roughly circular stain measuring 1.1 by 1.0 m (Fig. 10). Two artifacts, a flake and a piece of burned rock, were found during surface-stripping. A probe at the edge of the feature demonstrated it to be at least 12 cm thick.

Auger Tests

Fifteen auger tests were placed outside the perimeter of the artifact scatter in a semistabilized dune along the temporary road, and were used to examine that area for cultural remains before mechanically dug trenches were excavated. They were spaced at approximately 5-m intervals along the edge of the surface artifact scatter, and at 10-m intervals beyond those limits. The only stratum encountered was a fine-grained, yellow-brown eolian sand containing occasional small pebbles. No cultural features or deposits were found. Summary information is shown in Table 8.

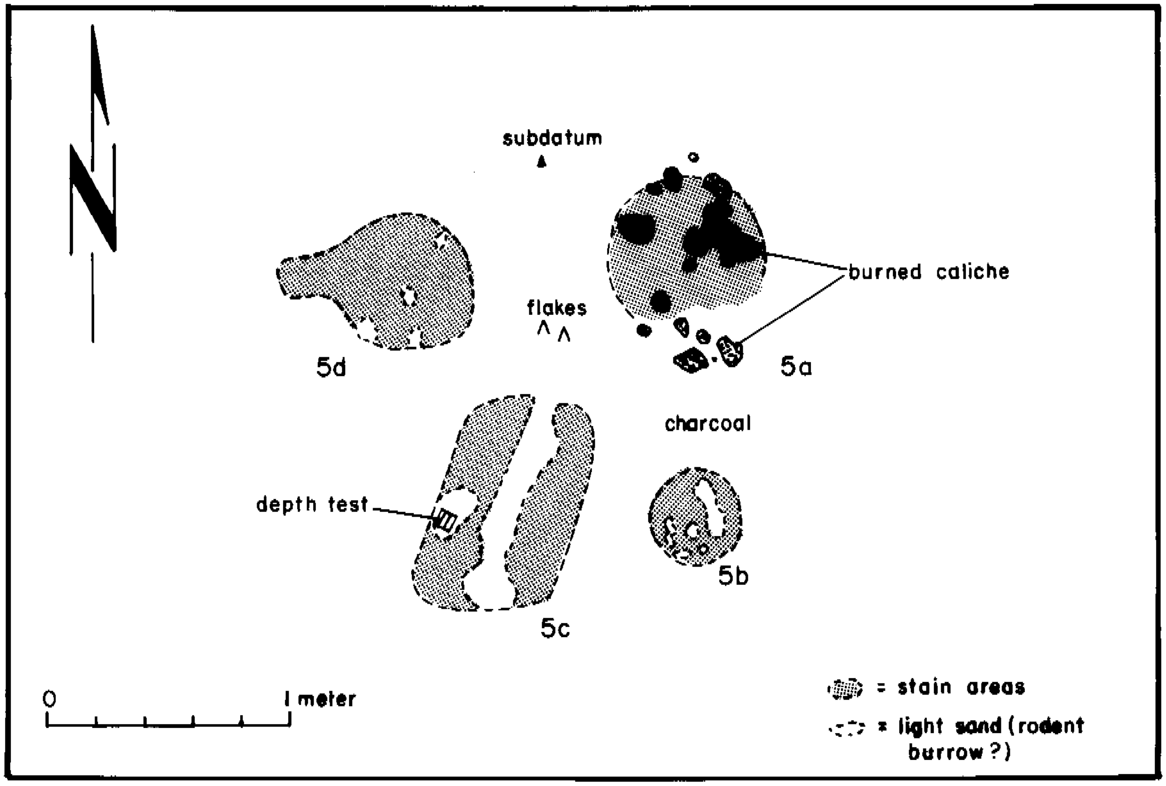

Figure 9. Plan of the Feature 5 hearth complex.

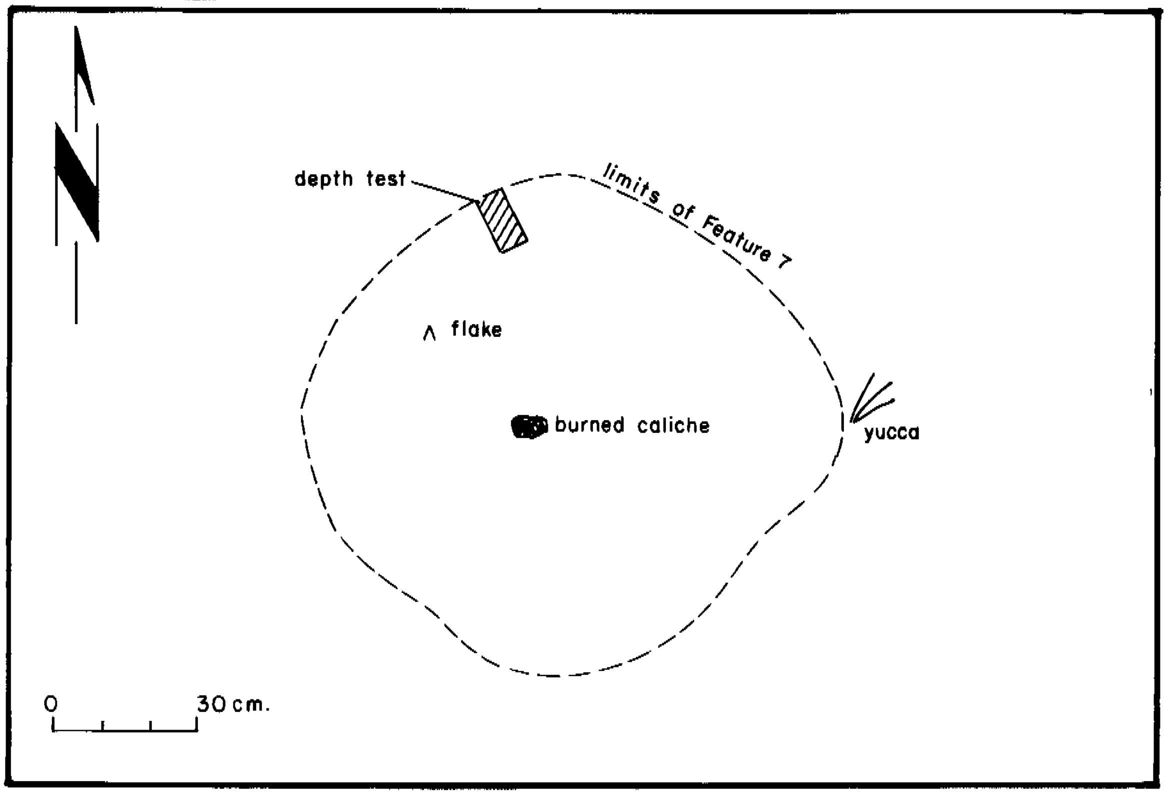

Figure 10. Plan of Feature 7.

Table 8. Auger Tests along Temporary Road Right-of-Way on LA 86780

Auger Test	Depth	Contents
1	1.90 m	no cultural materials
2	1.80 m	no cultural materials
3	1.86 m	no cultural materials
4	1.80 m	no cultural materials
5	1.83 m	no cultural materials
6	1.85 m	no cultural materials
7	1.87 m	no cultural materials
8	1.75 m	no cultural materials
9	1.88 m	no cultural materials
10	1.85 m	no cultural materials
11	1.85 m	no cultural materials
12	1.90 m	no cultural materials
13	1.91 m	no cultural materials
14	1.89 m	no cultural materials
15	1.90 m	no cultural materials

Mechanically Dug Trenches

Thirteen mechanically dug trenches were used to investigate semistabilized dunes along the temporary road at the edge of the artifact scatter, and to determine whether features or cultural deposits occurred in that area. Summary information is contained in Table 9. While the locations of potential features were noted, no trench profiles were drawn.

Trench 1. This trench was used to examine a stabilized dune remnant on BLM land next to the International Border, and was the westernmost of the trenches used to investigate that area. It was situated at the edge of the bladed zone, was oriented north to south, and encountered no cultural features or deposits.

Trench 2. This trench was used to examine a stabilized dune remnant on BLM land next to the International Border, and was at the edge of the bladed zone. The trench was oriented north to south and encountered no cultural features or deposits.

Trench 3. This trench was used to examine a stabilized dune remnant on BLM land next to the International Border, and was at the edge of the bladed zone. The trench was oriented north to south, and encountered no cultural features or deposits.

Table 9. Backhoe Trench Information for LA 86774

Trench No.	Length	Width	Depth	No. Stains	Size
1	3.4 m	2.0 m	2.3 m	0	-
2	3.6 m	3.1 m	2.2 m	0	-
3	4.0 m	2.5 m	2.2 m	0	-
4	5.1 m	2.5 m	2.3 m	0	-
5	5.3 m	2.3 m	2.3 m	0	-
6	5.4 m	2.5 m	2.4 m	0	-
7	7.9 m	2.6 m	2.0 m	0	-
8	4.9 m	2.7 m	2.4 m	0	-
9	7.4 m	2.9 m	2.2 m	0	-
10	7.0 m	2.8 m	2.2 m	0	-
11	7.1 m	2.8 m	2.5 m	0	-
12	7.3 m	2.8 m	2.2 m	1	.3 x .2 m
13	9.0 m	2.6 m	2.1 m	0	-

Trench 4. This trench was used to examine an area of stabilized sheet sand on BLM land, and was east of the bladed zone. The trench was oriented east to west and encountered no cultural features or deposits.

Trench 5. This trench was used to examine an area of stabilized sheet sand on BLM land, and was east of the bladed zone. A possible erosional surface was noted about a meter below the surface. The trench was oriented east to west and encountered no cultural features or deposits.

Trench 6. This trench was used to examine an area of stabilized sheet sand on BLM land, and was the easternmost of the trenches used to examine the area east of the bladed zone. It was oriented east to west and encountered no cultural features or deposits.

Trench 7. This trench was at the edge of the bladed area, near the southeast corner of the perimeter of the surface artifact scatter. It was oriented east to west and encountered no cultural features or deposits.

Trench 8. This trench was at the edge of the bladed area, along the south-central section of the perimeter of the surface artifact scatter. It was oriented east to west and encountered no cultural features or deposits.

Trench 9. This trench was at the edge of the bladed area, along the central section of the perimeter of the surface artifact scatter. It was oriented southwest to northeast and encountered no cultural features or deposits.

Trench 10. This trench was at the edge of the bladed area, along the central section of the perimeter of the surface artifact scatter. It was oriented southwest to northeast and encountered no cultural features or deposits.

Trench 11. This trench was at the edge of the bladed area, along the north-central section of the perimeter of the surface artifact scatter. A few fragments of charcoal were noted in the south wall at a depth of 1.5 m, but were not demonstrably cultural in origin. The trench was oriented southwest to northeast and encountered no definite cultural features or deposits.

Trench 12. This trench was at the edge of the bladed area, along the north-central section of the perimeter of the surface artifact scatter. A charcoal stain measuring 30 cm long by 20 cm thick was found at a depth of 60 cm.

Trench 13. This trench was at the edge of the bladed area near the northeast corner of the perimeter of the surface artifact scatter. A change in soil texture and color occurred at a depth of 1.5 m. At that level, the normal fine-grained, light yellow-brown sand changed to a reddish clayey sand. The trench was oriented southwest to northeast and no cultural features or deposits were encountered.

Artifacts Recovered During Testing

Artifacts collected from the surface included tools, all visible sherds, and obsidian debitage (Table 10). All artifacts found in test pits were also recovered. Three artifact classes are represented in this assemblage: chipped stone, ground stone, and pottery. Other than burned rock, artifacts were recovered from only one test pit (one mano fragment) and one surface-stripped area (two chipped stone artifacts). Tools from the surface comprise most of the collected assemblage. In addition to the concentrations defined as features, burned rock was scattered across most of the central part of the site.

The artifacts collected during testing represent a small sample of those present, and only very basic conclusions can be made. This analysis is descriptive, and was concerned with determining lithic material type, cortex type, morphology, and function, and pottery type and vessel form. No temporally diagnostic artifacts were recovered. The four ceramic artifacts are body sherds from undifferentiated brown ware or corrugated vessels, probably all jars. The undifferentiated brown wares could date between A.D. 200 to 500 and 1600+, and the corrugated sherds suggest a date after A.D. 1100. Three pieces of obsidian were collected, but have not been submitted for dating.

Few pieces of debitage were recovered, and are in no way representative of the entire assemblage. Observations made in the field provide a few additional impressions of assemblage characteristics. Cherts and igneous rocks are most common. Both core and biface reduction seem to have occurred, though evidence of the former dominates the assemblage. Most materials were obtained from gravel deposits, probably in the Río Grande Valley. However, all three

Table 10. Summary of Collected Artifacts from LA 86780

Location	Level	Artifact Count and Type
point provenience	surface	1 sandstone mano fragment, possibly reused as chopper
point provenience	surface	1 sandstone metate fragment, probably shallow basin
point provenience	surface	1 igneous undifferentiated metate fragment, shallow basin, both sides used, fire-cracked
point provenience	surface	1 sandstone metate fragment, shallow basin, fire-cracked
point provenience	surface	1 quartzitic sandstone metate fragment, shallow basin, fire-cracked
point provenience	surface	1 sandstone metate fragment, shallow basin
point provenience	surface	1 igneous undifferentiated metate fragment, unknown type, fire-cracked
point provenience	surface	1 sandstone metate fragment, shallow basin
point provenience	surface	1 sandstone metate fragment, shallow basin, fire-cracked
point provenience	surface	1 quartzite hammerstone
point provenience	surface	1 silicified wood early stage biface, utilized, waterworn cortex
point provenience	surface	1 metasiltstone core, waterworn cortex
point provenience	surface	1 siltstone core-hammerstone
point provenience	surface	1 rhyolite chopper-hammerstone
point provenience	surface	1 siltstone core
point provenience	surface	1 black chert core
point provenience	surface	1 bipolar obsidian flake, nonwaterworn cortex
point provenience	surface	1 obsidian core flake, nonwaterworn cortex
point provenience	surface	1 obsidian core flake, nonwaterworn cortex
point provenience	surface	1 pink chert early stage biface fragment
point provenience	surface	1 metasiltstone chopper-plane
point provenience	surface	1 undifferentiated brownware sherd-jar, smudged (?)
point provenience	surface	1 undifferentiated brownware sherd-unknown vessel
point provenience	surface	2 corrugated brownware sherds-jar, probably same vessel
325N/547E	1	1 sandstone mano fragment 1 sandstone ground stone fragment, burned
366N/551E	surface	1 dark rhyolite core flake 1 tan chert angular debris
330N/575E	surface	1 rhyolite angular debris

obsidian flakes had nonwaterworn cortex, indicating that they were procured at or near the source.

Most of the collected artifacts were tools or cores. Ground stone predominated (58 percent), and included eight metate fragments, two mano fragments, and one fragment of an unknown tool type. All of the metate fragments seemed to be from shallow basin metates; mano types could not be determined. Many of these artifacts were recycled. One mano fragment was reused as a chopper, and five metate fragments and the unknown ground stone tool were fire-cracked. These artifacts appear to have been reused as heating elements after being broken or worn out. Several other tools were either multipurpose or reused including a core-hammerstone, a chopper-hammerstone, and a chopper-plane.

Several activities are suggested by this assemblage. Food processing and preparation were major activities, and most of the tools and features were used in these tasks. This category includes manos, metates, choppers, and burned rock hearths. Other tools suggest general manufacturing-maintenance activities, and include bifaces and planes. Hammerstones were used for lithic reduction and for other tasks that involved pounding.

Discussion

LA 86780 seems to represent a residential site or camp, and either one long or many short-term uses are indicated. This is suggested by the horizontal extent of the scatter, the number of features present, the size of the lithic assemblage, and reuse of ground stone tools as heating elements. The lack of structures suggests that it was a camp; however, less sand was removed from the eastern part of the site along the edge of the stabilized dune. It is possible that intact features, including structures, exist in that area. The largest stain (Feature 7) is in that part of the site, and may represent the base of a pit structure, with the upper section removed by blading. While conjectural without further excavation, LA 86780 probably represents a multi-occupational short-term residential site.

Like LA 86774, features occurred at a variety of depths. Again, it is uncertain whether this distribution reflects an undulating land surface at the time of occupation, or is an indication of multiple uses. Currently, the latter is thought to be most likely. While exact depths were not available for all features, it was possible to reconstruct approximate depths. The shallowest feature was a concentration of burned rock (Feature 10) at 1.2 mbd. This is the approximate depth of cultural materials in the southwest part of LA 86774. Four concentrations of burned rock (Features 2, 5, 6, and 9) ranged between 2.0 and 2.15 mbd. This is the approximate level at which Stains 2 and 3 occurred in Trench 1 on LA 86774. Feature 7 was 2.4 to 2.5 mbd, but if it is the bottom of a bladed pit structure it may be related to those features as well. Two ash stains and two concentrations of burned rock (Features 1, 3, 4, 12) were 2.6 to 2.8 mbd. Finally, a charcoal stain (Feature 13) was the deepest feature at 3.2 to 3.3 mbd.

Survey suggested that this site was a processing-procurement locale used between A.D. 200 and 1450 (Stuart 1990c). Testing results are somewhat at odds with this conclusion. First, only four sherds were found in an artifact population estimated at greater than 500. The presence of two corrugated brown ware sherds (probably from the same jar) suggests a post-A.D. 1100 date. While Mesilla phase sites often contain few ceramic artifacts, the available literature suggests that this is not the case with later sites. These few sherds seem inconsistent with a late date, and it is possible that they are not actually related to the bulk of the assemblage. Bioturbation or mechanical disturbance could easily have redeposited them on the current surface, and both of these processes have obviously affected the site. Other than Feature 10, artifacts and features were at depths consistent with or below the level of possible preceramic deposits at LA 86774. Though artifacts diagnostic of Archaic occupation were lacking, it is likely that LA 86780 represents a preceramic use of the area. A casual examination of chipped stone artifacts suggested that some flakes were removed from large bifaces. In other areas this is often considered evidence of an Archaic occupation. Tentatively, then, the artifact assemblage and varied depths of cultural materials suggest that this site was occupied before A.D. 200 to 500, and that it is a multi-occupational locale.

Off-Site Trenches

At the request of the Historic Preservation Division, a series of mechanically dug trenches were excavated outside site boundaries to determine whether buried cultural deposits are present in other parts of the facility. This testing was initiated because of the nature of archaeological remains in south-central New Mexico. As discussed in greater detail in the next chapter, archaeological materials seem to be continuously distributed across basin floors in this region, and traditional site and isolated occurrence definitions often do not work well. Thus, site boundaries express the surface extent of cultural materials, but cannot predict whether those boundaries surround a discrete cluster of features and artifacts related to one or more occupations, or simply delineate an area where cultural materials are exposed by erosion.

In order to determine whether subsurface cultural features or deposits occurred outside site boundaries, 22 trenches were excavated using mechanical equipment. Locations are shown in Figure 11; trench size and results are summarized in Table 11. The only potential cultural remain encountered was a small stain at a depth of .5 m below ground surface in Trench 18. While this stain may represent a cultural feature, it is more likely of natural origin.

Table 11. Backhoe Trenches Outside Site Areas

Trench No.	Length	Width	Depth	No. Stains	Depth
1	13.0 m	2.5 m	.5 m	0	-
2	10 m	2.5 m	.5 m	0	-
3	12.0 m	2.5 m	.3 m	0	-
4	12.0 m	2.5 m	.3 m	0	-
5	7.8 m	2.5 m	.4 m	0	-
6	8.6 m	.8 m	1.0 m	0	-
7	10.5 m	1.1 m	1.0 m	0	-
8	11.5 m	.8 m	1.1 m	0	-
9	18.0 m	.8 m	1.0 m	0	-
10	7.0 m	.8 m	1.0 m	0	-
11	11.0 m	.8 m	.9 m	0	-
12	11.5 m	.8 m	1.1 m	0	-
13	15.5 m	.8 m	1.1 m	0	-
14	13.0 m	.8 m	1.0 m	0	-
15	15.0 m	.8 m	1.0 m	0	-
16	13.5 m	.8 m	1.2 m	0	-
17	10.0 m	.8 m	1.0 m	0	-
18	15.6 m	.8 m	1.2 m	1	.5 m
19	12.5 m	.8 m	1.2 m	0	-
20	14.5 m	.8 m	1.2 m	0	-
21	11.5 m	.8 m	1.2 m	0	-
22	13.0 m	.8 m	1.0 m	0	-

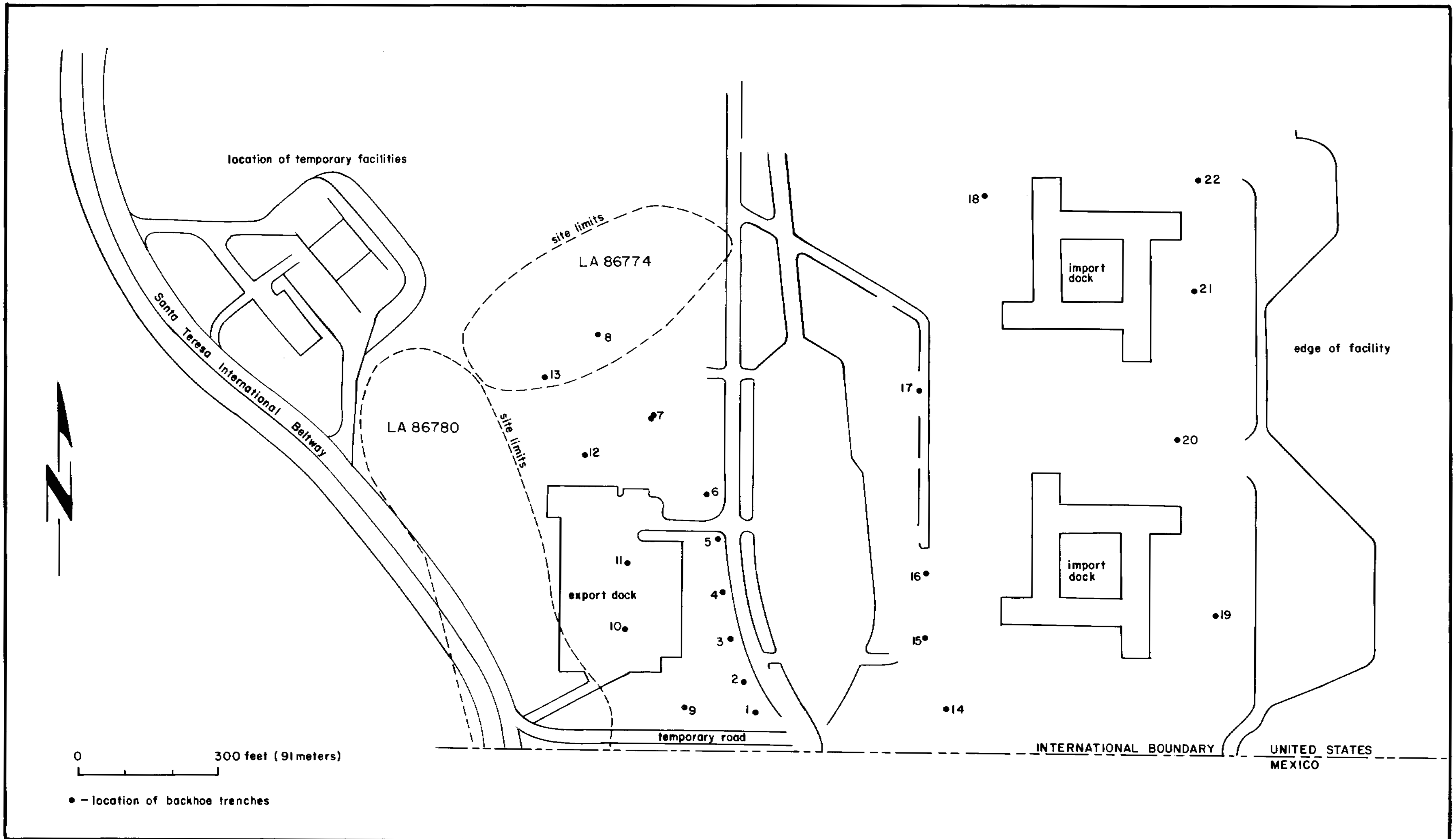

Figure 11. Locations of off-site trenches.

RESEARCH ORIENTATION

Two sites of uncertain date and cultural affinity will be examined by this project. While both were originally thought to have been occupied during the Formative period (A.D. 200 or 500 to 1400), testing was unable to unequivocally demonstrate this general date. LA 86774 resembles other sites assigned to this temporal and cultural affinity. However, as Beckett and Corbett (1992) note, historic Manso sites could easily resemble Archaic or Mesilla phase sites, depending on whether or not they were producing pottery before the Spanish arrived. Thus, a possible Protohistoric affinity must also be considered. LA 86780 is similar to sites assigned to the Formative period, but the presence of only four sherds in an otherwise extensive surface artifact scatter and the greater depth of this site in relation to LA 86774 suggest an earlier, probably Archaic affinity.

During survey, both sites were thought to have been used for food procurement and processing (Stuart 1990b, 1990c). However, the results of testing suggest a more extensive use. The presence of a probable pit structure at LA 86774 and a possible pit structure base at LA 86780 suggest that both sites were residential locales. Where a food procurement and processing function would be associated with a logistically structured subsistence system, it is felt that these sites are more indicative of a foraging orientation. That is, rather than use by task-specific groups for extraction of certain resources, these sites were probably occupied by microbands exploiting the entire range of resources present in the surrounding area.

The similarity of these sites to one another suggests that the same array of research questions can be applied to both. However, before any research questions are presented it is necessary to discuss the nature of archaeological remains in the Mesilla Bolson and to model settlement and subsistence patterns for the region. Following these discussions, a series of questions and test implications that will be addressed during data recovery is generated.

The Nature of Cultural Remains in the Mesilla Bolson

The nature of archaeological remains in a region is affected by both cultural and natural processes. Models describing the effects of these processes on cultural remains are discussed in the first part of this section. How those models apply to LA 86774 and LA 86780 is also addressed. The second section examines the potential for buried remains at sites in this area. That discussion includes a review of buried features found at other sites in the region. These discussions will provide a better understanding of how cultural remains are structured, how they have been affected by geologic processes, and the likelihood of finding other buried features at these sites.

Geomorphology and Site Formation Processes

Rather than being distributed as discrete loci of human activities (sites and isolated occurrences) across the basin floors of south-central New Mexico, cultural materials occur as a *palimpsest*, defined as "assemblages that, due either to having been deposited on the same surface or to erosional collapsing, are a blend of many separate occupations" (Doleman and Chapman 1991:12).

Doleman and Chapman (1991:12) felt that conventional site and isolated occurrence concepts could not be applied to cultural remains in their study area in the Tularosa Basin because they obscured the actual spatial patterning of archaeological remains. Recent investigations in the Mesilla Bolson and Tularosa Basin have proceeded under this assumption. Researchers have presumed that cultural remains are continuously distributed across the landscape rather than concentrated into discrete sites separated by scatters of isolated artifacts representing the locations of resource extractive tasks (Camilli et al. 1988; Doleman 1992; Seaman et al. 1988). Thus, it is likely that only part of the archaeological record is visible at any one time due to recent dune formation and erosion processes.

These concepts have been formalized into models for the Tularosa Basin that are undoubtedly quite applicable to the Mesilla Bolson as well. The Holocene Litter Model (Doleman 1992:73) "proposes that the extant archeological record on the basin floor consists of a more or less random and continuous distribution of cultural remains, which is the product of highly dispersed foraging/extractive activities."

This model has two variations. The first variation considers the distribution of artifacts to be nearly uniform and related to purely extractive activities (Doleman 1992:75). Large-scale variation based on landform-related productive diversity was expected. The second variation adds "small camps and processing areas located primarily to minimize the energy expended in transporting unprocessed raw materials or to support extended foraging trips" (Doleman 1992:75). In this variation, smaller-scale patterning was expected.

The second model proposed by Doleman (1992:73) is the Geological Disturbance Model, which "proposes that the original archeological distribution has been masked and disturbed to varying degrees by eolian processes both during and subsequent to prehistoric times. These geomorphic processes have both buried and exposed archeological materials and biased sample of the total archeological record. The geomorphic processes of the Geological Disturbance Model are expected to have both collapsed and smeared portions of the original archeological distributions."

Nearly all cultural materials (except Paleoindian) are contained within a single geomorphic unit in the Tularosa Basin, dating ca. 7,300 to 100 B.P. (Blair et al. 1990; Doleman and Stauber 1992; Doleman and Swift 1991). Surface artifacts have been exposed by erosion and subjected to varying amounts of vertical and horizontal displacement (Doleman 1992:75).

Cultural and geological processes are described by these models, and are not mutually exclusive; both have undoubtedly affected the distribution of cultural remains. The Holocene Litter Model describes the way in which cultural materials were deposited on the basin floor, while the Geological Disturbance Model depicts the ways in which that distribution has been affected by natural processes. Thus, both must be considered in a discussion of site formation processes.

Dolman's models were tested with data from the southern Tularosa Basin and several conclusions were generated. Small-scale patterning in the archaeological record confirmed the second variation of the Holocene Litter Model, in which small camps and activity areas are discernable. Thus, rather than a random and continuous distribution of cultural remains across the basin floor, the distribution of artifacts was patterned, and in at least one case, strongly associated with features.

The distribution of artifacts was also influenced by natural processes, as suggested by the Geological Disturbance Model (Doleman 1992). The development of deflation basins affected horizontal artifact distributions by concentrating materials during the early stages of blowout formation. This process is termed the *funnel effect*. The development of deflation basins also caused vertical sorting, with larger artifacts remaining at or moving to the surface while smaller artifacts stayed buried. Thus, surface densities tend to seriously underrepresent the number of buried artifacts. The distribution of cultural materials through the main artifact-bearing stratum suggests they were subjected to a combination of eolian and soil formation processes. While this unit has suffered numerous geologic disturbances, evidence for intact spatial patterning of cultural materials was found in eroded areas.

These models have important implications for data recovery at LA 86774 and LA 86780. First, it is likely that both surface and subsurface artifacts have been displaced from their original locations. Surface artifacts in blowouts are expected to have been displaced vertically and horizontally due to the funnel effect. However, subsurface artifacts may not have suffered the same degree of displacement. Investigations in the Tularosa Basin indicate that while subsurface artifacts can be displaced a considerable distance vertically, horizontal movement may be minimal (Schutt 1992). Geomorphic processes apparently resulted in considerable vertical sizing of materials, but spatial analysis was able to determine whether artifact clusters represented cultural activity loci or artifacts grouped by natural processes (Schutt 1992).

Though insufficient data were recovered during testing for detailed comparison with Schutt's results, similar processes may have been at work at LA 86774. There, artifacts were recovered from the surface to depths of 30 to 60 cm, with no evidence of multiple cultural horizons. At least one feature was found at the bottom of these deposits, and none occurred at higher levels. It is likely that this vertical artifact distribution is a result of geomorphic rather than cultural processes. If horizontal displacement is minimal, as Schutt (1992) suggests, some of the original patterning of activities may be preserved. In order to test this assumption, excavation must proceed in a carefully controlled manner. Mechanical stripping of sand from above the level at which features were encountered would obscure this patterning by removing most of the artifact-bearing layer.

Schutt's (1992) analytic results also suggest that LA 86780 may have suffered a considerable amount of data loss with the mechanical stripping of 1 to 2 m of sand from its surface. Thus, the remaining artifacts may only represent part of the original assemblage, with many of the larger artifacts removed by blading. The horizontal distribution of cultural materials should be relatively intact, however, so it may still be possible to discern activity locales.

The palimpsest concept (Holocene Litter Model) may also be partially testable with data from these sites. As discussed earlier, features and artifact-bearing levels cluster at several depths at both locales. Geomorphically, this area may represent a different type of formation process than was studied in the Tularosa Basin. As Camilli et al. (1988:2-14) indicate, these sites are in an accretional zone in which a more or less continuous sand sheet has developed. If this was a long-term process, little sand may have been removed by erosion until recently. Thus, a palimpsest may not have developed, and cultural remains might occur as a series of occupational levels with widely differing dates at various depths and locations in the unstratified sand sheet. While geomorphic processes like vertical sorting may have mixed these assemblages, intact features with the potential for dating appear to be present.

The Potential for Intact Subsurface Remains

Were we fortunate enough to encounter all or nearly all of the buried features at these sites during testing, or is it likely that undiscovered features are present? This question is critical to the development of a data recovery plan. If we assume that most subsurface features were found during testing, the plan can be developed to specifically address those remains. If it can be shown that other buried features are probably present, the plan must be aimed at locating and recovering information from them as well.

In order to address this problem, a number of testing and excavation reports from south-central New Mexico were examined to provide a basis for comparison. The results of those studies will be used to gauge the potential of LA 86774 and LA 86780 to contain buried cultural features and deposits other than those found during testing. The techniques used to locate buried remains by other investigators are also discussed, and will help determine the methods that will be used during data recovery.

Testing on property adjacent to the project area (O'Leary 1987) produced interesting results. While 18 features found during survey were initially slated for investigation, a total of 46 were eventually located, 40 of which were excavated. Six of the 28 new features were found by hand-trenching; the rest were apparently uncovered by erosion after the survey was finished. The array of investigated feature types included pit structures, hearths, ash stains, roasting pits, and artifact concentrations.

Some of the most intensive studies in this region have been conducted in the southern Tularosa Basin (Anschuetz et al. 1990; Doleman et al. 1991; Doleman et al. 1992). Testing and excavation found many buried features in that area. Numerous mechanically dug trenches were placed within sites and in off-site locations during testing. Subsurface cultural remains were encountered in 3.5 percent of 661 trenches, only one of which was in a definite off-site location (Anschuetz 1990b). This resembles the results of our off-site testing program, either suggesting that surface artifact scatters are a good indicator of the location of subsurface cultural features and deposits, or that the random placement of trenches in off-site areas is not a reliable method for finding buried remains. As cultural remains are thought to be distributed across the study area, the latter is more likely. However, as Anschuetz (1990b:163) indicates:

> the archeological backhoe data suggest that the potential for the presence of significant buried cultural remains, including the remnants of hearths or roasting pits, increases with proximity to known surface artifact scatters...we are confident that heavy equipment, in combination with geomorphological studies, hand trenching, and screening, *can* help to determine the extent of buried cultural

distributions adjacent to exposed surface scatters.

Mechanical equipment was considered inappropriate for locating cultural deposits in off-site areas because of the low visibility of artifacts found by this technique and the high potential for sample error (Anschuetz 1990b:163). However, in combination with other methods, mechanical equipment was effectively used to find buried cultural features and deposits on, and adjacent to, sites.

Besides mechanically dug trenches, methods used to probe for features on and next to sites included auger and shovel tests (Schutt et al. 1991). Mechanical trenching was used on 26 sites and auger tests were dug on 24. Twelve features were found by mechanical trenching on nine sites, and 5 were located on 4 sites by auger tests. Shovel tests were the most productive method used, locating 12 features on 3 sites. Features found by these methods included ash stains, hearths, and a possible pit structure.

Data recovery was conducted at seven sites in this area (Swift et al. 1991). Two types of mechanical excavation were used: trenching and blading. Large parts of these sites were also excavated by hand in 1-by-1-m grids. Mechanical excavation found seven buried features on five sites. Another seven were located on three sites by hand excavation. Most of these features were charcoal stains or hearths; in one case a large surface ash stain contained three individual hearths. An ephemeral pit structure was found by hand excavation at one site.

Several features were located and excavated at the Doña Ana County Fairgrounds (Seaman et al. 1987). Mechanical equipment was used as an adjunct to hand excavation during this study and it was noted that "mechanical trenching of the coppice dunes was far more desirable [than grading] from the standpoint of documenting the geomorphic and archeological context of discovered features" (Seaman et al. 1987:11).

Most of the 17 features investigated during this project were not visible on the surface. Three features were exposed in backhoe trenches, one was found by blading, and five were discovered during excavation of other features. Three features were found when an old blade-cut was examined. The types of features excavated included hearths, roasting pits, and a possible pit structure.

O'Laughlin (1980) excavated numerous features and structures on an Archaic site at Keystone Dam north of El Paso, few of which were expected from surface indications. Of 23 pit structures, 4 were found in arroyo walls, 1 was visible on the surface, 4 were located by backhoe trenches, and 14 were found by augering at various intervals. Numerous hearths and concentrations of burned rocks were also found by these methods.

Carmichael (1985a) excavated two other sites at Keystone Dam with similar results. While surface indications suggested the presence of only about 20 features, 77 were discovered during excavation. Seven buried features were found next to surface features, and 32 were located by mechanical trenching, including 25 possible pit structures. Few of the pit structures were burned, and were only visible as subtle variations in color and texture in trench walls that were left exposed for several days. Thus, Carmichael (1985a) argues that mechanical trenching is more effective than augering for finding unburned features. A magnetometer was used but was unable to locate buried features.

Batcho et al. (1985) tested 13 sites at the Santa Teresa Airport. Only features visible on the surface were investigated at most sites; however, mechanical equipment was used to probe for features at a few locations. Surface stripping with a front-end loader located a small burned rock feature at NMSU 1383 and two storage pits at NMSU 1386. Two methods were used to find buried features at NMSU 1393. A square pit structure was found using a magnetometer, and mechanical trenching located seven pits.

A Mesilla phase site in the Hueco Bolson was intensively investigated by Whalen (1990). Before excavation began, auger tests were bored across the site at 4-m intervals. This method was predicted to have an 80 percent chance of locating structures with >4-m diameters, and a 50 percent chance of finding smaller structures. When features were found, auger tests were placed around them at closer intervals to define their shape and size. Numerous structures and other features were thus located, and there were no surprises during excavation. While this method was an accurate predictor of feature location and size, it was also quite time-consuming. Approximately four weeks were required to adequately cover a 2.4 ha area.

As this discussion demonstrates, buried features are common at sites in south-central New Mexico, and no single technique is suitable for locating all of the features at a site. While intensive augering seems at first glance to be the most accurate predictor of feature location and size, that method can only find features containing fill that is colored differently from the surrounding matrix. Auger tests in the Tularosa Basin were less effective than mechanical trenching, while shovel tests and hand excavation were the most effective methods used in that study. Nondestructive techniques, such as a magnetometer survey, were effective in some cases. Unfortunately, as Carmichael (1985a) and Batcho et al. (1985) found, this method was not 100 percent accurate either.

These data suggest three conclusions. First, in answer to the question posed at the outset of this section; no, we cannot be certain that all of the buried features at these sites were found during testing. In fact, the opposite is undoubtedly true. It is likely that numerous other features remain buried at these sites, many of which may be found during data recovery. None of the methods used to probe for subsurface remains was 100 percent effective in any of the cases discussed above. Thus, we cannot assume their effectiveness in this study. Second, it will be necessary to use several different techniques to investigate the subsurface potential of these sites. Third, only by completely excavating the sites and much of the area surrounding them would it be possible to locate most of the associated features, and that would be an unreasonably expensive undertaking.

Thus, it will be necessary to sample, focusing on areas that contain known features and artifact clusters, and attempting to systematically locate those that remain hidden. Several methods can be used to search for buried features and deposits including mechanical excavation, magnetometer survey, augering, and hand excavation. All of these methods are applicable to studies at LA 86774 and LA 86780. If a large number of features are found during data recovery it may be necessary to sample rather than investigate each in detail. Such decisions can only be made in the field, but guidelines are developed and discussed in a later section of this report.

A Model of Prehistoric and Protohistoric Settlement and Subsistence Systems

As suggested by local geomorphology, it is unlikely that Paleoindian remains will be found at these sites. In addition, the lack of obvious historic materials suggests that they were used before the Spanish occupation began in the A.D. 1600s. Thus, this discussion begins with the Archaic period and ends with the Protohistoric period.

In general, the Archaic period was characterized by a mobile hunting and gathering economy. Though a long span of time is included in this period it remains poorly known (Irwin-Williams 1979). Sites are often ephemeral and economic data is rarely well preserved. This is especially true of the early Archaic, ca. 6000 to 4000 B.C. Some information on Archaic settlement and subsistence was presented in the prehistoric overview. To summarize, MacNeish and Beckett (1987) feel that Gardner Springs complex sites were small, reflecting a mixed hunting and gathering economy with some degree of seasonal scheduling related to the availability of wild foods. Domesticates were added to the diet during the middle Archaic (ca. 4000 to 900 B.C.), with squash appearing during the Keystone phase, and corn and pumpkin during the Fresnal phase. New domesticates were adopted during the late Archaic (900 B.C. to A.D. 200 or 500), including beans and amaranth. However, domesticates are thought to have been of little importance to the diet, with most food being provided by hunting and wild food collection.

The Early Archaic economy was probably based on foraging (as defined by Binford 1980), with the population moving around the landscape in small bands and exploiting resources immediately adjacent to their camps. A seasonal pattern of population aggregation and dispersion may have begun during the Middle Archaic. That population is thought to have occupied winter base camps along the Río Grande, breaking into microbands to exploit other resource zones during the rest of the year. By the Late Archaic this pattern may have become logistically organized, with task-specific groups being sent out from base camps to collect (and process) resources in distant zones and transport them back to the main camp for consumption.

MacNeish and Beckett (1987) assume progression from a simple foraging to a more complex logistical subsistence system, and this may not have been the case. It is likely that a mixed foraging/logistical system was operative through most of the Archaic. O'Laughlin (1980:29) notes that Archaic winter camps along the Río Grande are on the east side of the river where the mountain, upper bajada, lower bajada, and riverine ecozones were easily exploited. Presumably, when water was available in playas, ponds, and ephemeral streams the population broke into microbands to exploit other resource zones. Thus, the predictability and dependability of water supplies were critical to movement and settlement patterns. In years when precipitation levels were significantly above the mean, the population may have been predominantly organized in microbands. Conversely, when precipitation levels were far below the mean, the population may have been organized as macrobands in areas containing permanent water sources for most of the year.

The few data available for this period seem to support this pattern. O'Laughlin's (1980) Keystone Site 33 is the largest intensively excavated and reported Archaic camp in the region. Sixteen shallow, circular pit structures were found, twelve of which were excavated. The only interior features they contained were hearths; there were no postholes and floors were unprepared. Superstructures consisted of unsocketed leaners covered with small branches and grass and a layer of clay (O'Laughlin 1980:144). Houses occurred in clusters of two to five structures.

This site was interpreted as a winter macroband camp. Clusters of pit structures suggested occupation by an extended family or several nuclear families. The interior hearths were probably heating rather than cooking facilities, and the layer of clay on structure exteriors suggests weather-proofing. The occupational pattern may have included revisits between spring and fall to cache foods, with residential occupation occurring during the winter (O'Laughlin 1980:234). Alternately, sites along the Río Grande may have been occupied between winter and spring or summer when water was unavailable on basin floors. More than one macroband camp may have been occupied during the cold and dry seasons. Thus, rather than residing in a single "village" during these seasons, macrobands may have moved from one location to another as they exhausted local supplies of food.

Basin floor Archaic pit structures have been excavated by Camilli et al. (1988), O'Leary (1987), and Swift et al. (1991). Of the seven pit structures investigated during these studies, only one contained an interior heating feature. It is also interesting to note that none evidenced a coating of clay on the outside of the superstructure, though all appear to have been burned (which would have baked the clay coating). These pit structures were probably used during the warm season. They do not appear to occur in clusters as did the structures at Keystone Site 33. Thus, these sites were probably occupied by microbands sometime during the period between spring and fall.

While evidence of the Archaic subsistence base is rare or lacking at most sites, several trends are indicated. Though domesticates were reportedly introduced as early as 3400 B.C. (MacNeish and Beckett 1987), no evidence of cultivated crops was found at the sites discussed above. This suggests that cultigens were of limited importance in the Archaic diet. Wild plant foods including grass and other seeds, cheno-ams, mesquite beans, and leaf succulents seem to have been among the most important foods. Faunal remains are even rarer, but the few data available suggest a general pattern of small to medium-sized mammal hunting.

In general, a similar settlement and subsistence pattern is suggested for the Mesilla phase, though with a few modifications. The Jornada population may have remained hunter-gatherers after surrounding peoples began to rely on farming because of the nature of resources and precipitation patterns (Hard 1986). The arid climate of the Jornada region results in a highly productive floral community (in terms of edible parts), while potential farmlands are restricted to the few areas with dependable water supplies. Hard (1986) feels that areas with a high proportion of new annual plant growth to the amount of standing biomass can support intensive hunting and gathering at population densities that would lead to dependence on farming in other regions.

Earlier studies may have assumed a heavy Mesilla phase dependence on agriculture because pottery was produced during that period. A distinction between preceramic and ceramic periods is often made in Southwestern archaeology, assuming that the former represents a hunter-gatherer economy and the latter dependence on farming. However, the manufacture and use of pottery by hunter-gatherers is not unknown, and has been documented among prehistoric Bushman populations in South Africa (Sampson 1988). This suggests that ceramic production and use is not out of place in a mobile economy, even one lacking cultigens.

Hard (1986) modeled the late Mesilla settlement and subsistence system, and that pattern can probably be extended to the early Mesilla phase. There appear to be few differences between the Archaic and Mesilla patterns. Winter base camps are thought to have been along the Río Grande or next to mountains where water was available in playas, springs, or perched water tables at the ends of alluvial fans (Hard 1986:273-274). Winter subsistence was based on a small harvest of cultigens and stored wild plant foods including mesquite, yucca, cheno-ams, sunflower, and acacia. These foods were supplemented with meat provided by hunting small and medium game, primarily rabbits. O'Laughlin (1980) notes that while leaf succulents like soaptree yucca can be processed and consumed at any time of year, they are at their best in the spring. Thus, logistical camps could have been temporarily established in other ecozones during winter and spring to procure and process these foods as supplements to stored resources. This may have been of particular importance in the spring, when stored foods probably regularly ran short. Winter camps should contain structures suitable for cold season use, as well as accumulations of trash suggesting periods of intensive occupation separated by short periods of abandonment.

During the summer rainy season (July through September) critical resources became available in other ecozones, including basin floors. Plant resources and the rabbit population both peak during this season, and water is widely available in playas (Hard 1986:266). The population appears to have abandoned its winter or spring camps at this time, breaking into smaller groups and dispersing into other resource zones (Hard 1986:272-273). Microbands are thought to have employed a mobile foraging strategy of resource exploitation. Hard (1986) feels that summer foraging camps were located near playas where both seeds and rabbits were most available. These camps would have been occupied for short periods, basically until resources within a radius of about 10 km were depleted. Then the group would move to another location. Small fields were probably planted in the winter occupation zones along the Río Grande or near the mountains, and aged individuals may have remained behind to tend crops while the rest of the group moved into foraging zones. Summer or rainy season camps should be small, contain limited cultural remains, and be most common on basin floors. Structures should be ephemeral and more accurately described as huts than pithouses. They should not have been suitable for winter occupation, and interior heating features should be absent.

From the discussion thus far it would seem that the Archaic and Mesilla occupations represent a long period of relative cultural stability, similar to Lehmer's (1948) original scheme. However, rather than long-term stability, it is likely that southern Jornada populations were continually modifying their settlement-subsistence system to cope with changes in the physical and social environments. The Mesilla phase undoubtedly saw continual fluctuation between more and less reliance on farming. Years with wet winters and springs may have seen increased dependence on agriculture, with little or no use of farming in dry years.

While there are similarities between Archaic and Pithouse period settlement and subsistence systems, there is also evidence for greater dependence on agriculture during the Mesilla phase. O'Laughlin (1980:29) noted a shift from winter occupation on the east side of the Río Grande during the Archaic to the west side during the Mesilla phase. As conditions are more amenable to farming on the west side of the river, he infers an increased dependence on farming. Thus, though both time periods were dominated by a hunting-gathering economy with some farming, dependence on agriculture (to produce storable surplus for winter use) may have increased through time.

Two factors may have led to a realignment into relatively sedentary villages with a much higher reliance on agriculture after A.D. 1100. First, the population may have reached levels impossible to support without increased dependence on farming. Second, the climate may have mandated change. Widespread conditions of below average precipitation seem to have prevailed in twelfth-century New Mexico. Gillespie (1985) indicates that increased summer precipitation and temperature predominated in northwestern New Mexico between A.D. 900 and 1100, followed by a period of summer drought between A.D. 1100 and 1180. Similar trends occurred in southwestern New Mexico. Between A.D. 1000 and 1100 there was an unusually favorable climatic regime in that area, followed by a period of below normal precipitation between A.D. 1100 and 1150 (Minnis 1981; Stuart and Gauthier 1981). In both cases, populations grew during periods of increased rainfall and were catastrophically affected by drought.

It is possible that similar climatic conditions prevailed in the southern Jornada area, but had a different effect on the local population. An ameliorated climate ca. A.D. 900 or 1000 to 1100 would have increased wild food availability while at the same time increasing the reliability of farming. Indeed, researchers have identified differences in Mesilla sites from this period including settlement in basin zones amenable to farming and changes in house styles. This may have been a consequence of continuing population growth, or could have been occasioned by the increased reliability of farming. Reduced precipitation could have forced the population to further intensify their agricultural base by concentrating near the best farmlands. However, these difficulties could also have been overcome by returning to a predominantly hunting-gathering economy, which did not occur. The population may have grown too large to be supported by that type of economy, leading to continued and intensified reliance on agriculture.

Another possibility is suggested by Hard (1986), who believes that growing populations in areas surrounding the Jornada region may have applied pressure to wild resources. Those populations may have been competing for the foods that grew between their occupational zone and that of the Jornada. This may have caused stress on the Jornada subsistence system, forcing them to increase their dependence on agriculture rather than hunting and gathering. In all likelihood, however, more than one factor was responsible for development of a farming economy in this region. Internal population growth, external population growth, and changing climatic conditions probably all contributed to the process.

The Doña Ana and El Paso phase settlement systems included rather substantial villages situated next to arable land, and large adobe pueblos were being built by the El Paso phase. This kind of construction probably had more to do with changing patterns of land tenure and storage than adoption of foreign traits as Lehmer (1948) supposed. While this settlement system suggests a heavy dependence on domesticates, wild foods continued to comprise a large portion of the Pueblo period diet (Foster and Bradley 1984). The settlement system appears to have been logistically organized during these phases. Villages situated where dependable water and arable land are juxtaposed were the main occupational loci, but camps used by task-specific groups occur in other ecozones. Task-specific camps were probably used for short periods of time while wild resources were being collected and processed for transport back to the main residence. These sites should demonstrate sporadic and short-term occupations, and lack evidence of substantial architecture or a wide variety of tasks.

There is also evidence for the existence of farmsteads on the basin floor away from sources of permanent water. Several sites that appear to have served this purpose were recorded by Elyea (1989) near the project area. They contain formal middens, and it is likely that structures are also present. Farmsteads should contain substantial architectural remains as well as evidence for long-term occupation by families rather than task-specific groups.

Further changes in the physical and social environments may have either allowed the population to return to a generalized hunter-gatherer pattern after A.D. 1400, or forced them to abandon their dependence on farming. Unfortunately, there is not enough information available to explore this in detail. Documentary evidence, however, suggests that the population returned to a pattern very similar to that of the late Archaic and Mesilla phases. Thus, lacking absolute dates, Protohistoric sites may be impossible to distinguish from those of earlier time periods.

Models and Test Implications

Data recovered from these sites will be used to examine two general models. The first is related to the nature of cultural deposits and assumes that, like other basins in south-central New Mexico, the distribution of cultural remains is a palimpsest. That is, numerous overlapping occupations have left behind an almost continuous scatter of artifacts and features. Local geomorphology, however, suggests that cultural deposits at LA 86774 and LA 86780 are not compressed by erosion as they are elsewhere. Thus, the clustering of cultural features and deposits at a series of depths across these sites is thought to reflect multiple uses of an area along the edge of a playa.

The second model concerns the nature of local settlement and subsistence patterns over time. To summarize, most of the occupational history of this area was dominated by a hunting and gathering economy. Archaic and Pithouse period occupations are thought to have been based on a combination of microbands using small foraging camps during the rainy season (mostly on the basin floor) and macrobands residing in larger camps near permanent water sources during the dry season, where they also practiced limited farming and used logistical camps to exploit other ecozones. Farming assumed increased importance during the Pueblo period, resulting in establishment of relatively permanent villages in areas where arable land and reliable water were both available. Other resources, particularly leaf succulents, were exploited by specialized logistical camps. The Protohistoric economy seems to have been characterized by a return to the mixed hunting-gathering and farming pattern of the Pithouse period. Presumably, this also entailed a similar settlement system.

Many questions were raised during earlier discussions of these models; some are applicable to LA 86774 and LA 86780, while others are only marginally germane. In this section, a series of research questions that can be addressed with data from these sites are developed. These questions are closely linked, and are aimed at determining how the sites fit the models. The nature of these sites, as suggested by testing, should provide a unique opportunity to examine these questions. This is especially true if the project area has been more or less continually aggrading during the late Holocene, as suggested by geomorphological studies. Following the development of these questions, test implications are formulated and data needs are discussed.

Research Questions

When Were the Sites Occupied? While this seems simplistic, determining occupational dates is critical to most of our research questions. The only diagnostic artifacts at either site were undifferentiated brown ware sherds, providing a general date of A.D. 200 or 500 to 1600 or later. In addition, the direct association of ceramic artifacts with features and the lithic assemblage at LA 86780 has been questioned. The depth of features at that site, the paucity of pottery, and some evidence for the reduction of large bifaces all suggest an Archaic occupation. LA 86774 is thought to have been primarily used during the Mesilla phase, though some of the deeper deposits may be preceramic. However, as noted earlier, Protohistoric sites may be indistinguishable from Archaic or Pithouse period sites. Thus, it is also possible that some of these remains date after A.D. 1400. The clustering of features and cultural deposits at various depths across these sites suggests that both are multi-occupational locales.

Absolute dates are critical to a fine-tuned examination of these questions. While artifacts can and will be used to help determine periods of occupation, only the finer control provided radiocarbon or archaeomagnetic dates will allow us to test many of the ideas we have about these sites. In the absence of these types of data, it may only be possible to very grossly determine when and how the sites were occupied.

How is Site Structure Related to Geomorphic Processes? Features and cultural deposits were clustered at a series of depths across these sites, and the meaning of that distribution has not yet been determined. Two possibilities were discussed. While this distribution could reflect an undulating landscape at the time of occupation, it more likely indicates repeated uses over time. The distribution of features at various depths was likened to an uncompressed palimpsest. True palimpsests occur along the Chaco River. There, Reher (1977) found complex sites containing thousands of artifacts and numerous features occurring as large, continuous scatters along major arroyos. These sites were originally thought to represent large macroband camps. More recent research disagrees with that interpretation, concluding that a series of adjacent or overlapping foraging camps were established in that area (Moore 1980). Deflation has mixed materials from the various occupations, resulting in a continuous scatter of artifacts and features. Thus, an archaeological palimpsest is a confused scatter of cultural materials derived from numerous overlapping uses and activities. Unraveling such a record is difficult and often impossible.

Geomorphically, LA 86774 and LA 86780 are in an area that may represent an almost continuous accumulation of sand during the late Holocene. While some periods of deflation are probably represented, this area may not have suffered the continuous process of coppice dune and blowout formation that seems to characterize most basin floors in the region. The clustering of features and cultural deposits at various depths suggests repeated occupations at widely varying times. This problem is closely linked to the determination of occupational dates. There is only one way to rigorously test this idea, and that is to accurately date a number of features at different depths.

If dateable materials are unavailable from most features, it will be impossible to determine whether their distribution is related to local topography or to repeated occupations in an area of continuous sand accumulation. If enough dates are recovered, a narrow clustering for each site will suggest that an undulating occupational surface caused this distribution. If dates from features at similar depths cluster and are considerably different from those derived for other clusters of features, multiple occupations will be indicated.

An examination of site stratigraphy could also help address this problem. Unfortunately, testing showed that features and artifacts occur in a relatively homogeneous and thick layer of sand. During data recovery we will try to define stratigraphic differences between occupational levels. However, we do not anticipate being able to either verify or refute these ideas with stratigraphic data.

Are There Differences between Archaic and Mesilla Chipped Stone Assemblages? As discussed earlier, LA 86780 may represent an Archaic occupation and LA 86774 seems to have been primarily occupied during the Mesilla phase. According to current thought there should be few differences between sites of these time periods because they represent a similar adaptation. Both periods seem to represent mobile foraging occupations using the same set of ecozones. The main difference is in the array of temporally diagnostic artifacts that are present. Archaic sites often contain large dart points, while Mesilla phase sites contain small arrow points and pottery.

The idea that the population was comprised of highly mobile foragers during both periods can be addressed by analysis of chipped stone assemblages. Many researchers have isolated differences between mobile and sedentary chipped stone assemblages (Chapman 1977; Hicks 1988; Irwin-Williams 1973; Kelly 1988; Kerley and Hogan 1983; Laumbach 1980; Moore n.d.; Rozen 1981). These differences have been modeled by Kelly (1988). In general, the reduction strategy used by mobile Southwestern hunter-gatherers was oriented toward the manufacture and curation of general purpose biface-cores, while that of sedentary groups was based on the expedient production of flake tools.

If Archaic and Mesilla phase peoples were mobile foragers, as suggested by the settlement-subsistence model presented earlier, a curated reduction strategy should have been used during both periods. However, if there were differences in the degree of mobility represented by these adaptations, there may be corresponding differences in reduction strategies. Camilli et al. (1988:158) feel that similar reduction strategies were used throughout the occupation of this area:

> Evidence exists, therefore, for at least two strategies of tool production and use at places containing lithic assemblages associated with projectile points: one incorporating carried tools and cores, and the other using expediently produced flakes manufactured from local materials. Rather than an emphasis on biface production during the Archaic and on flake production during later periods, expedient flake production may have been a technological option of occupations that were widely separated in time.

While Kelly (1988) associates curated strategies with mobility, Bamforth (1986) argues that they are more closely related to the availability of desired materials. Preliminary studies near San Ildefonso (Moore n.d.) suggest that both are correct. Archaic assemblages in that study displayed a differential reduction of local and exotic materials. While local materials were mostly expediently reduced, exotic materials were primarily reduced as large biface-cores. It was concluded that Archaic populations reduced exotic materials efficiently because they were desirable and in limited supply. Local materials were expediently reduced because they were easily obtained and plentiful, and conservation was unnecessary. Did hunter-gatherers in the Mesilla Bolson use a curated technology, was an expedient reduction strategy used because of the availability of raw materials, or were both strategies used?

Suitable raw materials for lithic reduction are rare in the basin, and may only be associated with volcanic features or deep erosional cuts. Other than at their sources in adjacent mountain ranges, raw materials are only common in Santa Fe gravels along the Río Grande. While they are available a few kilometers from the project area at the edge of the Río Grande Valley, lithic materials are not evenly distributed throughout the region as is necessary to Bamforth's (1986) argument. Thus, some curation of materials, particularly those of the highest quality, might be expected among mobile hunter-gatherers.

Several authors have identified differences between Archaic and Mesilla phase reduction strategies and tool kits. Elyea (1989) used evidence of biface manufacture to define Archaic sites near the project area. Schutt (1987) found differences in Archaic and ceramic period tool kits. Archaic tool kits were used to acquire vegetal materials, and for limited processing by grinding. Ceramic period tool kits suggested the acquisition, roasting, and processing of vegetal materials, but there was little or no evidence for food grinding. This probably reflects the increased reliance on leaf succulents in the Mesilla phase noted by O'Laughlin (1980).

O'Laughlin (1980:190) also found differences between Archaic and Ceramic period assemblages. Archaic assemblages exhibited a higher reliance on chert, contained no core tools, had more small flake tools, smaller and more intensively worked cores, and less cortical debitage. A few multifacet platforms were also noted, resharpening flakes occurred, and there seemed to be a greater reliance on bifacial reduction. Unfortunately, the attributes used as evidence of biface manufacture are not good indicators of that strategy. There were also no prepared platforms, which are the best evidence for a bifacial reduction strategy. When these points are considered, O'Laughlin's conclusions may be erroneous.

Carmichael (1985b) contrasts Mesilla and Doña Ana phase chipped stone assemblages, noting that the former demonstrate some use of biface technology, while the latter is characterized by a core-flake reduction strategy. However, excavation at an early Mesilla site and a probable Doña Ana site suggested that an expedient strategy was used at both (Miller and Carmichael 1985).

Unfortunately, there is a lack of consistency in these studies, both in attributes examined and results. There is little doubt that bifaces were made and used during all periods of occupation. Bifaces with specialized uses are characteristic of both mobile and sedentary societies (Kelly 1988). Thus, the presence of these tools does not automatically suggest a high degree of residential mobility. According to Kelly's (1988) model, a curated reduction strategy is characterized by the use of large bifaces that function as both general-purpose tools and cores. Two questions may be asked: (1) Was a curated strategy used at all in this area? and (2) If a curated strategy was employed during the Archaic occupation, did it continue in use during the Mesilla phase?

There is evidence that the Mesilla phase settlement and subsistence system differed slightly from that of the Archaic. Cold-season camps shifted from the east side of the Río Grande during the Archaic to the west side during the Mesilla phase (O'Laughlin 1980). That zone contains better farm lands, suggesting that while hunting and gathering continued to provide the bulk of the diet, farming had assumed increased importance. There also seems to have been more reliance on leaf succulents during the Mesilla phase than the Archaic. Finally, the adoption of pottery may signify important differences in storage needs or food preparation techniques. Thus, while the basic subsistence system was similar to that of the Archaic, a few subtle changes during the Mesilla phase suggest that there were important differences. These may have included a higher dependence on cultigens and leaf succulents that required greater labor input in production, collection, and processing. These changes may have been accompanied by subtle shifts in the settlement system. If so, a decrease in residential mobility may have occurred, and should be reflected in the lithic assemblage.

Two possibilities have been presented. Either there were no great differences between Archaic and Mesilla phase settlement and subsistence systems, or there were subtle differences reflecting a higher dependence on cultigens and more labor-intensive plant collecting and processing during the Mesilla phase. In the first case, there should be no great differences between Archaic and Pithouse period reduction strategies. In the second, changes in the economy should be accompanied by reduced residential mobility, resulting in the use of a more expedient reduction strategy.

What Type of Occupation is Represented by These Remains? According to the settlement-subsistence model presented earlier, use of the basin floor during the Archaic, Mesilla, and Protohistoric periods should be limited to briefly occupied microband camps near intermittent water sources. Camps are short-term residential sites used for a few days to several months. The number of structures present and the amount and range of associated debris depends on the size of the group occupying the locale and the length of stay. During the Doña Ana and El Paso phases, the basin floor is thought to have been the location of specialized collecting and processing camps (Carmichael 1985b; Whalen 1977). Rather than use by one or more families, these sites were used for short periods by task groups. Thus, only a small range of activities was performed.

We have assumed that LA 86774 and LA 86780 were occupied during the Archaic period and Mesilla phase, thus they should be short-term residential camps. The sites are situated next to a small playa that presumably held water during the rainy season. Occupational groups probably consisted of one or more families, and a full range of maintenance, manufacturing, and food procurement-processing activities should be reflected, depending on how often and how long the sites were occupied.

Other studies suggest that structures on early Pithouse period camps are ephemeral, usually contain no formal internal heating features, and show no evidence of weather-proofing (Camilli et al. 1988; O'Leary 1987). While several structures and numerous features might occur on a site, this does not necessarily suggest occupation by a large group of people. Whalen (1986) found that large Archaic and Mesilla phase camps were comprised of small overlapping occupation areas. Studies in the Tularosa Basin confirm the idea that the distribution of cultural materials in that area is a partial palimpsest (Doleman 1991). In one case, features situated 20 m apart had dates that differed by 1,000 years, demonstrating the multi-occupational nature of that locale (Doleman 1991:444). Archaic and Mesilla phase camps in basin interiors also lack evidence of farming, including the remains of cultigens. Refuse generally occurs as sheet trash deposits rather than formal middens.

Pueblo period basin floor sites differ from this pattern. Camps from this period are thought to have been established by task-specific groups. Whalen (1986:75) determined that the Pueblo period adaptation in the Hueco Bolson used fewer and often larger camps that were often situated in specialized locations. He also found evidence suggesting that task-groups from this period may have been larger than those of earlier periods.

Pueblo period fieldhouses or farmsteads may also occur in basin floor settings (Elyea 1989; Stuart 1990a). These site types differ in the way they were used; fieldhouses were used seasonally by part of a family and farmsteads were year-round residences for entire families (Wilcox 1978:26). Fieldhouses or farmsteads on the basin floor contain small middens or square pit structures. As no evidence for these types of features was found at either LA 86774 or LA 86780, they do not seem to have been used as temporary farming sites. Thus, these site classes are not discussed any further. A detailed model of fieldhouse versus farmstead is developed in Moore et al. (1992). Should data be recovered that suggests LA 86774 or LA 86780 were Pueblo period farming sites, that model and its test implications will be used. This possibility, however, is very unlikely.

Testing the Models

The test implications listed below should help determine the nature of deposits and settlement and subsistence patterns reflected by the remains at these sites. However, it should be remembered that these sites represent only a small portion of the settlement and subsistence system of which they were part. They also occupy a minuscule part of the Mesilla Bolson. Thus, it will not be possible to fully test the models with information from LA 86774 and LA 86780. However, these data in combination with the results of other studies from this region may be sufficient for a preliminary assessment of the models.

1. Dates of occupation. If LA 86774 was occupied during both the Archaic period and Mesilla phase, the following characteristics are expected:

    a. Dates from deeper deposits in the southwest part of the site should be earlier than those from shallower deposits in the northeast section.

    b. Features in the southwest part of the site should date before A.D. 500, and features in the northeast part of the site should date after A.D. 500.

    c. Only lithic artifacts should occur in subsurface contexts in the southwest part of the site. If pottery is recovered, it should be restricted to the upper 10 to 20 cm. Subsurface pottery should mostly be restricted to the northeast part of the site.

    d. If projectile points are recovered, large dart points should be found in the southwest part of the site, and small arrow points should occur with pottery in the northeast part of the site.

    e. Any structural remains should be ephemeral, and should consist of round pit structures.

f. The ceramic assemblage should be dominated by El Paso Brown. Intrusive pottery may include Alma Plain, San Francisco Red, or Mimbres Boldface.

g. More evidence of grinding activities should be associated with Preceramic deposits.

If LA 86780 was occupied during the Archaic period, the following characteristics are expected:

a. Features should date before A.D. 200 to 500.

b. Few sherds will be found and should be restricted to the surface; the assemblage will contain mostly chipped and groundstone artifacts.

c. The only projectile points present should be large dart points; no arrow points should be found.

d. Any structural remains should be ephemeral, and should consist of round pit structures.

e. There should be considerable evidence of grinding activities.

While diagnostic artifacts can often be used to provide dates, they rarely provide any tight temporal controls. Thus, while artifacts like projectile points and pottery will be useful in assigning relative dates, absolute dates are more reliable and are needed to test many of our assumptions. While pottery will be recovered from LA 86774, little if any should be found at LA 86780. Projectile points may be present at both sites, but it is impossible to predict whether any will actually be recovered.

Four types of absolute dates are potentially available at both sites. Radiocarbon samples are expected to be the most common, and should occur as charcoal in pit structures and hearths. If features burned hot enough to oxidize the soil, archaeomagnetic samples might be obtained. However, testing suggested that this is unlikely. Tree-ring samples might be obtained from structural remains. Unfortunately, if our assessment of these sites as briefly occupied rainy season camps is correct, only local woods like mesquite should occur, which are not suitable for this type of dating. Obsidian can also be used to provide dates, and is available from the surface of both sites. However, problems associated with the accuracy of obsidian hydration dating, particularly when applied to surface materials, renders its utility questionable. Thus, charcoal from features at both sites should provide most of the absolute dates. Other dateable materials might be available, but except for obsidian, this is unlikely.

2. Interrelationship of cultural and geomorphic site formation processes. If these sites occupied an undulating land surface, the following characteristics are expected:

a. Dates from features at each site will cluster within a narrow time frame, suggesting they were used at approximately the same time.

b. Dates from LA 86780 should be earlier than those from LA 86774, reflecting the greater depth of deposits at that site.

c. As both sites seem to represent multi-occupational locales, a wide range of dates may be recovered. If so, dates should not cluster according to depth. Dates suggesting that an array of features are related to one occupational episode may occur at a variety of depths.

If these sites represent an uncompressed palimpsest, the following characteristics are expected:

a. Dates from features at both sites will not cluster within a narrow time frame; a relatively wide range of dates should be recovered.

b. Dates from features should cluster according to depth.

c. As both sites seem to represent multi-occupational locales, a wide range of dates may be recovered. Dates from features with similar depths at both sites should cluster.

Absolute dates are needed to fully assess these problems. The availability of this data class has already been discussed. Stratigraphic data may also be used to address these questions, though at a much coarser level. Stratigraphic data will be obtained from hand and mechanically dug trenches. Unfortunately, stratigraphic interpretations made by the field crew will probably not be sufficiently detailed to allow a full assessment of the relationship between soil strata and the distribution of features. These data must be gathered by geomorphologists. This will allow the stratigraphic sequence in the project area to be compared and contrasted with other well-studied sequences in south-central New Mexico, and will provide a further test of the accuracy of our predictions.

3. Archaic and Mesilla phase chipped stone assemblages. If there were equivalent levels of mobility during Archaic and Pithouse periods, the following characteristics are expected:

   a. Assemblages from both periods should reflect reduction strategies aimed at maximizing the amount of useable edge removed from a core.

   b. There may be differences in the way common or local materials were reduced versus rare or exotic materials. Rare and desirable materials, especially those that are glassy or very fine, should be reduced in a way that maximizes the number of flakes removed. Common materials, especially those available locally, should be reduced in an expedient manner, though some maximization might occur.

   c. While the maximization of materials might encompass the systematic removal of flakes from a prepared core, it will more likely be expressed as the manufacture and use of large biface-cores.

d. As suitable lithic materials are not available in the project area, there should be little if any evidence of large biface-core manufacture at these sites. Evidence for the use of this type of tool should be restricted to flakes removed from large bifaces for use or resharpening, and spent or broken biface-cores that were discarded.

e. The same approximate range of raw materials should be reflected in both Preceramic and Pithouse period assemblages.

f. A wide range of formal and informal tools should occur in assemblages from both time periods.

If different levels of mobility are reflected in Archaic and Mesilla phase sites, the following characteristics are expected:

a. A curated reduction strategy should be evident in Archaic chipped stone assemblages. A more expedient reduction strategy should be visible in Mesilla phase assemblages.

b. Evidence for the use of large biface-cores should occur in Archaic assemblages. For reasons specified above, it should be restricted to flakes removed from large bifaces and discarded bifaces.

c. Only bifaces with specialized purposes should occur in Mesilla phase assemblages.

d. A different range of lithic raw materials should occur in Preceramic and Pithouse period assemblages.

e. Archaic assemblages should contain a wide range of formal and informal tool types. Mesilla assemblages should contain fewer and a smaller range of formal tools, and should be dominated by informal tools.

Data needed to test these assumptions should be available from the chipped stone assemblages at these sites. Both seem to contain relatively large numbers of chipped stone artifacts that can be used for this analysis. Information on local raw material availability is also needed and can be obtained from earlier studies, nearby gravel deposits, and volcanic features, and local type collections.

4. Site occupation type. If these sites functioned as foraging camps during the rainy season, the following characteristics are expected:

a. Evidence of repeated short-term occupations should be found. Attributes that should not occur include long-term storage features, structures suitable for cold season use, human burials, evidence for macroband occupation, formal midden deposits, and signs of task-specific use. Attributes that may occur include ephemeral structures, evidence for occupation by a microband, sheet trash deposits, and a wide range of manufacturing-maintenance and food procurement-processing activities.

b. Structures should be shallow (less than 30 cm deep) and reflect warm season use; both formal interior heating features and weather-proofing should be absent. There should be no formal structure to floors; only compacted sand floors should occur.

c. There should be evidence for a wide range of floral and faunal foods in the diet. No cultigens should occur; only wild foods should be represented. Only the remains of local foods should be found; foods available in distant ecozones should be absent.

d. Clusters of associated features and artifact assemblages should be redundant. They should reflect the same season of use and performance of the same range of activities through time.

e. If the differences between Archaic and Mesilla phase economies discussed earlier are real, they should be reflected in the remains at these sites. The Archaic economy should be generalized, evidencing the collection, processing, and consumption of a wide range of floral and faunal foods. The former should include wild seed grinding as well as leaf succulent roasting. The Mesilla economy should also be relatively generalized, but should focus more on the roasting and consumption of leaf succulents and less on the grinding and consumption of wild seeds. The latter, which are eminently storable, may have been collected and transported to the winter residence for storage and cold season use.

Perhaps the widest range of data types are needed to address these questions. A comparative data base is also necessary, and can be obtained from the archaeological literature for this region. The types of data needed includes structure type and style of construction, types of features present and their association with one another and any potential structures, the range of activities that were performed, and the types of foods that were collected and consumed.

Structural information is potentially available from two features, one at each site. They include a probable pit structure found in a mechanically dug trench on LA 86774 and Feature 7 on LA 86780. Numerous other features are also known to exist at these sites, many of which were assessed during testing and were described earlier. In addition to these features, it is possible that others exist and will be found using a variety of methods including mechanically dug trenches, auger tests, and hand excavation. Remote sensing techniques can also be used to locate structures and features, and involve the measurement of magnetic and electrical properties of a site.

Data concerning the range of activities performed at these sites are available from several sources. Unfortunately, many tools were manufactured from perishable materials and will probably not be available. Other tools, if still useable, were carried off when the sites were abandoned. Thus, the range of activities reflected in artifact assemblages is nowhere near complete. Some data on activities will be obtained from the chipped and ground stone assemblages. The types of features that occur will also provide information on the range of activities performed at these locales. Ceramic assemblages will yield data on food storage and preparation.

Evidence of food procurement and consumption might be available, but specifics may be lacking. The types of lithic tools recovered can be used to suggest the range of foods that were gathered, processed, and consumed. Unfortunately, this information is nonspecific. For example, the presence of projectile points suggests that hunting occurred, but cannot tell us what animals were pursued. Similarly, the occurrence of ground stone tools indicates that vegetal foods were processed by grinding, but it is usually impossible to determine what those foods were. Floral and faunal remains are needed before food consumption patterns can be accurately assessed. These types of remains were rare at similar sites in this region. Information on the range of floral foods consumed will be obtained (if possible) from flotation samples taken from hearths and other cultural deposits. Bone may be recovered from similar deposits, but should be rare and difficult to identify.

FIELD AND ANALYTIC METHODS

General Excavation Procedures

The first step in data recovery will be reestablishment of the grid system, which will be used to provenience collection and excavation units. Horizontal and vertical controls will originate from the same point for both sites. Surface artifacts will either be collected in 1-by-1-m grids, or will be point provenienced. Initial excavation will concentrate on cultural features and deposits defined during testing. Hand tools will be used to examine areas containing known features. Auger tests and excavation in 1-by-1-m grids will be employed to locate other features and recover artifacts from these zones.

Several methods will be used to search for other buried features. A magnetometer survey will be conducted across parts of each site to provide information on the locations of potential buried features. It is likely that only burned features or substantial structures will be located by this method. Depending on the number of features found by this survey, all or a sample will be excavated. After surface artifacts are collected and known features investigated, mechanical equipment will be used to trench areas that potentially contain other cultural features or deposits. Mechanical equipment will also be used where needed to strip disturbed or sterile overburden, and to investigate areas lacking surface remains.

Excavation by strata is considered optimal, because soil layers tend to represent specific depositional episodes. Therefore, exploratory units will be excavated to define the natural vertical and horizontal structure of features and areas containing cultural deposits. Excavation units will consist of 1-by-1-m grids, and will be dug in arbitrary 10 cm vertical levels unless natural strata are encountered. When natural breaks are found they will be used to delimit the boundaries of a level. These unit sizes allow the desired amount of control over recovered materials. Excavation will be expanded outward from exploratory grids to determine the nature and extent of cultural deposits and features, and will continue until sterile soil is encountered. If cultural features or deposits are found in an auger test, that area will be more intensively investigated by hand excavation, or will be trenched by backhoe to delineate the extent of buried remains.

The horizontal limits of features will be defined by excavating a series of grids around them. While 1-by-1-m grids will be used to define their edges, features will be excavated as individual units. Thus, while features will be provenienced and recorded according to the grid system, those boundaries will not necessarily be adhered to during excavation. Small features like hearths will be excavated in halves. One half will be dug in 10-cm arbitrary levels to define internal stratigraphy. After a profile is drawn, the second half will be excavated by natural strata. Larger features, such as pit structures, will be excavated in quadrants. If feasible, quadrants will be defined by the grid lines that pass through a feature; thus, they will not necessarily be of equal size. One quadrant will be excavated in 10-cm arbitrary levels to define internal stratigraphy. The remaining quadrants will be excavated by natural strata. North-south and east-west profiles will be drawn along quadrant lines.

All soil removed from grids, features, and auger tests will be screened through ¼-inch mesh hardware cloth to recover artifacts for analysis. Artifacts found on floors and other occupational surfaces will be mapped in place and bagged separately. Pollen and flotation samples will be collected from cultural strata, floors, and occupational surfaces. In addition, an off-site pollen sample will be collected as a modern control. Flotation samples will be taken from excavated features to provide economic data. Chronometric samples will be collected, where available, to aid in identifying periods of occupation.

As noted above, it may be necessary to excavate a sample of the features found. If this is required, sample size will depend on the number of features and budgetary constraints. An attempt will be made to excavate each pit structure found. A minimum of at least one example of each other type of feature will also be excavated. Some data will be collected from unexcavated features including location, depth, approximate size, and type. Flotation and radiocarbon samples will be taken if possible. These data will aid in analyzing site residence patterns, construction sequence, remodeling, and number and type of occupations.

Discovery of burials during data recovery is unlikely. Both sites seem to have been repeatedly used as camps with short occupational durations. Burials are seldom encountered at this type of site, and other studies in this area have not found burials at similar sites. However, should human remains be discovered at either locale, they will be treated in accordance with HPD Rule 89-1. Notification of any such finds will be made to the Historic Preservation Division, local law enforcement officers, and the medical examiner. Excavation of human remains will be conducted under Permit No. ABE-056, and will employ standard archaeological techniques including definition of the burial pit, use of hand tools to expose skeletal materials, photographing and mapping the position of the skeleton and any grave goods, and retrieval of soil for pollen analysis.

Field treatment of human remains and other sensitive cultural discoveries will be based on the Museum of New Mexico policy adopted January 17, 1991, "Policy on Collection, Display and Repatriation of Culturally Sensitive Materials" (SRC Rule 11). If sensitive materials are uncovered, no person will be allowed to handle or photograph them except as part of scientific data recovery efforts. Data recovery related photographs of sensitive materials will not be released to the media or general public. Interested parties including relatives (if found) or local Indian Tribal organizations will also be informed, and will be consulted concerning disposition of the remains and any grave goods.

All features and excavation areas will be mapped using the grid system or a transit. Artifacts will be provenienced by grid and excavation unit, or by exact location when such treatment is warranted. Plans and profiles of individual features and exploratory grids containing cultural deposits or features will be drawn, and standard recording forms will be completed. Features will be photographed before and after excavation.

Site-Specific Excavation Procedures

In general, the same excavation methods will be used at both sites. However, specific applications will vary. The presence of numerous mesquite-anchored coppice dunes at LA 86774 will limit the use of certain techniques. Thus, magnetometer survey, auger tests, and hand excavation will be restricted to interdunal areas. Mechanical equipment will be used to trench coppice dunes and clear mesquite and sterile overburden if buried cultural features or deposits are encountered. This will allow hand excavation to proceed.

Unless other cultural features or deposits are found, data recovery will concentrate on the northeast part of the site where testing found a hearth and probable pit structure, and the southwest area where deeper cultural deposits occur. The artificial boundary between this site and LA 86780 will also be investigated in more detail to determine whether they should be combined or remain separate analytic units. Excavation of the entire site is neither feasible nor desirable. Thus, no attempt will be made to recover all subsurface cultural materials present at this site. Instead, it will be sampled, concentrating on areas containing features or dense clusters of subsurface artifacts. As discussed above, features will also be sampled if necessary. It is anticipated that 50-100 cu m of soil will be excavated by hand, and 500+ cu m will be moved by mechanical equipment.

Previous mechanical disturbance has removed most of the overburden from LA 86780, exposing features and artifacts. Testing suggested that cultural deposits do not extend far below this new surface. Thus, investigations at this site will primarily entail extensive but shallow excavation in grids to search for other buried features and recover associated artifacts. These investigations will concentrate on the central part of the site, where most of the features and artifacts are currently exposed. Much of this zone will also be examined by magnetometer to locate buried features.

The eastern edge of the basin in which the site occurs is not as deeply excavated as the central part of the basin that contains most of the features and surface artifacts. Feature 7, which may be the bottom of a pit structure, is at the edge of this zone, suggesting that the scatter of artifacts and features extends beneath the mantle of sand. This zone will also be examined by magnetometer. In addition, mechanically dug trenches will be used to investigate the eastern edge of the site as well as the southern and northern parts of the site, which contain few surface artifacts and no visible features.

Total excavation of LA 86780 is neither feasible nor desirable, and no attempt will be made to recover all subsurface cultural materials. Sampling will be employed, concentrating on areas that contain features and dense concentrations of surface artifacts. All features identified during testing will be excavated. The array of features located by other methods will either be excavated or sampled, as discussed earlier. It is anticipated that 50-100 cu m of soil will be excavated by hand, and 500+ cu m will be mechanically moved.

Estimates of the amount of soil that will be removed during excavation are tentative. While testing can confirm whether intact cultural deposits are present, it rarely provides enough data to allow an accurate determination of the extent of those deposits. When large sites like LA 86774 and LA 86780 are tested, it is rarely possible to even determine how many features are present. Thus, these estimates are at best ball-park guesses based upon the little we know about subsurface remains at these sites. The actual amount of soil moved could easily fall short of or exceed these estimates.

Analysis of Cultural Materials

Ceramic Artifacts

In order to assign date, origin, and function to pottery, a detailed analysis of morphological attributes will be undertaken. Sherds will be identified by existing type name and vessel form. Other attributes that will be studied include rim form and cross-section, vessel diameter, paste texture and color, temper, surface color and finish, slip, design style, thickness, and alterations such as burning, smudging, reuse, and mending. Examination under a binocular microscope will aid this analysis.

If our predictions concerning the approximate dates of site occupation are correct, no sherds should be found beneath the surface at LA 86780. Pottery was found in subsurface contexts at LA 86774, but did not seem common during testing. Pottery will provide data in several critical areas. In particular, ceramic artifacts will provide temporal information that can be compared with other dates to assess their reliability. In the case of LA 86780, this will allow us to determine whether sherds are associated with features and other artifacts. At LA 86774, pottery will help determine whether the site was mainly occupied during the Mesilla phase.

Temporal information will be provided by such attributes as rim form and cross section, paste texture and color, temper, surface color and finish, location and types of design motifs, and thickness. These attributes will be used to assign sherds to existing types with known dates. They will also be used to ascertain where vessels originated, providing data on ties to other regions. We expect the pottery from LA 86780 to date to a significantly later period than other remains at the site.

Functional assignments will be based on vessel form and diameter, and alterations such as burning, smudging, reuse, and mending. As discussed earlier, pottery should not be recovered from subsurface contexts at LA 86780. Both storage and cooking vessels are expected at LA 86774, and jars should be the most common form. These expectations are related to suggested site function and date. Jars and bowls were the most common Mesilla phase vessel form, with jars increasing in frequency by the late part of the phase (Whalen 1980a). Because this site is thought to have been a camp, jars would have been the most practical vessel form, and could have been used for cooking, eating, and storage, particularly of water. While bowls may occur, they should not dominate the assemblage because they would have represented excess bulk for transport. Imported ceramics may occur, but should be rare. The assemblage should be dominated by local utility wares, and local decorated wares should not occur; decorated vessels should have been imported from other regions, particularly the Mimbres area.

Chipped Stone Artifacts

Chipped stone artifacts will be studied to provide data on material procurement and selection, range of activities, and alterations to enhance flaking quality. Certain attributes will be studied on all chipped stone artifacts. Material type and texture will provide information on the qualities that were selected for and whether materials were procured nearby or from distant locations. Cortex type will also be used as an indicator of material origin. While some cortical types suggest materials were obtained at or near their source, other types indicate they were procured from secondary deposits. In conjunction with other studies, these data will provide information on mobility and ties with other regions.

Chipped stone artifacts will be classified by morphology and presumed function. This will provide a basic categorization of activities employing chipped stone tools as well as a basis for more intensive analyses. They will also be examined for evidence of thermal alteration to improve flaking quality, a process that is tied to reduction strategy and the suitability of materials for reduction. The flaking quality of some materials can be enhanced by heating, and this can be an important aid in strategies aimed at formal tool production while it is less important in strategies focused on informal tool use.

Various other attributes will also be examined, depending on artifact morphology. Information on group mobility and tool production can be derived from an analysis of the reduction strategy employed. The reduction process produces three basic by-products: debitage, cores, and formal tools. Debitage and cores are the immediate by-products of this process, while formal tools are by-products that were modified to produce a specific shape. While the former categories provide information about the reduction strategy employed, the latter provides data on tool using activities. Thus, different attributes will be examined for each of these broad categories.

Debitage and cores will provide information on reduction strategies. Attributes examined in this analysis will include debitage type, amount of cortical surface present, artifact portion, and size. Cores will be morphologically identified by the direction of removals and number of striking platforms, providing basic information on how they were reduced. Flakes are debitage that were purposely removed from cores, and can provide critical data on reduction technology. Hence, several attributes will be analyzed on this class of artifact, including platform type and modification, platform lipping, direction of dorsal scarring, and distal termination.

Formal tools will be identified by morphology and wear patterns, and informal tools will be distinguished by the presence of marginal retouch or use-wear patterns along one or more debitage edges. A binocular microscope will be used to identify and classify retouch and wear patterns on all tools, and utilized or retouched edge angles will be measured. All evidence of edge modification will be recorded for informal tools, while evidence of use or modification unrelated to production will be recorded for formal tools. These attributes will provide data on the range of activities employing chipped stone tools.

Information from this analysis is critical, and should provide details about group mobility, site function, and ties to other regions. Two reduction strategies should be evident. Archaic chipped stone assemblages should demonstrate significant reliance on a curated strategy, though some expedient reduction should also be visible. Mesilla phase assemblages should exhibit heavy reliance on expedient informal tools and little or no use of a curated strategy. Thus, evidence for the use of large biface-cores should occur at LA 86780, but should be lacking at LA 86774. Biface manufacture and use at LA 86774 should be restricted to special-use tools. These expectations are based on our assessment of residential mobility during these periods. Contrary to other researchers who posit similar mobility patterns, we feel the Mesilla population was less residentially mobile than was the Archaic population. This difference should be visible in the chipped stone assemblage.

Information from both formal and informal chipped stone tools will help determine the types of activities performed at these sites. A wide range of manufacturing, maintenance, and subsistence-related activities should be represented at both. While local materials should predominate, exotic materials may occur in small quantities, particularly in Archaic deposits. Data on material source will be used to examine population movement patterns, and may also be useful in studies of extralocal contact and exchange.

Ground Stone Artifacts

Like the chipped stone assemblage, ground stone artifacts will be studied to provide data on material procurement and selection, the range of activities performed, and alterations. Raw material choice, procurement costs, and the cost of producing specific tools will be studied by examining material type and quality, preform morphology, production input, plan-view outline form (a measure of the regularity of artifact form), and ground surface texture.

Because ground stone artifacts are large and durable, they may undergo a long life history and be used for a variety of purposes, even after being broken. Several attributes will be used to monitor artifact life histories by identifying post-manufacture changes in form and treatment. They include size, heat alteration, portion represented, evidence for sharpening of the grinding surface, wear patterns, physical alterations for secondary use, and the presence of adhesions. Relative tool and assemblage age will be measured by examining the cross-section form of manos and depth and cross section of metate grinding surfaces.

These attributes will permit evaluation of the range of activities in which ground stone tools were used, as well as assemblage cost and value. Cost is the amount of time and energy invested in procurement, preparation, and shaping. Value is a measure of how used or "worn out" an artifact is. Extensive recycling of ground stone is expected for both sites, as there are no nearby sources of stone. Thus, few whole ground stone tools should be recovered. Ground stone tools were found at both sites, though they were more common at LA 86780. This may reflect temporal and functional differences, or it could simply mean that more tools were recycled at one locale than the other. Ground stone tools should be more common in Archaic deposits than in Mesilla phase remains. This may reflect a heavier dependence on wild seeds at temporary camps during the Archaic. Tool life histories, however, must also be taken into account, as it is likely that materials from earlier sites were scavenged and recycled during both periods.

Burned Rock

Burned rock is common at sites in this area, and has the potential to provide important information. All burned rock found on the surface or during excavation will be collected for analysis; however, if large amounts are present, only a sample will be collected. A limited number of variables will be analyzed on this class of artifact including material type and texture, artifact function and morphology, cortex type, type of heat alteration, and weight. This will provide data on the source of rock used in hearths, and will allow comparison with previous studies in the region. In conjunction with the analysis of other types of lithic artifacts, burned rock will also provide information on material recycling and scavenging.

Burned rock occurs at both sites, though it was only associated with intact features at LA 86780. Materials used for this type of artifact should reflect a local origin. Caliche should predominate, as this is the only type of sizeable rock available locally. Other types should reflect the recycling of materials from earlier occupations or sites. While large amounts of this artifact class may be collected, only a sample will be curated.

Faunal Remains

Faunal analysis will concentrate on the identification of species, age, bone element, and condition to aid in documenting food procurement and consumption patterns. Data concerning the use of bone as tools and information on butchering and processing methods will also be collected. Like other types of formal tools on a site, bone tools can provide information on activities performed at that locale. Thus, bone tools will be categorized by morphology and wear patterns.

Species identification will help determine the types of animals consumed and where they were obtained. Analysis of bone elements will also aid in these investigations. The occurrence of certain elements (such as feet) may indicate nearby or on-site procurement, while their absence could mean the opposite. The condition of bone elements will also provide information on consumption patterns. Evidence of burning, roasting, or boiling provides details on the processing of faunal materials as well as corroborating their economic use. Cut marks provide similar information, and are also indicative of economic use.

By estimating the age of fauna consumed at a site, it is often possible to determine the season of use. Many species reproduce at specific times of the year, and the presence of infant or immature specimens allows the timing of procurement to be estimated. If available, these data should demonstrate use during late summer or early fall, which is the local rainy season.

While likely to be sparse, some information on faunal exploitation may be recovered from these sites. Procurement and consumption patterns are expected to be similar for both. Only locally available animals, particularly small game, should have been hunted from these locations. A lowland hunting pattern focusing on jackrabbit, cottontail, and pronghorn is expected (O'Laughlin 1980:22). Evidence of nonlocal fauna should not occur, with the possible exception of broken and discarded bone tools.

Floral Remains

Three types of floral remains may be available during data recovery. When possible, macrobotanical specimens such as corncobs, nuts, charcoal, and seeds will be separated from other materials during excavation. Other botanical materials will be obtained from flotation and pollen samples. Flotation and pollen samples will be taken from each cultural stratum defined, but macrobotanical samples will be obtained whenever available. Where possible, plant materials from macrobotanical and flotation samples will be identified to the specific level to provide data on subsistence and seasonality. Selected charcoal samples will be examined to determine what species were used for fuel, and will then be submitted for radiocarbon dating.

Only wild plant foods should have been procured and consumed at these sites. Evidence for the use of cultigens should not occur. Neither should there be any indication that nonlocal plant foods were eaten. While a wide range of plants should occur at both sites, some temporal differences are expected. Archaic consumption patterns should be the most general, and there should be evidence for the processing and consumption of wild seeds as well as leaf succulents. Mesilla phase patterns are expected to focus on the processing and consumption of leaf succulents. Wild seeds may have been processed and consumed in small quantities, but these foods should have mostly been stored for transport back to the winter residence.

Charcoal samples should be indicative of both fuel wood and structural elements. If LA 86774 and LA 86780 were temporary camps used during the rainy season, only local woods should occur. Most fuel woods should consist of mesquite and other local shrubs such as saltbush and sage. Mesquite should also have been used for the main structural elements. There should be no evidence for the use of wood from riparian or mountain zones.

Pollen samples will provide two types of information. If obtained from undisturbed contexts, they will be used to compare the local environment at the time of occupation with that of the present. Samples from storage features can be used to help determine what materials were stored. The local environment at the time(s) of occupation should not differ significantly from that of the present. A similar climate and weather regime should be reflected. The main difference that is expected concerns the structure of the local botanical community. The prehistoric community should be dominated by mixed grasslands, though plants that are currently abundant like mesquite and soaptree yucca should also be well represented. Analysis of pollen from storage features should indicate the presence of local plants that produce economically useable seeds such as grasses, sunflower, chenopods, amaranth, and tansy mustard.

Human Remains

As discussed earlier, the probability of locating and recovering human remains is low. If human remains are found, the sample should be extremely limited. Under such circumstances, it will not be possible to establish that they are representative of the human biological populations that created a site. The main goal of skeletal analysis will therefore be a nondestructive study of the remains in order to add to our general knowledge of prehistoric human populations, rather than to address specific questions raised in the research design. This nondestructive approach will include standard metric studies, aging and sexing of the remains, and documentation of pathologies.

Research Results

The final data recovery and analysis report will be published in the Office of Archaeological Studies' *Archaeology Notes* series. The report will present all important excavation, analysis, and interpretive results, and will include photographs, site and feature plans, and data summaries. Field notes, maps, analytic notes, and photographs will be deposited with the Archaeological Records Management System of the State Historic Preservation Division, currently located at the Laboratory of Anthropology in Santa Fe.

If human remains (including any associated burial goods) are recovered, their disposition will be based on consultations carried out in accordance with State regulations. No disposition of the remains will be completed until the wishes of concerned parties have been documented. Unless an alternative disposition is established through consultation, the remains will be submitted to the Museum of New Mexico Archaeological Repository for physical storage at the forensic laboratory of the Department of Anthropology, University of New Mexico. Other artifacts will be submitted to the MNM Archaeological Repository for storage.

CONCLUSIONS AND RECOMMENDATIONS

Testing was conducted at two sites--LA 86774 and LA 86780. Both sites contain surface artifact scatters and intact cultural features, indicating that they have the potential to contribute information on local prehistory. Both sites are entirely within the construction zone of the Santa Teresa Port-of-Entry facility, and therefore a more intensive phase of data recovery may be necessary. Thus, a plan for recovering this information has been developed and is incorporated into this report. The plan includes a research design that outlines questions that will be addressed with information recovered from these sites, and the field and analytical procedures that will be followed. These investigations should provide information on early prehistoric use of south-central New Mexico by hunter-gatherers, and data on how archaeological sites form in actively aggrading dunes.

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