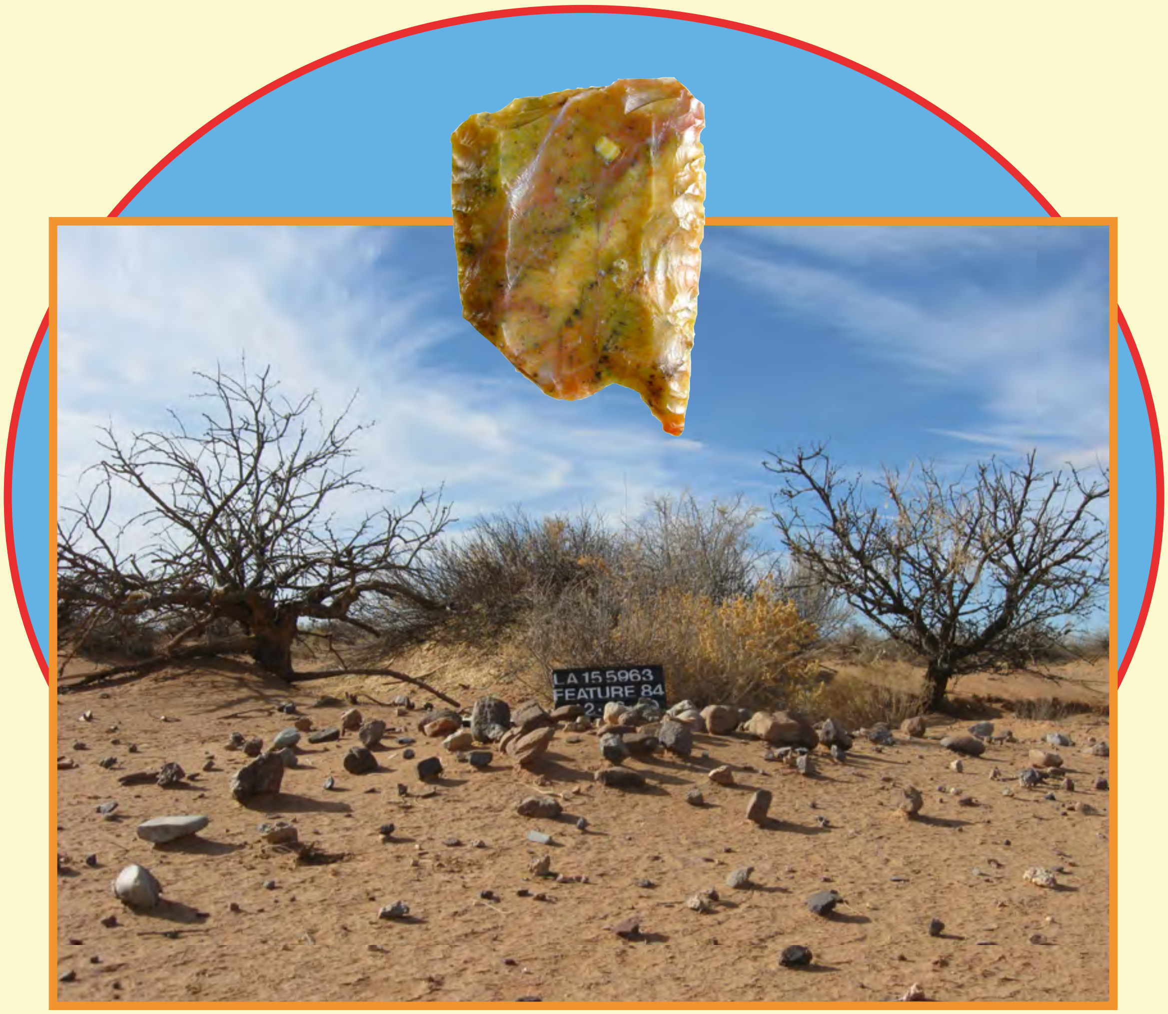
Test Excavations at Eight Sites at the Spaceport America Facility, Sierra County, New Mexico

Nancy J. Akins and James L. Moore



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Administrative Summary

At the request of the New Mexico Spaceport Authority (NMSA) of the Economic Development Department, the Office of Archaeological Studies (OAS), New Mexico Department of Cultural Affairs, completed testing at eight archaeological sites at Spaceport America in Sierra County, New Mexico. The sites are on New Mexico State Land Office trust land and Bureau of Land Management land. All excavation took place only on state trust land managed by the New Mexico State Land Office.

Test pits and auger holes were placed at seven sites—LA 111420, LA 111421, LA 111429, LA 112370, LA 112371, LA 111432, and LA112374—to assess their nature, extent, condition, and data potential. In addition, surface-artifact distributions and features at LA 111429 and LA 155963 were investigated to aid in selecting features and artifact concentrations for future research-driven excavations. Mechanically excavated geomorphology trenches were placed at all sites except LA 111429. As described in the pages that follow, while all field and laboratory procedures and methodologies conformed to the standards outlined in the previously approved testing plan, three different goals informed the approaches employed for the archaeological analyses of these sites and the data collected from them (Moore et al. 2010a).

Investigations at LA 111421, LA 112370, LA112371, and LA 112374 were designed to evaluate the sites for *National Register* eligibility by assessing their nature, extent, condition, and data potential. Of these, three (LA 111421, LA 112370, and LA 112374) were found to contain few surface artifacts and no evidence of subsurface deposits, and are thus recommended as not eligible to the *National Register*. LA 112371 was found to contain more surface and subsurface artifacts than the other three sites in this category and exhibits the potential to provide significant information on the past use of the area. It has been recommended as eligible to the *National Register*.

Three of the sites—LA 111420, LA 111432, and LA 111429—had been previously determined as "eligible," and investigations at these sites assessed areas of potential future disturbance within either a proposed utility or a road corridor. The data collected during assessment of LA 111420, LA 111432, and LA 111429 has confirmed that these sites exhibit considerable potential to provide significant information about the prehistory of the area and should continue to be evaluated as eligible to the *National Register*.

Exploration of the research potential exhibited by LA 111429 and an additional site, LA 155963 (also previously determined as eligible to the *National Register*), represented the third goal of the research reported here. Initial investigations at these sites were designed to aid in planning future research-driven excavations and have identified areas for investigations during the next phase of excavation.

MNM Project No. 41.917.
General Archaeological Investigation Permit for State Land (NM-10-27-T).
NMCRIS Activity No. 120320.

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1. Introduction

Nancy J. Akins and James L. Moore

The Office of Archaeological Studies (OAS), New Mexico Department of Cultural Affairs, tested eight sites at Spaceport America at the request of the New Mexico Spaceport Authority (NMSA). The investigations followed procedures that were detailed in a testing plan that was approved by the New Mexico State Land Office (SLO) and State Historic Preservation Division (Moore et al. 2010a). Work was conducted under the testing provisions of the General Archaeological Investigation Permit for State Land (NM 10-27-T).

Spaceport America is in the Jornada del Muerto in Sierra County, southeast of Truth or Consequences and east of Caballo Reservoir (Fig. 1.1). All of the tested sites are on New Mexico state trust land, with portions of LA 111420 and LA 111432 falling within Bureau of Land Management (BLM) property. No archaeological testing was conducted in portions of these sites occurring on Bureau of Land Management property.

Four of these sites (LA 111421, LA 112370, LA 112371, and LA 112374) have an undetermined *National Register* eligibility status, and work at those locations was conducted primarily to test the nature and extent of associated deposits. LA 111420 and LA 111432 have been determined eligible for inclusion on the *National Register*, and testing at those locations was conducted to examine the nature and extent of cultural deposits within the proposed Infrastructure Corridor F, as it was termed during the 2007 survey (Quaranta and Gibbs 2008), and to assess the potential for future research-driven excavations. LA 111429 and LA 155963 were also determined eligible for the *National Register* and are known to have research potential. Most of the effort at these sites was directed toward recovering information on features and artifact distributions to aid in planning research-driven excavations in the next year (Moore et al. 2010b). In addition, test excavations within a buffer zone adjacent to an existing road corridor at LA 111429 were used to evaluate the nature and extent of deposits within that corridor.

Fieldwork took place in November and December 2010. James L. Moore was the senior project director, assisted by Nancy J. Akins and Matthew J. Barbour. The field crew included Isaiah Coan, Vernon Foster, Guadalupe Martinez, Mary Weahkee, and Karen Wening. Stephen S. Post and Robert Dello-Russo were the principal investigators. Geomorphological investigations were conducted by Stephen A. Hall of Red Rock Geological Enterprises.

General Methods

A detailed description of field methods can be found in the testing plan for this project (Moore et al. 2010a). Field methods were generally the same for all sites, though some exceptions occurred because of unique site conditions. Before excavation began, a professional surveyor established datums and backsights for horizontal and vertical control. These are plotted in NAD 83 and do not correspond to the NAD 27 locations used by earlier surveys. The number and location of the datums depended on site size and topography. All datums consist of 2 ft lengths of 1/4-inch rebar topped with aluminum caps that are marked with the site and datum number.

Mapping

Boundaries and artifact densities were established for the six smaller sites by a detailed search of the site area. Crew members walked closely spaced transects (about 2 m intervals) and marked the locations of surface artifacts, artifact clusters, and features with pinflags. By necessity, the boundaries of the two larger sites were determined by examining the artifact distributions and feature locations in the areas designated as boundaries by Zia Engineering and Environmental Consultants, LLC (Quaranta and Gibbs 2008), rather than marking all artifact and feature locations.

A total station was used to produce scaled maps depicting the locations of site datums,

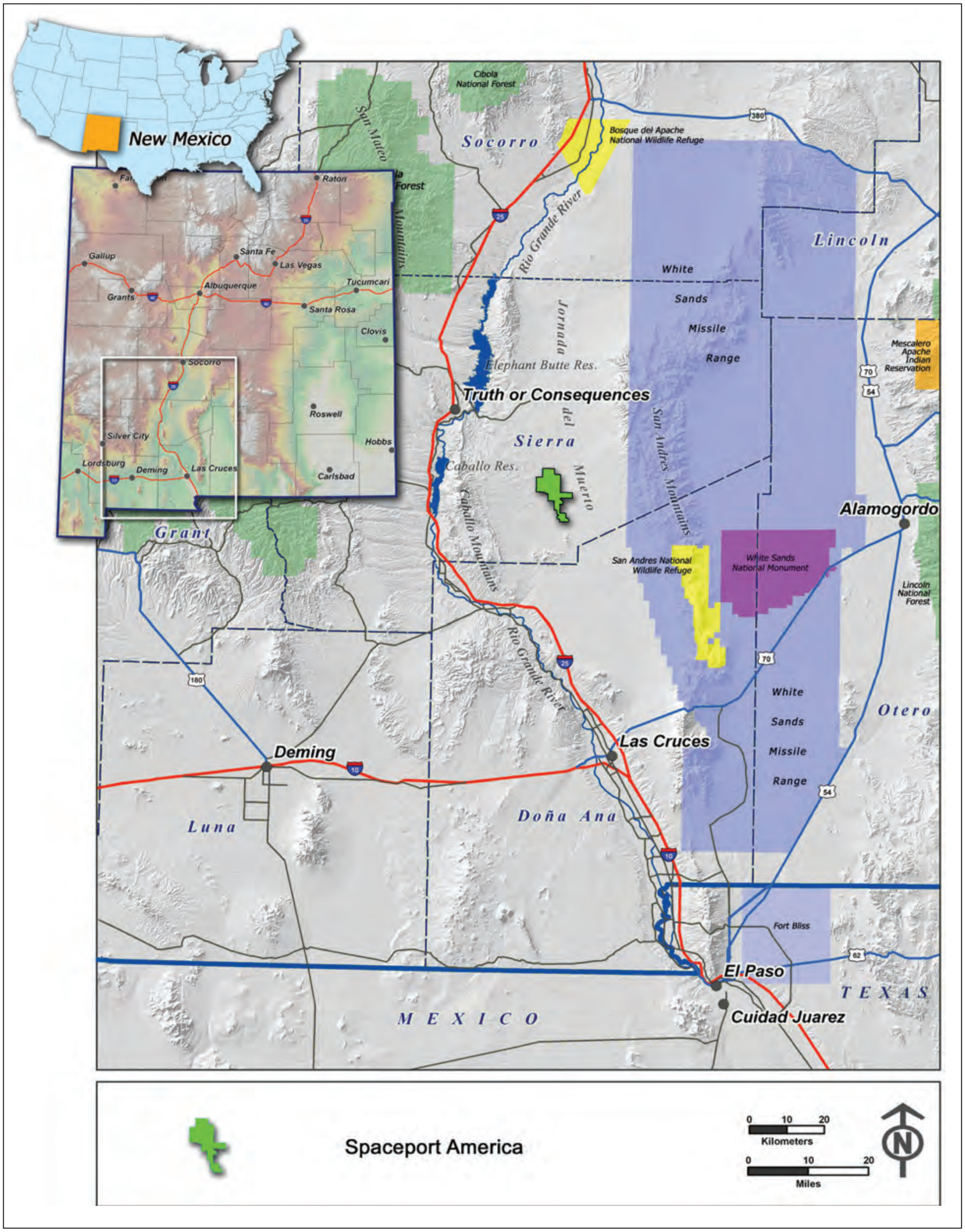

Figure 1.1. Location of Spaceport America in relation to surrounding areas.

artifact concentrations, features, test excavation units, backhoe trenches, auger holes, and estimated site boundaries. At the larger sites, this information was supplemented by data collected with a Trimble GPS unit where vegetation and topography impeded mapping.

Locational data for each site were based on a Cartesian coordinate system, with site datum points tied into the UTM system. In this report, the coordinates for grid units, auger holes, and artifact locations represent only the last three or four digits of their NAD 83 UTM location. Main site datum points were assigned an arbitrary elevation of 10.0 m below datum (or in the case of LA 155963, 100.0 m), and all vertical measurements were calculated from that point. Actual elevations above sea level are available, and the archaeological elevations can be converted to actual elevations. Hand-drawn plans based on transit data were completed in the field for all but the two largest sites to aid in ongoing investigations. These plans show the distribution of surface artifacts and/or concentrations as well as features, and characterize the extent and density of the surface scatter of cultural materials.

In-Field Analysis of Artifacts

Chipped stone artifacts that were visible on the surface and occurred outside excavated grid units were examined by an in-field analysis. The location of each of these specimens was recorded using a total station, and they were left in place after being analyzed. These artifacts were examined macroscopically or using a 10x magnifier, and a series of attributes were recorded for each individual specimen: material type, material texture, artifact morphology, artifact function, percentage of cortical coverage, portion, cortex type, and length, width, and thickness.

Metal Detecting

During archaeological testing, sample metal detector surveys were performed on all archaeological sites, with the exception of LA 155963. These surveys were performed in accordance with the methods outlined in the research design (Moore et al. 2010b). A single technician using a Type III very low frequency (VLF) instrument walked in transects spaced roughly 2 m apart across areas where surface artifact concentrations were greater than one artifact per 2 sq m. Throughout each sweep, the instrument was set to operate within the 5–6 kHz range. This allowed the surveyor to detect iron- and copper-based metallic objects.

Several modern metallic items, including two .22 caliber cartridge casings and a fencing nail, were encountered during these surveys. However, none of the materials identified could be definitively tied to historic (pre-1960) use of the area and clearly did not represent use of sites by historic Native American groups or the US Army. While these metal detector surveys do not represent a 100 percent coverage of any archaeological site, they were sufficient to show that it is highly unlikely that LA 111420, LA 111421, LA 111429, LA 111432, LA 112370, LA 112371, and LA 112374 contain historic components.

Hand-Excavated Units

Subsurface excavations did not extend beyond depths that were necessary to assess the research potential of a site or their capability to provide important information on the prehistoric occupation of this region. Test pits were generally excavated through loose surface fill into compact Pleistocene-age soils (called the Pleistocene B soil horizon in the remainder of this report), regardless of whether cultural materials were recovered. Some initial test pits were excavated well into Pleistocene-age soils, but that ended once the project geomorphologist pointed out the futility of hand excavations in soils of that age. The testing plan called for auger tests to be placed in the bottom of each test unit to verify the presence of sterile sediments. This, too, was discontinued, since test pits were already excavated into culturally sterile deposits, and the auger test transects and mechanically excavated trenches provided adequate information for documenting the sediments at each site.

All hand excavations were conducted in 1 by 1 m grid units. These excavation units were given test pit numbers and provenienced by the grid lines that intersected at their southwest corners. Subdatum points were established for each test pit, and their elevations were measured in respect to the main site datum. Fill was removed with shovels, picks, and/or trowels in 10 cm arbitrary levels and systematically passed through 1/8-inch steel-mesh screens. Recovered artifacts were inventoried and assigned a field specimen (FS) number, and that number was listed in an FS catalog and recorded on all related excavation forms and artifact bags. All materials removed from a particular excavation level received the same FS number. Thus, the FS number is the primary organizational tool that maintains the relationship between recovered materials and spatial information.

Standard OAS field forms were used to record excavation data. The types of data recorded included information on provenience, stratum and excavation level, elevation below datum or modern ground surface, test excavation unit context, characterization of sediments, and artifact and sample description and summary. Stratigraphic profiles were recorded as scaled diagrams, in photographs, and in narrative descriptions. All strata and soil horizons were described using standard scientific terms, including the use of a Munsell Soil Color Chart. Digital photographs were taken of each test pit after excavation. Excavation units were manually backfilled after completion, and their surfaces were returned to their former gradients. Geocloth was placed in the bottoms of deeper test pits.

Auger Tests

Auger holes were excavated in transects spaced at 5 m intervals. A sleeved, 10 cm diameter auger was used to examine subsurface fill and define major changes in sediment type. Forms noting depths of any changes in sediment color or texture and descriptions of those sediments were completed for each auger test. Sediments removed from auger tests were passed through 1/8-inch steel-mesh screens to retrieve any cultural materials encountered. Artifacts that were recovered in this way were collected and assigned an FS number.

Geomorphology Trenches

Geomorphological trenches, generally 5 m long and up to 2 m deep, were mechanically excavated in order to more fully explore the nature of subsurface strata and collect samples for sediment, optically stimulated luminescence (OSL), and pollen analyses. These trenches exposed more extensive profiles useful for documenting the nature and origin of strata encountered in the nearby hand-excavated units. Trenches were mechanically backfilled after they were recorded by the project geomorphologist. Detailed geomorphological descriptions and interpretations of soils will be presented in a final report discussing any research-based or data recovery–related excavations. Soil descriptions in this report are archaeological interpretations of the fill or, in the case of LA 155963, are preliminary data provided by the project geomorphologist.

Report Structure

This report is structured in several sections covering multiple topics in order to provide the level of detail needed to assess the results of this effort. The physical and cultural environments of the region containing Spaceport America are described in Chapters 2 and 3, providing necessary background information. These sections are followed by two chapters in which the results of testing are detailed. Chapter 4 describes studies conducted at six of the eight sites. For four of these sites, testing was aimed at assessing *National Register* eligibility because the eligibility status of these sites was left undetermined by earlier studies (LA 111421, LA 112370, LA 112371, and LA 112374). In the other two cases (LA 111420 and LA 111432), the sites have been determined eligible for the *National Register*. These sites were tested to assess their potential for containing important deposits that would require further examination before the initiation of any construction activities within utility or road corridors. An additional consideration in testing at these six sites was whether or not they have any potential to provide useful data during a research-oriented phase of investigation.

Chapter 5 discusses the results of testing at the final two sites, LA 111429 and LA 155963. These very large multicomponent sites were determined eligible for the *National Register* during earlier survey examinations. While neither of these sites is within an area where construction activities are currently planned, they could be impacted by a variety of construction activities, and they have potential to provide important information on the prehistoric occupation of this part of the Jornada del Muerto. Additionally, a corridor containing a county road that bisects LA 111429 was examined in some detail to determine whether cultural deposits in that part of the site would be affected by any future improvements to the road. Because of the research potential exhibited by these sites, they were examined and recorded in more detail during testing than was possible during either of the previous studies. This was done in order to allow definition of features and artifact concentrations where research-oriented studies would be likely to provide useful data for addressing questions presented in the research design for research-driven excavations (Moore et al. 2010b). Plan drawings were not included for all test pits because they would provide little detail to the discussion, since no features or structural remains were encountered during these limited investigations, and they would essentially simply show squares representing individual test pits. Similarly, stratigraphic profiles and photographs are not presented for all test pits because of the repetitive nature of the strata encountered during test excavations. Rather, representative stratigraphic profiles and photographs are presented to show the general appearance of the various strata that were encountered. Exceptions are made when strata encountered in an individual test pit varied considerably from those that occurred in other test pits at a site.

Following these discussions of the tested sites, Chapters 6 and 7 present preliminary discussions of some of the artifacts examined and/or recovered from these sites. The chipped stone assemblages are discussed in Chapter 6, which also presents a description of the analytic methods used for studying those artifacts. The few historic Euroamerican artifacts that were collected during testing are described in Chapter 7.

Chapter 8 provides conclusions and recommendations for the future treatment of these sites. These are followed by three appendixes that present detailed information on the field- and laboratory-analyzed artifacts (Appendix 1), the features examined during testing (Appendix 2), and site location information (Appendix 3). When archaeological investigations are completed by the OAS at Spaceport America, all artifacts and field notes will be curated at the Archaeological Research Collection of the Museum of New Mexico in Santa Fe.

2. *The Physical Environment*

James L. Moore

Geology

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

The project area is in the Jornada del Muerto, one of a series of downwarped basins that formed along the continental rift now occupied by the Rio Grande (Chapin and Seager 1975). Episodes of deformation contributed to development of the Rio Grande depression (Chapin and Seager 1975:299). The first of these was during the late Paleozoic (Fig. 2.1) 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, "The Rio 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 Rio 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 Rio Grande Valley is summarized by Hawley and Kottlowski (1969). Major basins in south-central New Mexico include the Palomas and Jornada del Muerto, and the Mesilla and Hueco Bolsons. Materials eroded from surrounding highlands began filling these basins during Tertiary times and continued until the mid-Quaternary. These sources were supplemented by the ancestral upper Rio Grande during the later stages of basin filling. The Rio Grande extended from Colorado to northern Chihuahua by Kansan times (455,000 to 300,000–380,000 years ago), entering the Hueco Bolson through a gap between the Franklin and Organ Mountains during the early Quaternary. It was apparently diverted from the Hueco Bolson to the Mesilla Bolson during the mid-Pleistocene. Until its integration with the lower part of the system, the upper Rio 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 seems to have halted deposition in the basins soon after the systems were integrated.

The Jornada del Muerto is a broad valley flanked by the San Andres Mountains on the east and the Caballo and Fra Cristóbal ranges on the west, and has an elevation of about 4,340 ft (1,323 m) above sea level. An internally drained basin, the Jornada del Muerto, is about 100 km long by 30 km wide and is filled with a mixture of fluvial, alluvial, and colluvial sediments derived from the ancestral Rio Grande and the bordering mountain ranges (Wondzell et al. 1996). While the fluvial sedimentation ended when the Rio Grande incised its current valley to the west of the Jornada del Muerto ca. 300,000 to 400,000 years ago, alluvial and colluvial sedimentation is ongoing.

Soils

This discussion of soils is summarized from Quaranta and Gibbs (2008:20–22) and from the USDA Natural Resources Conservation Service webpage (http://ortho.ftw.nrcs.usda.

Era	Period	Epoch	End Date[1]
Cenozoic	Quaternary	*Holocene*	Modern
		Pleistocene	0.012
	Tertiary	*Pliocene*	1
		Miocene	12
		Oligocene	25.7
		Eocene	34
		Paleocene	55
Mesozoic	Cretaceous	*Late Cretaceous*	78
		Early Cretaceous	
	Jurassic		130
	Triassic		180
Paleozoic	Permian		230
	Pennsylvanian		270
	Mississippian		310
	Devonian		350
	Silurian		400
	Ordovician		430
	Cambrian		490
Precambrian			600

[1] million years ago

Figure 2.1. Geologic periods and time scale.

gov; accessed August 25, 2010). The six soils defined within the study area are the Stellar-Continental soil association, the Berino–Doña Ana soil association, the Reakor–Doña Ana soil association, the Wink–Doña Ana soil association, Armijo clay, and the Largo series. However, the Stellar-Continental soil association dominates the study area.

The Stellar-Continental soil association occurs on gentle slopes of less than 9 percent and typically consists of 45 percent Stellar loam and 25 percent Continental fine sandy loam. Stellar loam is a deep and well-drained soil forming in mixed sediments derived from rhyolite, andesite, shale, and monzonite and tends to occur on basin floors and at the toes of alluvial fans at elevations of 792–1,768 m (2,600–5,800 ft). Runoff and permeability are both slow. Continental soils are gravelly, deep, and well-drained, and formed in mixed alluvium from various sources on slopes of 0–15 percent. These soils occur on fan terraces at elevations of 305–1,524 m (1,000–5,000 ft) and have slow permeability and low to moderate runoff potential. Quaranta and Gibbs (2008:20) noted this association in the proposed infrastructure corridor and Horizontal Launch Area (HLA).

Berino soils occur in combination with Doña Ana soils to form the Berino–Doña Ana soil association. Berino soils are very deep and well-drained, and are forming in mixed alluvium whose surface is often reworked by wind. These soils occur on sandy plains, fan piedmonts, piedmont slopes, and valley floors with slopes of 0–7 percent at elevations of 1,219–1,676 m (4,000–5,500 ft). Besides being well-drained, runoff is very slow, and Berino soils have a moderate permeability. Doña Ana soils are also very deep and well-drained, and are forming in alluvial sediments derived from sedimentary rocks. These soils occur on alluvial fans and fan terraces at elevations ranging from 1,097 to 1,676 m (3,600 to 5,500 ft). The runoff rate is moderate, and permeability is moderately slow.

Reakor soils occur with Doña Ana soils to form the Reakor–Doña Ana soil association.

Reakor soils are very deep and well-drained, and are forming in alluvium that is mostly derived from limestone, with small amounts of eolian sediments. These soils occur on broad plains and alluvial fans with slopes of 1–5 percent at elevations ranging from 914 to 1,676 m (3,000 to 5,000 ft). The runoff rate is moderately slow to slow, and permeability is moderate to moderately slow. Wink soils also occur with Doña Ana soils, comprising the Wink–Doña Ana soil association. Wink soils are very deep and well-drained, and are forming in calcareous unconsolidated sediments of eolian or alluvial origin. These soils occur on level to moderately sloping uplands at elevations of 823–1,219 m (2,700–4,000 ft). The runoff rate ranges from negligible to low, depending on slope, and permeability is relatively rapid. Quaranta and Gibbs (2008:22) note that sites that seem to occur on these soils are all in the Vertical Launch Area (VLA), mostly in the eastern part of that area.

The Armijo clay is deep and well-drained, and is forming in mixed alluvium on slopes of 0–2 percent. This soil occurs on broad floodplains, usually channelized, and on terraces around playas at elevations of 1,250–1,372 m (4,100–4,500 ft). Permeability and runoff rate are both very slow. Largo soils are very deep and well formed in loamy calcareous alluvium derived from red-bed formations. These soils occur on valley bottoms, terraces, alluvial fans, and piedmont slopes with slopes of 0–5 percent at elevations ranging from 1,219 to 1,676 m (4,000 to 5,500 ft). The rate of runoff is moderate, and permeability is moderate to moderately slow.

Vegetation

The Jornada del Muerto falls within the Chihuahuan Desert zone and is generally classified as a semidesert grassland, though the vegetation ranges from nearly pure stands of grass to savannah mixtures of grass and shrubs to nearly pure stands of shrubs. Most botanists 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 has most often been 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, bush muhly, mesquite, four-wing saltbush, creosote, Mormon tea, sacahuista, prickly pear, and cholla cacti (Dick-Peddie 1975:83).

In contrast, Frederickson et al. (2006) feel that mesquite expansion is due to a series of cause and effect relationships occurring over millennia, which might have otherwise occurred in the absence of livestock grazing. Mesquite has been present since at least the Pleistocene, and its dispersion across the landscape during that period may have been partly related to its consumption by megafauna and their patterns of movement (Frederickson et al. 2006:286). The combination dispersion by megafauna and increasing aridity at the end of the Pleistocene may have led to a spread of mesquite during the Paleoindian period. Archaic- and Formative-period exploitation of mesquite may also have extended its range. Dick-Peddie (1965) states that Territorial survey notes from the 1840s and 1850s indicate that most pockets of mesquite in southern New Mexico occurred in areas containing prehistoric settlements. Thus, humans have for millennia had an affect on the distribution of what is often considered to have been an invader species.

Information on the modern vegetation of the project area is adapted from Quaranta and Gibbs (2008:18–19), who obtained their information on the structure and extent of vegetative communities from Brown (1994) and Dick-Peddie (1993). Three vegetative communities are defined for the study area: Chihuahuan Desert Grassland, Chihuahuan Desert Scrub, and Arroyo Riparian. Most of the project area is dominated by a mixture of Chihuahuan Desert Grassland and Chihuahuan Desert Scrub. The Arroyo Riparian community tends to occur along the three major drainages and some of the minor arroyos.

Chihuahuan Desert Grassland

Most of the project area, from the northern part of the HLA south to the VLA, contains vegetation belonging to this community. The Chihuahuan Desert Grassland is dominated by a variety of grasses intermixed with abundant shrubs, forbs, and cacti. The grasses include tobosa (*Pleuraphis mutica*), black grama (*Bouteloua eriopoda*), and burrograss (*Scleropogon brevifolius*). Common shrubs include soaptree yucca (*Yucca elata*) and honey mesquite (*Prosopis glandulosa*), while cane cholla (*Cylindropuntia imbricata*) is a common variety of cactus.

Chihuahuan Desert Scrub

This vegetative community tends to be interfingered with the Chihuahuan Desert Grassland community throughout the project area. It includes zones of mesquite-stabilized coppice dunes, scattered areas dominated by tobosa and burrograss, four-wing saltbush (*Atriplex canescens*), and soaptree yucca. Low-lying areas in which water can accumulate often support stands of little-leaf sumac (*Rhus microphyllum*) mixed with tarbush (*Flourensia cernua*) and honey mesquite. Areas between stands of shrubs often contain erosional rills, especially in the coppice dunes, and archaeological features and artifacts tend to be more visible in these areas because of the erosion. Rill-eroded areas are common in the southern part of the HLA and are scattered through the VLA.

Arroyo Riparian Vegetation

This vegetative association occurs throughout the project area along arroyos and in playa basins. In the southwestern part of the VLA, Jornada Draw is a major area of Arroyo Riparian Vegetation. The types of plants that dominate this community include honey mesquite, desert willow (*Chilopsis linearis*), and little-leaf sumac. There are also dense stands of tarbush that often interfinger with the Chihuahuan Desert Grassland community.

Fauna

Fitzsimmons (1955) provides a brief summary of fauna for the region, and Quaranta and Gibbs (2008) provide lists of expected fauna that were used to construct Table 2.1, as well as a short but useful discussion. Table 2.1 contains lists of bird, reptile, and mammal species that are either known or expected to occur within the study area, but it does not extend to adjacent montane and riverine environments.

The most common types of birds found in this region are the desert sparrow, ash-throated flycatcher, mourning dove, and quail. Migratory waterfowl often winter along the Rio Grande and include various types of geese and sandhill cranes, as well as various other species. Most of the birds found in the study area that are shown in Table 2.1 are not restricted to any specific vegetative community. Exceptions to this include horned lark, vesper sparrow, and meadow lark, which mostly occur in grasslands, which they prefer as nesting grounds. Chihuahuan ravens and Swainson's hawks usually nest in areas dominated by mesquite but use the entire area for feeding. Of the reptile species included in Table 2.1, western diamondbacks are most common in arroyo systems, while whiptail and horned lizards tend to be found in upland areas containing Chihuahuan Desert Scrub vegetation. Pronghorn occur in the Jornada del Muerto, while deer are most common in adjacent mountain ranges but also range into the study area. Mule deer and oryx, the latter a recently introduced species, mostly occupy areas dominated by mesquite and little-leaf sumac, while pronghorn tend to live in grasslands. Rabbits and coyotes are found in all vegetative communities throughout the study area. Black bears and mountain sheep occur in the mountain ranges that border the Jornada del Muerto. Beaver and muskrat live along the Rio Grande, while skunks are ubiquitous in the region. Gray foxes are also sometimes found in this region. Fish are available in the Rio Grande, especially in the modern reservoirs, and include bass, catfish, carp, crappie, and sucker.

Physical Environment of Rio Grande Rift Province, Mexican Highlands Area: Paleoclimates

Donald E. Tatum

Regional Studies in Paleoclimate Processes and Events

The Jornada del Muerto (Jornada Basin, see Fig. 1.1) is a north-south-trending, elongated, closed structural basin that lies on a plain east of the Rio

Table 2.1. Faunal species known or expected to occur in the project area

Common Name	Scientific Name
	Birds
canyon towhee	*Pipilo fuscus*
ruby-crowned kinglet	*Regulus calendula*
ash-throated flycatcher	*Myiarchus cinerascens*
sage sparrow	*Amphispiza bellii*
Cassin's sparrow	*Amphispiza cassinii*
vesper sparrow	*Pooecetes gramineus*
house finch	*Carpodacus mexicanus*
thrasher	*Toxostoma* spp.
horned lark	*Eremophila alpestris*
western meadowlark	*Sturnella neglecta*
Chihuahuan raven	*Corvus cryptoleucus*
ladder-backed woodpecker	*Picoides scalaris*
black-throated sparrow	*Amphispiza bilineata*
white-crowned sparrow	*Zonotrichia leucophrys*
chipping sparrow	*Spizella passerina*
loggerhead shrike	*Lanius ludovicianus*
scaled quail	*Callipepla gambelii*
greater roadrunner	*Geococcyx californianus*
red-tailed hawk	*Buteo jamaicensis*
northern harrier	*Circus cyaneus*
mourning dove	*Zenaida macroura*
turkey vulture	*Cathartes aura*
Gambel's quail	*Callipepla gambelii*
Scott's oriole	*Icterus parisorum*
northern mockingbird	*Mimus polyglottos*
brown-headed cowbird	*Molothrus ater*
lesser nighthawk	*Chordeiles acutipennis*
Swainson's hawk	*Buteo swainsoni*
prairie falcon	*Falco mexicanus*
western kingbird	*Tyrannus verticalis*
	Reptiles
greater earless lizard	*Cophosaurus texanus*
Texas horned lizard	*Phrynosoma cornutum*
collared lizard	*Crotaphytus collaris*
roundtailed horned lizard	*Phrynosoma modestum*
side-blotched lizard	*Uta stansburiana*
checkered whiptail	*Aspidoscelis tesselatus*
western diamondback rattlesnake	*Crotalus atrox*
New Mexico whiptail	*Aspidoscelis neomexicanus*
	Mammals
black-tailed jackrabbit	*Lepus californicus*
desert cottontail rabbit	*Sylvilagus audubonii*
pronghorn	*Antilocapra americana*
mule deer	*Odocoileus hemionus*
oryx	*Oryx gazella*
coyote	*Canis latrans*
American badger	*Taxidea taxus berlandieri*
pocket mouse	*Perognathus* spp. and *Chaetodipus* spp.
kangaroo rat	*Dipodomys* spp.
mountain lion	*Felis concolor*
spotted ground squirrel	*Spermophilus spilosoma*

From Quaranta and Gibbs (2008:19–20).

Grande, 100 m (328 ft) above the river (Havstad and Beck 1996). It is bordered to the east by the Organ, San Andres, and Oscura Mountains and to the northeast by Chupadera Mesa, and is partially separated from the Rio Grande by the Fra Cristóbal, Caballo, and Doña Ana Mountains. To the north it is bounded by the Loma de las Canas hills and an extensive series of arroyos draining west to the river (DeLorme 1998; USGS Loma de Las Canas and San Antonio quadrangles). The down-faulted basin (graben) is an eastern extension of the Rio Grande Rift geologic province of the Mexican Highland section, which in turn occupies parts of southeastern Arizona, southern and central New Mexico, western Trans-Pecos Texas, and northern Chihuahua. The basin areas of the Mexican Highlands comprise most of the northern Chihuahuan Desert (Hawley 1993). Now mantled by thick fluvial, alluvial, and eolian deposits derived from sediment transported by ancestral Rio Grande distributaries from erosion of the tectonically uplifted valley walls and from deflated, reworked valley-floor deposits, the basin represents the one of the easternmost extensional faults of the Rio Grande Rift (Hawley 1993).

Numerous paleoclimate studies have been undertaken in the Mexican Highland section and surrounding environs; from these investigations the paleoclimatic history of the area can be inferred. Regionally and temporally specific paleoclimate data have been derived from packrat midden palynology and plant macrofossil studies conducted in the Sacramento, San Andres, and Hueco Mountain ranges of New Mexico and Texas, in the Jornada Basin, and on Otero Mesa (Betancourt et al. 1990; Holmgren et al. 2003; Van Devender and Martin 1979). Speciation studies of fossil insects extracted from packrat middens in the northern Chihuahua desert have provided additional insights into climate during the transition from the early to late Holocene (MacKay and Elias 1992). Studies of Holocene alluvial fan deposits in the Organ and Sacramento Mountains (Frechette and Meyer 2009; Gile 1987; Hawley 1993) and deflation/lag deposit studies at Fort Bliss (Monger 1993) have also contributed correlatable data to the body of paleoclimate knowledge of the region. Other geochronologic evidence for climate change through time includes sedimentation studies of pluvial and perennial lake basins in southern and central New Mexico and northern Mexico (Allen 1994; Allen et al. 2009; Castiglia and Fawcett 2006; Gile 2002; Hall 2001; Hawley 1993). Stable carbon isotope and soil geomorphology, as paleovegetation indicators, have been used to identify and date major climate shifts in the northern Chihuahuan Desert (Buck and Monger 1999; Monger 1993).

The most time-specific, chronologically detailed studies with implications for the recent Holocene in the Mexican Highland area include dendroclimatology data obtained from living old-growth wood samples in El Malpais National Monument, and the San Andres, Organ, Oscura, Sierra del Nido, and Gallinas Mountains (Dean and Robinson 1977; Grissino-Mayer 1996; Parks et al. 2006; Stahle et al. 2009). Speleochronology studies also contribute correlatable, high-resolution climate data from the late Pleistocene through the late Holocene (Polyak et al. 2004). Finally, Poore et al. (2005) have used comparisons of sedimentation rates and relative abundance of the planktic foraminifer (*Globigerinoides sacculifer*) in cores from the Gulf of Mexico with dendroclimatology records as corroborative proxy indicators for the southwest monsoon (Mann et al. 1999).

Regional Paleoclimate Overview

Some of the more extensively documented climate events with implications for the Tularosa and Jornada Basins and eastern Mexican Highlands are the major climate shifts of the late Pleistocene and early to mid-Holocene that had geographically wide-ranging effects across much of North America. Many climatic processes that contributed to more recent paleoenvironmental conditions of these regions are rooted in the Wisconsinan Glacial Episode (16,300–110,000 BP), the most recent glacial maximum in North America. Based on studies of Pleistocene lake expansion as indicated by relict shorelines and sedimentary facies changes in Lake Otero and Lake Estancia, the Wisconsinan ended between about 18,000 and 16,300 BP (Allen 2005; Allen et al. 2009).

Studies of packrat-midden pollen and fossil-insect assemblages (Coleoptera and Hymenoptera) from the northern Chihuahuan

Desert indicate that from about 42,000 BP until about 12,875 BP, the climate was more mesic than it is today. During the late Pleistocene, average summer temperatures for the region have been estimated to be about 1 to 4 degrees C lower than present-day temperatures (Brackenridge 1978; Hawley 1993; Mackay and Elias 1992; Mehringer and Haynes 1965; Phillips et al. 1986; Sebastian and Larralde 1989; Wendorf and Hester 1975). Fossil-pollen studies conducted in the region indicate that piñon-juniper-oak woodlands were the dominant vegetation on upland slopes, while shrubs (including sage), steppe grass, and sparsely scattered nonconiferous trees grew on the lowland landscapes (Betancourt et al. 1990; Hall 2001; Holliday 1987; Mackay and Elias 1992).

The presence of cienega and spring deposits dating to the late Pleistocene indicates that there was more surface water during this time than at present (Hall 2001). Perennial and pluvial lakes occupied closed playa basins in the southern High Plains and the ancestral Rio Grande Valley of southern New Mexico. Wetlands and shallow lakes developed in the valley floor of the Tularosa Basin beginning ca. 49,000 BP. By about 35,400 BP the wetland and lake systems hosted dense stands of emergent aquatic vegetation, attracting Pleistocene mammals, as indicated by fossiliferous plant fragments, mammalian skeletal remains, and footprints preserved in extensive fine-grained gypsum deposits (Allen 1994; Allen et al. 2005, 2009; Gile 2002; Holliday et al. 2008; Hawley et al. 1976; Lucas et al. 2002, 2007; Morgan and Lucas 2002, 2005).

Geochronology studies of depositional facies in three lakes in the region indicate that lake freshening occurred repeatedly beginning about 29,300 BP for Lake Otero (Tularosa Basin), about 28,700 BP for Lake Estancia (just north of the Tularosa Basin), and about 27,600 BP for Lake King in the Salt Basin, just southeast of the Tularosa Basin (Allen and Anderson 2000; Allen et al. 2005; Allen 1994; Allen et al. 2009; Gile 2002; Hawley et al. 1976). This time frame is consistent with playa highstands recorded across the western United States during the late Wisconsinan (Smith and Street-Perrott 1983). Sedimentation records also indicate periods of drought and minimization of lake pooling. For Lake Estancia, a severe desiccative period occurred between about 18,100 and 16,340 BP, when the lake shrank to its minimum pool. Lake Otero may have completely dried up during the drought. Consequently, wind deflation and erosion obliterated or obscured the sediment record, and any subsequent mesic-period deposition would probably have been inset into the eroded areas. On the Llano Estacado, too, sedimentation rates based on radiocarbon date extrapolation at White Lake indicate lake desiccation by 16,400 BP (Hall 2001). The lake-sediment record of drought between 18,100 and 16,340 BP is loosely corroborated by groundwater isotope studies in northwestern New Mexico which infer that between 20,000 and 17,000 BP, a short period of higher temperatures (+3 degrees C higher than the rest of the late Wisconsinan) and decreased precipitation occurred (Phillips et al. 1986). Two more periods of pluvial expansion between about 16,340 and 14,480 BP are indicated by Lake Estancia's sediment record. Magnetic susceptibility measurements recorded in sediments from Hall's Cave on the Edwards Plateau in Texas also indicate a brief time of milder climate and increasing rainfall for the same time period. This mesic interval temporally correlates with a major influx of freshwater derived from melting northern hemisphere ice shelves (Heinrich event H1). The reduced salinity of seawater resulted in changes to oceanic current circulation and atmospheric temperature and weather patterns (Maslin et al. 2001). Event H1 has been geochronologically dated to between 16,500 and 17,500 BP, indicating a climatic event of global proportion (Ellwood and Gose 2006).

The termination of the 17,000 BP cooling period signaled the transition from the mesic Wisconsinan period into a more xeric, postglacial late Pleistocene/early Holocene. In the eastern Mexican Highlands and Basin and Range provinces, fossil insect, plant, and pollen evidence from packrat middens indicates that the full-glacial Wisconsinan interval was followed by successively warmer and drier intervals alternating with multidecadal periods of greater effective moisture, cooler temperatures, and diminished evaporation (Betancourt et al. 1990; Hawley 1993, Holmgren et al. 2003; Van Devender and Spaulding 1979). Such short-term, cool, wet weather cycles have been linked to Pacific Decadal Oscillation and El Nino–Southern Oscillation (ENSO) climate cycles and related southward shifts of winter storm tracks—processes still recurrent in modern times (Asmerom et al. 2007; Castiglia and Fawcett 2006; Collier and Webb 2002; Rasmussen et al. 2006).

About 14,500 BP, the first xeric-adapted ant species began appearing in the Mexican Highlands (MacKay and Elias 1992). Sedimentation rates in drainages leading into playas began increasing shortly thereafter, indicating more sediment from drying playa basins being redeposited into the drainage channels and eolian sediments deposited in the playa basins (Hall 2001; Holliday et al. 2008). Piñon pine began disappearing from lower-elevation woodlands, retreating to the highlands and leaving oak, juniper, and desert-adapted grasslands as the dominant species in areas that formerly also supported piñon (Van Devender 1990; Van Devender and Spaulding 1979).

Younger Dryas. In the final millennia of the late Pleistocene, during the Clovis and Folsom occupations, the warming, drying climate abruptly returned to near-glacial conditions in the northern hemisphere (Haynes 2008). This dramatic climate shift, known as the Younger Dryas, lasted from about 12,900 to 11,200 BP. From the Lake Estancia basin, the sediment record indicates renewed lake freshening between about 12,900 and 11,500 BP. The cooling episode has been theorized to have occurred as a result of a glacial meltwater pulse originating from a thawing Antarctic ice sheet that caused sea level to rise about 20 m. Consequently, the influx of freshwater altered the flow of salinity currents in the North Atlantic Deep Water (NADW) formation, warming the North Atlantic region and triggering the Bolling-Allerod interstadial (about 14,600 BP), which initiated the end of the Wisconsinan glacial stade and contributed to the melting of the northern hemisphere Fennoscandian and Laurentide ice sheets. As a consequence of freshwater forcing in the North Atlantic, the response by the NADW initiated the Younger Dryas cooling event in the northern hemisphere (Weaver et al. 2003).

The Younger Dryas was punctuated by a roughly 900-year period of climatological vacillation during the Clovis/Folsom transition. The Folsom drought saw fluctuating water levels in playas and marshes and the beginning of sand sheet deposition in upland areas (Holliday 2000). The cooling episodes were accompanied by a resurgence of higher precipitation levels and the recharging of aquifers. Favorable rainfall conditions led to the reemergence of wetlands and cienegas, environments that were conducive to riparian plant growth.

Wetland and cienega deposits are dark, organically enhanced, sometimes peaty deposits that have been recorded across North America. They can be associated with the Younger Dryas period, or they may be Holocene-related. Younger Dryas–aged deposits of this type are referred to as black mat deposits (Haynes 2008). They are sometimes immediately underlain and overlain by eolian silt or fine sand facies that are indicative of warmer, drier depositional environments. The stratigraphic sequence represents the more xeric climate conditions that prevailed after the Wisconsinan glacial terminus, the sudden onset of Younger Dryas cooling, and an abrupt shift back to more xeric climate conditions. The black mat deposit, when present in Clovis-era deposits, may be an indication of the apparent termination of Clovis culture and the sudden demise of many Rancholabrean faunal species (Firestone et al. 2007; Haynes 2008; Polyak et al. 2004; Stuiver et al. 1995; Taylor et al. 1997). In the Mexican Highlands area and adjacent environs, some of the extinct paleofauna are represented by the faunal assemblage recovered from Pendejo Cave in the Sacramento Mountain western foothills (Harris 2003). The assemblage included *Equus* spp. (horse), *Capromeryx* (midget goat), *Stockoceros* (Stock's pronghorn), *Coragyps occidentalis* (western vulture), *Hemauchenia* (lamine camelid), *Camelops* (camel), and *Aztlanolagus agilis* (hare) (Harris 2003).

Scharbauer interval. After the Younger Dryas, the climate in the southern High Plains/northern Chihuahuan Desert continued warming and drying between 11,200 and 10,200 BP during a period known as the Scharbauer interval (Sebastian and Larralde 1989; Wendorf and Krieger 1959). Piñon and juniper woodlands disappeared from lowland areas (Holmgren et al. 2003) and moved upslope into the highlands (Sebastian and Larralde 1989). Soil deflation occurred as a result of increased eolian movement of sediment, creating localized accretions of coarse-grained particles known as lag deposits, which have been dated to this drying period (Monger 1993).

Beginning around 10,900 BP, the region experienced increasing rainfall and slightly cooler temperatures during the Scharbauer Interval, a period that would become known as the Lubbock subpluvial. Pollen preserved in packrat middens indicates a brief readvance of piñon-juniper forest into lowland areas (Betancourt et al. 1990; Sebastian and Larralde 1989). Climate researchers working in caves in the Guadalupe Mountains conducted geochemical and geochronological studies gauging oxygen-stable isotope concentrations and speleothem growth over time, contributing more evidence for the Lubbock subpluvial. Asmerom et al. (2007) and Polyak et al. (2004) recorded a resurgence of speleothem growth occurring between about 11,100 and 10,800 BP.

Altithermal period. During the middle Holocene, the southern High Plains/Llano Estacado experienced long-term, overall drying and warming conditions during a time known as the Altithermal (Antevs 1948; Holliday 1989; Meltzer 1991). Eolian reworking of playa basin sediments continued as lake-replenishment rates slowed (Allen et al. 2005, 2009; Holliday et al. 2008). Drought-related accretionary lag deposits and erosional alluvial fans dating to this time period have been recorded on Fort Bliss and in the Organ Mountains (Monger et al. 1993). During the Altithermal, more xeric-adapted plant and animal species began arriving in the southern High Plains and northern Chihuahuan desert in the time period leading up to the establishment of the modern climate regime about 4000 BP (Holmgren et al. 2003). Pollen records infer the final demise of the late Wisconsinan winter rainfall regime during this time period (Betancourt et al. 1990). Desert grass species continued to gain inroads into territory previously dominated by piñon-juniper-oak species, followed by the arrival of Chihuahuan desert scrub vegetation in the region (Buck and Monger 1999). Xeric-adapted ant species began replacing mesic-adapted species (Mackay and Elias 1992). Perhaps for the first time on the southern High Plains, people began excavating water wells to replace former surface-water sources. Altithermal-period wells have been recorded near former playas, springs, and valley floor stream beds at Blackwater Draw, New Mexico; and Mustang Springs, Texas (Meltzer 1991; Meltzer and Collins 1987). Charcoal-rich alluvial fans in the Sacramento Mountains dating between 5800 and 4200 BP indicate episodic forest fires and slope failure during the Altithermal period (Frechette and Meyer 2009).

Evidently, this period was punctuated by more mesic climate intervals. For example, Castiglia and Fawcett (2006) have recorded the mid-Holocene (about 7000–7600 BP) development of constructional beach ridges for the Laguna El Fresnal and Laguna Santa Maria closed playa basins of the northern Mexico Chihuahuan desert borderlands (southwest of the Jornada Basin). Poore et al. (2005) have used relative abundance of the planktic foraminifer (*Globigerinoides sacculifer*) in sediment cores from the Gulf of Mexico and comparisons to relative abundance of packrat middens as indicators for the summer monsoon in the southwestern United States. *G. sacculifer* increased in abundance in Gulf sediments during an enhanced monsoon. Conversely, packrat middens decrease in abundance during an enhanced monsoon because they are unstable and susceptible to damage by insects (Spaulding et al. 1990). Their research indicates amplified monsoonal activity during the time of pluvial lake enhancement recorded for the Laguna El Fresnal and Laguna Santa Maria subbasins.

Speleoclimatology data from caves in the Guadalupe Mountains provide correlative proxies of increased effective rainfall during the mid-Holocene. Asmerom et al. (2007) and Polyak et al. (2004) recorded a resurgence of speleothem growth occurring around 7270 BP.

Neoglacial and Post-Neoglacial periods. For the mid- to late Holocene, several data sources provide a somewhat correlative to proximally correlative, chronologically specific, subdecadal record of climate. Stalagmite growth and stable oxygen isotope records have been obtained from speleothems in Guadalupe Mountain caves. Dendroclimatology records are available from the Sacramento, Organ, and San Andres Mountains, the Sierra del Nido in north-central Mexico, the El Malpais National Monument on the southwestern Colorado plateau, the Sevilleta National Wildlife Refuge near Socorro, the Gallinas Mountains, and Chupadera Mesa. Other data are available from sediment cores from the Gulf of Mexico. The marine sediment cores provide data from the early Holocene onward and show an overall drying trend with lower effective precipitation after about 7000 BP, with multidecadal and multicentury periods of increased precipitation. The El Malpais chronology begins about 136 BC (Table 2.2). The other dendrochronology records begin in the late sixteenth century (AD 1569 and 1597; Sierra del Nido and Organ Mountains) and the mid- to late seventeenth century (AD 1644–1687; Betancourt et al. 1990; Grissino-Mayer 1996; Grissino-Mayer et al. 1990; Naylor 1971; Polyak and Asmerom 2001; Poore et al. 2005; Stahle et al. 2009). Some climate researchers have placed the final establishment of the modern climate regime in the Mexican Highlands area at about 3000 to 4000 BP. Beginning about 4000 BP, another cycle of slightly moister, cooler climate took hold. Researchers have recorded magnetic susceptibility variations occurring around 4400 BP in Hall's Cave sediments on the Edwards Plateau, linking them to a North American climate event termed the Neoglacial period (Ellwood and Gose 2006). During the Neoglacial, a resurgence of alpine glacial activity occurred in the North American Cordillera (Pielou 1991; Wood and Smith 2004).

Again, the contemporaneous formation of constructional playa beach ridges around 4200–4800 BP, coinciding with playa lake level highstands in the northern Chihuahuan Desert, provides corroborative evidence for a mesic interval, this time during the Neoglacial (Castiglia and Fawcett 2006). Goodfriend and Ellis (2000), in a study of stable carbon isotopes from shells of gastropods recovered from Hinds Cave on the southern High Plains, have recorded a period of progressively moister conditions dating to the onset of the Neoglacial. Geomorphology and geochemistry studies conducted at Fort Bliss in the Tularosa Basin identified stable geomorphic surfaces with stable pedogenic carbon isotopes dating to the Neoglacial, between 4000 and 2200 BP (Buck and Monger 1999).

Asmerom et al. (2007) have recorded low stable oxygen isotope signatures, indicative of Neoglacial pluvial conditions and corresponding to increased speleothem development during moist climate conditions. These pluvial conditions, based on more recent speleothem growth data, were generally similar to the climate during the recent Holocene—that is, lengthy intervals of somewhat more mesic, then less mesic conditions, with intervals of true drought. The middle Holocene pluvial, beginning around 7000 BP, continued until about 4600 BP. This was followed by a 1,300-year-long period of decreased effective annual precipitation. By about 3300 BP, somewhat more pluvial conditions returned to the Guadalupe Mountains vicinity, lasting for 200 years. Decreased moisture and more arid conditions prevailed again for about 300 years. Pluvial conditions returned about 2800 BP and lasted for half a millennium, followed by the onset of aridity beginning about 340 BC. This drier, less mesic interval, according to speleothem data, lasted until about 10 BC (Asmerom et al. 2007); its final decades are revealed in the dendrochronological record from the El Malpais Long Chronology, where its effects seem to persist for several more decades (Grissino-Mayer 1996). Another pluvial record appears in speleothem growth data during the first decade AD and persisting until approximately 265 AD. This period is also reflected in the El Malpais chronology, as is a xeric period which follows it; the stalactite record shows the latter continuing until about AD 470. The tree ring chronology indicates a period of near-perfect drought lasting from about AD 250 until around AD 500 that was punctuated by brief pluvial intervals several years in duration, with drought during most decades being severe. This dry period is also apparent in the sediment core record from the Gulf of Mexico (Poore et al. 2005).

One notable period of reduced tree-ring growth is apparent in the El Malpais record but is not reflected in the stalactite record, either because of small-scale regional climate variations or because the events affecting tree-ring growth did not affect speleothems: AD 536–543, AD 560–570, and AD 577–585 show markedly reduced tree growth at El Malpais. Tree-ring chronologies from three old tree sites in Colorado (Almagre Mountain 1 and 2; Mount Goliath) also indicate a period of greatly reduced growth spanning three to four decades during the same period (Graybill 1983; Lamarche and Harlan 1969). Historic accounts and dendroclimatic evidence from Europe also indicate a major climate event ca. AD 536 that inhibited vegetative growth. Baillie (1994) has referred to the event as a "dust veil," thought to have been the result of a major volcanic eruption or the collision of a cosmic object with Earth.

The so-called Anasazi Drought may be evident in the stalagmite record as a period of reduced speleothem development occurring about AD 1047 to 1180. This somewhat xeric interval also shows up in the Long Chronology from El Malpais, although intermittently punctuated by several multiyear pluvial periods. Another lengthy xeric period with pluvial intermissions occurred around the early to mid-fifteenth century, according to El Malpais dendrochronology records, Gulf of Mexico sediment cores, and stalagmite annular growth data (Grissino-Mayer 1997; Polyak et al. 2004; Poore et al. 2005). Also evident in the Gulf of Mexico sediment cores and in several dendroclimatology records (the El Malpais tree-ring record, the Sierra del Nido record, the Gallinas Mountains record, and the Organ Mountains record) is the ca. AD 1660–1670 drought that contributed to abandonment of the Salinas Pueblos and other cultural upheavals (Grissino-Mayer 1997; Grissino-Mayer and Swetnam 1981; Naylor 1971; Parks et al. 2006; Poore et al. 2005; Stahle et al. 2009; Stokes et al. 1971). Parks et al. (2006) have contributed additional dendroclimatic data from tree-ring samples collected in Sevilleta National Wildlife Refuge near Socorro, Chupadera Mesa, and Mountainair. The evidence from these samples also indicates a xeric interval spanning about a decade beginning around 1660. However, this dry period is not quite as apparent in the speleothem data, although a xeric blip occurs in the record at around AD 1680. This could be because the middle to late seventeenth-century drought lasted only about 10 years, and the speleothem sampling interval was 32 years (Polyak et al. 2004).

Major Historic-period xeric episodes that are visible in all of the previously cited dendroclimatology records and in the Gulf of Mexico sediment core records include mid-eighteenth-century episodic drought and a mid-twentieth-century interval of significant drought. These episodes have also been documented in dendroclimatic studies conducted in northern Mexico by Cleaveland et al. (2003) and Villanueva et al. (2006). The eighteenth-century drought episodes were implicated in mass livestock die-offs, river desiccation, and cultural abandonment events that were recorded in northern Mexico and what is now Texas by Spanish Colonial settlers and religious officials. The AD 1950–1960 drought had disastrous effects in the Trans-Pecos and borderlands regions (Cleaveland 2006; Holden 1928; Villanueva et al. 2006).

Major pluvial periods with implications for human occupation and adaptation in the Mexican Highlands are also documented through dendroclimatic research and may be correlated with the Gulf of Mexico sediment cores and, to a lesser extent, with the speleothem-stable isotope research. However, some period of lag between the appearance of a pluvial period in annular tree rings and its appearance in the annular rings of stalactites is apparent, possibly because of the time lag between the onset of the pluvial event, the rainfall absorption in the ground, its dissolution of calcium carbonate, and the occurrence of mineral deposition and resolution on the speleothems.

Based on Gulf of Mexico sediment cores and abundance of *G. sacculifer* forms, relative absence of packrat middens, and annular tree ring growth, major pluvial events of multidecadal duration occurred during the late second to mid–third century AD, late sixth century to the mid-seventh century AD, early to mid-eleventh century AD, and AD 1825 to 1900. The latter pluvial event may have reached its maximum peak around the turn of the nineteenth-to-twentieth century. The monsoonal indicators from the Gulf of Mexico sediment core records suggest that it was the strongest pluvial period since the late fifteenth century (Poore et al. 2005). Scurlock (1998) has compiled documentation of 13 major to moderate floods (flow 10,000 cubic feet per second or more) between 1890 and 1911. Tree-ring records from El Malpais, and the Oscura, Sierra del Nido, Gallinas, and San Andres Mountains all indicate a pluvial period beginning around 1890 and continuing through the first decade of the twentieth century (Grissino-Mayer et al. 2004; Grissino-Mayer and Swetnam 1981; Stockton 1982, 1991; Stokes et al. 1971).

Implications of Geochronometrics and Climate for Human Occupation and Adaptation in the Mexican Highlands Area, Rio Grande Rift Province, and Beyond: Research Questions and Possibilities

Geochronometrically dated cultural occupations at archaeological sites in the Tularosa and Jornada del Muerto Basins may reveal correlations between proxy-observable climate regimes and events and cultural activities. For example, preceramic occupations that can be dated to a specific cultural period (e.g., Clovis or Folsom) may have taken advantage of pluvial conditions during late Pleistocene or early Holocene times to use the terraces, lowlands, or other environs around Jornada Draw for the entrapment of game animals. Early Archaic inhabitants during the Altithermal may have been motivated to move away from the midlands to areas closer to the Rio Grande or to more mesic highland areas in the pursuit of game, mast, or grain. Similarly, early agriculturists, such as Late Archaic forager-farmers and Jornada Mogollon groups, may have sought out wet meadows, cienegas, or playas to grow domesticates during xeric times or may have taken advantage of mesic conditions around 950 BP to pursue dryland agriculture on lowland or midland terraces, or to gather piñon in upland areas. Detailed studies about paleoclimates and human adaptations have been previously conducted in and around parts of the southern Rio Grande Rift and Mexican Highlands. That information is readily available for comparison to future discoveries in these regions and will reveal more about the continual evolution of ecological dynamics between humans and the environment.

3. Overview of the Culture History of the Jornada Mogollon Region

James L. Moore

The first synthesis of archaeological data was completed for south-central New Mexico in 1948. Through survey, excavation, and reevaluation of previous work in the region, Lehmer (1948) defined the Jornada Branch of the Mogollon in a region extending from north of Carrizozo to south of Villa Ahumada, Chihuahua, and from 120 km west to 240 km east of El Paso. This was not only the first comprehensive examination of the region, it was virtually the only such study until large-scale cultural resource investigations began in the 1970s.

Large areas of federally controlled land in south-central New Mexico and the western Trans-Pecos region of Texas have been examined since that time, and many of the sites recorded by these studies have been tested or excavated. The most extensive investigations have been conducted on land administered by the Department of Defense in south-central New Mexico and adjacent parts of Texas. Thus, a considerable amount of information has become available over the last thirty years, and literally tens of thousands of new sites have been recorded in this region. This has provided a considerable amount of data concerning the entire span of human occupation in the region. Following other studies, culture history is divided into five broad periods: Paleoindian, Archaic, Formative, Protohistoric, and Historic. The chronological scheme presented here is summarized in Figure 3.1.

Paleoindian Period (10,000–6000 BC)

The earliest agreed upon occupation of the Southwest was during the Paleoindian period, which is divided into two broad temporal divisions: Llano, which includes Clovis (10,000–9000 BC) and Folsom (9000–8500 BC); and Plano (8500–6000/5500 BC). These dates are by no means exact and fluctuate by several hundred years among researchers (Agogino 1968; Irwin-Williams 1965, 1973; Irwin-Williams and Haynes 1970; Neuman 1967). While Clovis and Folsom are considered to represent distinct cultures, the Plano encompasses a number of individual traditions. At one time all Paleoindians were classified as big-game hunters. Many now consider Clovis to have been more generalized hunter-gatherers, while Folsom and some later groups turned increasingly toward the specialized hunting of migratory game, particularly bison (Stuart and Gauthier 1981). Other Plano groups may have been hunter-gatherers whose lifestyle resembled that of the Archaic. However, even these groups probably placed more emphasis on large-game hunting and less on collecting plant foods that required extensive processing and that were to become staples during the Archaic period.

Some view the break between the Paleoindian and Archaic periods as an actual dislocation of populations. This view entails the migration of late Paleoindian peoples onto the Plains in response to the movement of bison out of the desert Southwest (Irwin-Williams and Haynes 1970). While some groups, especially those that specialized in big-game hunting, probably did follow the retreating bison, it is unlikely that everyone left and the ensuing demographic vacuum was occupied by a new peoples. Instead, later inhabitants of the Jornada region were probably Paleoindian descendants who exploited a more general array of resources. Thus, the Paleoindian period ended with the slow demise of specialized big-game hunting and the movement of most of those specialists out of the Southwest.

Although Paleoindian remains are relatively rare in the Jornada region, they do occur and indicate that south-central New Mexico and western Trans-Pecos Texas were occupied by humans by at least 10,000 BC. However, there are some who feel that the occupation of this region can be pushed back to a much earlier date. From data collected during excavations at Pendejo Cave, MacNeish et al. (1993) propose three distinct pre-Clovis complexes dating back to ca. 53,000 BC. As Riley (1995:37) notes, these early dates have been

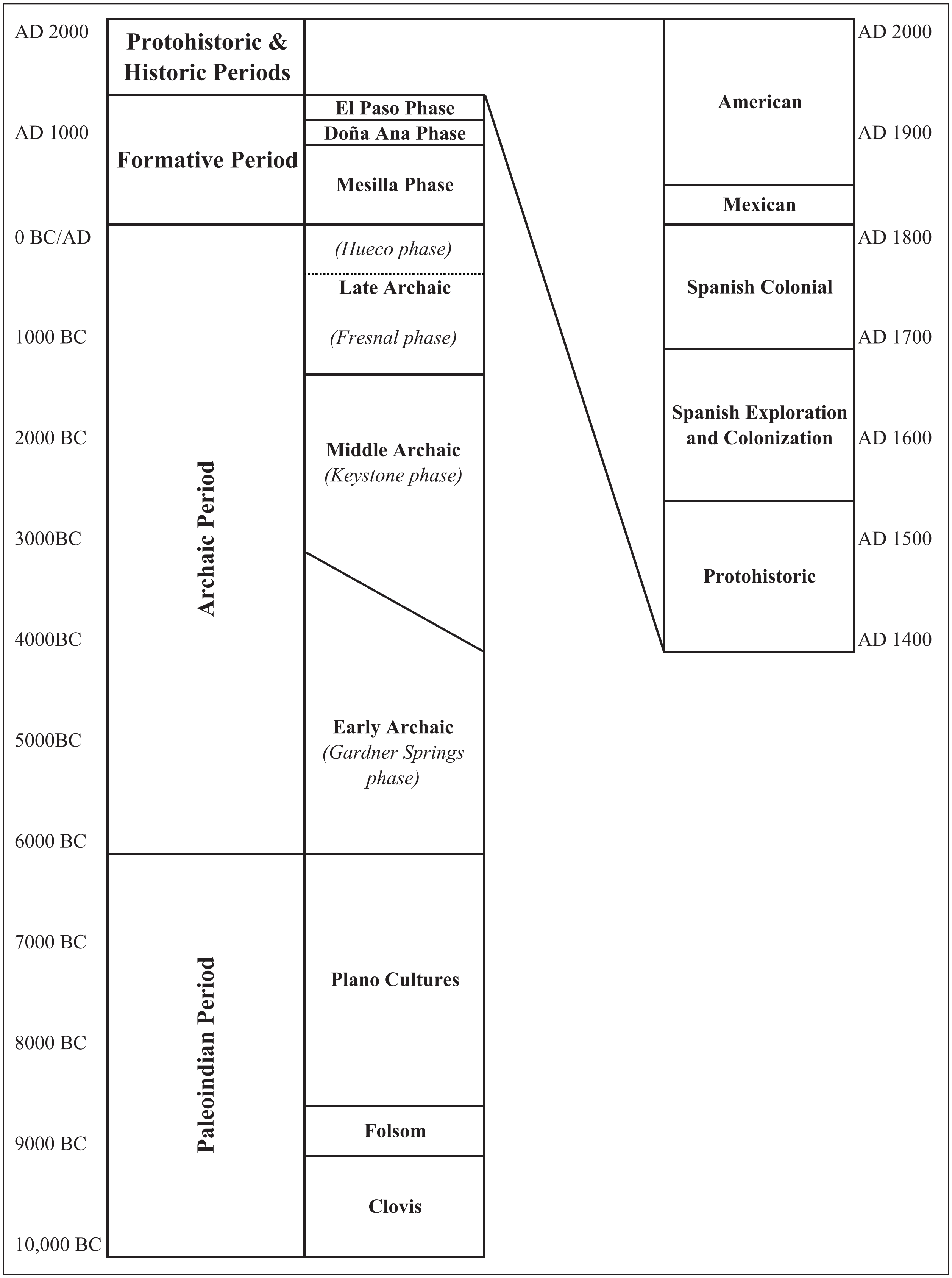

Figure 3.1. Chronological timeline for the project area.

met with some skepticism. Miller and Kenmotsu (2004:211–212) summarize data from the initial study of Pendejo Cave and various reevaluations of both those data and the site's stratigraphy, and conclude that the precision used during the initial excavation was insufficient to accurately define the stratigraphy and support the argument for pre-Clovis occupations. Lacking a firm resolution to this controversy, we simply note that possible pre-Clovis remains have been found in the region.

Clovis materials are rare. Sechrist (1994:47) indicates that only three Clovis sites or localities have been found in south-central New Mexico, including the Mockingbird Gap site, the Rhodes Canyon locality, and the North Mesa site. Other Clovis remains generally consist of isolated points found in southern New Mexico, western Trans-Pecos Texas, and northern Chihuahua (DiPeso 1974; Krone 1976; Miller and Kenmotsu 2004). Evidence of a Folsom occupation is more common. Seaman and Doleman (1988:15) found two Folsom points and many possible spurred scrapers during a survey in the Jornada del Muerto. The only evidence of Paleoindian occupation found by Whalen (1978:14) during surveys in the Hueco Bolson were two isolated Folsom point fragments. Other isolated Folsom points have been found east of El Paso in the Hueco Bolson and north of El Paso in Otero and Doña Ana Counties (Brook 1968a; Davis 1975; Krone 1975). Ravesloot's (1988a, 1988b) survey near Santa Teresa located a single site containing a Folsom component. Quimby and Brook (1967) found a site containing a Folsom point and a tentatively associated hearth along the New Mexico–Texas border. Russell (1968) recorded three Folsom campsites around a dry Pleistocene lake near Orogrande. Stuart (1997) reported a cluster of Folsom sites north of El Paso. A sample survey near the Mockingbird Gap site discussed six other Paleoindian components within 20 km of the study area and documented five newly discovered Paleoindian (Folsom and Cody) sites (Elyea 2004). Perhaps more significantly, Amick (1994) reported 526 Folsom artifacts (mostly from private collections) in the northern Jornada del Muerto.

Miller and Kenmotsu (2004:216) note that Folsom assemblages characteristically contain large percentages of high-quality, fine-grained materials, some of which were obtained from sources up to 450 km from where they were found, including the Texas Panhandle (Alibates and Edwards Plateau cherts), northwestern New Mexico (Chuska chert), the Jemez Mountains (obsidian), and eastern Arizona (Cow Canyon obsidian). In contrast, Elyea (2004) suggests that most Folsom lithic materials in the Jornada Basin originated in the Rio Grande Valley, followed by more local materials from the Jornada Basin itself. This pattern suggested cultural ties between the Rio Grande and the Jornada region during the Folsom period to Elyea. Miller and Kenmotsu note that Amick (1994, 1996) suggested that the Folsom occupations in the Hueco and Tularosa basins used residential sites oriented toward hunting game animals other than bison as part of a settlement system that exploited a very wide area, including the Southern Plains (Miller and Kenmotsu 2004:217).

Plano materials also occur in the region. During a survey near Santa Teresa, Elyea (1989:18) found a Cody Complex projectile point and a spurred end scraper. The Cody Complex is comprised of Scottsbluff and Eden projectile point types and associated formal tools dating to near the end of the Plano period. These artifacts occurred on different sites and were associated with no other Paleoindian materials, suggesting they were curated by later peoples. Elyea (2004) also noted the presence of Cody Complex artifacts in the northern Jornada Basin. Hart (1994:39) recorded a Late Paleoindian site in the southern Tularosa Basin that contained an Agate Basin point fragment. A probable Cody Complex site was located during the Border Star 85 survey in the southern Tularosa Basin (Elyea 1988). Brook (1968b) found an isolated Scottsbluff point north of El Paso. Russell (1968) recorded a large Plainview site on the edge of a dry Pleistocene lake near Orogrande and recovered later Paleoindian points from two of the three Folsom sites he recorded in that area.

A few studies have found large numbers of Paleoindian sites. Carmichael (1986a:107) recorded 50 Paleoindian components in the southern Tularosa Basin. Relative dates were established for 29 components, including 14 Folsom and 15 Plano. Nearly all seemed to be short-term camps and contained similar tool assemblages (Carmichael 1983:151). Anschuetz et al. (1990:87) found four Paleoindian components during another survey in the southern Tularosa Basin. Other than a Plainview point on one component, the only temporally diagnostic artifacts were an unidentified point and spurred scrapers. Miller and Kenmotsu (2004:217) note that most finds of Plano materials have been in basins near major playas or along the margins of the Rio Grande Valley and indicate that this essentially replicates a pattern noted by Carmichael (1986a) in the Tularosa Basin. This pattern may reflect an adaptation to the hunting of large animals that tended to stay close to these water sources (Miller and Kenmotsu 2004:217). A survey of much of the area encompassing Spaceport America by Human Systems Research (1997) identified Paleoindian components on nine sites, including Folsom and Plano locales.

Unfortunately, the relative rarity of Paleoindian sites in the region precludes a more detailed discussion of settlement or subsistence patterns. Whether this rarity is real or related to patterns of soil deposition, later occupation, or survey location is unresolved. However, it is interesting that most recorded sites from this period are parts of multicomponent locales or occur in badly eroded areas. This suggests that many Paleoindian remains may have been revealed by soils eroded after their occupation or are mixed with the remains of later peoples who either mined earlier sites for usable materials or chose to occupy the same locations.

Archaic Period (6000 BC–AD 200/400)

A tradition based on the use of a broader range of plant and animal foods emerged at the end of the Paleoindian period. These subsistence changes probably occurred because of environmental shifts coincident with the end of the Pleistocene that involved a long-term pattern of drying that resulted in the extinction of large game animals, the expansion of plant communities adapted to drier conditions, and a reduction in perennial water sources (Miller and Kenmotsu 2004:218). As Miller and Kenmotsu (2004:218) note: "These changes undoubtedly contributed to large-scale changes in subsistence strategies, requiring a diversification of the Paleoindian subsistence base with a greater focus on exploitation of plant foods. Such changes and accompanying shifts in settlement and technology mark the onset of the Archaic period at ca. 6000 B.C."

Groups employing this new adaptation exploited a different range of foods—plant foods in particular—than appear to have been used during the Paleoindian period. Rather than being tied to the migratory patterns of large game, Archaic peoples focused on seasonally available plant foods occurring in a wide variety of environmental zones, supplemented by the hunting of small to large game. The project area is within the zone assigned to the Chihuahua Tradition by MacNeish and Beckett (1987) and MacNeish (1993). This tradition extends north from Chihuahua into southeastern and south-central New Mexico and western Trans-Pecos Texas (Miller and Kenmotsu 2004). Many consider the Chihuahua Tradition to be separate and distinct from other Archaic traditions defined to the north (Oshara Tradition) and west (Cochise Tradition) of the project area, though many characteristics are shared between all three groups.

Archaic Phases

MacNeish and Beckett (1987) divide the Archaic into five phases. However, the Archaic can also be more simply divided into Early, Middle, and Late subperiods, based on projectile point typologies, which also correspond to paleoenvironmental and paleoclimatic intervals (Miller and Kenmotsu 2004:218). A correlation between these systems is provided by Miller and Kenmotsu (2004:218), allowing both systems to be used in this discussion.

The Gardner Springs phase, first in the Chihuahua Tradition sequence, corresponds to the Early Archaic (6000–4000/3000 BC). Most sites from this phase are small, and a pattern of seasonal scheduling may be indicated. The Gardner Springs population probably exploited a wide range of floral and faunal resources. The chipped stone assemblage included projectile points, flake and core choppers, denticulates, planes, and scrapers, while the ground stone assemblage contained basin milling stones, anvil mortars, slab mullers, and pebble hammers or pestles.

The Keystone phase corresponds to the Middle Archaic (4000/3000–1200 BC) and is considered a period of efficient foragers. MacNeish (1993) feels there was a further deterioration of the climate during this period, and rainfall became less reliable. Dependence on plant foods may have increased, but this is tentative. Most Keystone phase sites are small, and there are some indications that the use of resources was seasonally scheduled, focusing on the processing and consumption of seeds. The associated assemblage included small half-moon bifacial side blades, large pointed unifaces, planes, and projectile points. Milling stones and mullers continued to be used, along with manos and metates.

Significant changes occurred during the Fresnal phase, which corresponds to the early part of the Late Archaic (1,200 BC–AD 200) and is better defined than earlier phases. There is definite evidence for the use of domesticated plants during this phase, and as a consequence there seems to have been significant changes in the settlement system. Of equal importance is evidence suggesting that surplus foods were stored in pits. The associated assemblage could include planes, gouges, choppers, projectile points, and bone beads. Though milling stones and mullers continued to occur in the ground stone assemblage, they were now outnumbered by manos and metates.

The Hueco phase represents the late part of the Late Archaic. MacNeish (1993:403) suggests that the population grew rather rapidly during this phase, and there are more recorded sites dating to this phase than there are for any earlier period. Base camps were larger, suggesting they were occupied for longer periods and/or by larger groups. Distinctive scrapers and small disk choppers occur in addition to projectile points. Wedge manos and trough metates dominate the ground stone assemblage, which also includes bedrock mortars. There is also evidence that baskets and sandals were being woven by this time. Importantly, the number and types of storage features appear to have increased during this phase.

Miller and Kenmotsu (2004:218–236) provide a detailed overview of the Archaic in the Jornada region, and many of their observations are important to this discussion. As noted earlier, few Early Archaic sites have been found in this region. Early Archaic projectile points are often found on the surface but are only slightly more common than Paleoindian points. This period is not well dated, and its temporal placement is mainly based on the cross-dating of projectile points with those of other regions. The rarity of Early Archaic sites may be due to environmental factors, with much of this period's landscape currently buried beneath sediments, eroded away, or in the lower strata of rockshelters and therefore invisible during archaeological survey. One characteristic of the Early Archaic is the first evidence for the use of rock or caliche as cooking stones or heating elements, suggesting that an important change occurred in the subsistence system involving increased emphasis on plant processing. Ground stone artifacts also seem to have appeared at this time, supporting the increased value of plant processing to the subsistence system. Projectile points changed from the lanceolate styles of the Paleoindian period to stemmed forms. Accompanying this change was the use of coarser-grained materials for projectile point manufacture. These characteristics may indicate a shift in the types of animals being hunted as well as in hunting practices. Differences between the Early Archaic and Paleoindian periods suggest the development of "a seasonally mobile settlement system of small bands, although possibly more restricted than during earlier periods" (Miller and Kenmotsu 2004:223).

The changes in subsistence, settlement, and technology that began in the Early Archaic seem to have continued through the Middle Archaic, perhaps becoming intensified in the second half of the period (Miller and Kenmotsu 2004:223). Population growth is also likely. Continued drying may have caused a more restricted timing and distribution of plant resources, resulting in the development of a seasonal land-use pattern focused on the exploitation of specific plants. Some characteristics of excavated sites suggest greater levels of occupational intensity and perhaps the presence of larger groups. Evidence of houses, or huts, has been found for this period at several sites including Keystone Dam and on White Sands Missile Range (O'Laughlin 1980; Swift and Harper 1991). This, the first occurrence of definite structures in this region, predated the arrival of domesticated plants. Few technological changes were visible in chipped and ground stone assemblages, and the same types of thermal features seen in the Early Archaic continued in use. Perhaps the most visible change was in the diversification of projectile point styles. Miller and Kenmotsu suggest that patterns of beveling and serration on point blades that are most common during the Middle Archaic may be indicative of a behavioral change: "Such patterns may indicate an increased emphasis on the conservation of raw materials, blade modification related to multiple uses of the tools, or an aspect of increased efficiency in felling prey. These possibilities suggest that the design and use of projectile points among Middle Archaic groups reflects different patterns of technological and settlement organization than was the case among earlier and later intervals of the Archaic period" (Miller and Kenmotsu 2004:225). The argument for general continuity of Middle Archaic settlement, subsistence, and technology with those of the Early Archaic may be incorrect, and may simply be a function of the paucity of basic comparative data from both periods.

In contrast, many important changes occurred during the Late Archaic, especially in the second half of the period. The number of recorded sites represents a dramatic increase over earlier periods and characterizes the peak of residential use in several environmental zones. Indeed, nearly every major environmental zone was exploited during the Late Archaic, indicating an apparent expansion of the resource base beyond the central basins that formerly were the focus of occupation. This expansion may have been the result of a wet period that ended ca. 500 BC. Population growth seems likely, as represented by the vast increase in number of sites. Cultigens, including corn and beans, were introduced during this period (Miller and Kenmotsu 2004:227) but were most likely a supplement to the diet rather than a focus, as shown by stable isotope analysis of human remains that do not indicate a high level of corn in the diet (MacNeish and Marino 1993). Cultigens were merely one facet of a diet that was primarily based on hunting and gathering. Burned rock features appear to have been more common during the Late Archaic, and ring-middens occurred in areas outside the Hueco Bolson. Changes in projectile point technology included a shift to corner- and side-notched types. A probable reduction in territorial range is suggested by a large jump in the number of sites from this period and an increased use of local raw materials for the manufacture of projectile points.

Some general observations made by Miller and Kenmotsu (2004:230–236) for the Late Archaic are of particular interest. They note a general correspondence between the introduction of cultigens and an increase in dated features, and suggest that these trends are closely linked. Rather than indicating dramatic growth, these trends could suggest that population levels actually remained stable while land use was intensified because of an increasing restriction of territorial range. Competing groups may have cut off access to resources that were formerly exploited outside the general region, requiring the population to focus on increasingly smaller areas. Late Archaic projectile point types reflect less intensive maintenance and reduced durability and versatility compared to earlier types. Coupled with evidence for increased numbers of dated features and structures, these patterns suggest more intensive land use, constrained territorial ranges, and decreases in mobility as reflected in a reduction in the number of residential moves, an increase in the duration of moves, or both.

Diagnostic Archaic Artifacts

In general, only projectile points are considered temporally diagnostic for the Archaic period. Styles commonly associated with the Early Archaic include Bat Cave, Abasolo, Jay, and Bajada. Miller and Kenmotsu (2004) note that Uvalde points also occasionally occur in the region but are much more common further to the east in Texas. A different array of projectile points is associated with the Middle Archaic, including Pelona, Amargosa, Todsen, Almagre, Langtry, Shumla, Trinity, and Bat Cave styles. Projectile point styles commonly associated with the early Late Archaic include Chiricahua, Nogales, Augustin, Todsen, La Cueva, San José, Fresnal, Maljamar, and possibly Pedernales. Styles associated with the later Late Archaic include San Pedro, Hatch, Hueco, and Fresnal. As characterized in the Chihuahua Tradition, this array of projectile points reflects a mixture of diagnostics from several different regions. This suggests that, not only was the Jornada Basin area stylistically connected to the general Southwestern Archaic communication system, but it also had ties further to the east and southeast in Texas.

Archaic House Forms and Feature Types

Data on structures and features are available from several excavations. Roney and Simons (1988) excavated Late Archaic pit structures near Santa Teresa that were circular (n = 4) or oval (n = 1) in shape and dish-shaped in profile, except for one that was flat-bottomed. All were under 3 m in diameter, three were less than 2 m in diameter, and none were deeper than 30 cm. Interior features included postholes, a basin hearth in one structure, and an informal hearth on the floor of a second. Three similar pit structures were excavated in the same area by O'Leary (1987). These examples were circular (n = 2) or oval (n = 1) in shape, less than 3 m in diameter, and no deeper than 25 cm. In profile they were dish-shaped and contained no internal features. All three were radiocarbon dated to the Hueco phase.

A similar Middle or Late Archaic structure was excavated on White Sands Missile Range (Swift and Harper 1991). It was shallow (18 cm deep) and less than 2 m in diameter, with no internal features other than a possible posthole (Swift and Harper 1991:115). Gerow (1994) excavated two pit structures near Chaparral that appeared to be Archaic in date, and each was associated with a different cluster of features. They were roughly circular, and while one was dish-shaped, the second was incompletely excavated, so its profile shape was unknown. Both structures were less than 3 m in diameter and 30 cm deep. One floor was use-compacted, though there was no formal preparation evident, and an informal hearth was found on the floor surface.

O'Laughlin (1980) excavated 12 pit structures at the Keystone Dam site and found at least 11 more in auger tests. In general, they were small (ca. 3 m diameter), shallow (ca. 10 to 20 cm deep), and circular, with nearly level or dish-shaped floors. Most contained informal hearths. Evidence for a clay or adobe coating on the outside of superstructures was found in at least 12 cases (O'Laughlin 1980:144). This is the only known example in the region of an Archaic site that contained a large number of structures and it was interpreted as a winter village. Several clusters of huts in groups of two to five were identified, suggesting the presence of multiple nuclear families. Rather than indicating a single large macroband occupation structured in discrete clusters, the site was probably occupied on several occasions by groups of two to five families.

In general, Middle and Late Archaic pit structures were shallow with basin-shaped or flat-bottomed, scooped-out, unplastered floors. Posts were usually placed in irregular patterns around and within floor areas, often occupying both positions in the same structure. Interior hearths were often absent and when present were usually informal concentrations of ash and charcoal on floor surfaces, though at least one shallow basin hearth has been found. Posts formed the base of the superstructure, which was covered with grass stems, yucca stalks, and reeds. Mesquite branches were most commonly used for posts, though other woods were undoubtedly also used when available. A thin layer of clay or adobe may have been applied to the exterior surface, but evidence for this has been found at only one site. Most exterior features were thermal features, both with and without associated fire-cracked rock (Gerow 1994; Hard 1983a; O'Laughlin 1980; O'Leary 1987; Roney and Simons 1988). Between one and four extramural pits were probably used for storage at the Keystone Dam site, and two were reused for trash disposal at a later time (O'Laughlin 1980).

Archaic Ideology and Ceremonialism

Little information concerning Archaic religious beliefs is available. Panels of abstract rock art in the region may have been created by Archaic peoples (Schaafsma 1992), but while this art is probably related to ideology, its nature currently precludes any interpretation of meaning. However, variation between this style of rock art and later forms suggests that there were great differences between the ideological systems of hunter-gatherers and farmers in the Jornada Mogollon region.

Archaic Ties to Other Regions

When dealing with a highly mobile population, determining whether the presence of an exotic artifact or material represents the size of the territory exploited or exchange ties with distant groups is difficult. Considering the large distances between the Jornada region and the sources for some of the exotic materials found there, the latter is more likely. Projectile point styles are often used to indicate ties between groups, and in this light the Jornada region seems like a crossroads between the Oshara and Cochise Traditions, as well as groups living to the east and southeast in Texas. Evidence from geochemical sourcing suggests acquisition of some obsidian from sources in the Jemez Mountains, as well as from sources in Chihuahua (Miller and Kenmotsu 2004:235), though the former is more indicative of acquisition of materials from gravels along the Rio Grande. A textile analysis by Beckes and Adovasio (1982) concluded that similarities in basketry and weaving techniques between the Jornada region and northern Mexico indicated a close relationship or cultural continuum between those regions. In contrast, Formative-period textiles had predominantly Mogollon characteristics (Miller and Kenmotsu 2004:235). These data, combined with obsidian sourcing, suggest primarily north–south ties with other groups during the Archaic, shifting to a westerly focus during the Formative period (Miller and Kenmotsu 2004:236).

Archaic Subsistence

The few subsistence data that are available suggest use of a broad range of plant and animal foods during the Archaic. Deer and antelope bones are common in Early Archaic deposits, implying heavy dependence on medium-to-large game. The appearance of ground stone tools and burned rock features during the Early Archaic implies that wild seeds and possibly succulents were processed and consumed. A shift to the use of coarser-grained materials for projectile point manufacture along with a change in point design may signify the hunting of a different array of animals than was exploited by Paleoindians as well as a change in hunting techniques (Miller and Kenmotsu 2004). Little subsistence information is available for the Middle Archaic, but the continued use of ground stone tools and the association of projectile points from this period with burned rock features suggests a continuity in wild plant exploitation, including four-wing saltbush, chenopods, purslane, mesquite, rushes, grasses, and cacti (Miller and Kenmotsu 2004:224). Limited evidence for the hunting of rabbits and other small-to-medium mammals has been recovered from Middle Archaic contexts.

Domesticates were certainly available by the Late Archaic, and there is good evidence for the storage of food in pits. The range of domesticated plants increased during the late part of this period and included at least four varieties of corn, cucurbits, and possibly beans and amaranth. The number and types of storage features appear to have increased during this phase, suggesting careful planning and storage of surpluses for consumption during the winter rather than any degree of true sedentism. Most of the meat consumed seems to have come from small game, particularly rabbits, with little evidence for reliance on large animals.

The use of several wild plant species has been documented, particularly in Late Archaic contexts. Camilli et al. (1988) found evidence for the use of vetch seeds and flower stalks or pods of a plant from the Liliaceae family. Other economic plants identified during that study included purslane and amaranth seeds, and a probable yucca pod. Gerow (1994) recovered evidence for the Archaic use of chenopodium and purslane. Mesquite seems to have been the main source of fuelwood, but there is also evidence for the use of other shrubs, like saltbush (Camilli et al. 1988; Hard 1983a).

A wider variety of woods and economic plants was identified at the Keystone Dam site than at other open-air sites. Mesquite wood was recovered from thermal features. Other woods were identified in samples from structures and probably represent construction materials, though use as fuels cannot be ruled out. They included desert willow, Apache plume, creosote, wolfberry, reed, cottonwood, and possible tornillo (O'Laughlin 1980:82). Burned grass stems and yucca stalks were also identified, as were fragments of Turk's cap cactus. The array of charred seeds included saltbush, cheno-am, tansy mustard, Turk's cap, various grasses, creosote, prickly pear, purslane, smartweed, mesquite or tornillo, possible acacia, dock, bulrush, and a plant from the poppy family (O'Laughlin 1980:88).

Excavations at High Rolls Cave near Fresnal Shelter in the Sacramento Mountains recovered extensive and detailed information concerning Late Archaic subsistence. Three main periods of occupation were defined, beginning with a very late Middle or early Late Archaic occupation, followed by two periods of Late Archaic use (Lentz 2005). Bohrer (2005) identified a suite of wild plants used as food as well as domesticates including corn, a variety of amaranth (*Amaranthus cruentus*), and possibly tobacco. The main wild plants used included cheno-ams, chenopods, dropseed grass, false tarragon seeds, juniper, mesquite, piñon, prickly pear, and banana yucca fruit (Bohrer 2005:218–219). The use of a wide range of small-to-medium animals was also evident, suggesting a long-term Late Archaic trend toward increased use of rabbit and small mammal, concomitant with an increase in the use of deer versus pronghorn and bighorn sheep (Akins 2005:143). However, deer bones consistently dominate the identified taxa, indicating they were probably taken nearby and brought to the cave as intact or nearly intact carcasses (Akins 2005:143).

Some evidence from Fresnal Shelter has been used to suggests a specialized highland Archaic hunting pattern by Wimberly and Eidenbach (1981). Most of the identified bone from this site was mule deer, though some antelope, bighorn sheep, and bison bones were also found. The butchering pattern suggested that meat packages including major long bones and attached muscle were removed and transported elsewhere, while parts that contained less meat were processed and consumed on-site (Wimberly and Eidenbach 1981:27). This would have major implications for low-altitude sites, especially since radiocarbon dates suggest the shelter was used throughout the Archaic period. If a pattern of this sort was common, there might be little evidence for large-game consumption in lowland sites, and when such evidence occurs, only long bones may be present. Thus, the predominance of small mammal remains in lowland Archaic sites might not preclude the consumption of meat from large mammals obtained in the highlands. However, Akins (2005:140) reexamined these data and suggested that a large percentage of unidentified long-bone fragments and cancellous tissue represent the missing elements, which simply could not be precisely identified during analysis. Akins attributed the fragmented condition of these bones to the extraction of bone grease and marrow, which has important implications for some of the earlier conclusions drawn from this assemblage. Occupations in Fresnal Shelter appear to have been of longer duration than some have suggested (e.g., Cameron 1972), and all of the bone grease and marrow produced were probably not consumed during residence at the shelter, as Wimberly and Eidenbach (1981) proposed. Thus, the possibility that highland hunters were transporting parts of carcasses to lowland sites may be unlikely, but this does not rule out the transport of dried meat, marrow, and bone grease.

Formative Period (AD 200/400–1450)

The Jornada Mogollon occupation is collectively labeled the Formative period (O'Laughlin 1980; Ravesloot 1988a; Stuart 1990). Lehmer (1948) defined three phases for this period, which originally spanned the years between AD 900 and 1400. This framework remained mostly unchanged until the 1970s, when large-scale studies were begun in the Hueco Bolson of southwest Texas (Whalen 1977, 1978). Through these and other studies, the temporal framework and settlement and subsistence model developed by Lehmer has been modified and refined.

Mesilla Phase (AD 200/400–1000)

Lehmer (1948) considered the Mesilla phase an outgrowth of the Archaic and dated it between AD 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 cultigens in the sites he investigated (Lehmer 1948:76). These assumptions have been questioned by other researchers.

Dating the phase. Whalen (1977, 1978) initially pushed the beginning of the Mesilla phase back to ca. AD 400 and proposed a generalized settlement-subsistence system. Other beginning dates have been suggested by various researchers, illustrating a continuing uncertainty about when it started. While some (O'Laughlin 1980; Whalen 1980a, 1981) have placed its beginning around 0 BC/AD, others feel it began ca. AD 200 (Batcho et al. 1985; Ravesloot 1988a). O'Laughlin (1985:54) noted that the best evidence for early ceramics in the Hueco Bolson came from a site radiocarbon dated to the sixth or seventh centuries AD; earlier dates are single samples from limited-activity sites. This suggests that an AD 200 or earlier date for the beginning of the phase is questionable, and the beginning of the phase is currently thought to have been sometime between AD 200 and 500. Whalen (1994:23) simply suggested that the Mesilla phase began in the early centuries AD, sidestepping the issue. In contrast, most authors have agreed with Lehmer's ending date of AD 1100.

Miller and Kenmotsu (2004:238) provide an updated temporal range for the Formative period, based on analysis of many additional radiocarbon samples from Fort Bliss and a reanalysis of early archaeomagnetic samples obtained from the region. They date the Mesilla phase between AD 200/400 to 1000, though they note it would also be plausible to consider the period between AD 1000 and 1150 as a late extension of the phase. The actual dating of phases can be confusing, and the use of phases tends to emphasize the importance of certain trends that more realistically represent a long-term trajectory (Miller and Kenmotsu 2004:238). Ultimately, examining the development and direction of cultural patterns is more important than dividing a particular time period into phases. However, we use the dates for phases assigned by Miller and Kenmotsu (2004) in this discussion, since they represent one of the most recent evaluations. Since research suggests there were significant differences in settlement and subsistence between the early and late parts of the phase, most researchers now break the Mesilla phase into early and late periods based on the types of pottery present.

Mesilla-phase pottery. While undecorated El Paso Brown wares dominate throughout the phase, early sites contain intrusive types like Alma Plain and San Francisco Red, while Mimbres white wares occur in later assemblages. The appearance of the latter provides a good demarcation point, and the late Mesilla phase is considered to have begun ca. AD 750 (Hard 1983b:41; Hard 1986:266; Whalen 1993:481).

The extremely long period during which El Paso Brown was made has led many to search for temporally sensitive variation in vessel form, manufacturing techniques, and stylistic attributes. Whalen (1980b:31–32) suggested that early El Paso Brown vessels tended to have pinched rims, coarse temper, and a coarse, bumpy surface finish. Late El Paso Brown was thought to be dominated by rims that were everted and tapered or direct, with finer temper and a smoother surface finish (Whalen 1980b:31–32). Some of these ideas have been verified and amplified by further research. A regional comparison showed that ceramic densities increase on Mesilla-phase sites over time, so there tends to be more pottery on late Mesilla sites than on early Mesilla sites (Whalen 1994:75). Two long-term trends in temper were also identified. Through time, vessels tended to contain more temper, and temper tended to be more finely ground (Whalen 1994:79). While vessel forms were dominated by neckless and short-necked jars throughout the life of this type, changes in vessel shape, volume, and orifice diameters indicate that storage in large containers became increasingly important in the late Mesilla phase (Seaman and Mills 1988a, 1988b; Whalen 1994:86, 89).

Another significant variation identified by Whalen (1994:83) was a change in firing temperatures around AD 700. After that date, vessels seem to have been fired at higher temperatures or for longer periods, producing differences in surface hardness and core characteristics that are distinguishable from earlier brown wares. However, Whalen (1994:83) does not believe this represents a reorganization of ceramic technology. Rather, something as simple as the use of more wood and less grass during firing may have been involved.

House forms and feature types. Pithouses were the only type of structure used during the Mesilla phase. Some differences have been noted between structures in different environmental zones, but there seems to have been little variation in form between the early and late parts of the period. Whalen (1994:46) found that the largest, deepest, and most heavily roofed structures were in the Rio Grande Valley, while those in the desert basins were smaller, shallower, and less heavily roofed. In general, pit structures from the Jornada region were smaller than their contemporaries elsewhere in the Southwest and tended to contain few internal features. Heavily used extramural activity areas are often found in association.

The most detailed information on Mesilla-phase structures comes from Whalen's (1994) excavations at Turquoise Ridge, a winter village occupied during both the early and late parts of the phase. While it is likely that the late Mesilla population was larger and remained at the village for longer periods, the only apparent difference between early and late structures was their depth (Whalen 1994:47). Late structures were somewhat deeper, though it was uncertain whether this was caused by deeper initial excavation or more wear during longer occupations. Some structures were occupied long enough to require remodeling or were used more than once. House abandonments were apparently planned, and abandoned structures were used for trash disposal (Whalen 1994:50). Internal features included postholes, hearths, storage pits, warming pits, and pits of unknown function. Postholes occurred both on and around the edge of floors, often in combination. Hearths included formal basins excavated into floors and informal deposits of ash and charcoal or areas of oxidation on floor surfaces. Both large and small storage pits sometimes occurred inside structures. Warming pits were found but were rare; they consisted of irregular unburned pits that contained burned or heated rock. There was a shift from round to rectangular pithouses between AD 700 and 1000, with round pithouses being almost entirely replaced by rectangular houses by 1000 (Miller and Kenmotsu 2004:240).

Smaller, more ephemeral huts are found at sites occupied for short periods and were similar in form to those used during the Archaic (Miller and Kenmotsu 2005:239). Huts are represented by small-diameter (average 2.5 m), shallow (15–30 cm), circular, dish-shaped basins with sloping walls that lacked prepared floors (Miller and Kenmotsu 2005:239). The insubstantial nature of these structures in addition to evidence for short occupations suggest that they represent the summer component of a settlement system that mixed a sedentary cold-season residence based on stored foods with a mobile warm-season exploitation of seasonally productive ecological zones.

Many types of extramural features also occur at Mesilla-phase sites. While storage and midden features can be common at winter villages like Turquoise Ridge (Whalen 1994), they are rare at sites occupied during other seasons. Middens are usually shallow and diffuse, with imprecise boundaries (Whalen 1994:61). Burials are rare and usually unaccompanied by grave goods. Thermal features are common and take several forms, including simple hearths and small and large fire-cracked rock features with and without fire pits. In general, the presence or absence of a pit within fire-cracked rock features probably reflects different degrees of erosion rather than functional differences. Size may reflect functional differentiation, with small roasting features potentially more related to household use, while larger features were probably used communally (Whalen 1994). Variety in the types of thermal features peaked by AD 650, either declining or occurring in similar frequencies after that date (Miller and Kenmotsu 2004:250–251).

Ideology and ceremonialism. Little information is available concerning Mesilla-phase ceremonialism. Larger than normal pithouses that may reflect ritual use have been found at only three sites, including Turquoise Ridge (Whalen 1994), Los Tules (Lehmer 1948), and the Rincon site (Hammack 1962). These sites were all occupied late in the phase, leading Whalen (1994) to conclude that this type of structure originated after AD 750. The appearance of such features suggests an accompanying change in social organization. Traditionally, Southwestern communal structures are associated with ritual societies that crosscut communities and bound them together. Thus, the appearance of communal structures in the late Mesilla phase suggests that the loose social organization characteristic of the Archaic period and early Mesilla phase was giving way to a more cohesive pattern of group identity and membership. However, there is no evidence for any ceremonial organization larger than individual villages.

Ties to other regions. Certain types of artifacts are indicative of ties to other regions, but what form those ties took cannot be determined with certainty. Most imported pottery at Mesilla-phase sites is from the Mimbres area to the west. Mimbres pottery occurs on both early and late Mesilla-phase sites, suggesting that the Jornada region was tied into an exchange system that centered on the Mimbres area, especially during the late part of the phase. This represents the change in direction of exchange ties from the north–south Archaic pattern to one centered on groups to the west, as discussed earlier. Marine shell, another relatively common import, includes *Olivella* sp. beads and fragments of *Glycymeris* sp. bracelets (Lehmer 1948; O'Laughlin 1977, 1985; O'Laughlin and Greiser 1973; Whalen 1994). Other types of marine shell are rare; they include fragments of *Haliotus* sp. and *Pyrene* sp. (O'Laughlin 1985; Whalen 1994). Turquoise also occurs in Mesilla-phase contexts and is best reported from Turquoise Ridge (Whalen 1994), where 11 fragments were found. One piece of turquoise was also found at Los Tules (Lehmer 1948). However, without chemical analysis it is impossible to determine whether this material was obtained from local sources, such as those in the Orogrande area, or was imported.

Subsistence. Both wild and domestic foods were consumed during the Mesilla phase, presumably continuing the Archaic pattern of exploiting a broad spectrum of resources. In general, domesticates occur more rarely than wild foods, and this probably reflects a heavier use of wild species with domesticated plants acting as supplements rather than staples. Corn and beans have been recovered from Mesilla-phase sites, but cucurbits have not been found. However, since cucurbits occur at Archaic sites, they were probably used but are poorly preserved. In the most detailed study yet conducted, Whalen (1994) found a differential distribution of corn remains in samples from early and late Mesilla contexts at Turquoise Ridge. Corn occurred in 7.3 percent of early samples and 27 percent of late samples, suggesting increased use after AD 750. One bean was also found in early deposits at this site. However, agriculture most likely played a somewhat more important role in the subsistence system of the Mesilla phase than it did during the Archaic, as evidenced by more intensive occupation at Mesilla-phase sites and the appearance of winter villages like Turquoise Ridge.

A wide spectrum of wild plant remains occur at both early and late Mesilla-phase sites, representing use as food, fuel, and construction materials. Wild plants are mostly represented by seeds, including purslane, chenopods, amaranth, sunflower, acorn, mesquite, tornillo, mallow, yucca, sumac, bugseed, mustard, and various cacti and grasses (Camilli et al. 1988; Dean 1994; Ford 1977; Hard 1983a; O'Laughlin 1979, 1981, 1985; Wetterstrom 1978; Whalen 1980b, 1994). Some evidence for the use of leaf succulents also exists. Scott (1985) found agave fibers in a large roasting pit, and Camilli et al. (1988) recovered yucca leaves from a late Mesilla pit structure; both examples probably represent foods. Fuels were mostly shrubs, mesquite in particular (Camilli et al. 1988; Hard 1983a; Minnis and Toll 1991; O'Laughlin 1979), though there is limited evidence for the use of small trees like oak and juniper (Kirkpatrick et al. 1994; Minnis and Toll 1991). Other fuels included saltbush, Mormon tea, creosote, desert hackberry, and desert willow (Brethauer 1979; O'Laughlin 1979). Mesquite branches are usually assumed to have been the main elements in pithouse superstructures, though there is little direct evidence of this. Materials used to cover superstructures include grass stems and yucca stalks (Gerow 1994; Hard 1983a; Roney and Simons 1988).

Hard and Roney (2005) compared levels of agricultural dependence between the Jornada region and Cerro Juanaqueña, a Late Archaic *trincheras* site in northern Chihuahua. While there was a heavy investment in the cultivation and consumption of domesticates, especially corn, at Cerro Juanaqueña by 1,250 BC, similar levels of agricultural dependency did not occur in the Jornada region until ca. AD 1000. Using optimal foraging theory to examine the data, environmental factors were suggested as the cause of these differences. Farming was a risky, low-return proposition in the Jornada region before AD 1000. In contrast, shrubs represented high-density, high-return resources, supplemented by the use of succulents and forbs. "The relatively high return of shrub resources and the mobility required to exploit them were favored relative to the lower return and higher risk of farming" (Hard and Roney 2005:173). Thus, this mix of heavy reliance on wild plants supplemented by domesticates continued until conditions were such that the risk and yield associated with the cultivation of domesticates were reduced to levels that made their use economically feasible.

Evidence for the range of animals exploited is more limited. Rabbits, both cottontails and jackrabbits, are the most commonly identified faunal remains (Brethauer 1979; Brown 1994; Foster 1988; Hard 1983a; O'Laughlin 1977, 1979, 1981, 1985; Whalen 1980b, 1994). Other types of animals for which evidence of consumption exists include box turtle, spiny soft-shell turtle, quail, owl, muskrat, deer, possibly antelope, fresh water mollusks, and various rodents and birds (O'Laughlin 1977, 1979, 1981, 1985; Whalen 1994).

Trends in the manufacture of ceramic vessels also provide some information on changing subsistence patterns. Changes in the amount and size of temper in the late Mesilla phase suggests an attempt to produce pottery more resistant to thermal shock (Whalen 1994:11). This implies that vessels were required to withstand longer periods of heating, which could indicate shifts in food processing techniques. Changes in firing techniques may have resulted in harder and more durable vessels. This may have been required by new patterns of pottery use or could reflect variation in the types of materials used in firing, possibly as a consequence of environmental change. Finally, the larger average size of late Mesilla-phase vessels may indicate an increase in their use for storage (Seaman and Mills 1988a, 1988b; Whalen 1994). All of these changes in pottery suggest important behavioral differences between the early and late parts of the Mesilla phase.

The behavioral differences visible between the early and late parts of the Mesilla phase probably involved a continuing adaptation to population growth and a concomitant constriction of the area available for economic exploitation, a process that began during the Archaic period. Mesilla-phase settlements tended to be scattered across the interior basins, and some villages were along the margins of the Rio Grande Valley (Miller and Kenmotsu 2004:244–245). Cold-season villages seem to have been occupied more intensively during the late Mesilla phase, suggesting the growing importance of stored foods to support longer periods of village occupation, perhaps by larger groups of people. This possibility is supported by the increased size of ceramic vessels in the late Mesilla phase. The appearance of probable ritual structures in late Mesilla-phase villages may be indicative of population growth, with new elements of social structure being developed to help organize larger populations. Though cold-season villages seem to have been occupied more intensively, the warm-season pattern of dispersal of part of the village population to basin interiors to exploit food resources in that zone did not disappear, indicating that wild plant foods continued to be an important part of the subsistence economy at the same time that farming assumed increased importance.

Doña Ana Phase (ca. AD 1000–1250/1300)

While the Doña Ana phase was initially defined by Lehmer (1948), it is the most poorly known period of occupation. Lehmer (1948) considered this phase to be transitional between the Mesilla and El Paso phases and dated it from AD 1100 to 1200. No attempt was made to distinguish Doña Ana components in Whalen's (1977, 1978) early studies in the Hueco Bolson because of difficulties involved in distinguishing those remains from survey data alone. Thus, Doña Ana components were combined with the later El Paso phase into the Pueblo period. Whalen (1980a) has also referred to the Doña Ana phase as the Transitional period, again combining it with the El Paso phase in a regional synthesis.

Lehmer (1948:88) used pottery recovered during excavations at La Cueva, which lacked structural remains, to date the Doña Ana phase. The initial definition of this phase was mostly based on guesswork using remains excavated in 15 cm levels from the talus in front of a cave in which the fill was described as "hideously disturbed" (Lehmer 1948:35–37). No wonder there has been so much confusion and speculation about this phase! Nevertheless, Carmichael has proposed a locally extensive Doña Ana–phase occupation in the Tularosa Basin. Unfortunately, his arguments were based on survey data, and some have criticized his logic. Carmichael (1983, 1984, 1985a, 1985b, 1986b) presented a series of attributes he considered diagnostic of a Doña Ana occupation and integrated these data into a model of nonlinear culture change for the region. First was a mixture of pottery, combining types from the Mesilla and El Paso phases. Initially, sites were only assigned to the Doña Ana phase when this ceramic association occurred in discrete features thought to represent eroded middens (Carmichael 1986a:72). However, once the association was considered valid it was extended to all sites at which it occurred, whether found in discrete features or not. The latter class of sites comprised over two-thirds of his sample. Though no surface evidence of structures was found, they were inferred by the presence of features interpreted as eroded trash-filled borrow pits (Carmichael 1986a:72). The associated adobe pueblos were thought to have eroded away, leaving behind little visible evidence of their existence.

From these data, Carmichael inferred a locally extensive, short-term occupation during the Doña Ana phase for the southern Tularosa Basin. Many large habitation sites were identified in environmental settings similar to, though slightly different from, those occupied during the El Paso phase. These were alluvial fans, with El Paso phase sites tending to occur at slightly lower elevations. This suggested a climax of population and complexity at an earlier date than was previously thought and led to construction of a model of development entailing oscillations in the relative intensity of local occupations (Carmichael 1985b). Simply put, Carmichael felt there were peaks in occupation size and intensity during both the Doña Ana and El Paso phases. In his study area, the larger peak was thought to have been during the earlier phase.

While this is an interesting model and certainly deserves consideration, many of its assumptions have been criticized. Anschuetz (1990:24) noted that the framework on which Carmichael built his definition of the Doña Ana phase was based on excavations at La Cueva and Indian Wells Village (Lehmer 1948; Marshall 1973)—sites that were disturbed or incompletely described. The ceramic association used to define the phase may be more indicative of mixed Mesilla- and El Paso–phase occupations (Anschuetz 1990:24). While Carmichael originally considered this possibility, he later disregarded it. His logic in concluding that trash deposits represented the remains of eroded trash-filled borrow pits rather than surface middens was also criticized. Anschuetz and Seaman (1987:5) concluded there is no definitive or consistent way to define Doña Ana–phase remains during survey. One of the main problems they pointed out was the lack of pottery types exclusive to this phase, leading to serious difficulties in discriminating remains from this period from those of earlier or later occupations. Thus, they felt that survey data should not be used to define Doña Ana–phase occupations.

During a survey on Fort Bliss, Mauldin (1993) recognized and addressed these difficulties. Sites containing pottery types that Carmichael considered diagnostic of the Doña Ana phase were defined as multicomponent (Mauldin 1993:24). However, one such site was subjected to a more rigorous examination to test Carmichael's assumptions. While this did not include excavation, it did entail detailed mapping and recording of surface feature and artifact types and distribution. Though several middens on the site contained pottery diagnostic of both the Mesilla and El Paso phases, Mauldin (1993:41) concluded, "The spatial patterning of components . . . suggests that the apparent Doña Ana assemblage actually may represent the overlap of the Mesilla and El Paso phase occupations." Mauldin's (1993) results suggest that Carmichael may indeed have been in error, and that his sites actually represented a mixture of Mesilla- and El Paso–phase occupations in an area that was eminently suitable for use during both periods. So, where does this leave the Doña Ana phase? Should it be abandoned, or merely reconsidered yet again? Fortunately, a few sites from this phase have been excavated and provide some data (Bilbo 1972; Kegley 1982; Scarborough 1986). Thus, a basic outline of the Doña Ana phase can be sketched.

Dating the phase. Mauldin (1993:41) suggested that this phase should be dated between AD 1100 and 1150 and may have spanned an even shorter period. This was based on Kegley's (1982) work at Hueco Tanks and Scarborough's (1986) excavations at Meyers Pithouse Village, which suggested that the overlap between Mimbres Black-on-white and Chupadero Black-on-white that was originally used to define the phase lasted only 50 years or less. In fact, Mimbres Black-on-white was absent from Meyers Pithouse Village, which was securely dated to the late Doña Ana phase by radiocarbon and archaeomagnetic samples (Mauldin 1993:41). If the traditional date of AD 1100 to 1200 were to continue in use, then what Lehmer and Carmichael both considered a characteristic ceramic assemblage may only have occurred at sites occupied early in the phase. Miller and Kenmotsu (2004:237–238) noted that recent revisions to the Jornada sequence now place this phase between AD 1000 and 1250/1300. Several changes occurred around AD

1000 that point to the beginning of the transition from residence in pithouses to pueblos, along with an intensification of the agricultural base. This period of transition is now considered to represent the Doña Ana phase.

Changes in architecture mark both the beginning and end of this period. By AD 1000, the transition from round to rectangular pithouses was virtually complete, and the first isolated rooms appeared. These consisted of square rooms in shallow pits with prepared floors, central collared hearths, and occasional storage pits and entry steps (Miller and Kenmotsu 2004:239). Roof support was supplied by two main posts along a central axis, supplemented by both interior and exterior posts. These structures may have been precursors to pueblo rooms, differing mainly in that they were isolated rather than joined together, as was common in the later form, and tended to have smaller floor areas (Miller and Kenmotsu 2004:239). Pit structures essentially disappeared after AD 1250/1300, and pueblos containing contiguous roomblocks were built after that time. Changes in village location occurred coincident with these shifts in structural types. Doña Ana– and El Paso–phase sites tended to cluster on alluvial fans, with sites of the latter phase occurring at somewhat lower elevations (Miller and Kenmotsu 2004:245).

Because the Doña Ana phase represented a period of transition, there were differences between the early and late parts of the phase (as discussed by Miller and Kenmotsu 2004:246–251). Use of the central basins declined markedly by around AD 1000, and there was an increased use of alluvial fans. This shift also corresponded to the changeover from round to rectangular pit structures. This pattern held until ca. AD 1150, when settlement on alluvial fans reached its apex, and settlement near playas became common. Construction of the more formal isolated rooms was greatly increased, and a major change in the structure of settlements also occurred. Rock-lined thermal features became increasingly common after AD 1000, and their use peaked after AD 1150. There was a significant increase in the construction of formal trash pits and storage facilities after AD 1150, and reliance on agriculture appears to have begun to intensify, as signified by a marked increase in mano size and grinding area (Hard et al. 1996).

Pottery. Traditionally, this phase was defined by the occurrence of El Paso Brown, El Paso Polychrome, Chupadero Black-on-white, St. Johns Polychrome, Three Rivers Red-on-terracotta, and Mimbres Classic Black-on-white (Lehmer 1948:37). Marshall (1973:53) added El Paso Bichrome to the list. Carmichael (1986a:72) indicates that Playas Red Incised also occurs on Doña Ana–phase sites and notes that the variety of El Paso Brown on his sites was late and had thickened rims. An unidentified black smudged ware was found in a probable Doña Ana–phase pithouse near El Paso (Bilbo 1972:75).

Mauldin (1993:41) notes that the Hueco Tanks site (Kegley 1982) contained a ceramic assemblage similar to that defined by Lehmer. However, Mimbres Black-on-white comprised only a very small percentage of imported wares, while 90 percent was Chupadero Black-on-white. This type also comprised most of the nonlocal pottery from Meyers Pithouse Village (Mauldin 1993:41). Other intrusive pottery at that site included Three Rivers Red-on-terracotta, Playas Red, and undifferentiated Chihuahuan wares (Mauldin 1993:41). No Mimbres Black-on-white was found in this assemblage of over 13,000 sherds (Mauldin 1993:41).

Significant changes occurred in brown ware assemblages after AD 1000, as discussed by Miller and Kenmotsu (2004:252–253). The manufacture of El Paso Bichrome and Polychrome vessels began around this time, and these types represented increasingly large portions of assemblages until around AD 1275, when the bichrome and early polychrome varieties were replaced by classic El Paso Polychrome. In the plain wares, the predominantly neckless jars of the Mesilla phase were augmented by short-necked jars. These types were replaced by necked jars with everted rims by AD 1250/1300, and a smaller variety of vessel forms overall were made.

House forms and feature types. This topic was partly addressed in the section on dating the phase, when temporal architectural trends were presented. Marshall (1973:53) indicates that Indian Wells Village contained a mixture of pithouses and surface structures. Round pithouses were common, but square pithouses also occurred. Surface structures had jacal or coursed adobe walls, and rooms often contained hearths. Surface rooms were common late in the period at this site, with small pit rooms being used for storage (Marshall 1973:53). Unfortunately, Indian Wells Village was incompletely described, and little detail is available. Even more unfortunate is that it was assigned to the Doña Ana phase because it contained a mixture of surface and pit rooms, even though the ceramic assemblage was similar to that of the El Paso phase (Marshall 1973:13). The presence of both round and rectangular pithouses is also suspicious, because this is a characteristic of the late Mesilla phase rather than the Doña Ana or El Paso phases. Thus, this site may represent a locale that was occupied from the Mesilla phase to the El Paso phase rather than a Doña Ana–phase village.

At Meyers Pithouse Village, Scarborough (1986) found no surface structures, only four rectangular pithouses. One was substantially larger than the others and may have been a communal structure or work area (Scarborough 1986:283). Internal features included irregularly placed postholes and well-defined hearths in at least three structures. Extramural hearths were also found, and storage pits occurred both within and outside of pithouses.

Six pithouses were excavated at the Hueco Tanks site, all similar in construction style (Kegley 1982). These pithouses were rectangular, 2.3–5.5 m long by 2.3–4.5 m wide, and 24–95 cm deep. Floors were plastered with adobe and had two postholes oriented on a north–south axis. Hearths were formal and were usually collared. An adobe step was sometimes adjacent to the south wall and may have been related to a wall or roof entrance in that area. Walls appear to have been plastered but were usually so deteriorated that this was not certain. Little evidence of roof construction remained, but in at least one case the roof was covered with a layer of adobe.

A probable pithouse from this phase was excavated at the Castner Annex Range Dam site (Bilbo 1972). It was shallow (10 cm deep) and rectangular, with both interior and exterior postholes (Bilbo 1972:75). Building materials had collapsed into the structure when it was partly burned, showing that walls were made of jacal and slanted inward, and that roof vigas were covered with a similar material (Bilbo 1972:75). A formal hearth may have existed, but the condition of the structure made this difficult to verify.

Ideology and ceremonialism. The late Mesilla-phase ceremonial pattern at least partly continued into this phase. This is suggested by a probable communal structure at Meyers Pithouse Village (Scarborough 1986), which resembled similar structures from late Mesilla–phase sites. However, at the beginning of the Doña Ana phase there was a significant change in rock art style that may reflect initial participation in a widespread ideological system with its roots in Mesoamerica. Jornada-style rock art seems to have appeared around AD 1000, and Schaafsma (1992) suggests it began in the Mimbres area and spread to the Jornada. Common motifs include masks and faces, which occur as both carvings and paintings (Schaafsma 1992:67). Schaafsma (1972:122) notes, "As the art represents a significant break with the past, so, too, must the associated ritual have represented a cleavage with the earlier tradition." This new ritual system appears to have been introduced at the beginning of the Transitional period and was probably closely linked to the changes in Jornada society that began occurring around that time.

Ties to other regions. Significant changes in extraregional ties occurred during this phase, as suggested by pottery imports. Mimbres pottery disappeared from assemblages by around AD 1150 (Mauldin 1993), and this closely corresponded to the date of the Mimbres systemic collapse (Stuart and Gauthier 1981). Subsequent pottery imports were dominated by types from the north (Chupadero Black-on-white, Three Rivers Red-on-terracotta, and St. Johns Polychrome) or the south (Playas Red and various Chihuahuan wares). This indicates a geographic change in interaction from an east–west axis to a north–south axis, similar to the pattern defined for the Archaic and differing significantly from that of the Mesilla phase.

Turquoise was found at Meyers Pithouse Village (Scarborough 1986:283), though whether it was from sources in the Jornada region or elsewhere is uncertain. Turquoise and a *Glycymeris* sp. shell bracelet fragment were found at the Castner Annex Range Dam site and may have been from Doña Ana–phase deposits (Bilbo 1972). A small fragment of cloth was recovered from the pithouse at this site (Bilbo 1972:75), which may be a piece of imported cotton cloth. *Olivella* sp. shell beads were recovered from the Hueco Tanks site (Kegley 1982).

Subsistence. Flotation analysis suggests that domesticates continued to comprise only a small part of the diet during the early Doña Ana phase, increasing in use after AD 1150 (Miller and Kenmotsu 2004:248). Wild plant foods were the focus of subsistence activities in the early part of the phase and were also very important in the late part of the phase. However, the more common occurrence of two-hand manos in addition to increased mano size and grinding area after AD 1000 has suggested to some that corn had assumed a more important role than ever before. This possibility is supported by studies of plant ubiquity conducted by Hard et al. (1996) and Miller (1990, 1997) on flotation samples from all phases of the Formative period. This study showed increasing agricultural dependence during the Doña Ana phase, with a pronounced increase after AD 1150 (Miller and Kenmotsu 2004:249). The use of various cacti and succulents may have also intensified during the late Doña Ana phase, peaking by the end of the phase.

Excavation at Meyers Pithouse Village recovered at least one bean, several kernels of corn, and a large amount of rabbit bone (Scarborough 1986). Heavy lagomorph use is evident in three Transitional assemblages for which detailed analytic results are available (Miller and Kenmotsu 2004:250). While bone from medium and large artiodactyls including deer, antelope, and bison also occur, their numbers are small compared to rabbit bones.

El Paso Phase (AD 1250/1300–1450)

Lehmer 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). El Paso phase residence was generally in adobe pueblos, with roomblocks grouped around plazas or in east–west oriented rows. Pithouses were thought to have been phased out by this time. However, Miller and Kenmotsu (2004) suggest that the differences between these phases are much more apparent than was initially thought. In addition to shifts in the areas that were occupied before and after AD 1200, there was a much heavier reliance on farming after that date, and a significantly decreased use of the central basins. Major changes also occurred in ceramic assemblages, house types, village layout, and other aspects of material culture.

Dating the phase. Lehmer (1948) found it difficult to find a break between the Doña Ana and El Paso phases. He considered the occurrence of Mimbres pottery in the former and its absence in the latter to be significant and from this suggested that the transition occurred between AD 1150 and 1250 (Lehmer 1948:87–88). The end of the phase was linked to dates for the early Rio Grande glaze wares that were occasionally found in local assemblages, and suggested that the El Paso phase ended sometime between AD 1375 and 1400.

Since they were first proposed, these dates have come under scrutiny and have been questioned by many. Traditionally, the El Paso phase has been considered to extend from around AD 1200 to 1400, as proposed by Lehmer. As Mauldin (1993:41) noted, if the presence of both Mimbres Black-on-white and Chupadero Black-on-white defines the Doña Ana phase, evidence from the few well-dated sites suggests that this phase ended around AD 1150. However, if construction of adobe roomblocks is also used as a defining characteristic, the El Paso phase probably didn't begin until around AD 1200, as tradition suggests.

Recent research has added a considerable amount of information concerning the end of this phase. Cordell and Earls (1984) reevaluated manufacturing dates for Glaze A in the Piro district and concluded that it was produced or continued in use until at least AD 1500 in that area. This is a hundred years later than the traditional end date for this type (Habicht-Mauche 1993). If most of the Glaze A in the Jornada region was obtained from the Piro district, Cordell and Earls (1984:96–97) suggest that a later ending date for this phase must be considered.

Miller and Kenmotsu (2004:238) have reassessed data for the Formative sequence and place the beginning of the El Paso phase at AD 1250/1300. This date is based on information that suggests the population became agricultural specialists by this time, rather than simply using cultigens to supplement a diet focused on the exploitation of a variety of wild plant foods. This is viewed as the culmination of a long-term trend beginning in the Mesilla phase, representing a continuum of increasing agricultural dependence and social integration and decreasing mobility (Miller and Kenmotsu 2004:238). The El Paso phase ended sometime after AD 1450, based on a lack of later radiocarbon dates from structures of this phase. Miller and Kenmotsu (2004:258) link the abandonment of the Jornada region by farmers to similar abandonments occurring throughout the southern Southwest in the fifteenth century. Several reasons for this abandonment have been proposed, including drought leading to the failure of an overspecialized farming economy or fallout from the demise of the regional system centered on Páquime in northern Chihuahua. Considering the range of data that were examined and evaluated by Miller and Kenmotsu (2004), their dates are used in this discussion.

Pottery. The beginning of the El Paso phase has often been assumed to coincide with the almost exclusive use of polychromes and the virtual abandonment of plain wares. However, Seaman and Mills (1988a:181) suggest that use of El Paso Brown continued into the early El Paso phase and was not replaced by decorated wares as rapidly as many believe. Thus, one cannot assume that an assemblage containing both El Paso Brown and El Paso Polychrome dates to the late Mesilla or Doña Ana phases, as has often been the case in the past.

El Paso Polychrome sherds, both from decorated and undecorated parts of vessels, usually comprise a very high percentage of El Paso–phase ceramic assemblages. For example, this type makes up 94 percent of the assemblage from La Cabraña Pueblo, 95 percent from Pickup Pueblo, 90 to 95 percent from the Sgt. Doyle site, 95 percent from the Condron Field site, 94.4 percent from the Bradfield site, 83.3 percent from the Alamogordo sites, and 90 percent from Twelve Room House (Bradley 1983; Gerald 1988; Green 1969; Hammack 1961; Lehmer 1948; Moore 1947). Trace amounts of El Paso Brown were found at the McGregor and Sgt. Doyle sites (Brook 1966a; Green 1969). A few textured El Paso Brown sherds were also noted at the Alamogordo sites (Lehmer 1948).

As noted earlier, El Paso Bichrome and early versions of El Paso Polychrome disappeared by the beginning of this phase and were replaced by a late or classic variety of El Paso Polychrome (Miller and Kenmotsu 2004:252–253). Trends in these wares include an increasing elaboration of designs, the addition of secondary design elements, and complex multiple band layouts (Miller and Kenmotsu 2004:253). The neckless and short-necked jars that dominated during the Doña Ana phase were replaced by necked jars with everted rims, and this may have been related to a desire for greater containment security for processing corn (Hard et al. 1994; Seaman and Mills 1988a, 1988b; Miller and Kenmotsu 2004:253). There was a greater uniformity in vessel form and less variety in assemblages from this phase, which may have been related to reduced mobility or a more uniform vessel function (Miller and Kenmotsu 2004:253).

Imported wares from several regions occur in small percentages at sites from this phase; Chupadero Black-on-white is often the most common import. Small amounts of Mimbres Black-on-white occur at a few sites and probably represent an earlier occupation or heirloom pieces (Brook 1966a; Hunter 1988; Lehmer 1948). Other types made in the Mogollon region are Lincoln Black-on-red and Three Rivers Red-on-terracotta. Pottery from the White Mountain and Zuni areas includes St. Johns Polychrome and Heshotauthla Polychrome (Bradley 1983; Brook 1966a; Gerald 1988; Green 1969; Hammack 1961; Hunter 1988; Lehmer 1948). Rio Grande Glaze A wares occasionally occur and include Agua Fria Glaze-on-red and Arenal Glaze Polychrome (Green 1969; Lehmer 1948). Galisteo Black-on-white is also reported from a few sites (Brook 1966a; Green 1969).

Wares imported from northern Mexico include Ramos Polychrome, Ramos Black, Playas Red Incised and Corrugated, Casas Grandes Incised, Carretas Polychrome, Villa Ahumada Polychrome, Madera Black-on-red, Babicora Polychrome, and unidentified brown wares (Bradley 1983; Brook 1967; Foster and Bradley 1984; Green 1969; Hammack 1961; Hunter 1988; Kirkpatrick et al. 1994; Lehmer 1948). Since Wiseman (1981) has identified local copies of Playas Incised produced in the Sierra Blanca region, this type cannot always be assumed to be imported. Salado types include Tucson Polychrome and Gila Polychrome (Bradley 1983; Green 1969; Hammack 1961; Kirkpatrick et al. 1994; Lehmer 1948).

Unidentified smudged wares are sometimes recovered and include a polished brown ware from Pickup Pueblo (Gerald 1988) and corrugated wares from La Cabraña Pueblo, the Sgt. Doyle site, the Condron Field site, the Alamogordo sites, and Twelve Room House (Foster and Bradley 1984; Green 1969; Hammack 1961; Lehmer 1948; Moore 1947). Unidentified black and brown incised wares are reported from the McGregor site (Brook 1966a), and a red punctate ware was found at the Tony Colon I site (Hunter 1988).

Thus, while imported wares usually comprise less than 10 percent of El Paso phase assemblages, they occur at many sites, especially those containing adobe structures. Various types were imported from regions to the north, west, southwest, and south and represent a number of groups including the Rio Grande Pueblos, Zuni, western Mogollon, Salado, and Casas Grandes of northern Mexico.

House forms and feature types. Lehmer (1948:80) claimed that El Paso–phase houses were always adobe-walled surface structures and defined two basic forms: linear roomblocks and rooms grouped around plazas. While his first assertion is not upheld by more recent data, the second has been confirmed. An example of the first basic form is Hot Well Pueblo, which contains 150 to 200 rooms arranged in a number of discrete linear units (Brook 1966b). Plaza arrangements include Indian Tank in the San Andres Mountains, House 2 at Alamogordo Site 1, and Alamogordo Site 2 (Lehmer 1948; Miller and Kenmotsu 2004).

In addition to Hot Well Pueblo and House 2 at Alamogordo Site 1, Hubbard (1992) indicates that Escondida and Indian Tank Pueblos contain more than 100 rooms apiece, and Cottonwood Springs Pueblo has over 200. Of these large villages, only Indian Tank is thought to contain more than one story (Hubbard 1992). Foster (1993:11) notes that pueblos containing 8–10 single-story rooms are more common than these large villages. Smaller villages were usually built as linear roomblocks, though a few L-shaped structures also occur. Roomblocks are usually one or two rooms wide, and multiple roomblocks often occur at the same site. Descriptions are available for several small linear sites and can probably be considered representative. La Cabraña Pueblo contains 9 rooms, 8 in a double-row roomblock with a single large room at the northeast end (Bradley 1983; Foster and Bradley 1984). Pickup Pueblo contains 6 linear rooms (Gerald 1988). A total of 17 rooms in several blocks of one to four rooms occur at the Sgt. Doyle site (Green 1969). Most roomblocks are a single room wide, but one is two rooms wide, and another is L-shaped. The Condron Field site contains 7 rooms in blocks of three and four, each a single room wide (Hammack 1961). Sixteen rooms arranged in a block one to two rooms wide were found at the Bradfield site (Lehmer 1948). House 1 at Alamogordo Site 1 contains 15 rooms in a linear block that is one to two rooms wide, with an isolated block of two rooms (Lehmer 1948). Twelve Room House was built along similar lines, containing 12 rooms in a block that is mostly one to two rooms wide, ranging up to three rooms wide in one area (Moore 1947). Finally, Anapra Pueblo contains 8 linear rooms (Scarborough 1985). Miller and Kenmotsu (2004:242) note that most El Paso–phase roomblocks are oriented along an east–west axis unless they are in riverine settings or are situated along major drainages, in which case they tend to parallel stream orientation. Isolated rooms, similar to those used during the Doña Ana phase, continued to occur during the El Paso phase (Miller and Kenmotsu 2004:244).

Villages probably grew by accretion rather than being built as planned communities. Pueblo walls were usually coursed or puddled adobe; they were commonly set in foundation trenches and often extend below floor levels. Wall heights are impossible to determine, since erosion has usually reduced them to mere stubs. Floors were sometimes slightly sunken, and steps commonly occurred, usually just within the presumed locations of doors. Floors were usually adobe, and interior wall and floor surfaces tended to be plastered. A few examples of multiple plaster layers on floors and walls have been noted, indicating that some structures were refurbished (Brook 1966a; Hammack 1961; Lehmer 1948). Little evidence of roof construction is normally either preserved or described in reports. Fortunately, data concerning roof construction techniques are available from La Cabraña Pueblo (Foster and Bradley 1984). There, roofs consisted of wooden vigas overlain by mesquite and tornillo limb latillas. This framework was covered with layers of grass and reeds, which were coated with a layer of adobe in at least some rooms. Besides the refurbishing of walls and floors, evidence of more extensive remodeling has been found at some sites. Parts of rooms at the Bradfield site and Twelve Room House were partitioned into long narrow bins or rooms (Lehmer 1948; Moore 1947). Remodelings like these could have been done to create secure storage spaces for important objects or supplies, and may be an indication of seasonal residence rather than year-round use. This was almost certainly the case at Twelve Room House, where a cache of ritual objects was discovered in one of the bins/narrow rooms.

Nearly every El Paso–phase village contained at least one room that was much larger than other rooms at the site (Hammack 1961; Marshall 1973). Caches of ritual materials were often placed beneath the floors of these rooms, and these rooms seem to have served a communal function. At Twelve Room House, Moore (1947:99) noted that the largest room did not show much evidence of use. The hearth was not fired to the extent of similar features in other rooms, and the floor was rough and unpolished. However, another room that was remodeled into four compartments was as large as or larger than this chamber before it was subdivided. Thus, the original communal room may have been replaced by a new one and converted to storage chambers for ritual materials.

Postholes and hearths are the most common features in El Paso–phase pueblos. Pits for roof support posts are often, but not always, found inside rooms. Support posts were set into walls in at least one case (Brook 1979:27). Interior hearths were normally plastered and often collared and were usually circular in shape, though rectangular examples occur. Storage pits were often built within rooms, and their walls were sometimes plastered. Other pits with undefined purposes sometimes occur, as do caches. A possible aboveground storage cist was identified in one room at the Sgt. Doyle site (Green 1969).

Few extramural features have been recorded for pueblos because most excavation has concentrated on rooms. Extramural hearths containing fire-cracked rock were noted at the Sgt. Doyle site (Green 1969). Middens have been recorded at several sites, as have trash-filled borrow pits. Extramural storage pits occur at a few villages, and small plazas or work areas have been defined at several sites. An exception to the lack of extramural excavation is Firecracker Pueblo, where dozens of extramural features were found including trash and storage pits, hearths, and several types with undefined functions (Miller and Kenmotsu 2004:244). Perhaps the most interesting features are those associated with water conservation and control. At least nine reservoirs have been recorded for the area, and all were either associated with El Paso–phase villages or contain materials indicative of use during that phase (Bentley 1993; Hubbard 1987; Leach et al. 1993). Hubbard (1992) located a possible canal, which he dated ca. AD 900 to 1000 on the basis of nearby sites. However, this date may be too early, and if this feature is real it was probably built during the El Paso phase.

Some variation has been noted between villages along the Rio Grande and those built away from the river, including differences in size, construction techniques, and degree of refurbishing. Foster and Bradley (1984:199) note that riverine sites tend to lack internal floor features, while nonriverine villages often contain a variety of them. Riverine pueblos usually lack internal support posts and do not exhibit evidence of extensive refurbishing. This may reflect variation in the duration of occupation, with little major refurbishing required at riverine villages because of constant attention to maintenance needs (Foster and Bradley 1984:211). The largest villages tend to occur in nonriverine settings.

While adobe villages are considered the main residences of the El Paso–phase population, short-term habitation or task-specific sites also occur. While most seem to have been open-air camps containing ephemeral shelters at best, there are a few examples of more substantial structures. Batcho et al. (1985:54–55) excavated an El Paso–phase pithouse at the Santa Teresa Airport. This structure was square, measured 2 by 2 m, and was at least 40 cm deep. At least five large extramural pits were probably used for storage. This site was thought to be a fieldhouse. Moore (1996) excavated a multioccupational camp at the Santa Teresa Port-of-Entry with some features that may date to the early El Paso phase, including a shallow pit structure that was similar in size and form to huts built during the Archaic period and Mesilla phase.

Carmichael (1985a, 1985c) excavated numerous pit structures dating to the Pueblo period (Doña Ana and El Paso phases) at Site 37 at Keystone Dam. Between 16 and 23 pit structures were located that were generally small and circular with sloping walls, irregular floors, informal internal hearths, and postholes around their peripheries as well as on floor surfaces. Several structures overlapped, suggesting that multiple occupational episodes were represented. These structures seem to have been unburned ephemeral brush shelters (Miller et al. 1985:182). Extramural features included large and small hearths containing fire-cracked rock. Carmichael (1986b) felt that these remains represented short-term hunting and gathering occupations. However, they could also represent farming structures.

Other researchers also suggest the existence of farming structures or fieldhouses in this region. Hubbard (1992) feels that many ceramic scatters and smaller pueblos may be fieldhouses. During a survey in the southern San Andres Mountains, Browning (1991:31) identified numerous single-room structures represented by upright slab foundations that are thought to have been fieldhouses. These structures are often surrounded by activity areas containing extramural hearths and middens, and are probably contemporaneous with local large El Paso–phase villages.

Ideology and ceremonialism. The ideological and ritual system that originated during the late Mesilla phase became more pronounced and elaborate during this phase. The rock art style depicting masks, human faces, and animal forms continued in use, and the two former elements figured predominantly in the art of the Rio Grande Valley and Tularosa Basin (Schaafsma 1972, 1992). Foster (1993:12) feels that the abundant and complex rock art is evidence for increased ceremonialism. This ritual system was probably much different from that of Archaic period and early Mesilla phase and seemed to have been particularly concerned with farming and rainmaking.

Foster (1993) feels that Jornada society became more complex during the El Paso phase, with greater population concentrations and densities resulting in reorganization. The largest villages were built during this phase and were probably at least partly integrated by ritual societies whose activities were centered on the large communal rooms, which Thompson (1988:61) suggests were focal points for activities related to group needs. Further evidence for the increased importance and elaboration of ritual was found at Hot Well Pueblo. There, analysis of features in one room suggested that it functioned as an astronomical observatory (Brook 1979:38). Another room contained a polychrome wall mural of probable ritual significance (Brook 1975:19).

The discovery of ritual caches and objects of religious importance buried beneath the floors of El Paso–phase houses is further evidence of the religious system. Ritual caches have been documented for several sites and are known anecdotally for others. Thompson (1988:61) notes that ritual caches are usually found beneath the floors of large communal rooms and often contain ornaments, pigments, and ceramic vessels. Brook (1975:19) indicates that there were jewelry caches under the floors of two rooms at Hot Well Pueblo. Hammack (1961) found a cache in the center of the largest room at the Condron Field site, which contained 99 shell beads in a pit covered with a removable adobe plug and filled with sand that was not native to the area. Lehmer (1948) documented a cache from one of the Alamogordo sites that contained five polished turquoise blanks, several olivella shells, and a quartz crystal buried in a small jar under a floor. More extensive caches have also been reported. A subfloor cache at La Cabraña Pueblo contained limonite and kaolin pigments, a large projectile point, three turquoise pendants, and smoothing stones (Bradley 1983:48). Numerous fossils were recovered from the floor of an adjacent room in association with pieces of shaped and unshaped calcite, gypsum crystals, shell beads and pendant, turquoise, pyrite, carved stone shells, a copper ore pendant, a piece of pyrite embedded in a basalt nodule, many olivella shell beads, a fragment of a *Conus* sp. shell, and pieces of kaolin, hematite, malachite, limonite, and copper ore (Bradley 1983:72, 74). There was also a necklace containing an etched fluorite pendant and olivella shell beads, crinoids, turquoise, and sandstone concretions.

Perhaps the most extensive cache was found at Twelve Room House (Moore 1947). Room 2 at that site was partitioned into several bins, one of which contained 3 large jars, 2 "jug form" vessels, 3 El Paso Polychrome bowls with terraced rims, a polished black ware bowl, a small trough metate with yellow ocher stains, 2 round stone balls, a round stone object, 6 pieces of yellow ocher, 2 pieces of travertine, 62 olivella shell beads, 34 shell disk beads, 4 turquoise beads, 15 *Alectrion* sp. beads, 1 tubular shell bead, 1 small charred corncob, a section of hollow reed containing a soft light green material, a basket fragment, and many burned gourds. The shell beads were stored in one or two of the broken jars. The material in the section of reed was similar to a lump of iron potassium found cached in a shallow pit in another room. Hammack (1961) recovered a similar El Paso Polychrome bowl with stepped rim at the Condron Field site.

Several unique or very rare objects of probable religious function have also been found. Lehmer (1948:53) reports seeing several stone and clay animal effigies in private collections from the Alamogordo area, which were reputedly found in El Paso–phase sites. Four stone effigies were found at the Alamogordo sites—three resembled bears and one a mountain sheep (Lehmer 1948). In addition, an elaborate white stone cloud terrace set in a cylindrical base was buried beneath the floor of one room (Lehmer 1948:70). Traces of green, brown, black, and blue paint were all that remained of its decoration. Lehmer (1948) noted that it was similar to another specimen seen in a private collection in Las Cruces.

Thus, an elaboration of the ritual system is visible in the array of objects and materials left behind, usually hidden in caches. They include objects depicting animal forms and cloud terraces, as well as ceramic vessels, especially bowls with cloud terrace rims. Various pigments, numerous species of marine shell, turquoise, and perhaps projectile points also seem to have had ritual significance. These types of objects and caches have not been found in earlier sites and may have assumed a special significance during this phase.

Ties to other regions. There is much evidence for extraregional contact during the El Paso phase, and pottery is one of the best indicators of its areal extent. Though imported types usually comprise only 5–10 percent of ceramic assemblages, they consistently indicate some level of interaction with distant regions. In particular, there was a great deal of interaction with other Mogollon groups in central New Mexico and east central Arizona. Pottery types from the Pueblo area indicate contact with the glaze ware producing region in the central Rio Grande, and the Chupadero Black-on-white producing area in central New Mexico. Considering the rarity of most Pueblo pottery, there may have only been indirect contacts with the far northern parts of the Pueblo area. However, the common occurrence of Chupadero Black-on-white suggests a rather high degree of contact with intermediate groups. Some contact with the Salado peoples to the west and southwest are suggested by finds of Tucson Polychrome and Gila Polychrome, but these types are rarely common. Conversely, the array of Mexican pottery types suggests a considerable amount of contact with northern Chihuahua. Numerous polychromes and textured ceramics were imported from that region and are fairly common at sites of this phase, especially the large adobe-walled villages.

Turquoise is often found at El Paso–phase sites, though much of it may have been mined in the Jornada area. Bentley (1993) suggests that at least some of the turquoise from Hot Well Pueblo was mined in the Jarilla Mountains. Similarly, some of the turquoise at La Cabraña Pueblo was from the Jarillas, though other specimens were from undetermined sources. Turquoise fragments or ornaments are reported from other sites but are not sourced (Brook 1966a; Green 1969; Hammack 1961; Hunter 1988; Kirkpatrick et al. 1994; Lehmer 1948; Moore 1947). Thus, it is difficult to determine whether most of the turquoise from this area was imported or mined locally. Preliminary evidence suggests that both possibilities are likely. Finds of copper bells are reported for the region but are rare (Lehmer 1948).

Marine shell, primarily from the Gulf of California, occurs with regularity in El Paso–phase assemblages and suggests the existence of an extensive exchange network. *Olivella* sp. shells were often processed into beads, but unworked specimens also occur. Fragments of *Glycymeris* sp. shell bracelets have been recovered from many sites, and were probably obtained from the Hohokam. *Conus* sp. shells were often used for tinklers and probably dangled from clothing or jewelry. Other types of shell include a mother-of-pearl pendant from La Cabraña Pueblo and a possible abalone shell fragment from the Tony Colon I site (Foster and Bradley 1984; Hunter 1988). Lehmer (1948) reports beads made from marine worm casings and pendants cut from bivalve shells at the Alamogordo sites. Unfortunately, he does not mention whether the bivalves were marine or freshwater. *Alectrion* sp. beads were found at Twelve Room House (Moore 1947). Finally, Southward (1979) reports freshwater mussel shells in an assemblage from Three Rivers, as well as specimens of *Vermitus* sp. and *Spondylus princeps*. The freshwater mussel at this site was obtained from the Rio Grande (100 km away) or the Rio Pecos (160 km away).

Goods from a large region were moving into the Jornada area during the El Paso phase. While there was a degree of contact with other regions during earlier phases, there appears to have been an intensification of exchange ties with distant areas during this period that is represented by a proliferation in the amounts and types of exotic goods that occur at many sites. In particular, there seems to have been quite a bit of contact with northern Mexico and central New Mexico. While direct contact is possible for these areas, indirect contact is probably responsible for the occurrence of raw and processed marine shells, some turquoise, and pottery from the northern Pueblo region.

Subsistence. Though wild plant foods continued to be consumed in this phase, the variety and amounts of domesticates in addition to evidence for the construction of water- and soil-control systems suggest that cultigens had a vastly increased dietary importance. This is partly suggested by large finds of corn. For example, Scarborough (1985) recovered corn cached in storage pits at Anapra Pueblo, and Brook (1966b:4) notes that a village excavated in 1939 about 64 km north of Hot Well Pueblo yielded 200 bushels of charred corn. The array of cultigens includes corn, beans, and cucurbits. In addition to common beans, tepary and lima beans are reported from a few sites (Bradley 1983; Ford 1977). Cucurbit remains are rare and are often not identified to species. However, Ford (1977) identified warty squash at an El Paso–phase site in the Hueco Bolson, and gourds are mentioned as possible cultigens (Bentley 1993).

Many wild plants continued to be used for food, fuel, building materials, and other purposes. Mesquite and tornillo were probably very important supplements to the diet. Beans, pods, seed coats, and stems from these plants have been recovered from many sites (Bentley 1993; Brook 1966b; Bradley 1983; Ford 1977; Scarborough 1985; Southward 1979). Chenopods and amaranth were also important food sources, and there was some use of grass seeds, though they are not commonly reported. Other wild plants that were consumed include large petal onion, mariola, acorn, at least two species of yucca, spurge, two species of acacia, purslane, buffalo gourd, a member of the pink family, bugseed, Mexican buckeye, and several species of cactus including prickly pear, Turk's cap, cholla, and pitaya (Bentley 1993; Brook 1966b; Bradley 1983; Ford 1977; Kirkpatrick et al. 1994; Southward 1979).

Woody plants were used for fuel and construction. Types of fuel woods reported for El Paso–phase sites include mesquite, saltbush, and oak (Kirkpatrick et al. 1994; Southward 1979). Mesquite and tornillo limbs were used in construction, as were ponderosa pine, juniper, reeds, and grass stems (Bentley 1993; Bradley 1983; Foster et al. 1981; Southward 1979). Some plants may have been used for different purposes. Sand Mormon tea stems were found at Hot Well Pueblo (Bentley 1993) and may have been used as medicine. Hoary pea was found at La Cabraña Pueblo. This plant is used to stupefy fish by the Tarahumara and may have served a similar purpose at La Cabraña (Bradley 1983:109). Fish remains are only reported from this site, but they comprise a large percentage of the faunal assemblage and probably represent an important, but often unrecognized, food source. Over 5,000 fish bones and scales were found in trash deposits, representing members of the catfish, gar, and sucker families.

Many animal species were eaten, though rabbits remained the dominant source of animal protein. This was true even of La Cabraña Pueblo, where large amounts of fish were consumed (Bradley 1983; Foster et al. 1981). It is possible that turkeys were kept in El Paso–phase villages, but direct evidence for this is not good. Turkey bone was recovered at La Cabraña Pueblo, but an overlying historic component also contained turkey remains, suggesting that the turkey bone from prehistoric deposits could have originated in historic levels (Foster and Bradley 1984). Eggshells have been found at some sites and are probably turkey (Brook 1966b; Green 1969). Other mammals used for food include antelope, mule deer, kangaroo rat, white-throated woodrat, and possibly long-tailed weasel (Brook 1966b; Bradley 1983).

Protohistoric Period (AD 1450–1600)

Many assume that the Jornada region was mostly abandoned at the end of the El Paso phase. While few sites from this area are actually assigned a Protohistoric date, Spanish documents show that it was occupied in the sixteenth century, and a reevaluation of dates suggests a continual occupation from the El Paso phase into the Protohistoric period, though residence in adobe-walled villages did not continue past around AD 1450. Upham (1984, 1988) feels that a realignment of subsistence strategies occurred, rather than replacement of the indigenous population. He suggests that the Jornada people adapted to changing environmental conditions by switching to a more generalized settlement and subsistence system. Thus, the Protohistoric economic and settlement systems are thought to have been similar to those of the Archaic or early Formative periods. This is echoed by Carmichael (1986a), who also suggests that the indigenous people reverted to a hunting-gathering adaptation at the end of the El Paso phase, similar to the subsistence system documented in the early Historic period by the Spanish.

While evidence for this transition is visible in the part of the Jornada region around modern El Paso, it is not yet documented for our study area. Thus, we currently do not know whether the residents of the latter also returned to a hunting and gathering lifestyle when they abandoned their villages, continuing to exploit the same region, or if they moved elsewhere, including to the south to join related groups in the El Paso area or north to join Pueblo groups in the Rio Grande Valley or Salinas district. If the former is correct, then by at least the late sixteenth century they had been pushed out of the region and replaced by Athabaskan hunter-gatherers. Whether or not the middle and southern portions of the Jornada del Muerto were used by Piros during the Protohistoric period is also unknown, but possible. Some evidence of possible Piro occupations are suggested at the Mockingbird Gap site in the northern Jornada del Muerto (Weber and Agogino 1997).

Several different peoples occupied south-central New Mexico and adjacent parts of Trans-Pecos Texas and Chihuahua during the Protohistoric period, including the Manso, Suma, Jumano, Jocome, Patarabuye, and various Athabaskan groups. Of these, only the Athabaskans are of interest to this study because none of the others are thought to have lived as far north as the project area. The Manso, considered descendants of the Jornada Mogollon, lived in the area between El Paso and Las Cruces (Baugh and Sechrist 2001; Beckett 1984; Beckett and Corbett 1992). The Patarabuye and Jumanos lived in the La Junta region to the east and south of the Manso. The Mansos were not the only descendants of the Jornada Mogollon in this region. Beckett (1994:163) has suggested that the Jano and Jocome spoke similar dialects of the Sonoran branch of the Uto-Aztecan language family, while the Suma and Jumanos were latecomers to the region and probably spoke languages that were related to one another but not to those of the other groups. Athabaskans considered ancestral to the modern Mescalero Apaches occupied a region between the Mansos on the south and the Piros on the west and northwest (Baugh and Sechrist 2001:36). This area encompassed the Jornada del Muerto, where the Spanish first encountered Athabaskans during Oñate's colonizing expedition in 1598, initially naming them the Apache del Perrillo (Baugh and Sechrist 2001:35). This same group may have later been known as the Sierra Blanca and Faraon Apaches, and eventually became the Mescalero Apaches (Baugh and Sechrist 2001:35–36). The modern Mescalero tribe contains three different groups: the Mescalero, Chiricahua, and Lipan peoples (www.mescaleroapache.com/area/history_and_cul.htm, accessed August 23, 2010). The project area is within the region encompassed by the sacred mountains of the Mescaleros, including Sierra Blanca, the Guadalupes, Three Sisters Mountain, and Oscura Peak.

Seymour (2002:393) places the Apache arrival in the area now occupied by the Fort Bliss military reservation between AD 1450 and 1645. A firmer arrival date cannot yet be defined, and this range, which spans the years between the presumed end of the El Paso phase and the earliest Spanish entry into the region, is the best compromise. Apaches became more prominent in the Tularosa and Hueco basins in the 1650s (Baugh and Sechrist 2001:36), and this may indicate an expansion of their traditional range. Raids against the Spanish and Pueblo Indians intensified after the Pueblo Revolt, as the Spanish hold on the region was weakened. Finally, under pressure from Spanish and Comanches, who were encroaching on the plains by the early to middle 1700s, the Mescaleros were pushed toward the El Paso area (Baugh and Sechrist 2001:36).

Using primarily survey information and a reexamination of suspected sites on Fort Bliss, Baugh and Sechrist (2001:290) concluded that very little evidence for an Apache occupation of that area is indicated and considered their conclusions upheld by Miller's (1996, 2001) survey of radiocarbon dates from the area, which found few dates suggesting occupation during the Protohistoric period. They considered the normal indicators of probable Apache occupation applied in the region—the presence of rock rings, enclosures, and alignments—to be weak evidence, noting that "the association of grouped rock features with Apache activity is an overworked assumption that has a long, deeply ingrained history among archaeologists" (Baugh and Sechrist 2001:273). However, they do note that Protohistoric components often occur on sites that mainly represent occupations by other cultures during earlier periods, and that the Protohistoric components are often discounted as evidence of occupation during that more recent period (Baugh and Sechrist 2002:272).

Seymour (2002), using more detailed information from excavation and material culture analysis, identified a range of probable Protohistoric-period sites in the same region, often displaying distinctive characteristics thought to be diagnostic of different ethnic groups. As Seymour (2002:395) notes, "It was Baugh and Sechrist's (2001:278) conclusion that the Protohistoric period 'appears to be underrepresented on the Fort Bliss reservation.' It is my position that the Protohistoric period is under-recorded in the region owing to the fact that it has not been recognized. This same factor likely accounts for the low frequency of Paleoindian and Early and Middle Archaic sites on the base."

Archaeologically, Seymour (2002; Seymour and Church 2007) identified two complexes at Fort Bliss and elsewhere in south-central New Mexico and western Trans-Pecos Texas that are thought to represent the remains of various Protohistoric and early Historic groups known to have occupied the region. The Canutillo complex is considered a Plains adaptation related to bison hunting, and it is related to several similar complexes in Texas (Seymour and Church 2007:99). This complex probably represents sites occupied by groups such as the Jano, Jocome, Suma, and/or Manso, and its chipped stone assemblage is biface-oriented with a distinct range of projectile points and other tools. The Cerro Rojo complex is representative of the early Apache occupants of the region and exhibits an expedient chipped stone reduction strategy with retouched tools and distinct side-notched and trinotched projectile points. Since the Canutillo complex is unlikely to extend north into the study area, we focus on the Cerro Rojo complex.

Characteristics of the Cerro Rojo complex include rock-ringed huts, tipi rings, structural clearings, lean-tos, and sleeping platforms in rockshelters. A number of pottery types are considered diagnostic of Protohistoric- and early Historic-period occupations throughout the region. They include seven types of Apache wares and several Pueblo wares. The currently defined Apache wares are Soledad Plain, Otero Plain, Llano Plain, Sierra Plain, Cerro Plain, Cornudas Plain, and Rustler Plain (Seymour 2002). Except for Soledad Plain and Cornudas Plain, these types are brown wares, and the latter is thought to be intrusive from further to the northwest. Pueblo wares include Valle Bajo Red-on-brown from the El Paso region, Piro utility wares and Pueblo glaze wares from the Middle Rio Grande, Tewa Polychrome and Ogapoge Polychrome from the northern Rio Grande, and Tabira gray ware from the Salinas District. Most of the Pueblo types are Historic rather than Protohistoric, though some types were also made during the Protohistoric period. Apache summer camps and those occupied by large groups of people were mostly in high-altitude settings in the mountains, while winter camps were in low-altitude settings along rivers and in the foothills (Seymour and Church 2007:100). The latter are thought to account for some of the sites in the Santa Teresa area along the Rio Grande and around playas (Seymour and Church 2002:100).

Historic Period (AD 1598–Present)

While Spanish incursions into New Mexico began in 1539, the Historic period is considered to have begun with the Spanish colonization led by Oñate in 1598. Spanish expeditions occurring between 1539 and the 1580s technically fall into the Protohistoric period, but are discussed in this section to separate the European history of the region from that of the Native American population. Several methods have been used to divide the European occupation into shorter periods of time. One of the most common is to divide this period into politically based subperiods: Spanish Exploration and Colonization (1540–1693), Spanish Colonial (1693–1821), Mexican (1821–1848), and American (1848–present). This is the approach taken in this chapter.

Spanish Exploration and Colonization Period (1540–1693)

Based on information gathered by Cabeza de Vaca and his companions following the Narváez expedition to Florida (Covey 1990), the Spanish Empire became interested in lands north of Mexico in the 1530s. Fray Marcos de Niza was dispatched on a scouting mission into the Southwest in 1539, and a major expedition under Francisco Vázquez de Coronado explored the region between 1540 and 1542. No other contact between New Spain and New Mexico occurred until 1581, when Father Agustín Rodríguez and Captain Francisco Sánchez Chamuscado led an expedition up the Rio Grande (Hammond and Rey 1966). Ostensibly to rescue two priests left by the Rodríguez-Chamuscado expedition, Antonio de Espejo led a party into New Mexico in 1582. Gaspar Castaño de Sosa attempted to illegally found a colony in 1590–1591 but was arrested and returned to Mexico (Simmons 1979). A second attempt at colonization was made by Francisco de Leyva Bonilla and Antonio Gutiérrez de Humaña in 1593, but their party was devastated by conflict with Indians (Hammond and Rey 1966).

Juan de Oñate established the first successful Spanish colony in New Mexico at San Juan Pueblo (Ohkay Owingeh) in 1598. The route Oñate's party traveled to reach New Mexico became El Camino Real de Tierra Adentro and remained the main line of contact between New Mexico and the rest of the world until the Santa Fe Trail was established in 1821. Oñate was replaced as governor in 1607 by Pedro de Peralta, who moved the capital to the new town of Santa Fe around 1610 (Simmons 1979). The first Spanish settlement in southern New Mexico was at El Paso del Norte, now the city of Juárez in Mexico, where the mission of Nuestra Señora del Guadalupe de los Mansos del Paso del Norte was established in 1659 to serve the Manso and Suma Indians (Baugh and Sechrist 2001:38). The settlement that grew up around the mission was El Paso del Norte, which became a *villa* in 1680 (Baugh and Sechrist 2001:38).

During this period, the colony was poorly and sporadically supplied with goods carried up the Camino Real. The missions were supplied by an inefficient caravan system (Ivey 1993; Moorhead 1958; Scholes 1930), while the secular population was mainly supplied by a few independent traders (Hendricks and Mandell 2002). Trade with the Plains Apaches was an important source of income. Slaves, a particularly important commodity, were often bought from the Apaches for resale to the mines of northern Mexico. The Spanish also supplemented this source of slaves by raiding Apache villages during the seventeenth century. This antagonized both the Apaches and their Pueblo trading partners, and caused the former to unleash a series of raids against the Spanish and some Pueblos in the 1660s and 1670s (Forbes 1960). This, in turn, exacerbated Pueblo resentment of the Spanish, contributing to several rebellions that finally culminated in the general revolt of 1680.

A combination of religious intolerance, forced labor, the extortion of tribute, and Apache raids led the Pueblo Indians to revolt in 1680, driving the Spanish from New Mexico (Forbes 1960; Hackett and Shelby 1942; Simmons 1979). The surviving colonists retreated to El Paso del Norte, accompanied by the Pueblo Indians who remained loyal to them. Because El Paso del Norte could not accommodate all the refugees, new villages were founded to house them. Difficult living conditions caused by war, drought, and disease resulted in a population decline that led to the abandonment of several of these villages, until by 1700 only five settlements remained in the area (Baugh and Sechrist 2001:39).

Attempts at reconquest were made by Governors Otermín in 1681 and Cruzate in 1689, but both failed (Ellis 1971). Diego de Vargas eventually negotiated the Spanish return in 1692, exploiting the factionalism that had developed among the Pueblos (Ellis 1971:64; Simmons 1979:186). Vargas returned to Santa Fe in 1693, staging his expedition out of El Paso del Norte, but had to fight several pitched battles with the Pueblos. After displacing the Tanos from Santa Fe and pacifying the other pueblos, Vargas reestablished the New Mexican colony.

Spanish Colonial Period (1693–1821)

Hostilities with the Pueblos continued until around 1700, but by the early years of the eighteenth century the Spanish were again in control of New Mexico. Though failing in its attempt to throw off the Spanish yoke, the Pueblo Revolt caused many significant changes. The system of tribute and forced labor was never reestablished, and the missions were scaled back (Simmons 1979). Much of the earlier New Mexican economic system was abandoned after the reconquest. The dominance of the Church and mission supply caravans eventually ended. The new economic power was the families who prospered by dealing in sheep. By the middle of the eighteenth century a considerable trade developed over the Camino Real between New Mexico and Chihuahua (Athearn 1974), mostly to the benefit of the Chihuahuan merchants. Most trade goods were transported on mule back in annual caravans, carrying raw materials and items produced by cottage industries south and manufactured and luxury goods north. Caravans still followed an irregular schedule, but by the middle of the eighteenth century they operated almost annually (Connor and Skaggs 1977:21).

New Mexico suffered from hostile Indian activity virtually from its founding (Forbes 1960), though certain periods were worse than others. Attacks by Utes and Comanches began as early as 1716, as the Comanches sought to drive the Apaches from the Plains and cut their economic ties to the French in Louisiana (Noyes 1993). Having been pushed off the Plains by 1740, various Apache groups were attempting to establish new territories and support themselves in any way possible. Governor Anza concluded a peace treaty with the Comanches in 1786, which included an alliance against the Apaches (Noyes 1993:80; Thomas 1932:75). Later the same year, Anza broke up an alliance between the Gila Apaches and Navajos, and concluded a peace with the Navajos (Thomas 1932:52). This brought New Mexico into a period of relative peace and improved economic conditions (Frank 1992:95). Unfortunately, unrest in Mexico cut this period of economic prosperity short and interfered with the movement of goods throughout Mexico. The war for independence from Spain began in 1810 and continued until 1821.

Mexican Period (1821–1848)

Under the Treaty of Cordova, Mexico gained its independence in 1821, and New Mexico became part of the Mexican nation. Trade between Missouri and New Mexico began that same year and dominated the New Mexican economy for the next quarter century (Connor and Skaggs 1977). Trade with the United States brought ample inexpensive goods to New Mexico and broke the Chihuahuan monopoly. Trade over the Santa Fe Trail soon expanded to Chihuahua via El Camino Real de Tierra Adentro. Most of the goods carried by the Santa Fe traders were transported south over the Camino Real until trade was interrupted by the Mexican War of 1846–1847. The importance of the Camino Real as a transportation corridor increased during this period, with this link to the United States via the Santa Fe Trail providing a new source of manufactured goods and other imports. The Mexican War resulted in the annexation of New Mexico as well as other western states by the United States. The years immediately following the war were characterized by a growing interest in commerce and a market economy that demanded more dependable means of transportation (Pratt and Snow 1988).

American Period (1848–present)

After the disruption of trade by the Civil War ended, a resurgence of trade over the Santa Fe Trail and the Camino Real actually helped doom them as primary transportation routes. Railroad promoters saw the possibilities of overland routes to the west and began developing their finances (Connor and Skaggs 1977:204). The railroad reached Santa Fe by 1880 (Glover and McCall 1988), effectively bringing commercial use of the Santa Fe Trail to an end. The railroad was extended south to El Paso by 1881, and by 1882 El Paso was connected by rail to Juárez (Myrick 1990). These developments ended use of the Camino Real as a major commercial route. Thus, both trails were superseded by more efficient transportation systems in the late nineteenth century, bringing to a close their dominance as transportation corridors.

The arrival of the railroad significantly altered supply patterns in New Mexico. With this link to the eastern United States, New Mexico entered a period of economic growth and development, especially in the larger urban areas (Pratt and Snow 1988:441). This link began the process of ending New Mexico's position as a frontier territory by better tying it to the national economy. In addition to increasing ease and volume of supply to the region, New Mexico became more accessible to tourists, who soon became an important part of the local economy. With the availability of rapid and inexpensive transport, several industries boomed in New Mexico. Sheep and wool production expanded, and the cattle business began its climb toward becoming the dominant ranching industry. Mining expanded into the early 1900s, with coal becoming an important export. The transformation of the New Mexican economy into its modern form was well under way by the time it became the 47th state in 1912.

A Brief Survey of Archaeological Sites in the Study Area

According to a search of the records conducted by Quaranta and Gibbs (2008), seven archaeological studies were previously conducted in or near the study area, four of which located sites now within the Spaceport America APE (Duran 1986; Marshall 1991; Human Systems Research 1997, unpublished survey data), and three that did not intersect with the study area (Hester 1977; Hilley 1983; Duran 1985). Additional surveys were conducted by Zia for Spaceport America (Gibbs 2008; Lawrence et al. 2010; Quaranta and Gibbs 2008). Table 3.1 provides basic information on these studies obtained from NMCRIS and contains 357 sites (see Appendix 1 in Moore et al. 2010b for details) ranging from the Paleoindian period through the Historic period. Without going into great detail, we can summarize this array of sites and showcase one survey—a sample of the northern Jornada del Muerto reported by Hester (1977)—to provide a partial picture of what types of sites have been recorded in and around the project area.

Of the 319 sites listed in Appendix 1 of Moore et al. (2010b), one is a Historic-period Pueblo village well outside the study area and can be discounted; a second has no information listed for it and can also be discounted. This leaves a total of 317 sites for consideration. Most of the sites in this sample are single component (n = 261; 82.33 percent), while the remaining 56 contain at least 123 different components. Paleoindian use is represented by 4 single-component sites and 13 components on other sites, for a total of 17 components. These include 3 Folsom locales, 4 Plano locales, and 10 locales that were assigned general Paleoindian dates. While the number of Paleoindian components seems low, this is actually a fairly large number for such a comparatively small region. Unfortunately, from survey data alone it is impossible to determine how many actually represent Paleoindian occupations and how many are simply Paleoindian tools that were salvaged and redeposited on later sites.

Archaic occupations are represented by 29 single-component locales and 34 components on other sites, for a total of 63 components. Sites from this long period are much more common than were those of the Paleoindian period, and Archaic components are third most common overall for the project area. Only 2 components were dated to the Early Archaic period, with 12 assigned to the Middle Archaic, 4 to the Early to Middle Archaic, and 21 to the Late Archaic. The 25 remaining components are generally dated to the period.

Formative-period occupations are represented by 76 single component locales and 25 components on other sites, for a total of 101 components. Formative-period components are the most common of those that can be assigned

Table 3.1. Previous cultural resource activities within the general vicinity of the current project area

NMCRIS No.	Year	Performing Agency	Acres	Activity	New	No. of Sites Revisited	Total
636	1983	New Mexico State University (NMSU) Cultural Resource Management Division	469	linear survey	13	0	13
7023	1985	Human Systems Research	57	block and linear survey	4	1	5
26132	1977	University of Texas–San Antonio Department of Anthropology	960	block survey	96	0	96
39797	1991	Cibola Research Consultants	1,601	linear survey	37	3	40
46610	1986	Human Systems Research	0	monitoring	0	9	9
49589	1997	Human Systems Research	4,096	block and linear survey	113	13	126
98713	2006	Human Systems Research	41	unspecified survey	0	3	3
104538	2007	Zia Engineering and Environmental Construction	2,710	block and linear survey	18	25	43
106719	2007	Zia Engineering and Environmental Construction	455	block and linear survey	20	2	22
118255	2010	Zia Engineering and Environmental Construction	88	block survey and monitoring	0	0	0
Total			10,477		301	56	357

dates, and this is the second most common category overall. Eighteen components are assigned to the Mesilla phase, 3 to the Doña Ana phase, 4 to the El Paso phase, and 10 to the general Pueblo period; the remaining 64 are assigned a general Jornada Mogollon affinity.

Definite Protohistoric components are rare; they are represented by only 1 single-component locale and 2 components on other sites. All 3 components are considered representative of Apache occupations. Combining Hispanic and Anglo locales, a total of 69 historic components are represented in the area, consisting of 41 single-component locales and 29 components on other sites. Most of the remaining sites and components could not be assigned to any specific occupational period, and this is overall the most common category. Unknown sites include 108 single-component sites and 16 components on other sites. The 2 remaining components are late Pueblo manifestations (1 single-component site and 1 component on other sites) and are probably outside the area of interest.

The study that will be discussed in somewhat greater detail was a sample survey of land administered by the Bureau of Land Management in the northern Jornada del Muerto (Hester 1977). A total of 96 sites were recorded by this study: a felsite quarry, a petroglyph site, 1 historic cemetery, 2 bead caches, 2 ceramic scatters, 5 hearths lacking associated artifacts, 5 ceramic-period villages, 8 lithic scatters, 33 lithic campsites, and 38 ceramic-period campsites.

Of these sites, the five ceramic-period villages probably deserve the greatest amount of attention because they represent some of the most substantial prehistoric settlements in the area. Three of these villages were damaged by illicit excavation at the time of the survey. One is a large pithouse village on an alluvial fan a few miles west of the San Andres Mountains (Hester 1977:35). This site has suffered considerably from illegal excavations and reportedly contained intact roof beams and human remains. Dating to the late Mesilla and Doña Ana phases, this site probably contains multiple pit structures. A second village, in the Rio Grande Valley, has also suffered damage from illicit excavation. Pithouses are present at this site, which may represent a Mimbres rather than Jornada Mogollon occupation. The third site is a very large Mimbres village along an arroyo draining the San Andres Mountains.

Two possible village sites did not appear to have suffered from illicit excavation at the time of the survey. The first of these is in the middle of the Jornada del Muerto basin. While no evidence of structures was noted at this site, the density of the artifact scatter and the number of features exposed by deflation suggested that houses might be present. This site was thought to date to the Doña Ana phase or later. The second site, which may represent a Mesilla-phase occupation, is on an alluvial fan of the Caballo Mountains. Again, this site was considered to be a village because of the density of associated artifacts, and the presence of structures is suspected. The location of this site on an alluvial fan may also be indicative of a village, since alluvial fans tend to be where the best arable soils occur.

The 33 lithic campsites were categorized as such by the presence of chipped stone artifacts and features and the absence of pottery. These sites were assigned dates ranging from the Paleoindian through Archaic periods and may also contain some Apache components. In contrast, no features were seen at the eight sites categorized as simple lithic scatters. The 38 ceramic campsites were similar to the lithic campsites with the addition of pottery to their assemblages. While some of the larger sites in this category could represent villages, they contained no visible evidence of structures or artifact densities similar to those seen at the five village sites. The two sites categorized as ceramic scatters contained no visible features or chipped stone artifacts. The remaining categories are represented by only a few examples apiece, and except for the historic cemetery, could not be accurately dated.

The results of Hester's (1977) survey provide a microcosm of the types of sites that occur in the region. Most sites appear to be camps, perhaps repeatedly used, dating to the Archaic and Jornada Mogollon periods. However, the presence of several villages in the region, mostly on alluvial fans near the mountains, suggests a settlement pattern similar to the models proposed by Hard (1983b) and Whalen (1994), with cold-season villages near permanent water sources and arable land and warm-season camps situated in basin interiors. Interestingly, both Jornada and Mimbres villages occur in the region, suggesting a frontier situation if those villages are contemporaneous. The two possible villages situated in the basin interior may actually represent prime locations for repeated use through time, rather than villages.

4. *Eligibility and Assessment Sites*

Nancy J. Akins and James L. Moore

The sites discussed in this section all received similar treatment, although during the Section 106 process, some were considered to have undetermined eligibility, and testing at these sites was conducted to evaluate them for potential inclusion in the *National Register* (the "eligibility sites"). Others were determined to be eligible for the *National Register* during the Section 106 process, and testing was used to assess their potential to provide further information on the prehistory of this region (the "assessment sites"). The eligibility sites are LA 111421, LA 112370, LA 112371, and LA 112374; the assessment sites are LA 111420 and LA 111432. Three sites (two assessment and one eligibility) are in the route of the proposed infrastructure corridor: LA 111420, LA 111421, and LA 111432. The three sites in the VLA—LA 112370, LA 112371, and LA 112374—are eligibility sites that have been previously impacted by an unimproved road and could be further affected if that road is widened.

The sites were all recorded at least once and often twice during previous surveys. OAS site boundaries, defined by the current distribution of artifacts, often differ from those defined by Human Systems Research (HSR) and Zia. The HSR survey was conducted in 1995 and 1996 (HSR 1997), and the area has since been modified by the construction of roads, grazing, and maintenance activities. Zia's survey was more recent, but the level of vegetative cover may have differed from what was present during testing. In addition, both surveys collected diagnostic artifacts from site surfaces when they were available. These factors, in addition to the greater amount of time spent at the sites during testing, account for differences in the site boundaries defined during the various studies.

All visible surface artifacts were point-provenienced using a total station. However, in many cases plotting all of those points would have created crowding on site plans, making it difficult to distinguish individual artifact locations. For this reason, artifacts are sometimes grouped into artificial clusters on plans to make them more readable. In these cases, the clusters are given alpha designations. See Appendix 1 for individual artifact coordinates.

LA 111420

LA 111420 is a large artifact scatter to the west of the VLA (Fig. 4.1). It was determined eligible to the *National Register* during Section 106 consultations. The proposed infrastructure corridor (45 m wide) runs through the center of this site. OAS excavations focused on the area within this corridor and a 15 m buffer zone on either side of the corridor (Fig. 4.1). Combined with the buffer zones, this corridor covers about 50 percent of the central part of the site. Testing within the proposed infrastructure corridor and 15 m buffer zone was aimed at assessing whether there are potentially important cultural deposits or features present in that part of the site and whether this site has any potential for further research-oriented studies.

Site Setting

LA 111420 is on a stabilized grassy plain bordering a mesquite dune/blowout area caused by seasonal sheet washing. Limestone nodules and gravels are dispersed throughout the site. Grasslands surround the site, and Jornada Draw is 400 m east of it. East–west and north–south trending fences separate SLO and BLM properties, with most of the site occurring on SLO trust land (Fig. 4.1). All excavations were on SLO trust land; none occurred on BLM land. An abandoned two-track road parallels the fence on the east side and impacts the site along its eastern boundary on SLO trust land and BLM land. Fall vegetation at the site consisted of abundant mesquite, bunchgrass, and occasional yucca and prickly pear cactus.

Previous Work

LA 111420 was first recorded by HSR (FAA and NMSA 2010) as a large, 125 by 120 m (11,755 sq

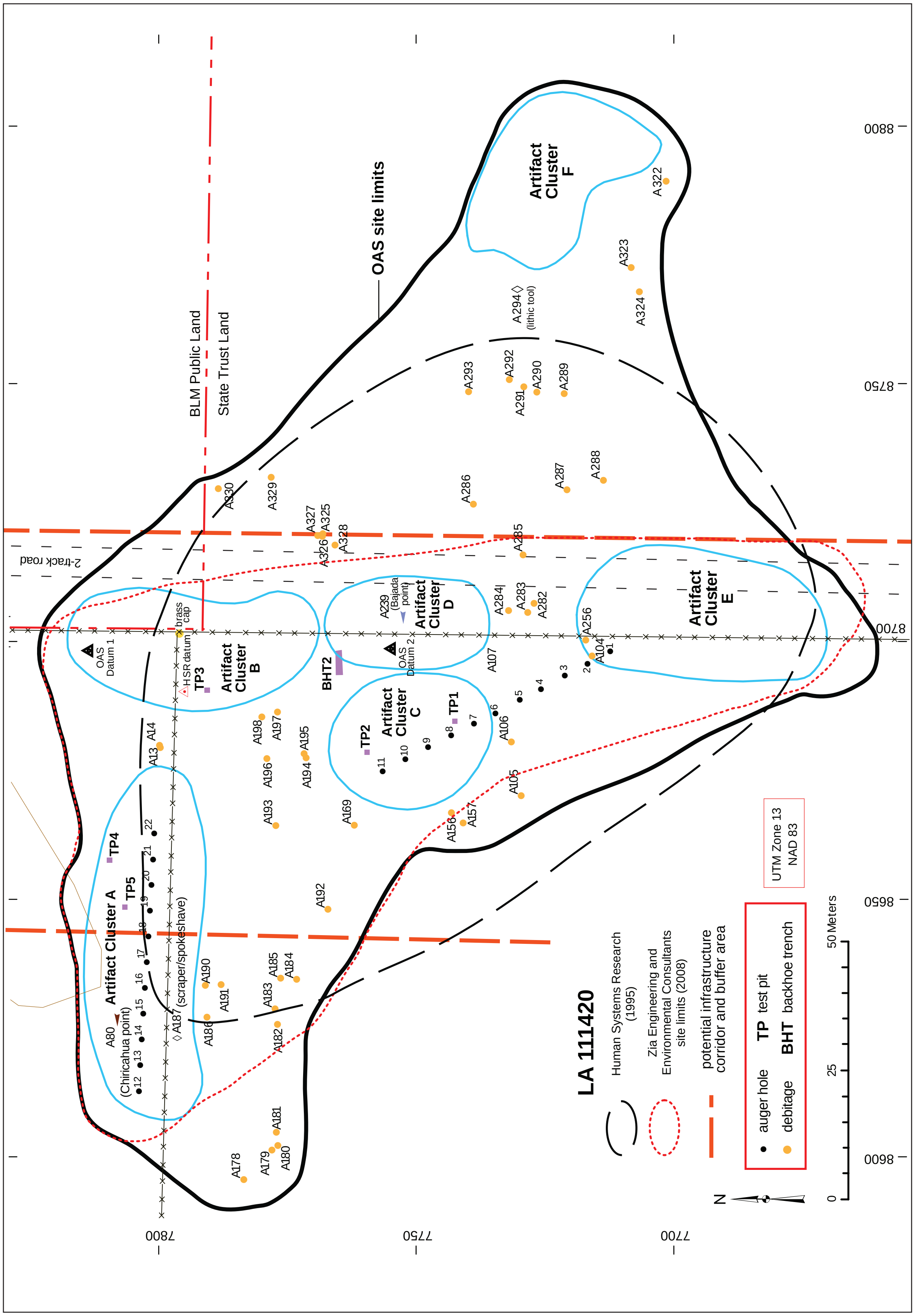

Figure 4.1. LA 111420 site plan, including boundaries proposed by HSR and Zia.

m; 1.18 ha; 2.9 acres), chipped and ground stone artifact scatter, with most of the exposed artifacts occurring in two nonvegetated, partially deflated areas along the fenceline. HSR estimated that 200 artifacts were present on the surface, and a sample of 25 was analyzed. The sample of analyzed artifacts included two biface thinning flakes, a tested cobble or core, a white chert scraper, and a mano fragment of granitic rock that was probably fire-cracked. They suggest the site may have been a short-term special use site (NMSA 2010:28).

Revisiting the site in 2007, Zia archaeologists adjusted the site boundaries considerably (Quaranta and Gibbs 2008), reducing the estimated size to 158 by 105 m (9,071 sq m; 2.24 ha; 0.91 acres). Zia was unable to locate the southeastern portion of the artifact scatter and found that the rest of the scatter was now a disturbed area. They found about 40 artifacts in the disturbed area and analyzed 26, including an Early Archaic Jay-style point and two Early Archaic Bajada-style points, two of which were collected. Other recorded artifacts were flakes (n = 21), a tested cobble, and a tested cobble/chopper. They also observed three cobble manos that are described as small and unmodified but well used, which could be associated with an Archaic component or from nearby LA 111422, a Jornada Mogollon site (Quaranta and Gibbs 2008:194–196).

Neither survey observed any surface features, only an artifact concentration or concentrations (Fig. 4.1). Both studies felt that this site has the potential to contain buried deposits. The only temporally diagnostic materials noted were the Archaic points recorded during the Zia survey.

Test Excavations

Licensed surveyors working for OAS placed two datums at this site, both on the west side of the fence on SLO trust land. Datum 1 (813.31N/697.54E), at the north end of the site, was assigned an arbitrary elevation of 10.0 m below datum (mbd). Datum 2 was placed near the center of the site (754.60N/697.89E).

Also prior to testing, a mechanically excavated geomorphology trench was placed near the center of the site, just west of the north–south fenceline and about 10 m north of Datum 2 (Fig. 4.1). This trench was 6 m long with a maximum width of 1.5 m and depth of 2 m. Upper fill in the trench was 30–40 cm of loose eolian fill overlying a compact clayey red-brown Pleistocene B soil horizon. The latter was ubiquitous throughout the study area and formed the preoccupational substrate at all sites. A cobble-lined stream channel was revealed about 1 m below the ground surface. Fill beneath the channel was silty with a fine texture. Three OSL samples (one Holocene and two Pleistocene) and 17 sediment samples were collected.

Crew members walking transects spaced at about 2 m intervals found 330 surface artifacts that were then field analyzed. These artifacts were distributed throughout the site area, with two main clusters occurring in the northwest and south-central parts of the site, and a smaller one occurring at the far east end of the site (Fig. 4.1). The northwest cluster roughly approximates the location of Artifact Cluster A in Figure 4.1, the south-central cluster is approximated by Artifact Clusters C and D, and the eastern cluster is in about the same location as Artifact Cluster F. Artifacts tend to occur in deflated areas, where pebbles of limestone and chert are common, and are sparse in undeflated areas. A Bajada point (ca. 6000/4800–3200 BC) and a Chiricahua point (ca. 3500–2100 BC) were both collected from the SLO section of site on the west side of the fence.

The artifact distribution indicates that the site measures 163.30 m north–south by 230.16 m east–west for an area of 16,516.47 sq m (1.54 ha; 4.08 acres). This is closer to, though much larger than, the size and shape that were defined by HSR and is considerably larger than the dimensions defined by Zia, with the eastern part of the artifact scatter being restored (Fig. 4.1). As defined by the OAS, LA 111420 is now about 39 percent larger than recorded by HSR and about 55 percent larger than rerecorded by Zia. These discrepancies are common when comparing site sizes defined during survey, when only a limited amount of time is available for defining and recording a site, and those defined in the longer period spent examining a site during testing or data recovery. The latter phases allow a much closer examination of a surface scatter and usually result in the discovery of significantly more artifacts and delineation of a more extensive site area than were originally defined. This occurred repeatedly during the course of this project.

Auger tests. Two auger transects were established, containing a total of 22 auger holes.

One was in the north part of the site and ran roughly parallel to the east–west fenceline, while the other extended from about the center of the site trending southeast toward the fence (Fig. 4.1). Auger holes were placed at 5 m intervals and were excavated to depths of 38–44 cm below modern ground surface (bgs). In the southern auger transect, the upper 6–12 cm was a loose eolian fill overlying the compact Pleistocene B soil horizon, and caliche flecks were commonly encountered in the latter at 32 to 40 cm bgs. The eolian fill was slightly thicker in the north at 10–20 cm, with caliche flecks appearing between 20 and 30 cm bgs. Two chipped stone artifacts were recovered from auger tests, including a chert core flake found between 10 and 20 cm deep in Auger Hole (AU) 8 and a piece of metaquartzite angular debris in the upper 12 cm of AU 9. Both of these auger tests were in the southern artifact cluster.

Hand-excavated units. Five hand-excavated (1 by 1 m) units were completed at this site. Two were in and just north of the south artifact cluster, two were in the north artifact cluster, and the last was between the clusters but farther to the east (Fig. 4.1). Descriptions of the excavated artifacts can be found in Appendix 1. Figure 4.2 shows a representative profile of the sediments encountered at this site.

Test Pit 1 (742N/684E, 10.36–10.66 mbd) is the farthest south of the test pits and is in the center of the south-central artifact cluster. No artifacts were present on the surface, which was nearly half covered by bunchgrass. The upper 2–6 cm of fill was loose eolian and alluvial silt containing very sparse gravels. Insect bioturbation was present throughout this and the underlying stratum. This loose fill overlies the Pleistocene B soil horizon, an increasingly compact clayey sand containing some caliche flecks that increase with depth. A thin gravel lens was exposed at the bottom of the pit. Chipped stone artifacts were recovered in Level 1 (n = 7) and Level 2 (n = 2).

Test Pit 2 was at the north edge of the south artifact cluster (759N/678E, 10.16–10.36 mbd). Two 10 cm levels were excavated. Fill was similar to that encountered in Test Pit 1, consisting of 4–6 cm of loose eolian and alluvial silt overlying the compact Pleistocene B soil horizon. Two chipped stone artifacts were recovered from the upper 2–3 cm of fill.

Figure 4.2. The north wall of Test Pit 1, LA 111420.

Test Pit 3 (790N/690E, 9.91–10.21 mbd) was in the north central part of the site. Three levels were excavated. The surface was partly covered by bunchgrass (about 30 percent) and a little gravel. The upper 4–10 cm of fill consisted of loose eolian silt containing a few pieces of gravel. As in the more southerly test pits, these sediments overlay an increasingly compact Pleistocene B soil horizon. Caliche flecks were encountered at the base of the pit. A single chipped stone artifact was recovered in Level 2 (10.01–10.11 mbd).

Test Pit 4 (809N/657E, 9.92–10.22 mbd) was the farthest north of the test pits. Three levels were excavated in the north half of the pit and two in the south half. The upper fill consisted of 10–12 cm of loose eolian silt covered by bunchgrass and containing no gravel. This overlay an increasingly compact Pleistocene B soil horizon that became slightly lighter colored with depth. No artifacts were recovered from this test pit.

Test Pit 5 (806N/648E, 10.11–10.31 mbd) was in a deflated area that was partly covered by bunchgrass. Two levels of fill were removed. The upper 2–4 cm of fill consisted of wind-deposited silty sand that overlay the compact Pleistocene B soil horizon. Two chipped stone artifacts were recovered from the surface of this test pit.

Artifact Assemblage

A total of 330 artifacts were field analyzed at LA 111420, and 16 were recovered during excavation (see Appendix 1 for artifact data). Two of the field-analyzed artifacts were also collected for laboratory analysis, providing a sample of 346 artifacts from this site. Of these, 344 specimens are chipped stone, and 2 are ground stone. The ground stone artifacts are fragments of one-hand manos, with one specimen each of sandstone and metaquartzite. Table 4.1 shows the distribution of artifact morphology by material type for the field-analyzed and fully analyzed artifacts. This assemblage is dominated by metaquartzite, which comprises 55.81 percent of the total. Chert is the second most common material type, making up 31.98 percent. Among the latter is a single specimen that appears to be Alibates chert, or more properly, Alibates silicified dolomite from the Texas Panhandle. LA 111420 is one of the few sites that yielded any obsidian, in this case a single specimen from the Polvadera, or El Rechuelos, source in the Jemez Mountains.

This assemblage is dominated by core flakes, with angular debris and biface flakes comprising much smaller percentages of the total. This provides a flake to angular debris ratio of 7.20:1, which is moderately high and indicative of a focus on efficient, or curated, reduction. This is partly supported by the presence of a middle-stage biface fragment that exhibits a lateral snap, a type of break that is indicative of manufacturing breakage. The presence of at least eight biface flakes, mostly metaquartzite, also partly supports this possibility. The presence of very few cores in this assemblage suggests that cores were transported away from this location when it was abandoned, or that most flakes were struck from bifaces and few cores were ever present at this site.

Of the four bifaces in this assemblage, the two late-stage bifaces are projectile point fragments, while the two middle-stage bifaces are distal fragments of broken tools. As noted above, one of the latter was broken in manufacture, while the other exhibits an indeterminate type of break. The projectile points include a Chiricahua point and a Bajada point, both of which are indicative of an Early to Middle Archaic occupation (6000/4800–2100 BC). Other tools identified in this assemblage include a chert end scraper, a metaquartzite scraper-spokeshave, and two utilized chert core flakes. Evidence of thermal alteration occurs on 10 pieces of chert, including the Alibates specimen. Nine of these specimens are pieces of unutilized debitage, while the tenth is the Chiricahua point.

Summary and Recommendations

Archaeological testing indicated that LA 111420 has considerable data potential. Projectile point styles identified by previous survey and current OAS testing suggest occupation in the Early Archaic period. Associated artifacts occur on a secondary geologic horizon but represent a discrete deposit likely to yield information on site structure and local subsistence strategies in the Jornada del Muerto during the Early to Middle Archaic period. The structure of the artifact assemblage suggests that LA 111420 served as a short-term base camp, perhaps occupied on a single occasion during the late Gardner Springs or

Table 4.1. Material type by artifact morphology for all chipped stone artifacts that were field analyzed or collected, LA 111420

Material Type		Angular Debris	Core Flake	Biface Flake	Tested Cobble	Unidirectional Core	Early-Stage Uniface	Middle-Stage Biface	Late-Stage Biface	Total
In-Field Analysis of Surface Artifacts										
Chert	Count	18	72	3	1	1	1	–	–	96
	Row %	18.8%	75.0%	3.1%	1.0%	1.0%	1.0%	–	–	29.4%
Alibates chert	Count	–	1	–	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	–	0.3%
San Andres chert	Count	–	1	–	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	–	0.3%
Silicified wood	Count	–	3	–	–	–	–	–	–	3
	Row %	–	100.0%	–	–	–	–	–	–	0.9%
Polvadera Peak obsidian	Count	–	1	–	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	–	0.3%
Basalt	Count	1	–	–	–	–	–	–	–	1
	Row %	100.0%	–	–	–	–	–	–	–	0.3%
Rhyolite	Count	4	29	–	–	–	–	1	–	34
	Row %	11.8%	85.3%	–	–	–	–	2.9%	–	10.4%
Limestone	Count	–	1	–	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	–	0.3%
Metamorphic, undifferentiated	Count	1	3	–	–	–	–	–	–	4
	Row %	25.0%	75.0%	–	–	–	–	–	–	1.2%
Metaquartzite	Count	11	165	5	–	–	1	1	–	183
	Row %	6.0%	90.2%	2.7%	–	–	0.6%	0.6%	–	56.1%
Quartz	Count	–	1	–	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	–	0.3%
Total	Count	35	277	8	1	1	2	2	–	326
	Row %	10.7%	85.0%	2.5%	0.3%	0.3%	0.6%	0.6%	–	100.0%
Full Analysis of Excavated Artifacts										
Chert	Count	4	4	–	–	–	–	–	1	9
	Row %	44.4%	44.4%	–	–	–	–	–	11.1%	50.0%
Metaquartzite	Count	2	6	–	–	–	–	–	1	9
	Row %	22.2%	66.7%	–	–	–	–	–	11.1%	50.0%
Total	Count	6	10	–	–	–	–	–	2	18
	Row %	33.3%	55.6%	–	–	–	–	–	11.1%	100.0%
Table total	Count	41	287	8	1	1	2	2	2	344
	Row %	11.9%	83.4%	2.3%	0.3%	0.3%	0.6%	0.6%	0.6%	100.0%

early Keystone phase. Like most sites from these phases, LA 111420 is fairly small and suggestive of short-term use (MacNeish and Beckett 1987).

No further work is planned for this site at the present time. Data collected at the site during testing will, however, contribute to addressing the research questions posed in the plan for investigating Spaceport America's cultural landscape (Moore et al. 2010b). If LA 111420 will be impacted by construction along the proposed infrastructure corridor, a strategy for additional investigation and monitoring consistent with the mitigation plan (FAA and NMSA 2010) should be prepared for work within that corridor.

LA 111421

A prehistoric lithic artifact scatter, LA 111421 (Fig. 4.3), is northwest of the VLA. This site's eligibility to the *National Register* was undetermined during the Section 106 process. The proposed infrastructure corridor (45 m wide) runs through the west half of the site and, with a 15 m buffer to each side of it included, this corridor covers the western 80 percent of the site. This site is immediately south of LA 111420 and is bisected by a north–south trending fence. Formal testing was aimed at assessing whether LA 111421 is eligible for inclusion in the *National Register*. Previous studies during survey found few artifacts and no temporally diagnostic materials at this site.

Site Setting

LA 111421 is situated on near-level ground with a slight slope to the southeast. The site is covered by low mesquite stabilized dunes within an area of naturally occurring gravels surrounded by wide areas of grassland. Jornada Draw lies 400 m to the east. Vegetation cover is moderate to sparse and consists of bunchgrass with mesquite, prickly pear, cholla, ephedra, and snakeweed.

Previous Work

HSR originally documented this site in 1995 (FAA and NMSA 2010), describing it as a moderate-sized (90 by 55 m; 3,888 sq m; 0.39 ha; 0.96 acres) flaked and ground stone scatter lacking temporally diagnostic artifacts. They estimated that 50 lithic artifacts could be present on the surface and observed two biface fragments, debitage, a core, and a one-hand mano. The flakes were generally large and complete. Few had cortex, and three exhibited evidence of retouch or use-wear. Most of the artifacts occurred along the fence where a cattle trail had broken up the topsoil. No features were associated with this scatter, and the tools and utilized debitage and mano suggested use as a short-term processing site (FAA and NMSA 2010:29–30).

Zia archaeologists revisited the site in 2007 and described it as a medium-sized temporally unknown artifact scatter (Quaranta and Gibbs 2008). They slightly reduced the overall size of the site, estimating that it measured 107 by 46 m (3,787 sq m; 0.38 ha; 0.94 acres). An estimated 40 surface artifacts were noted, including a complete early-stage biface, a late-stage biface tip, a piece of angular debris, 15 flakes, a core, and 2 metate fragments. At least one piece of debitage was identified as a biface thinning flake, and another flake exhibited unidirectional utilization. Zia archaeologists proposed that the evidence for bifacial technology as well as limited evidence for heat treating indicated tool production and a hunting focus for this site. Based on these observations they suggested the presence of an Archaic component. They further speculated that grass, mesquite beans, or cholla seeds could have been gathered near the site (FAA and NMSA 2010:30; Quaranta and Gibbs 2008:200–205).

Test Excavations

Licensed surveyors working for OAS placed two datums at this site, both on the west side of the fence. Datum 1 (628.63N/693.88E), at the north end of the site, was assigned an arbitrary elevation of 10.0 mbd. Datum 2 was placed near the south end of the site (545.96N/963.50E).

Also, prior to initiation of testing, a mechanically excavated geomorphology trench was dug at the north edge of the site, just east of the north–south fenceline and about 20 m north of Datum 1 (Fig. 4.3). This trench was 5 m long, with a maximum width of 1.7 m and depth of 2 m. Because the trench was placed in a deflated area, there was very little loose eolian fill at the top of the profile. This overlay a blocky, compact red-brown clayey Pleistocene B soil horizon.

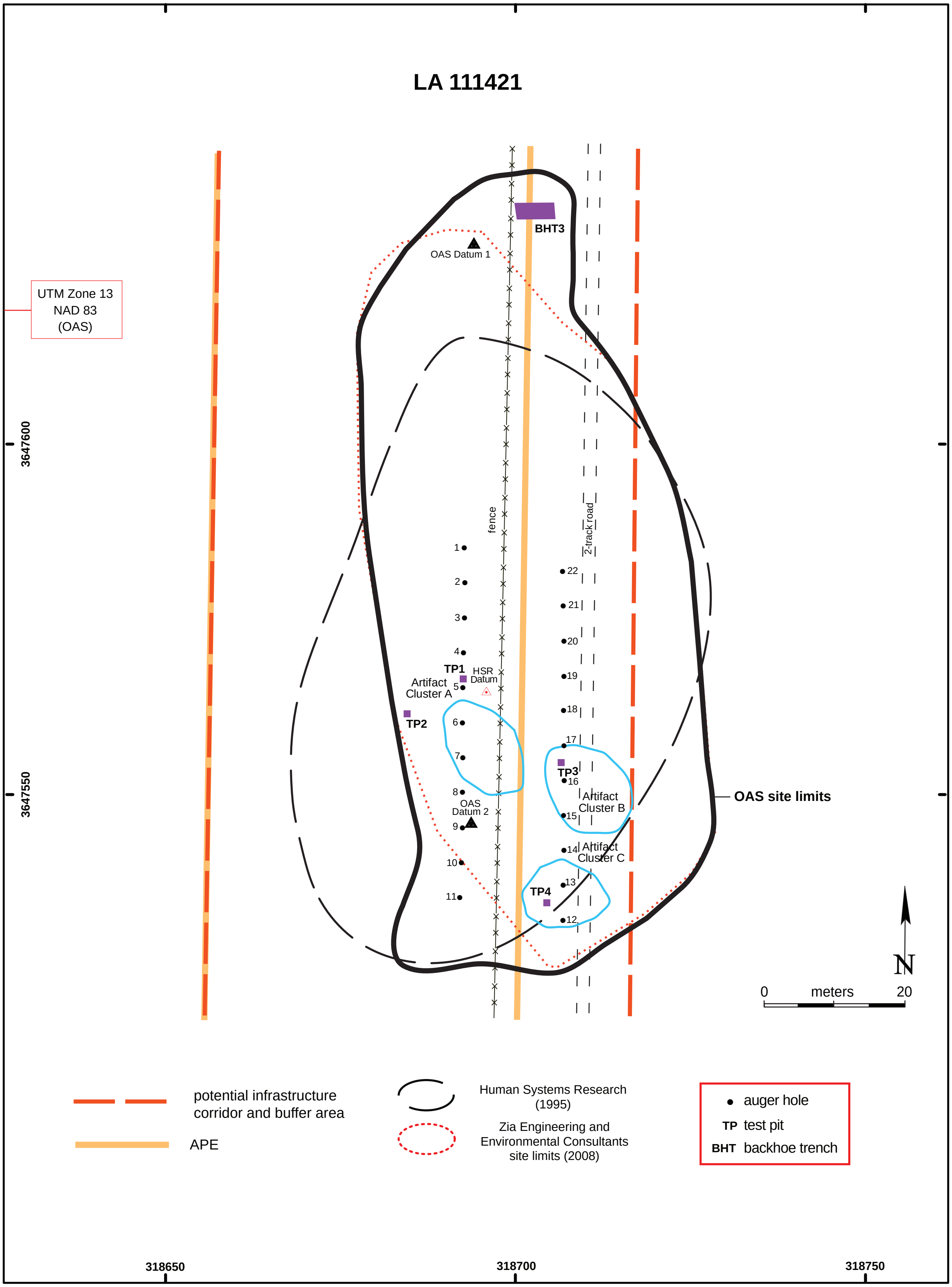

Figure 4.3. LA 111421 site plan, including boundaries proposed by HSR and Zia.

Sediments became finer textured at about 1.5 m below ground surface. At the base of the trench, a layer of river cobbles was encountered that suggests the presence of an old stream channel. An OSL sample was taken from the Pleistocene B soil horizon, and 17 sediment samples were collected.

Crew members walking transects spaced about 2 m apart located 58 surface artifacts that were subsequently field analyzed. These occur mainly in eroded areas, and most are in the southern half of the site. The artifact distribution indicates that the site measures 114.11 m north–south and 45.58 m east–west for an area of 4,289 sq m (1.06 acres; 0.43 ha). This is close to, though somewhat larger than, the dimensions defined by both HSR and Zia (Fig. 4.3). As defined by the OAS, LA 111421 is now about 9 percent larger than it was when originally recorded by HSR and about 12 percent larger than it was when rerecorded by Zia. These are not great differences and are attributable to the different archaeological crews encountering variations in surface artifact frequency and distribution.

Auger tests. Auger transects containing a total of 22 auger tests were placed on either side of the fence (Fig. 4.3). Auger tests were excavated at 5 m intervals in the transects. Tests in the western transect were excavated to depths between 51 and 85 cm bgs. Loose surface sediments ranged from absent in deflated areas to about 12 cm thick in undeflated areas. Caliche flecks were encountered at around 40 cm bgs in the northern tests and were deeper (about 58 cm bgs) in the southern tests. The eastern auger tests were excavated to depths between 48 and 54 cm bgs. Loose surface sediments were generally absent in these tests but ranged from 6 to 12 cm thick where grass-stabilized sediments or dunes occurred. Caliche flecks were encountered at about 44 cm bgs in the north part of this transect and 49 cm bgs in the south. In both transects, the upper caliche flecks were about 10 cm deeper in auger tests between 550N and 565N. No artifacts were recovered from the auger tests.

Hand-excavated units. Four test pits were completed, all in the southern half of the site. Two were placed west of the fence, and two were east of the fence. Descriptions of the excavated artifacts can be found in Appendix 1.

Test Pit 1 (566N/692E, 10.21–10.41 mbd) was placed in a shallow dune- and grass-stabilized area. Fill was removed in three levels. The upper fill was a loose eolian silt and sand with interbedded lenses of water-pooled sediments. This layer ranged from 2 cm thick in the more deflated areas up to 10 cm thick where it was stabilized by grass. The lower fill was a fairly compact Pleistocene B soil horizon consisting of a silty but plastic clay. Gravel inclusions decreased with depth, and evidence of insect bioturbation was present throughout. No caliche was observed in the pit, and two chipped stone artifacts (chert flake and chert angular debris) and a small piece of a possible ground stone tool were recovered from the uppermost level of fill.

Test Pit 2 (561N/684E, 10.21–10.41 mbd) was the westernmost of the test pits. Fill was removed in three levels. The upper fill consisted of up to 4 cm of fine eolian sand, somewhat stabilized by grass, overlying the compact Pleistocene B soil horizon. No caliche was noted in this test pit, nor were any artifacts recovered from it.

Test Pit 3 (554N/706E, 10.22–10.52 mbd) was placed in a fairly deflated area containing little surface gravel. Fill was removed in three levels, revealing a slightly more complex stratigraphy than was seen in the other test pits at this site (Fig. 4.4). The upper fill consisted of a loose silty sand that contained little gravel and ranged from 6 to 15 cm thick where grass had stabilized the soil. Beneath this was a thin (2–4 cm), almost level layer of alternating alluvial and eolian lenses, possibly representing an old ground surface. This overlies the more compact Pleistocene B soil horizon. Two chipped stone artifacts—a chert core flake and a chert biface fragment—were recovered from the second level of fill.

Test Pit 4 (534N/704E, 10.31–10.51 mbd), the farthest south of the test pits, was excavated in three levels. The surface layer consisted of loose eolian sediments containing some water-pooled clay lenses and a few pieces of gravel. Three distinct strata were observed in this test pit. The upper fill consisted of 2–6 cm of loose eolian silty sand containing little gravel. Beneath this was 8–10 cm of slightly more compact sediments with a greater clay content that was more similar to the upper fill than it was to the compact Pleistocene B soil horizon. A single metaquartzite core flake was recovered from the first level of fill.

Figure 4.4. Test Pit 3, LA 111421.

Artifact Assemblage

A total of 58 artifacts were field analyzed at LA 111421 (see Appendix 1 for artifact data), and 6 (5 chipped stone and 1 ground stone) were recovered from excavation and analyzed in the laboratory, providing a sample of 64 artifacts. Table 4.2 shows the distribution of artifact morphology by material type for the chipped stone artifacts. This assemblage is dominated by metaquartzite, which comprises 50.79 percent of the total. Chert is the second most common material type, making up 34.92 percent of the assemblage. This assemblage is dominated by core flakes, with angular debris and biface flakes comprising much smaller percentages. The high flake to angular debris ratio of 10.2:1 is indicative of a focus on efficient, or curated, reduction. This is partly supported by the presence of a middle-stage siltstone biface that was abandoned because a plateau developed on one surface and could not be removed, and was therefore rejected during manufacture. The presence of at least two biface flakes, both metaquartzite, also partly supports this possibility. The occurrence of very few cores in this assemblage suggests that cores were transported away from this location when it was abandoned or that most flakes were struck from bifaces and few cores were ever present at this site.

Of the four bifaces in this assemblage, the two late-stage bifaces include the distal end of a large projectile point and a large projectile point preform. The early-stage chert biface is whole but was never finished. As noted above, the middle-stage biface was discarded during manufacture. The style represented by the projectile point fragment could not be identified. The shape of the large projectile point preform, on the other hand, is reminiscent of a Bajada point (ca. 6000/4800–3200 BC), suggesting that it represents the failed manufacture of an Early Archaic style of point. The only other tool identified in this assemblage was a chert end/side scraper with early-stage uniface morphology. Evidence of thermal alteration was noted on three pieces of chert debitage. The single piece of ground stone was a small fragment of an indeterminate type of tool.

Table 4.2. Material type by artifact morphology for all chipped stone artifacts that were field analyzed or collected, LA 111421

Material Type		Angular Debris	Core Flake	Biface Flake	Tested Cobble	Unidirectional Core	Early-Stage Uniface	Early-Stage Biface	Middle-Stage Biface	Late-Stage Biface	Total
						In-Field Analysis of Surface Artifacts					
Chert	Count	1	13	–	–	–	1	–	–	1	16
	Row %	6.3%	81.3%	–	–	–	6.3%	–	–	6.3%	27.6%
Silicified wood	Count	1	1	–	–	–	–	–	–	–	2
	Row %	50.0%	50.0%	–	–	–	–	–	–	–	3.4%
Rhyolite	Count	–	5	–	–	–	–	–	–	–	5
	Row %	–	100.0%	–	–	–	–	–	–	–	8.6%
Siltstone	Count	1	1	–	–	–	–	–	1	–	3
	Row %	33.3%	33.3%	–	–	–	–	–	33.3%	–	5.2%
Metaquartzite	Count	1	25	2	1	1	–	–	–	1	31
	Row %	3.2%	80.7%	6.5%	3.2%	3.2%	–	–	–	3.2%	53.4%
Orthoquartzite	Count	–	1	–	–	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	–	–	1.7%
Total	Count	4	46	2	1	1	1	–	1	2	58
	Row %	6.9%	79.3%	3.4%	1.7%	1.7%	1.7%	–	1.7%	3.4%	100.0%
						Full Analysis of Excavated Artifacts					
Chert	Count	1	2	–	–	–	–	1	–	–	4
	Row %	25.0%	50.0%	–	–	–	–	25.0%	–	–	80.0%
Metaquartzite	Count	–	1	–	–	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	–	–	20.0%
Total	Count	1	3	–	–	–	–	1	–	–	5
	Row %	20.0%	60.0%	–	–	–	–	20.0%	–	–	100.0%
Table total	Count	5	49	2	1	1	1	1	1	2	63
	Row %	7.9%	77.8%	3.2%	1.6%	1.6%	1.6%	1.6%	1.6%	3.2%	100.0%

Summary and Recommendations

Archaeological testing indicated that LA 111421 is at best a limited-activity locus that has limited data potential. No further work is planned for this site at this time, and the OAS recommends that the site be determined not eligible for inclusion in the *National Register*. Data collected at the site during testing will, however, aid in addressing the research questions posed in the plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010).

This site may represent a short-term base camp for a group engaged in hunting-gathering activities, but no absolute date can be assigned due to a lack of temporally sensitive materials and artifacts. However, the presence of a preform that may represent the manufacture of a Bajada point could suggest an Early Archaic occupation, and certain assemblage resemblances to that of LA 111420 (see Chapter 6) may support this possibility. If this interpretation is correct, then LA 111421 may have been occupied during the Early Archaic Gardner Springs phase and represents a transitory use of this location that was less intense than the occupation of LA 111420. Again, small site size is characteristic of the Gardner Springs phase (MacNeish and Beckett 1987), and LA 111421 certainly falls into this size category.

LA 111432

LA 111432 is a large prehistoric artifact scatter (Fig. 4.5) that was previously determined to be eligible for inclusion on the *National Register* during Section 106 consultations. It is northwest of the VLA within the proposed infrastructure corridor (45 m wide). The corridor runs through the west half of the site and, with a 15 m buffer to either side of it, covers 35–40 percent of the site. Testing at LA 111432 was aimed at determining whether there are potentially important cultural deposits or features within the proposed infrastructure corridor and the 15 m buffer zones, and whether this site has any potential for further research-oriented studies. A fenceline divides the site into a western third and an eastern two-thirds. The portion of LA 111421 on the west side of the fence is SLO trust land, while the area to the east of the fence is administered by the BLM. All hand and mechanical excavations were conducted on the SLO trust land portion of the site.

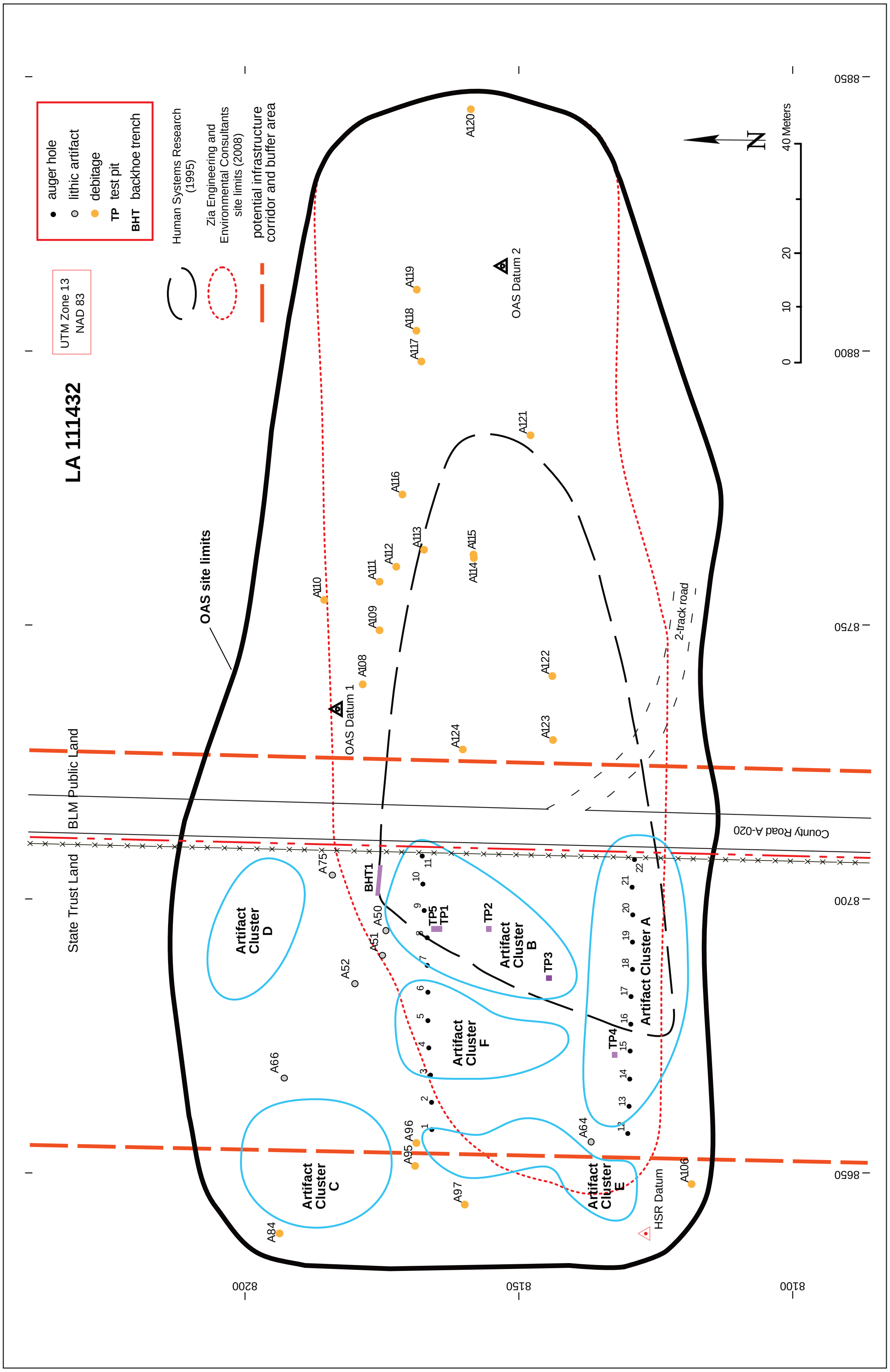

Figure 4.5. LA 111432 site plan, including boundaries proposed by HSR and Zia.

Site Setting

This site is situated on a flat plain covered with burro grass, fairly dense mesquite, creosote, snakeweed, and grama grass interspersed with occasional yucca and cholla. Jornada Draw lies 500 m to the east. The site is cut by County Road A020, which parallels the east side of the fence separating SLO trust land from BLM public land. A bar ditch (6 by 15 m) extends east from the road in the southern part of the site.

Previous Work

In 1995 HSR archaeologists recorded LA 111432 as a single-component chipped stone scatter (FAA and NMSA 2010). Occupation during the late Paleoindian period was suggested by an Eden-like projectile point base found at the site. HSR estimated that LA 111432 covered an area of 110 m east–west by 50 m north–south (4,320 sq m; 0.43 ha; 1.70 acres). About 50 artifacts were estimated to be present on the site surface, 25 of which were analyzed. Materials in their sample were of high quality. The recorded artifacts included a unifacial scraper, an expedient core, and a biface with grinding on one side. The site was interpreted as a possible Paleoindian hunting or kill/processing site due to the high quality of materials and the presence of nonlocal raw material (FAA and NMSA 2010:35–36).

Returning to the site in 2007, Zia archaeologists enlarged it by moving the eastern boundary 70 m farther to the east (Quaranta and Gibbs 2008). This resulted in a site area measuring 64 by 200 m (10,555 sq m; 1.06 ha; 2.61 acres). They observed fewer artifacts and analyzed a sample of 18 pieces of debitage, including 5 pieces of angular debris and 13 flakes. The flakes were thin with little dorsal cortex, suggesting they resulted from tool refurbishing or from detaching blanks for use. No tools, ground stone artifacts, or features were identified (Quaranta and Gibbs 2008:212–213).

Test Excavations

Licensed surveyors working for OAS placed two datums at this site, both east of the fence on BLM land. Datum 1 (183.35N/734.43E), at the north end of the site, was assigned an arbitrary elevation of 10.0 mbd. Datum 2 was placed at the far east end and closer to the south boundary of the site (153.21N/815.30E).

Prior to testing, a mechanically excavated geomorphology trench was placed near the center of the site, just west of the north–south fenceline (Fig. 4.5). The trench was approximately 6 m long, with a maximum width of 1.4 m and a depth of 2 m. Fill in this trench was mainly the compact clayey red-brown Pleistocene B soil horizon. The soil texture gradually changed from blocky to smooth, with some caliche flecks occurring near the bottom of the trench. A single OSL sample was taken from the Pleistocene B soil horizon, and 17 sediment samples were collected.

Crew members walking transects spaced about 2 m apart located all visible surface artifacts (n = 76) within the proposed utility corridor west of the fence. These materials were then inadvertently collected because of an error in reading the testing plan. Surface artifacts outside the corridor were field analyzed (n = 45). The artifact distribution indicates that the site measures 100.20 m north–south by 214.66 m east–west for an area of 17,502 sq m (4.33 acres; 1.75 ha). This is considerably larger than the size and shape defined by both HSR and Zia (Fig. 4.5). As defined by OAS, LA 111432 is now about 75 percent larger than it was when originally recorded by HSR, and about 40 percent larger than when it was rerecorded by Zia. As discussed earlier, these discrepancies are easily explained by the varying amounts of time spent in recording a site during survey versus testing.

Auger tests. Two auger transects containing a total of 22 auger tests ran perpendicular to the fenceline and on its west side on SLO trust land at the center and near the southern site boundary (Fig. 4.5). The fill encountered in these tests consisted of the Pleistocene B soil horizon, with caliche flecks generally being encountered between 30 and 40 cm bgs in the southern transect and at 45–55 cm bgs in the northern transect. Gravel mixed with caliche was encountered at the base of AU 12 at the west end of the southern transect. No artifacts were recovered from the auger tests.

Hand-excavated units. Five test pits were placed in the southern portion of the site. All were within artifact clusters, and all were on the west side of the fence on SLO trust land. Descriptions of excavated artifacts can be found in Appendix

1. Figure 4.6 shows a representative profile of the sediments encountered at this site.

Test Pit 1 (163N/694E, 10.26–10.56 mbd) was excavated in three levels. The upper soil layer was loose clayey sand covered by bunchgrass and permeated by grass roots. Gravel was sparse, but large and rounded. This stratum overlay an increasingly compact Pleistocene B soil horizon containing few roots or gravels. Caliche flecks were observed at the base of the test pit. Six chipped stone artifacts were found in the upper 5 cm of fill (one chert core flake, one chert angular debris, two metaquartzite core flakes, and two metaquartzite angular debris). Test Pit 5 (164N/694E, 10.25–10.35 mbd) was placed adjacent to the north edge of Test Pit 1 because of the number of artifacts recovered from the first grid unit. A single level was excavated, and the fill encountered was similar to that seen in Test Pit 1. Three chipped stone artifacts were recovered from Test Pit 5 (one chert core flake, one metaquartzite core flake, and one metaquartzite angular debris).

Test Pit 2 (154N/694E, 10.22–10.53 mbd) was just to the south of Test Pits 1/5. The fill was removed in three levels from the west half of the grid and two levels in the east half. The surface was covered with a sparse growth of grass, with a thin mud-cracked crust capping a 10 cm thick layer of eolian silty sand (Fig. 4.6). The lower fill was the redder and increasingly compact Pleistocene B soil horizon containing carbonate coated gravel. The first 5 cm of fill in this test pit contained six metaquartzite core flakes.

Test Pit 3 (144N/685E, 10.17–10.47 mbd) was also in an area containing a sparse growth of bunchgrass, with a thin water-pooled and -cracked surface deposit of eolian silt (1–3 cm thick). The remaining fill was the relatively uniform but increasingly compact Pleistocene B soil horizon. No artifacts were recovered from this test unit.

Test Pit 4 (132N/671E, 10.30–10.70 mbd) was the farthest south and west of the test pits. The surface was covered with loose eolian silt and bunchgrass. A single chipped stone artifact was found on the surface (chert core flake). The upper 20 cm of fill was loosely compacted sediment containing small harder inclusions, with chipped stone artifacts recovered from Levels 1 (two chert core flakes and two metaquartzite biface flakes).

Figure 4.6. The north wall of Test Pit 2, LA 111432.

The lower fill varied in compactness, possibly indicating disturbance. Level 4 was excavated only in the west half of the grid, and caliche flecks were observed at the base of the level.

Artifact Assemblage

A total of 45 artifacts were field analyzed at LA 111432, and 96 were collected or recovered from excavation and fully analyzed in the laboratory, providing a sample of 141 artifacts, all of which are chipped stone (see Appendix 1 for artifact data). Table 4.3 shows the distribution of artifact morphology by material type for these artifacts. This assemblage is dominated by chert, which comprises 57.45 percent of the total. Metaquartzite is the second most common material type, making up 39.01 percent. This assemblage is composed mainly of core flakes, with angular debris and biface flakes comprising much smaller percentages. This provides a flake to angular debris ratio of 4.7:1, which is moderate and possibly indicative of a mixture of expedient and efficient reduction strategies. The possible importance of an efficient reduction strategy in this assemblage is partly supported by the presence of at least 10 biface flakes, mostly chert, followed by metaquartzite. The identification of very few cores in this assemblage suggests that cores were either transported away from this location when it was abandoned or that most flakes were struck from bifaces and that few cores were ever present at this site.

The only formal tools identified in this assemblage were two late-stage unifaces, both of which are spurred end scrapers. Considering that a possible Eden point was recovered during survey (FAA and NMSA 2010), the presence of

Table 4.3. Material type by artifact morphology for all chipped stone artifacts that were field analyzed or collected, LA 111432

Material Type		Angular Debris	Core Flake	Biface Flake	Tested Cobble	Unidirectional Core	Late-Stage Uniface	Total
In-Field Analysis of Surface Artifacts								
Chert	Count	6	27	2	–	–	–	35
	Row %	17.1%	77.1%	5.7%	–	–	–	77.8%
Silicified wood	Count	–	1	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	2.2%
Limestone	Count	–	1	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	2.2%
Metaquartzite	Count	–	8	–	–	–	–	8
	Row %	–	100.0%	–	–	–	–	17.8%
Total	Count	6	37	2	–	–	–	45
	Row %	13.3%	82.2%	4.4%	–	–	–	100.0%
Full Analysis of Excavated Artifacts								
Chert	Count	11	28	4	1	1	1	46
	Row %	23.9%	60.9%	8.7%	2.2%	2.2%	2.2%	47.9%
Rhyolite	Count	–	–	–	–	–	1	1
	Row %	–	–	–	–	–	100.0%	1.0%
Limestone	Count	2	–	–	–	–	–	2
	Row %	100.0%	–	–	–	–	–	2.1%
Metaquartzite	Count	5	37	4	–	1	–	47
	Row %	10.6%	78.7%	8.5%	–	2.1%	–	49.0%
Total	Count	18	65	8	1	2	2	96
	Row %	18.8%	67.7%	8.3%	1.0%	2.1%	2.1%	100.0%
Table total	Count	24	102	10	1	2	2	141
	Row %	17.0%	72.3%	7.1%	0.7%	1.4%	1.4%	100.0%

two spurred end scrapers may corroborate the existence of a Paleoindian component at this site. Evidence of thermal alteration was noted on three pieces of chert debitage. Because none of the biface flakes are of material types that match formal tools, it is likely that more than one biface was flaked at this location, and most or all of them may have been carried away when the site was abandoned, since only one bifacial tool has been found here. Evidence of thermal alteration was noted on 16 chert artifacts, including 2 biface flakes and 1 spurred end scraper.

Summary and Recommendations

Recovery of a substantial number of subsurface artifacts during testing indicates that LA 111432 has the potential to contribute to our understanding of the Paleoindian period. The recovery of a possible Eden point fragment during survey of the site by HSR and the identification of two spurred end scrapers during testing are highly suggestive of a late Paleoindian-period occupation. Eden and Scottsbluff points are diagnostic of the Cody Complex, which dates to the late part of the Plano phase. Similar materials have been found in the northern Jornada del Muerto and in the Tularosa Basin (Elyea 1988, 2004). Though Miller and Kenmotsu (2004:217) note that most finds of Plano materials have occurred near major playas or along the margins of the Rio Grande Valley, LA 111432 does not fit either of these patterns. This could indicate that site location parameters were less restrictive than Miller and Kenmotsu suggest, and that more use was made of basin interiors than has been suspected. This site probably represents a short-term camp, similar to most of the other sites investigated during this phase of study. As shown in Chapter 6, multiple activities are represented in this assemblage, which argues for a residential occupation rather than a resource-extraction locale.

While artifacts are on a secondary geologic horizon, these artifacts represent a discrete deposit from which information regarding site structure and the nature of subsistence strategies in the Jornada del Muerto during the Paleoindian period can be ascertained. No additional research is proposed for this site at this time. Data collected at the site during testing will, however, contribute to addressing the research questions posed in the plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010b). If the site will be impacted by construction along the proposed infrastructure corridor or improvements along County Road A020, a strategy for additional investigation and monitoring consistent with the archaeology mitigation plan (FAA and NMSA 2010) should be prepared for work within that corridor(s).

LA 112370

LA 112370 is a prehistoric artifact scatter within the VLA. The site is bisected by both an east–west trending fence and an improved road (Fig. 4.7). The eligibility of LA 112370 to the *National Register* was undetermined during the Section 106 process. Formal testing at this site was used to evaluate whether LA 112370 is eligible for inclusion in the *National Register*. Previous studies observed few artifacts, and construction of the road has caused considerable damage to the site. The road and a 15 m buffer on either side of it covers over half of the site area.

Site Setting

LA 112370 is on a fairly eroded plain with a gentle western slope. Ground cover consists of intermittent patches of fairly dense grass with sparse mesquite, yucca, and prickly pear and cholla cactus occurring in stabilized areas. Jornada Draw lies 300 m to the west.

Previous Work

HSR (FAA and NMSA 2010) initially recorded this site as a sparse artifact assemblage containing no fire-cracked rock covering an area of 90 by 60 m (4,241 sq m; 0.42 ha; 1.05 acres). Most of the artifacts were observed near unimproved two-track roads that existed on either side of the fence or at the edges of stabilized hummocks. The observed artifacts (n = 12) included a scraper that could be Paleoindian in age, biface flakes, a biface fragment, and a core fragment. Although the assemblage was sparse, HSR felt that the variety of materials and their distribution suggests the presence of subsurface deposits and that the site is the result of Paleoindian or Archaic processing

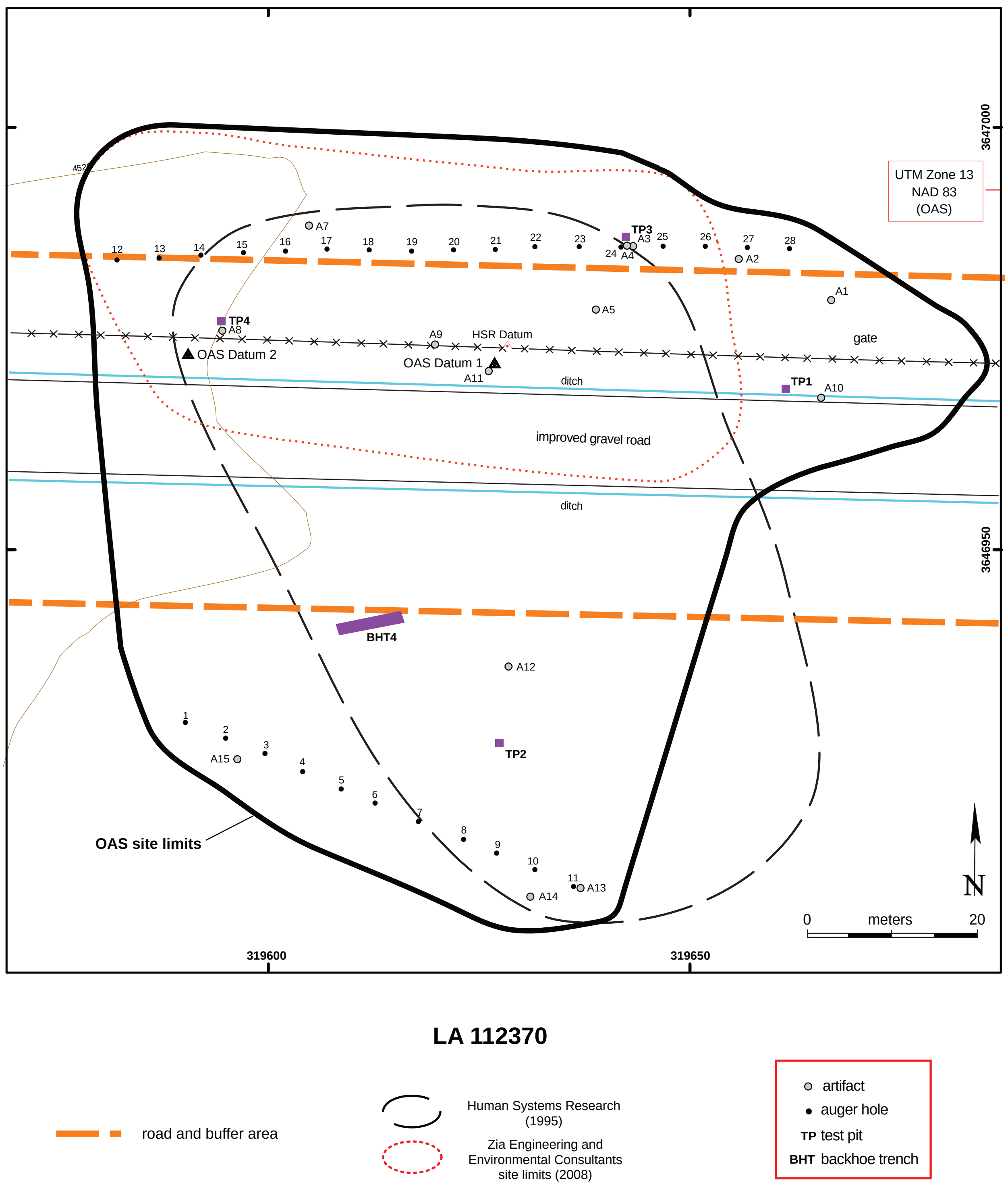

Figure 4.7. LA 112370 site plan, including boundaries proposed by HSR and Zia.

activities (FAA and NMSA 2010:38–39).

Between the time that HSR recorded the site and Zia revisited the site, an improved road 3 m wide and 0.5 m deep was built, bisecting the site. Zia archaeologists reduced the site size to 80 by 35 m (2,561 sq m; 0.26 ha; 0.63 acres), eliminating the area lying south of the road, which contained almost half of the artifacts plotted on the HSR map (Quaranta and Gibbs 2008). Surface visibility outside the roadbed was low due to dense grass, and Zia was able to find only four chipped stone artifacts on the surface of the site (a biface fragment and three flakes). Zia archaeologists speculated that the small assemblage indicated a limited-activity area or short-term camp dating from the Archaic period (Quaranta and Gibbs 2008:253–254).

Test Excavations

Licensed surveyors working for OAS placed two datums at this site, both just south of the fence between it and the bar ditch on the north side of the road. Datum 1 (972.56N/626.78E), at about the center of the site, was assigned an arbitrary elevation of 10.0 mbd. Datum 2 was placed at the far west end of the site (973.61N/590.40E).

Prior to testing, a mechanically excavated geomorphology trench was placed south of the road, near the west site boundary (Fig. 4.7). This trench was 7.6 m long, with a maximum width of 1.7 m and depth of 2 m. The fill in this trench consisted of the compact clayey red-brown Pleistocene B soil horizon. The soil texture gradually changed from blocky to smooth between 1.0 and 1.25 m bgs, with few or no caliche inclusions being noted. A single OSL sample was taken from the Pleistocene B soil horizon, and 10 sediment samples were collected.

Crew members walking transects spaced about 2 m apart located 14 surface artifacts, including a biface fragment that was collected. The 13 other surface artifacts were field analyzed. The artifact distribution indicated that the site measures 94.03 m north–south and 106.93 m east–west, and covers 6,768 sq m (1.67 acres; 0.68 ha). This is much larger than the size defined by HSR and considerably larger than the size defined by Zia, with the southern part of the scatter restored (Fig. 4.7). As defined by the OAS, LA 112370 is now about 31 percent larger than it was when originally defined by HSR and about 72 percent larger than it was when rerecorded by Zia. Again, this discrepancy is easily explained by the greater amount of time spent on recording the site during testing compared to the shorter amount of time that is usually expended during survey.

Auger tests. Two transects containing 28 auger tests were established, with one on the north side of and running parallel to the fence, and a second at a diagonal across the south end of the site. The northern auger transect (AU 1–11) tests were excavated to depths between 0.70 and 1.72 m bgs. The fill consisted of up to 20 cm of loose sandy clay transitioning to the Pleistocene B soil horizon reddish brown clayey silt, which continued to a depth of about 0.55 to 0.60 m bgs, where it became redder and more compact. The more compact material continued to a depth of about 1.5 to 1.6 m bgs, where it changed to a fine sand. Auger tests in the southern transect (AU 12–28) were excavated to depths between 0.5 and 1.5 m bgs. In this transect, the upper 10–30 cm consisted of loose silt overlying the redder and more compact Pleistocene B soil horizon. Caliche flecks were encountered at 1.5 m bgs.

Hand-excavated units. Four test pits were excavated at this site. One was placed south of the road, one north of the road and south of the fence at the east end of the site, and two north of the fence in the central and west parts of the site (Fig. 4.7). None of the test pits contained artifacts. Figure 4.8 shows a representative profile of the sediments encountered at this site.

Test Pit 1 (969N/966E, 9.54–9.85 mbd), at the eastern edge of the site, was excavated in three levels, and an auger test was placed at the base and continued to a depth of 10.60 mbd. The surface of this unit was almost entirely covered with grass. The upper fill consisted of about 8 cm of loose eolian sandy loam containing lenses of alluvial water-puddled clay. This layer overlay the Pleistocene B compact and blocky clayey sand soil horizon. Small (less than 1 cm diameter) caliche nodules occurred within the latter stratum and increased in number with depth. Gravel was rare in this test pit. The auger test found similar sediments containing more gravel to a depth of 10.19 mbd, where the sediments became finer grained. At 10.43 mbd the amount of gravel dropped off, and the sediments became very fine-grained and increasingly red.

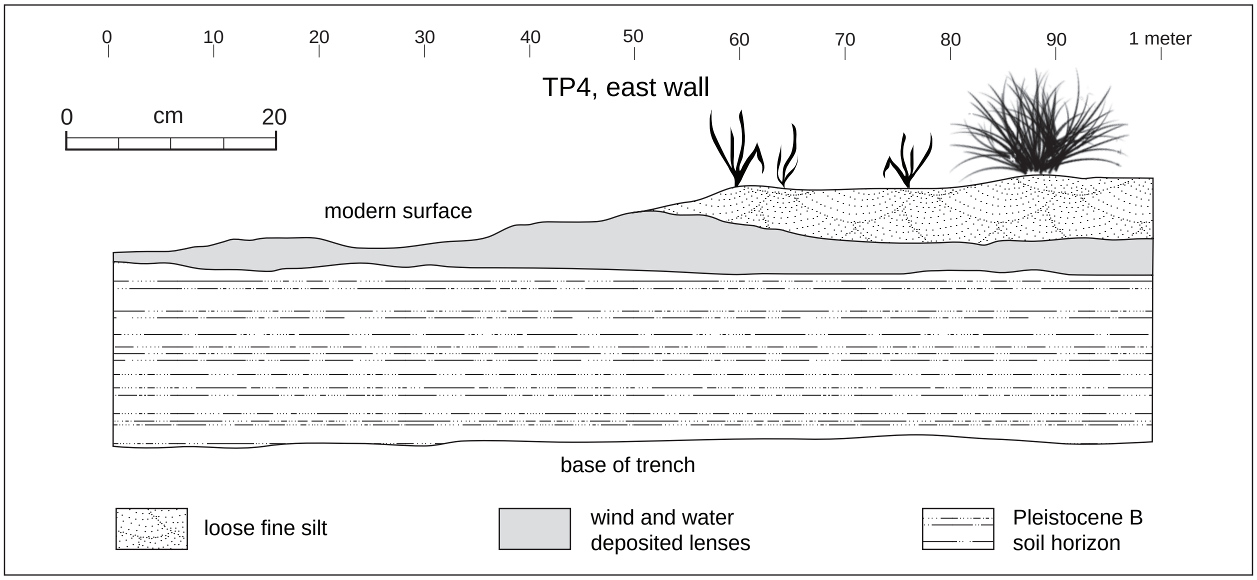

Figure 4.8. Profile of the east wall of Test Pit 4, LA 112370.

Test Pit 2 (927N/627E, 9.97–10.27 mbd) was placed at the south end of the site in an area where grass stabilized the surface. To the west was a deflated area containing a scatter of surface gravel. None of the field-analyzed surface artifacts were near this test pit. The upper layer of fill consisted of 4–8 cm of loose eolian silt containing platy water-puddled silt lenses. Gravel was very uncommon, and some small nodules of caliche were noted. At the base of the test pit was a nearly level 2–4 cm interface level of the eroded Pleistocene B soil horizon. This layer was compact but was not as blocky, compact, or red as the uneroded mass of the stratum. Rootlets and bug burrows were present throughout the Pleistocene B soil horizon, and gravel inclusions were sparse. An auger test at the base of the test pit encountered similar fill, and at about 50 cm below the base of the test pit (10.77 mbd), the gravels were carbonate coated. The auger test continued to a depth of 12.07 mbd.

Test Pit 3 (987N/642E, 9.77–10.07 mbd) was the farthest north of the test pits. Three levels of fill were removed. The surface cover was bunchgrass with small to somewhat larger nodules of black rock. The upper 8–12 cm of sediment was a blocky clayey sand containing very sparse gravels. Beneath this was the Pleistocene B soil horizon, which was redder with more clay, blocky, and more compact. Caliche inclusions increased in number with depth, and by the base of the third level the rocks were carbonate coated. An auger test at the base of the test pit showed that the fill changed slightly at 10.24 mbd, becoming loosely compacted, and the amounts of caliche and gravel decreased. At about 10.58 mbd the fill became much redder and was still loosely compacted with no gravels and few caliche inclusions occurring.

Test Pit 4 (928N/628E, 10.28–10.48 mbd), the westernmost test pit, was placed near where two surface artifacts occurred. The surface of the test pit was mostly stabilized by grass, with deflated sediments occurring on the west edge. The grass-stabilized sediments consisted of up to 6 cm of loose fine silt that was infiltrated by roots. This layer rested on a 2–6 cm interface layer of wind- and water-deposited lenses (Fig. 4.8). The Pleistocene B soil horizon was under this interface layer and was blocky and compact with a greater clay content and fewer rootlets. An auger test at the base of the test pit encountered similar fill for the upper 20 cm before sparse caliche flecks appeared. The sediments became redder with depth but remained blocky. At a depth of 50 cm below the base of the test pit (11.08 mbd), the sediments became less compact and continued until the auger test ended at 11.13 mbd.

Artifact Assemblage

Thirteen artifacts were field analyzed at LA 112370, and another was collected for full analysis in the laboratory, providing a sample of 14 chipped stone artifacts (see Appendix 1 for artifact data). Table 4.4 shows the distribution of artifact morphology by material type for these artifacts. This small assemblage is dominated by chert, which comprises 71.43 percent of the total. Silicified wood is the second most common material type, making up 14.29 percent. This assemblage is dominated by core flakes, with angular debris and biface flakes comprising much smaller percentages. This flake to angular debris ratio of 12.00:1 is high and possibly indicative of an efficient reduction strategy. The possible importance of an efficient reduction strategy in this assemblage is partly supported by the presence of at least two biface flakes, both chert, as well as a metaquartzite biface fragment with an nondiagnostic type of break. The lack of any cores in this assemblage suggests that cores were either transported away from this location when it was abandoned or that most flakes were struck from bifaces and that few or no cores were ever present at this site. The only formal tool identified in this assemblage was the biface fragment. Evidence of thermal alteration was noted on two chert core flakes. Because neither of the biface flakes are of material types that match the type of stone used to make the biface fragment, the reduction of multiple bifaces at this location is likely.

Summary and Recommendations

Archaeological testing indicated that LA 112370 has limited data potential. No further work is planned for this site at this time, and the OAS recommends that the site be determined not eligible for inclusion in the *National Register*. Data collected at the site during testing will, however, contribute to addressing the research questions posed in the plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010b).

LA 112370 probably represents a camp of short occupational duration based on analysis of the artifact assemblage recorded during the various examinations, as discussed in Chapter 6. Also based on that analysis, we can suggest that LA 112370 may have been occupied during the Archaic period, but no finer temporal distinction is possible.

Table 4.4. Material type by artifact morphology for all chipped stone artifacts that were field analyzed or collected, LA 112370

Material Type		Angular Debris	Core Flake	Biface Flake	Late-Stage Biface	Total
			In-Field Analysis of Surface Artifacts			
Chert	Count	–	8	2	–	10
	Row %	–	80.0%	20.0%	–	76.9%
Silicified wood	Count	1	1	–	–	2
	Row %	50.0%	50.0%	–	–	15.4%
Basalt	Count	–	1	–	–	1
	Row %	–	100.0%	–	–	7.7%
Total	Count	1	10	2	–	13
	Row %	7.7%	76.9%	15.4%	–	100.0%
			Full Analysis of Collected Artifacts			
Metaquartzite	Count	–	–	–	1	1
	Row %	–	–	–	100.0%	7.1%
Total	Count	–	–	–	1	1
	Row %	–	–	–	100.0%	100.0%
Table total	Count	1	10	2	1	14
	Row %	7.1%	71.4%	14.3%	7.1%	100.0%

LA 112371

LA 112371 is a sparse prehistoric artifact scatter containing some fire-cracked rock and burned caliche in the western part of the VLA. An east–west trending road passes through the north section of this site, and a fence parallels the road just north of the site boundary (Fig. 4.9). The eligibility of LA 112371 to the *National Register* was undetermined during the Section 106 process. Formal testing was initiated to evaluate whether LA 112371 is eligible for inclusion in the *National Register*. Previous studies located few artifacts, and construction of the road has caused considerable damage to the site. The road and a 15 m buffer on either side of it covers much of the north half of the site. The artifact clusters all lie outside the buffer area (Fig. 4.9).

Site Setting

LA 112371 lies on a flat, gently west-sloping area overlooking Jornada Draw, which is 420 m to the west. Vegetation consists of grass with occasional mesquite, yucca, ephedra, and cholla and prickly pear cacti occurring where soils are stabilized.

Previous Work

Surveying the site in 1996, HSR observed 30 surface artifacts and found two fire-cracked rock clusters that did not exhibit sufficient rock to be considered features (FAA and NMSA 2010). They estimated that the site covered an area measuring 90 by 45 m (3,181 sq m; 0.32 ha; 0.79 acres), extending from just north of the fence and adjacent unimproved road to about 70 m south of the fence. The surface artifacts were scattered throughout the site, with the fire-cracked rock occurring along the eastern edge. A sample of 25 surface artifacts was examined that included flakes, three with unifacial retouch, and a ground stone fragment. HSR estimated that cultural materials could occur up to 10 cm below the surface and interpreted the site as a short-term hunting and gathering site of unknown age and cultural affiliation (FAA and NMSA 2010:40, 72).

Returning to the site in 2007 (Quaranta and Gibbs 2010), Zia found that an improved road had been built since the original recording, and reduced the site size to 71 by 56 m (2,947 sq m; 0.30 ha; 0.73 acres), placing the northern boundary on the south side of the improved road. They observed and analyzed 15 surface artifacts (12 flakes and 3 pieces of angular debris) and found no features, although the Zia map shows a fire-cracked rock concentration and a tool, neither of which are mentioned in the text. The site was interpreted as limited or single-use (Quaranta and Gibbs 2008:257–259).

Test Excavations

Licensed surveyors working for OAS placed two datums at this site, one in the south-central section and the other just north of the east–west trending fence. Datum 1 (923.20N/732.34E) was assigned an arbitrary elevation of 10.0 mbd. Datum 2 was placed off site about 15 m south of the southern site boundary (863.29N/740.31E).

Prior to initiation of testing, a mechanically excavated geomorphology trench was dug to the south of the road at the eastern site boundary (Fig. 4.9). This trench was 6 m long with a maximum width of 1.5 m and depth of 2 m. Fill in this trench was the compact clayey red-brown Pleistocene B soil horizon, with caliche inclusions occurring through much of the trench. No OSL samples were taken, but 15 sediment samples were collected.

Crew members walking transects spaced at about 2 m intervals found 62 surface artifacts, 61 of which were subsequently field analyzed; 1 was collected. The artifact distribution indicates that the site measures 89.79 m north–south by 65.14 m east–west, covering an area of 4,614 sq m (1.14 acres; 0.46 ha). The scatter did not appear to extend north of the east–west fence but is larger than suggested by either of the previous site recorders, with a considerable extension to the northeast (Fig. 4.9). As defined by the OAS, LA 112371 is now about 31 percent larger than it was when originally recorded by HSR, and about 36 percent larger than it was when rerecorded by Zia. Again, these discrepancies are explained by the greater amount of time spent on the site during testing than was the case for either of the previous surveys.

Auger tests. Two northeast-southwest trending auger transects containing 27 auger tests ran from just south of the bar ditch on the south side of the road to the southern edge of the

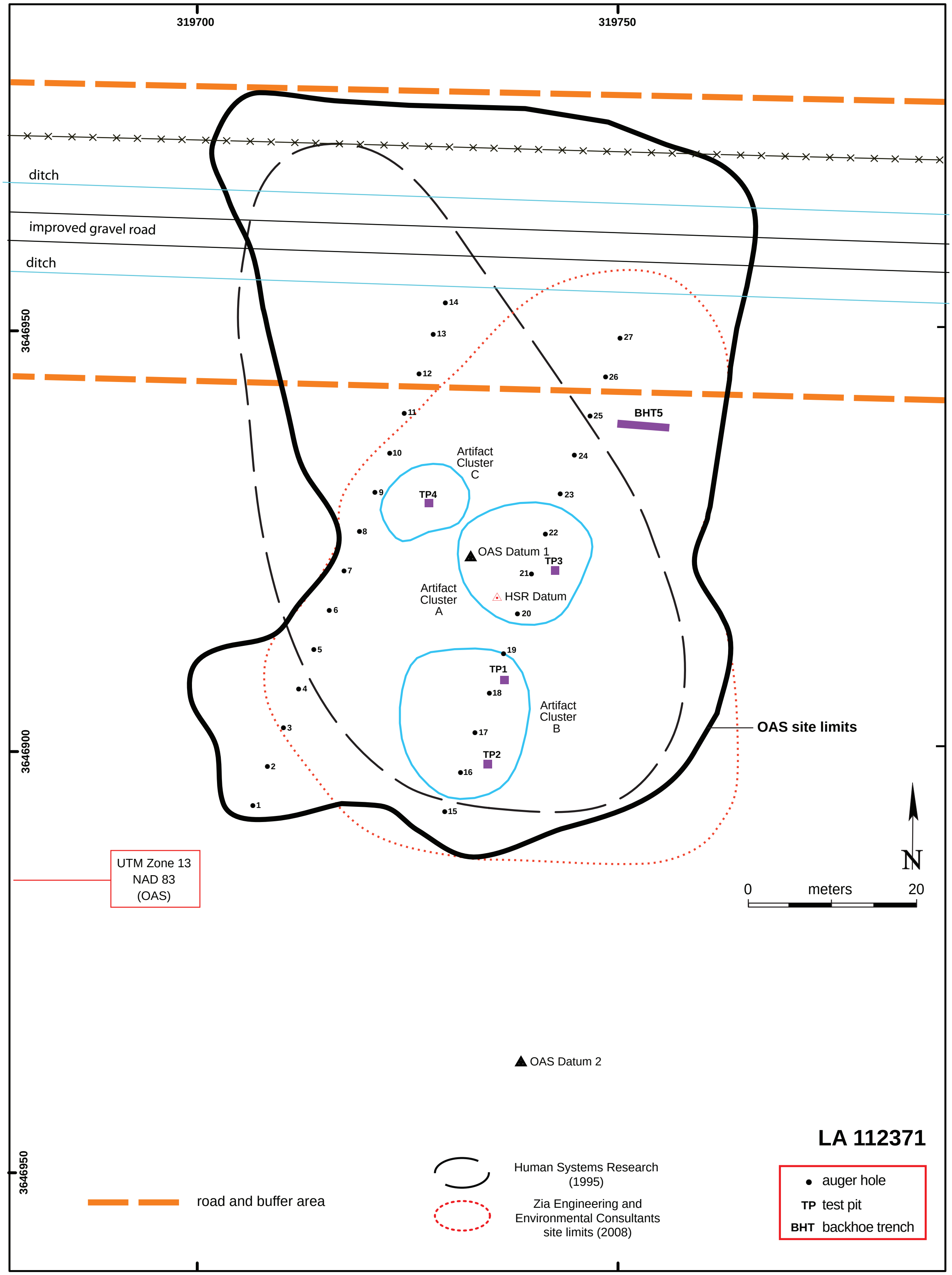

Figure 4.9. LA 112371 site plan, including boundaries proposed by HSR and Zia.

site, essentially dividing the site into thirds (Fig. 4.9). The west transect (AU 1–14) auger tests were excavated to depths ranging from 60 to 128 cm bgs. The upper sediments encountered in the transect consisted of a loose to slightly compacted silt containing very sparse gravels, continuing to a depth of about 70 cm bgs. These sediments transitioned into an increasingly compact, blocky silt that became redder with depth. The eastern auger tests (AU 15–27) were excavated to between 74 and 99 cm bgs. The sediment sequence was identical to that seen in the west auger transect, with a transition between the loose and more compact fill occurring at about 70 cm bgs. Caliche flecks were noted between 35 and 65 cm bgs in tests from AU 18 north. No artifacts were recovered from either auger transect.

Hand-excavated units. Three test pits were placed in areas containing grass-stabilized sediments along the eastern auger transect, with a fourth used to investigate a stabilized area near the west auger transect. All four test pits were situated within artifact clusters. Descriptions of excavated artifacts can be found in Appendix 1. Figure 4.10 shows a representative profile of the sediments encountered at this site.

The surface of Test Pit 1 (908N/736E, 9.88–10.18) was covered with grass and sandy sediments. Three levels of fill were removed from this test pit. The upper 10–15 cm was a weakly bedded, loose eolian sand containing abundant roots and considerable amounts of carbonate-coated gravel. Beneath this was the Pleistocene B soil horizon, which was redder, contained more silt and clay, and was more compact with fewer gravel inclusions. Chipped stone artifacts were recovered in the first two levels of fill: one chert core flake from the loose upper fill, and two chert core flakes from the more compact sediments. An auger test placed in the base of the test pit found that the Pleistocene B soil horizon remained the same as discussed above for the next 30 cm, below which it became a darker red.

Test Pit 2 (898N/734E, 9.90–10.20 mbd), the southernmost of the test pits, was excavated in three levels. As with Test Pit 1, the surface of Test Pit 2 largely consisted of a grass-covered eolian silty sand that was 10–15 cm thick. This layer was semicompact, containing a fair amount of carbonate-coated gravel. Beneath this was the compact red Pleistocene B soil horizon, which consisted of clay mixed with silt and sand. Gravel inclusions decreased in number in the lower stratum but remained carbonate-coated. Three chipped stone artifacts were recovered from the second level of excavation (chert core flake, chert core, chert angular debris). An auger test at the base of the test pit extended another 55 cm, encountering sediments similar to those in Level 3 of excavation, with some caliche flecks and a layer of red sand occurring at the bottom.

Test Pit 3 (9217N/742E, 9.93–10.33 mbd) was excavated in four levels (Fig. 4.10). The upper fill consisted of 8–15 cm of grass-stabilized laminated eolian sand with little gravel. The Pleistocene B soil horizon beneath this became more compact and blocky with depth as clay content increased, and redder. Caliche inclusions and gravels increased in abundance in the third and fourth levels. Four chipped stone artifacts were recovered from the lower half of fill in the first level (one chert core flake, one chert biface flake, two chert angular debris). An auger test continued to 50 cm below the base of the test pit and indicated that similar sediments continued downward, with minor color changes occurring, due in part to a higher moisture content.

The surface of Test Pit 4 (929N/725E, 10.08–10.40 mbd) had a sparse grass cover with an ephedra plant at its center. Sediments were removed in three levels. The upper 4–6 cm consisted of laminated eolian and alluvial lenses of sand and silt (Fig. 4.11). This material covered the Pleistocene B soil horizon, which became increasingly compact and blocky with depth, with some gravel and an increasing clay content. At the base of the test pit, caliche inclusions increased in abundance considerably, and sediments were more compact while still clayey and blocky. Roots and insect burrows occurred throughout the sediments. Chipped stone artifacts were recovered from the first (two chert core flakes, one metaquartzite core flake) and second levels (chert core flake). An auger test excavated an additional 40 cm below the test pit base noted only minor changes in sediments, becoming somewhat redder with more caliche inclusions.

Figure 4.10. Test Pit 3, LA 112371.

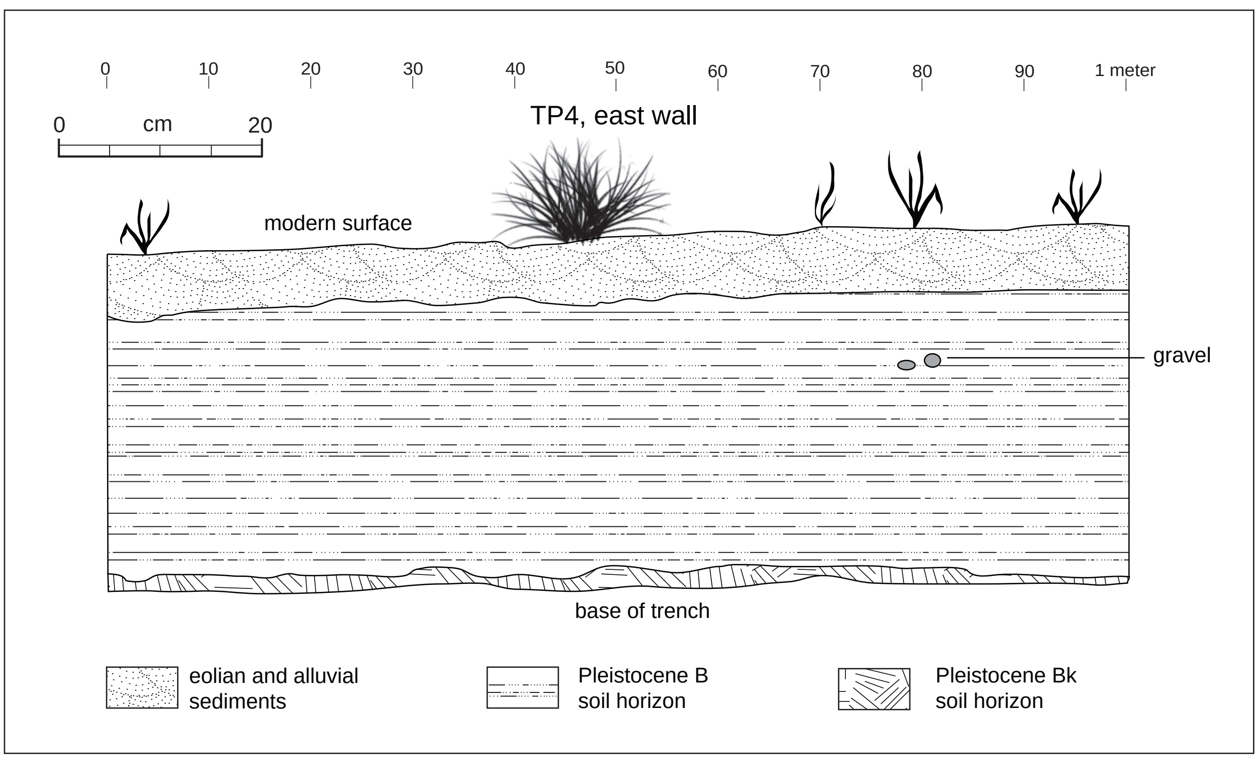

Figure 4.11. Profile of the east wall of Test Pit 4, LA 112371.

Artifact Assemblage

A total of 61 artifacts were field analyzed at LA 112371: 1 surface artifact was collected, and 14 artifacts were recovered from excavation and fully analyzed in the laboratory, a total sample of 76 artifacts (see Appendix 1 for artifact data). Of these, 75 specimens are chipped stone, and 1 is ground stone. The ground stone specimen is a fragment of a basalt tool of indeterminate morphology and function. Table 4.5 shows the distribution of artifact morphology by material type for the chipped stone artifacts. This assemblage is dominated by chert, which comprises 94.67 percent of the total. Metaquartzite is the second most common material type, making up only 4.00 percent. Morphologically, this assemblage is dominated by core flakes, with angular debris and biface flakes comprising much smaller percentages. The flake to angular debris ratio of 10.67:1 is high and may indicate an efficient reduction strategy. The likely importance of an efficient reduction strategy in this assemblage is partly supported by the presence of at least four biface flakes, all of chert, as well as a chert edge bite struck from a biface. The presence of very few cores suggests that cores were either transported away from this location when it was abandoned or that most flakes were struck from bifaces and that few cores were ever present at this site. The only formal tool identified is an early-stage chert uniface used as an end scraper. Evidence of thermal alteration was noted on five chert core flakes and one chert biface flake. Since at least four different types of chert are represented among the biface flakes and edge bite, the reduction of multiple bifaces is likely.

Summary and Recommendations

Archaeological testing indicated that LA 112371 has further data potential. The occurrence of several chipped stone artifacts in subsurface contexts in all four test pits and the presence of both chipped and ground stone artifacts suggest that a substantial assemblage is available for examination at this site. These artifacts appear to represent a discrete deposit from which information regarding site structure and the nature of subsistence strategies in the Jornada del Muerto can be ascertained. No additional research is proposed for this site at this time, and OAS recommends that LA 112371 may be eligible for inclusion on the *National Register*. Data collected at the site during testing will contribute to addressing the research questions posed in the

Table 4.5. Material type by artifact morphology for all chipped stone artifacts that were field analyzed or collected, LA 112371

Material Type		Angular Debris	Core Flake	Biface Flake	Unidirectional Core	Multidirectional Core	Early-Stage Uniface	Edge Bite	Total
				In-Field Analysis of Surface Artifacts					
Chert	Count	3	48	3	–	1	1	1	57
	Row %	5.3%	84.2%	5.3%	–	1.8%	1.8%	1.8%	95.0%
Siltstone	Count	–	1	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	1.7%
Metaquartzite	Count	–	1	–	–	1	–	–	2
	Row %	–	50.0%	–	–	50.0%	–	–	3.3%
Total	Count	3	50	3	–	2	1	1	60
	Row %	5.0%	83.3%	5.0%	–	3.3%	1.7%	1.7%	100.0%
				Full Analysis of Excavated and/or Collected Artifacts					
Chert	Count	3	9	1	1	–	–	–	14
	Row %	21.4%	64.3%	7.1%	7.1%	–	–	–	93.3%
Metaquartzite	Count	–	1	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	6.7%
Total	Count	3	10	1	1	–	–	–	15
	Row %	20.0%	66.7%	6.7%	6.7%	–	–	–	100.0%
Table total	Count	6	60	4	1	2	1	1	75
	Row %	8.0%	80.0%	5.3%	1.3%	2.7%	1.3%	1.3%	100.0%

plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010b). If LA 112371 will be impacted by future construction, a strategy for additional investigation and monitoring consistent with the archaeology mitigation plan (FAA and NMSA 2010) should be prepared for work within that corridor.

Like the other small sites investigated by this study, LA 112371 appears to represent a residential camp used for a short time. This is further discussed in Chapter 6, based on analysis of the chipped stone assemblage. Also based on that analysis, we can suggest that this site was occupied at some time during the Archaic period, but a finer temporal discrimination is not possible based on the information at hand. As discussed in Chapter 3, the Archaic represents a hunting-gathering adaptation, focusing on the exploitation of a wide variety of plants and animals. The study of small residential sites can help fill in some of the gaps in our knowledge of the Archaic adaptation.

LA 112374

This site is a small prehistoric artifact scatter of unknown cultural affiliation that is in the west central part of the VLA (Fig. 4.12). The eligibility of LA 112371 to the *National Register* was undetermined during the Section 106 process. Formal testing was conducted to evaluate whether LA 112374 is eligible for inclusion in the *National Register*. Previous studies found few artifacts, and construction of an improved road that now runs through this part of the VLA removed much of the area originally designated as the site. The road and a 15 m buffer on either side of the road occupies almost all of the site area.

Site Setting

LA 112374 is on a grassy plain that slopes gently westward toward Jornada Draw, 700 m to the west. It has a dense cover of grass with small denuded areas occurring between grassy patches. Mesquite, cholla, and yucca grow within 100 m of the site, with denser shrub zones to the north and east (Fig. 4.13). The improved road cuts through the center of the site.

Previous Work

LA 112374 was recorded by HSR in 1996 as a small (60 by 40 m; 1,885 sq m; 0.19 ha; 0.47 acres) dispersed scatter containing 12 artifacts (FAA and NMSA 2010). Examination of these few artifacts (10 flakes, including 1 biface-thinning flake and 2 biface fragments) indicated that several nonlocal materials were worked at the site, some with a gloss suggestive of heat treatment. One biface fragment may have been a stem or basal portion of an Archaic projectile point. They speculated that the lithic debris was from finishing or resharpening tools. Since nearly all observed artifacts were found in open, deflated patches, they surmised that there could be buried deposits and artifacts at this site (FAA and NMSA 2010:42).

Zia archaeologists were unable to locate any of the artifacts described by HSR and reduced the size of the site considerably (27 by 25 m; 517 sq m; 0.05 ha; 0.13 acres), noting that the redefined site is the southwestern portion of the original site (Quaranta and Gibbs 2008). However, they did find three pieces of fire-cracked rock and a core during this examination of LA 112374 (Quaranta and Gibbs 2008:268).

Test Excavations

Licensed surveyors working for OAS set two datums at this site, one on either side of the road. Datum 1 (722.54N/015.50E), was assigned an arbitrary elevation of 10.0 mbd. Datum 2 was set east of the road (744.50N/039.33E).

Prior to testing, a mechanically excavated geomorphology trench was dug southwest of the road near the southern site boundary (Fig. 4.12). This trench was 6.9 m long, with a maximum width of 1.5 m and depth of 2.2 m. Sediments encountered in this trench consisted of the compact clayey red-brown Pleistocene B soil horizon for the first meter, below which it became a smoother-textured Pleistocene B soil horizon with caliche inclusions. Four OSL samples were taken from the Pleistocene B soil horizon, and 18 sediment samples were collected.

Crew members walking transects spaced at about 2 m intervals found 11 surface artifacts, which were subsequently field analyzed. The artifact distribution indicates that the site measures 42.37 m north–south and 97.17 m east–

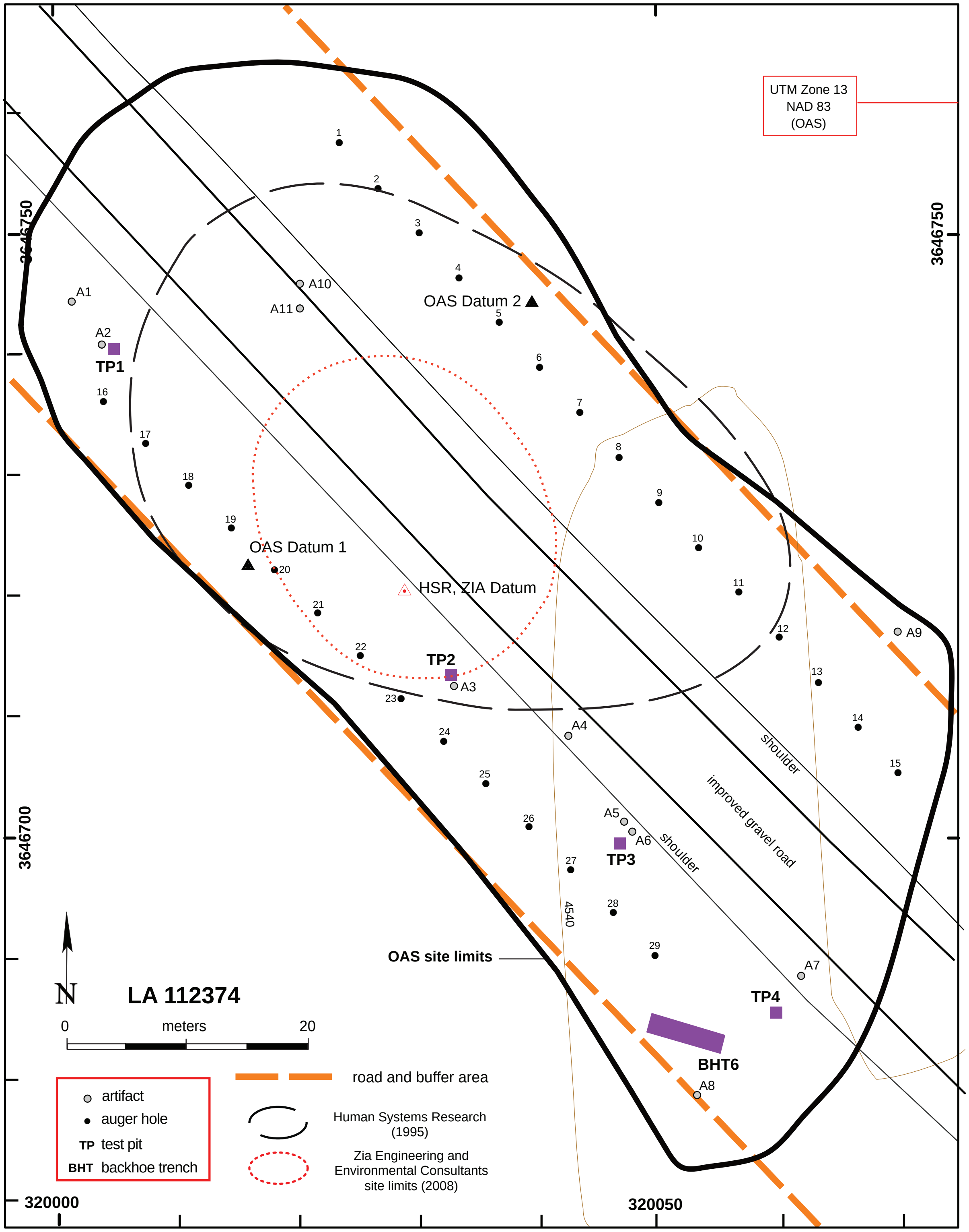

Figure 4.12. LA 112374 site plan, including boundaries proposed by HSR and Zia.

Figure 4.13. Overview of LA 112374.

west for an area of 3,651 sq m (.036 ha; 0.90 acres). LA 112374 does not appear to extend as far as the east–west fence but is larger than suggested by either of the previous surveys. As defined by OAS, LA 112374 is now about 48 percent larger than it was when recorded by HSR and has been extended to both the northwest and the southeast. The site is now 86 percent larger than it was when rerecorded by Zia, extending outward in all directions. As discussed several times earlier, this discrepancy is attributable to the amount of time spent in recording the site during the various studies, with considerably more time being expended during testing.

Auger tests. Two auger transects containing 29 auger tests were placed about 5 m from either side of the road and covered much of the site area. Tests on the east side of the road ranged in depth from 50 to 125 cm bgs. The sediments down to a depth of about 60 cm were the Pleistocene B soil horizon, which increased in compaction with depth. At about 60 cm bgs it became a loose fine sandy silt layer. Auger tests on the west side of the road were excavated to depths between 34 and 100 cm bgs, usually between 50 and 52 cm bgs. In the deepest test, the sandy silt layer was encountered at about 70 cm bgs. Another test (AU 25) hit caliche flecks between 45 and 65 cm bgs.

Hand-excavated units. All four hand-excavated test pits were placed southwest of the road (Fig. 4.12). Three were situated near artifacts, and the fourth was near the south boundary of the site. The single excavated artifact is described in Appendix 1. Figure 4.14 shows a representative profile of the sediments encountered at this site.

Test Pit 1 (740N/004E, 10.13–10.33 mbd) was excavated in two levels. The surface was partly covered by bunchgrass, with cattle-trampled, mud-cracked soil occurring between tufts of grass. The upper 4–6 cm was loose sandy silt containing no gravel. Beneath this was the Pleistocene B soil horizon, consisting of blocky clayey silt. A single piece of chert angular debris was recovered from the bottom of Level 1. An auger test was taken to 85 cm (11.18 mbd) below the bottom of the pit, encountering the same Pleistocene B soil horizon as above that level.

Test Pit 2 (713N/034E, 10.28–10.48 mbd) was excavated in two levels. It was placed in a relatively bare area and had an abandoned

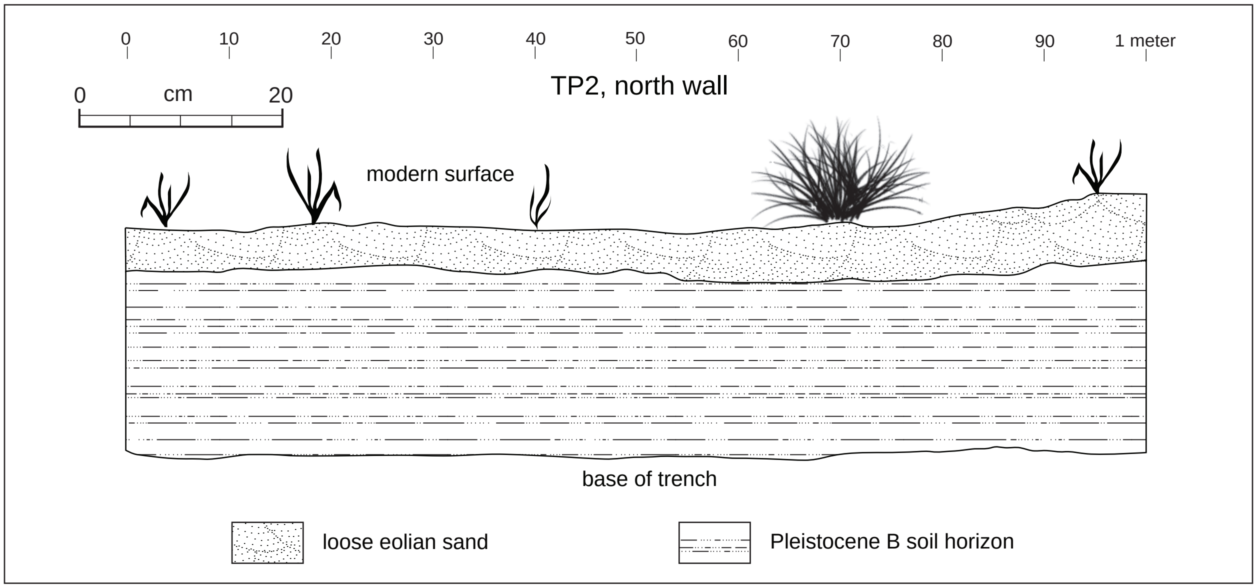

Figure 4.14. The north wall of Test Pit 2, LA 112374.

prairie dog burrow complex to its south. Surface sediments were 4–6 cm of loose eolian sandy silt containing few gravels (Fig. 4.14). The underlying Pleistocene B soil horizon was a compact, very blocky silty clay containing sparse gravels and no caliche nodules. An auger test extended to 47 cm (10.95 mbd) below the test pit base, finding less blocky and finer silt at 40 cm. No artifacts were recovered from this test pit.

Test Pit 3 (699N/046E, 9.63–9.83 mbd) had little grass on the surface and was excavated in two levels. The upper 4–6 cm was a loose eolian sandy silt with some laminations and very few gravels. The Pleistocene B soil horizon below this was a blocky, compact silty clay containing little gravel. An auger test excavated to 40 cm (10.23 mbd) below the test pit bottom found a change in sediments at 20 cm, where the silt content increased and the soil was not as blocky. No artifacts were recovered from this test pit.

Test Pit 4 (685N/059E, 9.47–9.67 mbd) was excavated in two levels (Fig. 4.15). The surface had some tufts of bunchgrass growing on it and displayed ample evidence of cattle trampling. The upper 6–10 cm was a loose to slightly compact eolian silt containing pebbles and rootlets. This layer overlay the Pleistocene B soil horizon, consisting of a compact blocky silty clay that lacked gravel and caliche inclusions. An auger test was taken to 1.2 m below the base of the test pit (10.87 mbd). Sediments were similar to those immediately above to a depth of 90 cm, where they became very compact and blocky. No artifacts were recovered from this test pit.

Artifact Assemblage

Eleven artifacts were field analyzed at LA 112374, and 1 was recovered from excavation and fully analyzed, providing a sample of 12 chipped stone artifacts (see Appendix 1 for artifact data). All specimens in this small assemblage are chert: three pieces of angular debris (25.00 percent), seven core flakes (58.33 percent), and two biface flakes (16.67 percent). One piece of angular debris was recovered during excavation, while all other specimens were field analyzed. The ratio of flakes to angular debris is 3.00:1, which is comparatively low and possibly indicative of an expedient reduction strategy. However, the presence of at least two biface flakes also suggests that biface reduction occurred. Because both biface flakes are of the same variety of chert, only one biface appears to have been worked. The lack of cores in this assemblage suggests that they were either transported away from this location when it was abandoned or that most flakes were struck from bifaces and few cores were ever present at this site. No formal tools were found, and evidence of thermal alteration was only noted on the piece of chert angular debris recovered during excavation.

Figure 4.15. Test Pit 4, LA 112374.

Summary and Recommendations

Archaeological testing indicated that LA 112374 contains few artifacts, lacks substantial subsurface deposits, and has limited data potential. No further work is planned for this site at this time, and the OAS recommends that the site is not eligible for inclusion on the *National Register*. Data collected at the site during testing will, however, contribute to addressing the research questions posed in the plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010b).

Like the other small sites investigated by this study, LA 112374 appears to represent a small residential camp used for a short duration of time. Characteristics of the chipped stone assemblage that suggest this function are further discussed in Chapter 6. Also based on that analysis, we can suggest that this site was occupied at some time during the Archaic period, but a finer temporal discrimination is not possible based on the information at hand. As discussed in Chapter 3, the Archaic represents a hunting-gathering adaptation, focusing on the exploitation of a wide variety of plants and animals. The study of small residential sites can help fill in some of the gaps in our knowledge of the Archaic adaptation.

5. *Research Sites*

Nancy J. Akins and James L. Moore

LA 111429 and LA 155963 were both determined eligible to the *National Register* during Section 106 consultations. The primary purpose of testing investigations at these sites was to collect data to aid in planning research-oriented studies. However, a section of LA 111429 was also tested to determine whether potentially significant cultural deposits or features occur within a buffer zone adjacent to County Road A020. Most of the information obtained during the testing phase will be integrated into a final report that discusses the more detailed investigations carried out during a research phase. The two sites that are strictly slated for research-oriented investigations differ from the other tested sites in that both are very large and contain numerous fire-cracked rock features. Features or a sample of features were inventoried at these sites during testing to provide basic descriptive information. Hand-excavated test pits and auger tests but no geomorphology trenches were completed at LA 111429. Small hand-excavated test units were placed in four features, but no other hand excavations or auger tests were done at LA 155963. Five geomorphology trenches were mechanically excavated to examine subsurface deposits at this site.

Feature Recording Methods

Before the testing phase began, a brief feature inventory form was devised to aid in determining which features have the best potential to provide the information needed to answer questions in the research design (Moore et al. 2010b). The form was originally designed to be a written description of the feature and included the following categories:

- Feature number
- Feature size
- Estimated number of fire-cracked rocks
- Types and proportions of fire-cracked rocks
- Fire-cracked rock distribution and density
- Soil horizon
- Condition of feature
- Potential for subsurface deposits
- Potential for chronometric samples
- Potential for subsistence remains

Features at LA 111429 were recorded using this form. However, our experience at this site led to the development of a more detailed form for use at LA 155963 that required less written description and more information on artifact associations. Data recorded on that form included:

- Feature number
- Feature type
- Feature size (north–south maximum extent and core; east–west maximum extent and core)
- Estimated number of fire-cracked rocks
- Maximum fire-cracked rock density (50 by 50 cm area)
- Fragmentation of fire-cracked rock
- Rock types and proportions (caliche, igneous, quartzite, limestone, sandstone, other)
- Whether there were ceramic artifacts in association
- Whether there was ground stone artifacts in association
- Whether there were chipped stone artifacts in association
- Whether any of the chipped stone artifacts were heat treated
- Whether the feature was tested
- Locale and soil association
- Potential for artifact association information
- Potential for subsurface deposits
- Potential for chronometric samples
- Potential for subsistence remains

Features were numbered sequentially and marked with an aluminum tag anchored to a steel nail. These were placed in a plant-stabilized area within the feature or near the core of the feature. For consistency, the same two individuals recorded all features. Digital photographs were taken of each feature.

How features were found and recorded

differed slightly between the two sites, mainly because of the much greater number at LA 155963. Feature types were assigned after the field session using the feature inventory form and reviewing the digital photographs. The fire-cracked rock features form more of a continuum than absolute types. For this reason individual features could be assigned to different types by other observers or those viewing the actual feature. The fire-cracked rock features were classified as:

- Dispersed fire-cracked rock scatter without a concentration that suggests a single origin
- Dispersed fire-cracked rock scatter with a core or concentration suggesting an origin for those materials
- Fire-cracked rock core or concentration
- Fire-cracked rock core or concentration with dispersed scatter

The main criteria in determining feature type were how dense and concentrated the core areas were and whether the scatter extended well beyond the core area.

LA 111429

LA 111429 is a very large artifact scatter containing numerous features (Figs. 5.1–5.3). Temporally diagnostic artifacts indicate that this site contains Paleoindian, Archaic, and Jornada Mogollon components. It is within and just outside the northwest corner of the VLA. County Road A020, along with a series of associated bar ditches, passes through the eastern part of LA 111429 and may eventually require improvements that could further impact the site. If perimeter fencing is ever placed around the VLA, it will impact the site in those boundary corridors.

Site Setting

LA 111429 lies on a flat plain that slopes gently towards Jornada Draw, 200 m west of the site. The north end of the site has about a 5 percent slope with rocky, caliche, and sandy soils supporting a combination of grasses and occasional mesquite and sumac. The central portion of the site is flat, gravelly, and grass-covered hardpan. The west, south, and southeastern areas are gravelly and flat, and low sandy mesquite-stabilized dunes are present along the east side. Plants observed include mesquite, burro grass, alkali sacaton, soaptree yucca, broom snakeweed, and cacti (HSR ARMS form). Caliche is exposed in areas to the north (caliche pit area in Figs. 5.1 and 5.2) and along the west edge within and just outside the site boundary.

Previous Work

HSR (FAA and NMSA 2010) recorded LA 111429 in 1995 as a large artifact scatter containing a diverse artifact assemblage and features covering an area measuring 700 by 275 m (151,190 sq m; 15.12 ha; 37.4 acres). They estimated that about 5,000 chipped stone artifacts were present on the surface along with a few ceramics. Artifacts dating to the Paleoindian, Middle Archaic, Late Archaic/Early Formative, and Jornada Mogollon periods, as well as the modern era, were noted. Chipped stone debitage samples from five randomly selected areas and about half of the visible tools were analyzed, and many were collected. Artifacts recorded or collected by HSR included a Clovis point base, 6 Folsom point fragments (4 bases, 1 midsection, and 1 reworked point fragment), Paleoindian and other scrapers (11 of which were collected), a Middle Archaic-like point, a Late Archaic/Early Formative projectile point, a biface midsection, cores, a core tool, a uniface, tabular chopper, knives, a hammerstone, fragments of 9 manos, 5 metates and other ground stone implements, Mimbres Corrugated ceramics, and modern metal artifacts (two movie film reels and a sanitary-seal metal food can). Of the eight fire-cracked rock features described, two had associated charcoal stains. Because some of the chipped stone artifacts exhibited evidence of heat treatment, HSR archaeologists speculated that some of the fire-cracked rock features could have been used to thermally alter raw materials. They also observed three historic era caliche pits in the northwest portion of the site (FAA and NMSA 2010b:33–34).

In 2007 Zia adjusted the site boundaries and slightly increased the estimated size to 730 by 290 m (159,801 sq m; 15.98 ha; 39.48 acres) based on the surface artifact distribution observed at that time (Quaranta and Gibbs 2008). They recorded Formative, Archaic, and Middle Archaic

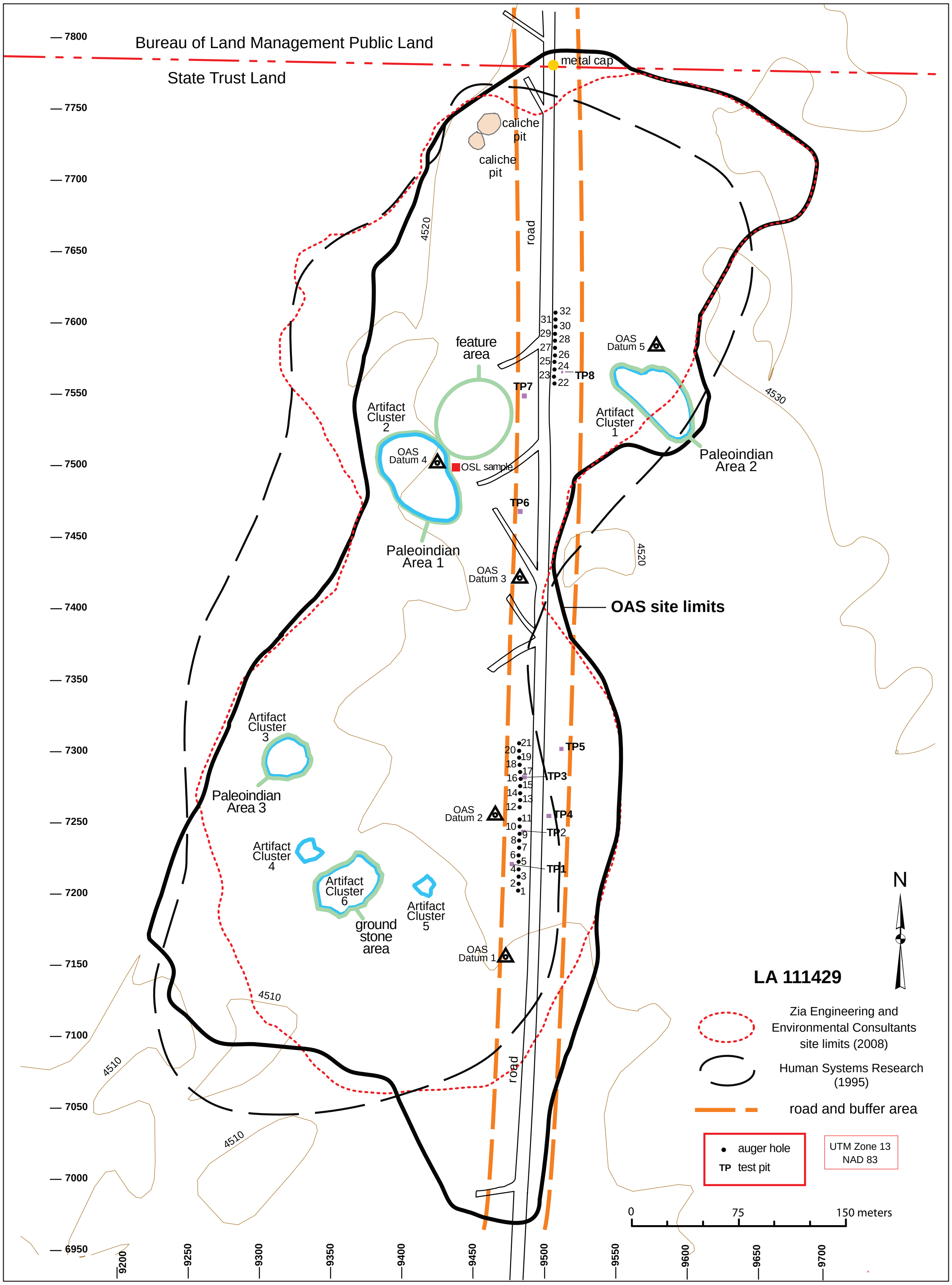

Figure 5.1. LA 111429 site plan, showing boundaries proposed by HSR and Zia.

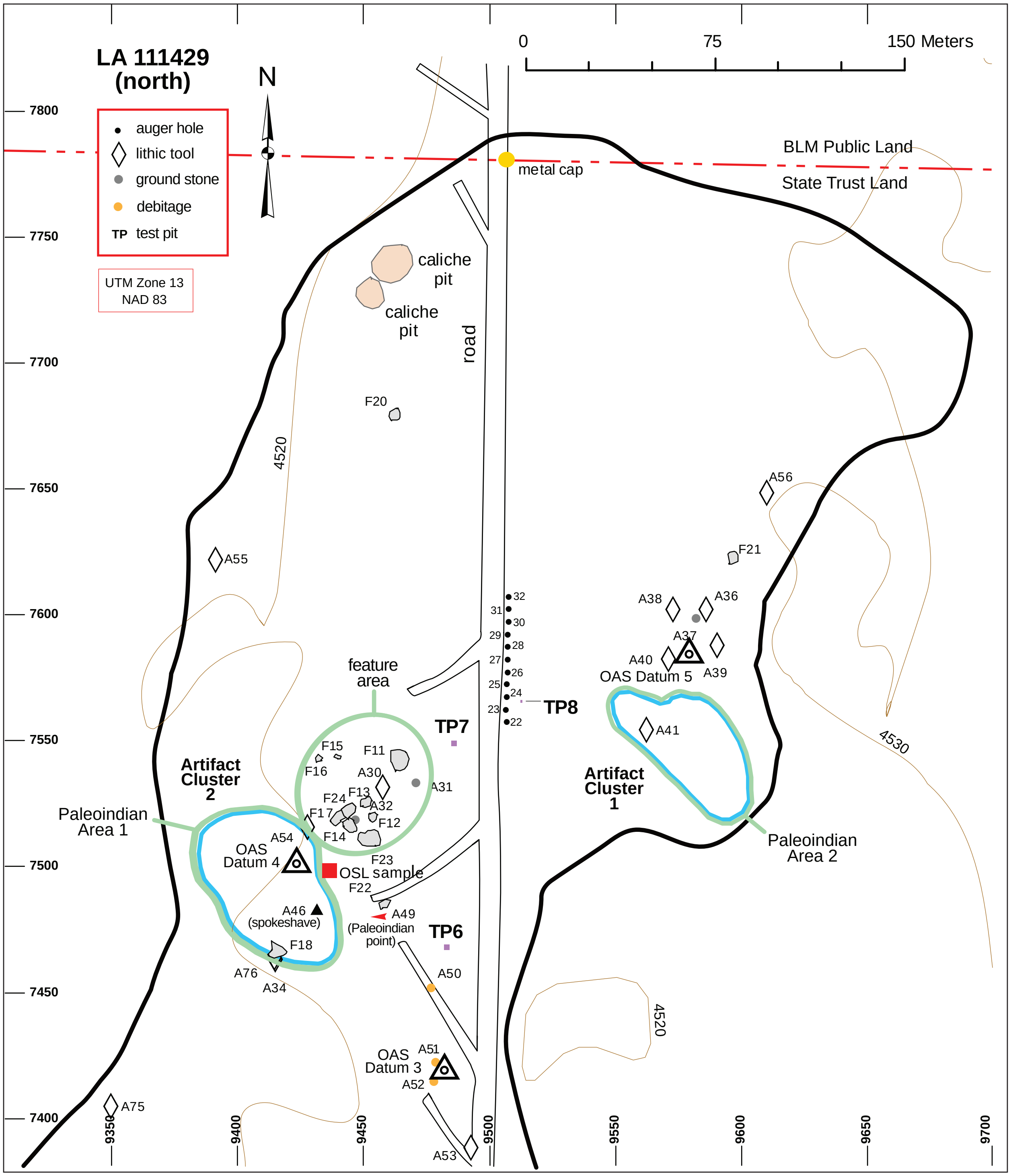

Figure 5.2. Detailed plan of the north area of LA 111429.

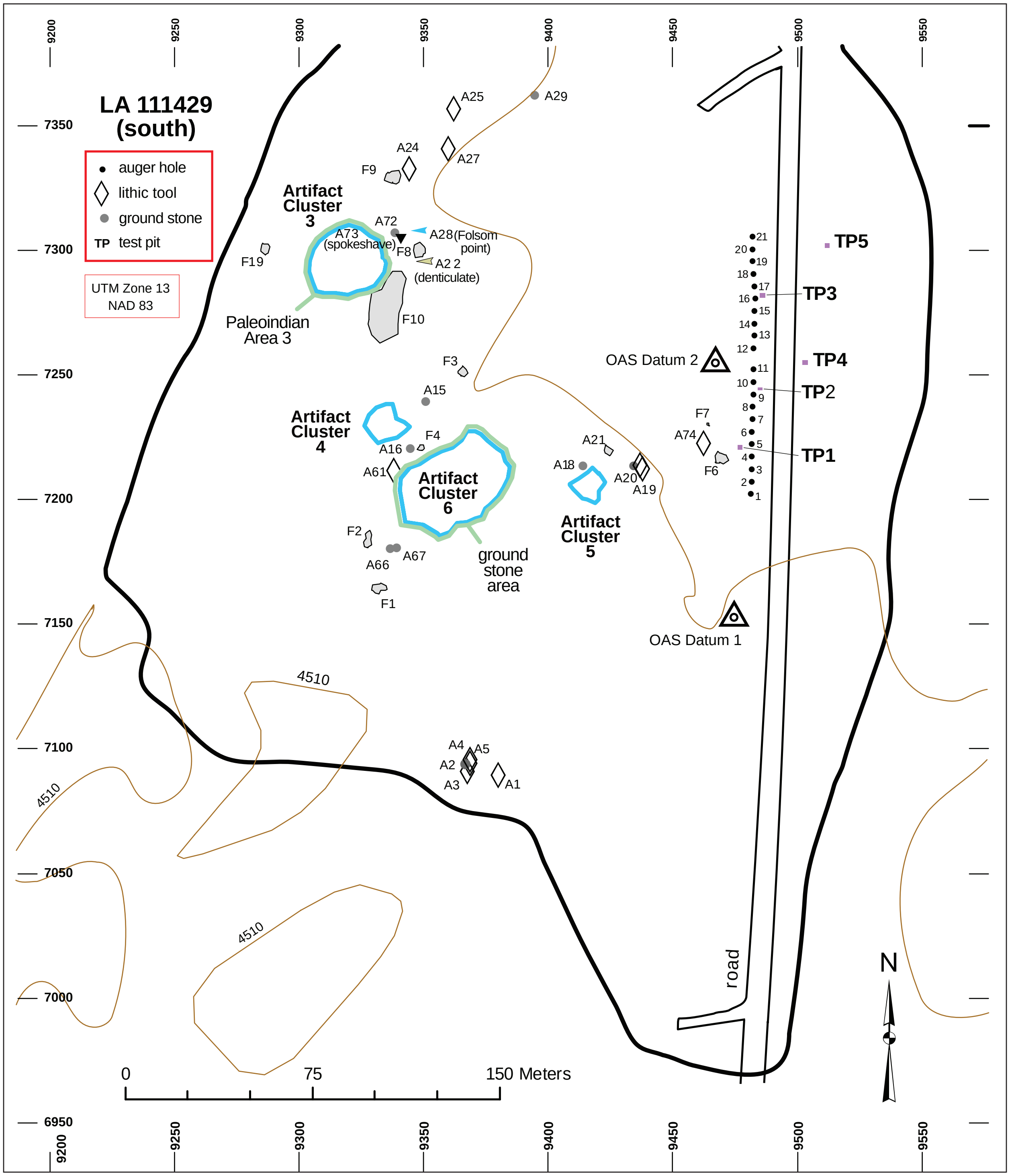

Figure 5.3. Detailed plan of the south area of LA 111429.

projectile points, a knife blade, and a variety of scrapers (n = 9), but no ceramics. A sample of 155 pieces of chipped stone debris was analyzed in the field (8 cores, 8 pieces of angular debris, and 139 flakes); 15 pieces of ground stone (complete and fragments of one-hand manos, fragments of slab and basin metates, and a hammerstone) were described. They also documented 21 fire-cracked rock features that are scattered throughout the site area. Zia archaeologists ascribe a communal food-processing function to some of the thermal features. In addition to the described features, they noted a small number of anomalous depressions. This site and others on the east side of Jornada Draw are postulated as kill and/or meat-processing locations for Paleoindian hunters and favorable camp locations for Archaic and Formative groups (FAA and NMSA 2010:32–35; Quaranta and Gibbs 2008:239–240).

Test Excavations

Before work at LA 111429 began, a licensed surveyor working for OAS established five datums for horizontal and vertical control. Datum 1 was placed on the west side of the road in the southern part of the site (155.589N/472.129E), and Datum 2 is 100 m farther north in the highest part of the site. Datum 2 (255.485N/464.67E) was assigned an arbitrary elevation of 10.0 m, and all vertical measurements were referenced to this point. Datum 3 is another 166 m north of Datum 2 between two bar ditches on the west side of the road (421.884N/481.954E), and Datum 4 is 81 m north of that in Artifact Cluster 2 (502.87N/424.18E). Datum 5 is the farthest north of the datums (584.95N/578.03E), the only one on the east side of the road. Topography and vegetation made mapping difficult, so a GPS unit was used to record some parts of the site. Because of the size of LA 111429, investigations began with locating and renumbering the 21 features identified by Zia, locating additional features and clusters of artifacts, and estimating site boundaries. A sample of 76 surface artifacts was field analyzed, and 4 specimens were collected (a Folsom point fragment, an unidentified Paleoindian point fragment, and two metal film reels). The extent of the artifact scatter provides dimensions for this site of 821.75 m north–south by 308.81 m east–west, for an area of 177,940 sq m (43.97 acres; 17.80 ha). This is larger than the sizes recorded during both previous surveys (Fig. 5.1), conforming somewhat more closely to the shape defined by Zia. Major differences include a retraction of boundaries in the northwest part of the site, and extensions in the south, northeast, and southwest. As defined by the OAS, LA 111429 is 15 percent larger than it was when originally recorded by HSR and about 10 percent larger than it was when rerecorded by Zia. As discussed in Chapter 4, these discrepancies are attributable to the greater amount of time spent on-site during testing when compared to survey.

Test excavations at LA 111429 were restricted to a buffer zone within 15 m of each side of the existing bed of County Road A020 in order to determine whether or not intact cultural deposits might exist in that zone. This was done to assess a corridor for the potential widening of the road through this area and provide an area within which bar ditches can be built and maintained. As such, the limited testing conducted at LA 111429 does not provide comprehensive data for the site as a whole. The few surface artifacts visible through this zone were point provenienced and field analyzed. Descriptions of the excavated artifacts can be found in Appendix 1.

Auger tests. Auger transects containing 32 auger tests were placed on either side of the north–south trending road. AUs 1–21 were on the west side of the road near Datum 2 (Fig. 5.3). The second transect was east of the road and west of Paleoindian Area 2 (Fig. 5.2). Tests in the southern transect ranged in depth from 21 cm (where the test was stopped by a large mesquite root) to 147 cm bgs. Three strata were defined along this transect. The uppermost layer was loose silty sand ranging from 28–74 cm thick and becoming progressively thicker from north to south. Next was the more compact Pleistocene B soil horizon, which contained some caliche flecks and was up to 70 cm thick. An impenetrable layer of calcrete was the third stratum, reached between 92 and 118 cm bgs. Auger tests in the northern transect ranged in depth from 61 to 106 cm bgs. The loose upper layer of sediments in this area was thick (44–74 cm) and overlay the Pleistocene B soil horizon, with some caliche flecks occurring at about 60 to 90 cm bgs. Calcrete was encountered between 86 and 92 cm bgs in most tests.

Hand-excavated units. Eight test pits were placed along the road corridor within a 15 m zone adjacent to both edges of the current road bed. These units were originally laid out as 2 by 2 m tests, but they were excavated as individual 1 by 1 m grid units. Not all four of the 1 by 1 m grids in a unit were necessarily excavated, and individual 1 by 1 m grid units were sometimes excavated to different depths. Test Pits 1–5 were in the southern part of the site on or at the edges of a coppice dune ridge. Test Pits 6–8 were in the north part of the site and examined somewhat different topographic features. Test Pit 6 was in a flat eroded area containing few eolian deposits, while Test Pits 7 and 8 were in coppice dunes toward the north edge of the site. Each grid of a 2 by 2 m unit was excavated and recorded separately, and the first was dug in arbitrary 10 cm levels. Sediments in adjacent grids were removed by strata defined in the initial test pit.

Test Pit 1 (220–221N/476–477E, 10.76–11.09 mbd) was placed near Feature 6. Surface cover in all four grids consisted of sparse clumps of grass. The upper fill was a wind-deposited silty sand ranging from 6 to 12 cm thick and containing no gravel. The lower fill was heavily disturbed by rodent burrows and was comprised of the Pleistocene B sandy clay soil horizon with caliche inclusions. A single chert biface flake was recovered from the upper 2–5 cm in grid unit 221N/477E.

Test Pit 2 (244–245N/484–485E, 10.34–10.75 mbd) was placed along the road north of the first test unit near Datum 2. The southwest corner grid was excavated in four levels down to 10.75 mbd. Fill in the northwest and northeast grids was removed as two strata down to 10.55 mbd. The southeast grid was not excavated. A small amount of bunchgrass was rooted in the upper layer of eolian silty sand, which ranged from 4 to 10 cm thick. These sediments were loosely compacted and contained roots and insect casings. Beneath this was the Pleistocene B soil horizon, which was comprised of a compact sandy clay exhibiting considerable rodent disturbance. No artifacts were recovered from these grids.

Test Pit 3 (281–282N/485–486E, 10.04–10.95 mbd) was placed near the crest of the southern coppice dune. Nine levels of fill were removed from the southwest grid (281N/485E), revealing four strata (Fig. 5.4). The upper three strata were removed from grid unit 281N/485E, stopping at 10.72 mbd. Only the upper two strata were removed from the two northern grid units, where excavation ended at 10.33 mbd. The surface of the dune was covered by a layer of sand with sparse vegetation growing on it including some grass and snakeweed. The uppermost stratum in this test pit was 3–4 cm of loose eolian fine-grained sand containing a few rocks and some organic material. The second layer was an A soil horizon comprised of 12–22 cm of semiconsolidated and darker laminated sand containing roots and some recent plant material. This stratum became hard and clayey toward its base. The A soil horizon overlay a layer of 15–20 cm of semiconsolidated sand containing roots and insect burrows. The final layer was a compact dense sand containing a few small pebbles and a small amount of caliche, and grading into the more typical Pleistocene B soil horizon, a silty sandy clay that is much harder than the upper layers in this test pit and contains more caliche. No artifacts were recovered from this test unit. However, a bulk soil sample for radiocarbon analysis was taken from the A soil horizon, and OSL samples were obtained from the Holocene (n = 1) and post and pre-Holocene strata (n = 3).

Test Pit 4 (254–255N/502–503E, 9.89–10.34 mbd) was also near the crest of the southern coppice dune ridge but was on the east side of the road. The surface of this test pit was loose dune sand with a sparse growth of grass and snakeweed. Five levels of fill were removed from the southwest grid (254N/502E), revealing three strata. All four grids were excavated to the top of or just into the third stratum. The upper layer consisted of 4–12 cm of dune sand containing sparse gravels and roots, and was riddled with rodent holes. Beneath this was a 32–36 cm thick layer of compact sand containing roots, evidence of insect and rodent bioturbation, and occasional clay wash lenses. At the very base of the test pit was the Pleistocene B soil horizon, a compact sandy silt with some clay content (Fig. 5.5). No artifacts were recovered from this test pit.

Test Pit 5 (301–302N/951–952E, 10.05–10.50 mbd) was also on the east side of the road. The surface cover in this unit was the usual sparse grass in an eolian coppice dune formation. Five levels were excavated in the southwest grid (301N/951E), and three strata were identified. Excavation in the other three grids stopped at the

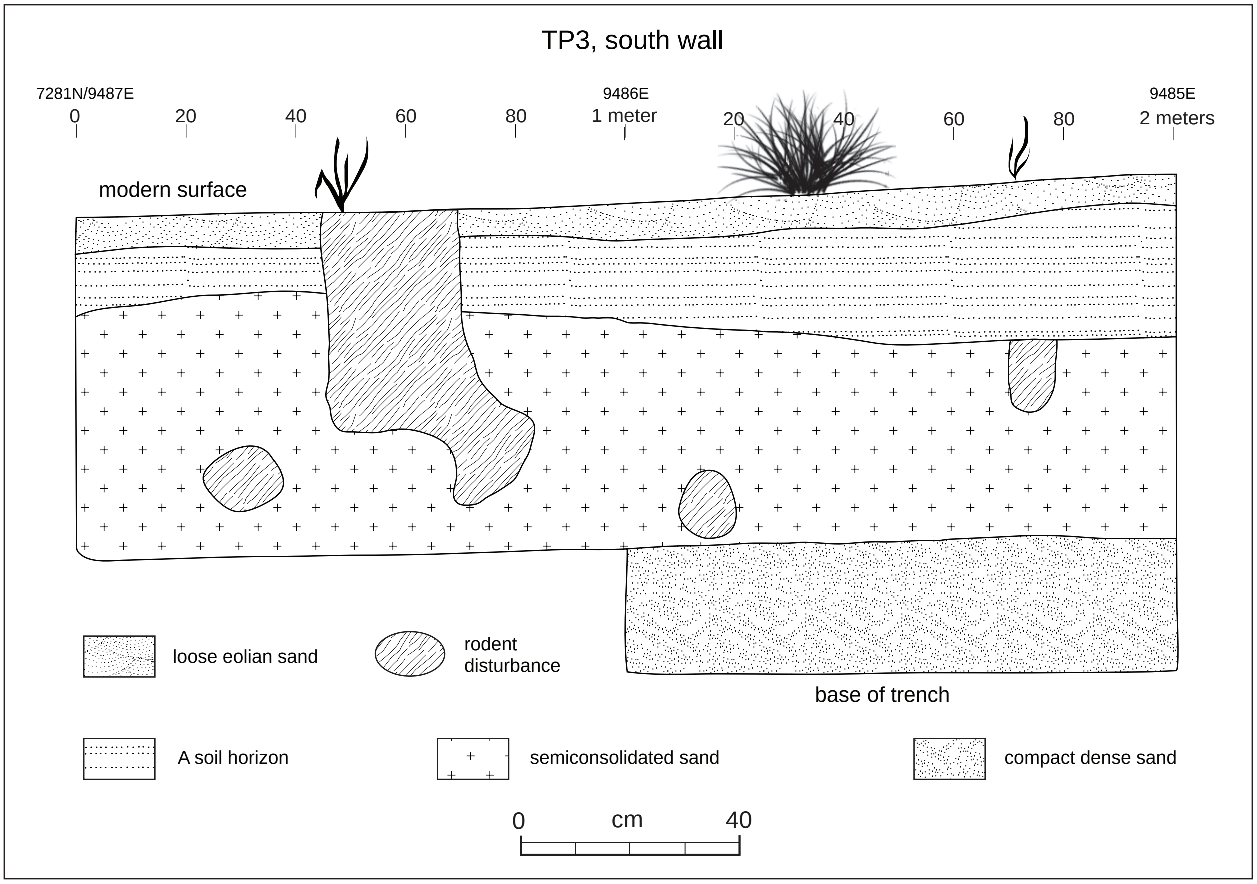

Figure 5.4. Profile of the south wall of Test Pit 3, LA 111429.

Figure 5.5. Test Pit 4, LA 111429, showing thick dune formation over Pleistocene soils.

top of the third stratum (10.40 mbd). The upper 4–8 cm of fill was a loose fine sand containing very occasional gravel. Beneath this was 20–30 cm of compacted fine-grained sand that lacked gravel but contained a few roots. At the base of the test pit was the Pleistocene B soil horizon, a compact silt. No artifacts were recovered from this test pit.

Test Pit 6 (467–468N/482–483E, 10.52–10.74 mbd) was placed at about the center of the north–south expanse of the site on the west side of the road in a flat silty area between two coppice dunes, with small patches of grass on the surface. Fill was removed from the southwest grid (467N/482E) in two levels to a depth of 10.74 mbd. No differences in strata were evident in this grid unit, and the other grid units were excavated to the same depth as a single level. The sediments in this test pit consisted of fine silty sand with a slight clay mix occurring in the lower portion. There was very little gravel and only minor rodent disturbance. A single chipped stone artifact (chert core flake) was recovered from the upper 10 cm of fill in grid unit 468N/482E.

Test Pit 7 (548–549N/485–486E, 9.37–9.96 mbd) was placed on top of a coppice dune on the west side of the road. Substantial grass patches covered the surface of this test pit. Fill in the southwest grid (548N/485E) was removed in five levels to a depth of 9.96 mbd, exposing three strata. Sediments in the other three grid units were removed by grid unit in single levels because no cultural deposits were identified in this test pit, with depths ranging from 9.58 mbd in the southeast grid to 9.83 mbd in the northwest grid. The upper layer was a 6 cm thick layer of loose dune sand covering 8–12 cm of slightly more compact sand containing grass roots (Fig. 5.6). At the base of this test pit was the Pleistocene B soil horizon, consisting of slightly compacted silty sand with sparse caliche inclusions. Extensive rodent burrows were found throughout this test pit, which yielded no artifacts.

Test Pit 8 (565N/512E, 9.42–10.22 mbd) was the farthest north of the test pits, on the east side of the road. Only the southwest corner grid of this test pit was excavated, and sediments were removed in eight levels. Grass covered a portion of the upper surface of this grid. Three strata were defined in this unit. The upper stratum was

Figure 5.6. Test Pit 7, LA 111429.

a 16–22 cm thick layer of eolian sand containing grass roots, a little gravel, and evidence of rodent disturbance. This stratum overlay the Pleistocene B soil horizon, a thick layer (52–60 cm) of blocky, semicompact sandy silt containing clay lenses, substantial rodent intrusions, sparse gravels, and flecks of caliche. At the base of the test pit, the sediments contained more caliche and were redder. No artifacts were recovered from this test pit.

Features

Zia located and briefly described 21 fire-cracked rock features at LA 111429 (Quaranta and Gibbs 2008:240). Using Zia's feature shape files loaded into a GPS unit, the OAS located and renumbered most of their features. At least one of the Zia features was eliminated, two were combined into a single feature, and others could not be located in the area indicated by the shape files. Additional features were found in areas that were not indicated in the Zia shape files. Ultimately, OAS located and numbered 24 features at this site (Table 5.1 and Appendix 2).

Most (64.0 percent) of the features at LA 111429 consist of dispersed scatters of fire-cracked rock with a concentration (Fig. 5.7). Only one (4.0 percent) is a core or concentration. The remainder have either no core concentration (12.0 percent) or a concentration with some scatter (20.0 percent). The maximum measurements for those with scatters range from 1.90 to 23.20 m north–south and 1.5 to 23 m east–west. Core areas are considerably smaller, measuring 0.70–6.70 m north–south by 0.90–5.2 m east–west. Estimated counts range from 11 to about 300 pieces of fire-cracked rock per feature, with more in the 50-to-100 category (36.0 percent) than any other. The maximum density for a 50 by 50 cm area in the densest portion of these features ranges from 3 to 50 pieces, with a mean of 16.4 pieces and standard deviation of 12.6. Most features contain a combination of cobbles and/or larger pieces of rock or caliche and highly fragmented pieces of fire-cracked rock (64.0 percent). Fewer features are mainly comprised of highly fragmented rocks (28.0 percent), or are mainly large pieces or cobbles (8.0 percent).

Caliche is the predominant fire-cracked

Table 5.1. Summary of data for recorded features, LA 111429

Feature No.	Feature Type	Estimated FCR Count	Maximum FCR Density	FCR Fragmentation	% Caliche	Feature Tested?	Comment	Information Potential
1	dispersed FCR with concentration	50–100	5	cobbles and highly fragmented	30.0%	yes	ash and biface flake in test	fair to good
2	dispersed FCR with concentration	50–100	5	cobbles and highly fragmented	60.0%	yes	part under dune	very low
3	FCR concentration and dispersed scatter	50–100	8	mostly cobbles	20.0%	yes	stain present	fair to good
4	dispersed FCR with concentration	<50	10	cobbles and highly fragmented	80.0%	no	<5 cm fill	very low
5	dispersed FCR with concentration	<50	7	highly fragmented	100.0%	no	–	very low
6	FCR concentration and dispersed scatter	50–100	15	cobbles and highly fragmented	75.0%	yes	subsurface rock present	fair to good
7	FCR concentration	12	7	cobbles and highly fragmented	90.0%	yes	–	low
8	dispersed FCR with concentration	300	26	highly fragmented	96.0%	yes	<5 cm fill	very low
9	dispersed FCR with concentration	>200	24	cobbles and highly fragmented	94.0%	no	–	low
10	dispersed FCR with concentration	50–100	21	highly fragmented	94.0%	no	large scatter with 2 core areas	low
		100–200	16	highly fragmented	80.0%	no	large scatter with 2 core areas	low
11	FCR concentration and dispersed scatter	>200	50	cobbles and highly fragmented	80.0%	no	stain present	good
12	dispersed FCR with concentration	100–200	27	cobbles and highly fragmented	95.0%	yes	biface flake in test	fair
13	FCR concentration and dispersed scatter	50–100	25	cobbles and highly fragmented	80.0%	yes	<5 cm fill	very low
14	dispersed FCR with concentration	>200	16	highly fragmented	95.0%	no	–	low
15	dispersed FCR scatter	11	4	cobbles and highly fragmented	10.0%	no	–	low to fair
16	FCR concentration and dispersed scatter	75	16	cobbles and highly fragmented	60.0%	yes	<5 cm fill	low
17	dispersed FCR with concentration	50–100	12	cobbles and highly fragmented	90.0%	no	subsurface rock present	fair
18	dispersed FCR with concentration	<50	4	cobbles and highly fragmented	80.0%	no	–	low
19	dispersed FCR with concentration	50–100	3	highly fragmented	95.0%	no	–	low to fair
20	dispersed FCR with concentration	300	50	cobbles and highly fragmented	95.0%	no	<5 cm fill	very low
21	dispersed FCR scatter	50–100	20	cobbles and highly fragmented	95.0%	no	–	very low
22	dispersed FCR scatter	20	8	highly fragmented	0.0%	yes	subsurface rock present	very low
23	dispersed FCR with concentration	<50	10	mostly cobbles	90.0%	no	<5 cm fill	very low
24	dispersed FCR with concentration	100–200	20	cobbles and highly fragmented	90.0%	no	part under dune	low

Note: *Cobble* includes rounded cobble forms and large chunks of caliche.
FCR = fire-cracked rock

Figure 5.7. Feature 3, LA 111429, a fire-cracked rock concentration with dispersed scatter.

rock type for all but four features and ranges from absent to 100 percent of the material (mean 75 percent, standard deviation 29). Limestone (which occurs as pebble to cobble-sized nodules in the caliche deposits at this site) is the second most common material and was noted in all but three features. This material comprises between 2 and 70 percent of the rock in features (mean 13.5 percent, standard deviation 17.3). Igneous rock (usually rhyolite but also including vesicular basalt) was recorded in just under half (48 percent) of the features and comprised between 1 and 31 percent of the rock in these features (mean 6.8 percent, standard deviation 9.9). Quartzite was rare, occurring in only seven features and comprising between 2 and 20 percent of the rock in those features (mean 2 percent, standard deviation 4.5). Sandstone (which also occurs as small red nodules in the caliche deposits) was seen in eight features, with a distribution similar to that of quartzite (range 1–20 percent, mean 2.2 percent, standard deviation 4.7). Other rock types included chert, silicified wood, and granite. These materials were always rare; they occurred in only four features and comprised from 1 to 8 percent of the included rock (mean 0.7 percent, standard deviation 1.9).

Feature location was coded as interdunal, stabilized soil, or brown paleosol (Pleistocene B soil horizon). Assignment was somewhat arbitrary as more than one of these categories could apply. Interdunal soils were generally the browner paleosol, as was the stabilized soil. Features in areas with stabilized soil (six were recorded) and brown paleosol (six were recorded) are mainly on the ridge top and along the western slope, where there is less substantial dune formation.

At LA 111429, the primary goal was to record the features, and less attention was paid to noting the types of artifacts in and around feature areas. Artifact clusters were recorded independently and will ultimately be considered in conjunction with individual features. Ground stone was associated with eight features, and a collector's pile was noted near another. Chipped stone artifacts are generally present or not noted. At least 10 features have heat-treated debitage in their vicinity.

Ten features were tested by 20 by 20 cm hand-excavated units. These units were placed in locations that had the potential to reveal whether there was subsurface rock, ash, or charcoal present. The feature with the most potential to contain intact deposits (Feature 11; Fig. 5.8) has a large associated stain containing charcoal visible from the surface. This feature was not tested since we already knew that it has the potential to provide samples suitable for radiocarbon and subsistence analyses. A stain was visible downslope from the core area of Feature 3, and while the core area of this feature was tested, the stain was not. No charcoal was observed in the test unit. No other features have evident stains in association, and only Feature 1 had charcoal in the fill investigated by the test. There was also a small biface flake in the fill of this and one other feature.

Features with the most potential to provide chronometric samples or subsistence samples, or are associated with diagnostic artifacts, include:

- Feature 1 had ash and a biface flake in the test.
- Feature 3 has a stain near the fire-cracked rock concentration.
- Feature 6 contains subsurface rock.
- Feature 11 contains a substantial ash deposit with charcoal on the surface.
- Feature 17 contains subsurface rock.

Other features may be determined to have research potential based on their proximity to artifact clusters.

Artifact Assemblage

A total of 76 artifacts were field analyzed at LA 111429, 2 were recovered during excavation, and 4 were both field analyzed and collected for further analysis. This provided a sample of 78 artifacts for this site (see Appendix 1 for artifact data). Because of the size of this site and the number of artifacts included in the several clusters that were defined, the clusters were described, but artifacts within them were not inventoried. Field analysis focused on formal tools, though a few other interesting specimens were also recorded. Thus, this analysis provides a limited view of the assemblage at this site that is useful for planning purposes but does not provide detailed functional data.

The sample of field analyzed artifacts

Figure 5.8. Feature 11, LA 111429, a fire-cracked rock concentration with scatter and stain.

includes 2 historic artifacts and 26 ground stone tools in addition to 50 chipped stone specimens. The ground stone assemblage includes 11 pieces of one-hand manos, 1 metate fragment, 10 undifferentiated mano fragments, and 4 unidentifiable fragments of ground stone tools. Basalt is the dominant material type used for the manufacture of ground stone tools in our sample, with 4 one-hand manos, 5 manos, and 1 piece of a ground stone tool made of this material. Sandstone is the second most common material, represented by 2 one-hand manos, 2 manos, the metate, and a piece of a ground stone tool. Two one-hand manos and a mano are made from metaquartzite; similarly, 2 one-hand manos and a mano are made from unidentified igneous materials. The last four specimens include a mano made from an unidentified material, a rhyolite one-hand mano, a mano made from an unidentified metamorphic material, and an unidentified orthoquartzite ground stone tool. The historic artifacts are two motion picture film rolls that are described in more detail in Chapter 7.

Table 5.2 shows the distribution of artifact morphology by material type for the field and fully analyzed chipped stone artifacts. This assemblage is dominated by chert, which comprises 72 percent of the total. Limestone is the second most common material type, making up 10 percent, followed by rhyolite at 8 percent. The only nontool artifacts that were field analyzed were four core flakes (two chert, two undifferentiated metamorphic) found in the buffer zone along County Road A020 and a chert overshot flake found elsewhere on the site. The latter was recorded because it is an example of a mistake made during biface manufacture. Only two specimens were recovered during excavation, and include a core flake and a biface flake, both made of chert. Otherwise, only tools and the occasional core were field analyzed. This part of the assemblage includes bifaces (n = 17), followed by unifaces (n = 13), cobble tools (n = 7), and cores (n = 6).

None of the six middle-stage bifaces could be assigned a more specific function. Four specimens exhibit lateral snaps indicative of manufacturing breakage, while two exhibit nondiagnostic breaks. No more specific function could be assigned to 8 of the 11 late-stage bifaces. Four of these specimens exhibit lateral snaps, and 1 has a reverse fracture, all of which are indicative of manufacturing breakage. The last three specimens exhibit nondiagnostic breaks. The three other late-stage bifaces are projectile points, including the medial portion of a Folsom point (Fig. 5.9a), a proximal fragment of an unidentified Paleoindian point (Fig. 5.9b), and the midsection of a large unidentified point.

Thirteen chert unifaces were also recorded. Four basic tool types occur in this small sample, including a denticulate made on a late-stage uniface, an early-stage uniface that could not be assigned a more specific function, a scraper-spokeshave made on a middle-stage uniface, and 10 end scrapers. The latter include 8 specimens made on early- (n = 7) and middle- (n = 1) stage unifaces; the others are spurred end scrapers, with one apiece made on early- and late-stage unifaces. It should also be noted that many, if not most, of the other eight end scrapers are also spurred end scrapers, but were not initially differentiated. All seven cobble tools are choppers; five are made of durable materials including basalt, rhyolite, and limestone, and two are made of nondurable cherts. Six cores were also recorded, one because it appeared to have been made from Alibates silicified dolomite. The other cores were recorded early in the examination of this site and served to help define the boundaries of the scatter before it became apparent just how many artifacts there were at LA 111429.

As noted above, six artifact clusters were defined and described for this site. Artifact Cluster 1 (Paleoindian Area 2; Fig. 5.2) is in the northeast part of the site and contains 200–300 surface artifacts, mostly made from various cherts, including San Andres. Glossy, probably thermally altered chert flakes are very common, and many appear to have been struck from bifaces, including at least one edge bite. Several small biface flakes were observed in an ant shield, and most visible artifacts occur in deflated areas, suggesting that there might be some shallow subsurface deposition in this part of the site, perhaps up to 10 cm in depth. The presence of at least one spurred end scraper in this area, the amount of thermal alteration noted, and the extensive amount of debris derived from biface reduction suggest that this area represents a Paleoindian- or Archaic period component, with the former probably being more likely.

Table 5.2. Material type by artifact morphology for all chipped stone artifacts that were field analyzed or collected, LA 111429

Material Type		Core Flake	Biface Flake	Overshot Flake	Unidirectional Core	Bidirectional Core	Multidirectional Core	Unidirectional Cobble Tool	Bidirectional Cobble Tool	Early-Stage Uniface	Middle-Stage Uniface	Late-Stage Uniface	Middle-Stage Biface	Late-Stage Biface	Total
In-Field Analysis of Surface Artifacts															
Chert	Count	2	–	1	1	–	–	–	2	9	2	2	5	7	31
	Row %	6.5%	–	3.2%	3.2%	–	–	–	6.5%	29.0%	6.5%	6.5%	16.1%	22.6%	67.4%
Alibates chert	Count	–	–	–	–	1	–	–	–	–	–	–	–	–	1
	Row %	–	–	–	–	100.0%	–	–	–	–	–	–	–	–	2.2%
Basalt	Count	–	–	–	–	–	–	–	1	–	–	–	–	–	1
	Row %	–	–	–	–	–	–	–	100.0%	–	–	–	–	–	2.2%
Rhyolite	Count	–	–	–	–	–	2	1	–	–	–	–	1	–	4
	Row %	–	–	–	–	–	50.0%	25.0%	–	–	–	–	25.0%	–	8.7%
Limestone	Count	–	–	–	1	–	1	2	1	–	–	–	–	–	5
	Row %	–	–	–	20.0%	–	20.0%	40.0%	20.0%	–	–	–	–	–	10.9%
Metamorphic undifferentiated	Count	2	–	–	–	–	–	–	–	–	–	–	–	–	2
	Row %	100.0%	–	–	–	–	–	–	–	–	–	–	–	–	4.3%
Metaquartzite	Count	–	–	–	–	–	–	–	–	–	–	–	–	2	2
	Row %	–	–	–	–	–	–	–	–	–	–	–	–	100.0%	4.3%
Total	Count	4	–	1	2	1	3	3	4	9	2	2	6	9	46
	Row %	8.7%	–	2.2%	4.3%	2.2%	6.5%	6.5%	8.7%	19.6%	4.3%	4.3%	13.0%	19.6%	100.0%
Full Analysis of Excavated Artifacts															
Chert	Count	1	1	–	–	–	–	–	–	–	–	–	–	2	4
	Row %	25.0%	25.0%	–	–	–	–	–	–	–	–	–	–	50.0%	100.0%
Total	Count	1	1	–	–	–	–	–	–	–	–	–	–	2	4
	Row %	25.0%	25.0%	–	–	–	–	–	–	–	–	–	–	50.0%	100.0%
Table total	Count	5	1	1	2	1	3	3	4	9	2	2	6	11	50
	Row %	10.0%	2.0%	2.0%	4.0%	2.0%	6.0%	6.0%	8.0%	18.0%	4.0%	4.0%	12.0%	22.0%	100.0%

Figure 5.9. Paleoindian stone tools recovered during testing: (a) Folsom Point fragment from LA 111429; (b) Paleoindian point fragment from LA 111429; (c–e) Folsom point fragments from LA 155963; (f–g) Paleoindian point fragments from LA 155963; (h–i) spurred end scrapers from LA 155963.

Artifact Cluster 2 (Paleoindian Area 1; Fig. 5.2) is in the northwest part of the site and contains 300–400 surface artifacts, mostly made from cherts and aphanitic rhyolites. As in Artifact Cluster 1, there were many glossy, probably thermally altered pieces of chert debitage in this cluster. Much evidence for biface reduction was seen, including biface fragments with fractures diagnostic of manufacturing breakage, as well as numerous biface flakes. Most of the artifacts in this cluster occur in slightly deflated areas containing numerous pebbles on the surface. Adjacent undeflated zones have few pebbles on the surface and are 10–15 cm higher than the deflated areas, suggesting that a thin mantle of sediment covers the pebbled surface that contains the artifacts. The large amount of thermal alteration noted and the extensive amount of debris derived from biface reduction suggest that this area represents a Paleoindian- or Archaic-period component, with the former probably being more likely.

Artifact Cluster 3 (Paleoindian Area 3; Fig. 5.3) is in the southwest part of the site adjacent to the area in which the Folsom point was found during testing. About 50–100 pieces of debitage occur in this area, mostly cherts. There are many glossy, probably thermally altered chert flakes in this area, and several biface flakes were noted. However, the presence of many small fragments of burned caliche may indicate that this cluster represents a discard zone associated with thermal features (Features 8 and 10) to the east and southeast, so the association of these materials with the Folsom point is questionable. The presence of a fairly high proportion of thermally altered debitage and biface flakes could also suggest an Archaic affiliation for this cluster.

Artifact Cluster 4, in the southwest part of the site (Fig. 5.3), contains 50+ pieces of debitage, mostly chert flakes, and a metaquartzite biface fragment. Very few pieces of burned caliche were observed in this cluster. There is less evidence for the thermal alteration of chert that was seen in Artifact Clusters 1–3, though some glossy specimens were noted. This cluster is fairly discrete and appears to be eroding out of a thin surface layer of wind-deposited silt. The smaller degree of thermal alteration and evidence for biface reduction suggests a post-Archaic, Formative-period affiliation.

Artifact Cluster 5 is in the south-central part of the site (Fig. 5.3) and contains 100+ pieces of debitage, mostly comprised of a gray chert, as well as a few pieces of ground stone. This cluster is fairly discrete, and may be associated with Feature 1, which is to the northeast. The presence of a few pieces of burned caliche suggests that this cluster either represents a discard area or an activity area in which some discard of rubbish also occurred. The comparative lack of evidence for the thermal alteration of cherts in addition to little visible evidence for biface manufacture suggests a post-Archaic, Formative-period affiliation.

Artifact Cluster 6 (Ground Stone Area; Fig. 5.3) in the southwest part of the site consists of a heavy concentration of ground stone, with at least 50+ pieces of debitage and numerous fragments of burned caliche in association. This cluster may be related to the use of Feature 2, which is to the west, but this is only suggested by proximity rather than direct association. The materials seen in this small chipped stone assemblage are not of the same high quality noted elsewhere. This, in addition to the large number of ground stone tools in this area, suggests a post-Archaic, Formative-period affiliation.

Summary and Recommendations

Excavation in the hand-excavated grid units indicates that the buffer area along the county road has little potential for containing buried cultural deposits. No further work is planned for this portion of the site at the present time. Data collected from this area during testing will, however, contribute to addressing the research questions posed in the plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010b). If improvements along County Road A020 are contemplated for the LA 111429 site area, the disturbance corridors should be assessed.

LA 111429, an excellent location for short-term camps, was used repeatedly between the Paleoindian and Formative periods. No evidence of long-term residential use of the site was noted, and this pattern of short-term interior basin use by small groups of people to collect floral and faunal resources has been suggested for both the Archaic and Formative periods (see Chapter 3). As also discussed in that chapter, Amick (1994,

1996) suggests that Folsom occupations in the Hueco and Tularosa Basins to the south and west of the study area were oriented toward hunting game other than bison, and a similar pattern might be expected in the study area. With an intermittent water source nearby (Jornada Draw) and exposures of calcrete that could be used in thermal features, LA 111429 represents a juxtapositioning of floral, faunal, and other resources, making it a prime location for hunter and hunter-gatherer camps.

A research design that includes research-oriented work at this site has been submitted to the proper permitting agencies (Moore et al. 2010b). This plan proposes a range of work that will aid in identifying specific temporal or functional components through investigations targeting the possible Paleoindian artifact clusters, the ground stone area, and the feature area shown in Figures 5.1–5.2. Mechanically excavated geomorphology soil trenches will allow the collection of soil and OSL dating samples and further investigate geomorphic processes at the site.

LA 111429 will not be directly affected by Spaceport America construction activities. However, this site has considerable time depth (as much as 12,000 years) and is well preserved. As proposed in the research design (Moore et al. 2010b), targeted research-oriented investigations in areas that could contain deep deposits or an abundance of surface materials could yield information on site chronology (Research Question 1), settlement, land use, and access to resources and subsistence practices (Research Questions 3–5), and would allow us to better characterize the site occupations and interactions with residents of other regions (Research Questions 6 and 7).

LA 155963

LA 155963 is a large artifact scatter containing numerous features (Figs. 5.10–5.13) that dates to the Paleoindian, Archaic, Early Mesilla through the Doña Ana phases of the Jornada Mogollon, and late nineteenth–early twentieth centuries. The site lies just west of the HLA in the vicinity of the Spaceport America entrance road. A power line runs along the southern boundary of the site, and County Road A021 parallels the southern site boundary. A north–south waterline passes through the east edge of the site, an infrastructure corridor has been built through the southern part of the site, and a tank and associated booster station have taken a small area out of the eastern edge. Potential construction effects include construction and improvements to the entrance road and the access road, a security and perimeter/game fence, and the tank and associated booster station (FAA and NMSA 2010:19).

Site Setting

LA 155963 is on the southern and southeastern slopes of a low, gently sloping hill. Soils are of mixed depths with exposed caliche nodules associated with shallow sediments. A southeast-trending drainage bisects the central part of the site (Fig. 5.12). Vegetation is mainly creosote bush, four-wing saltbush, and mesquite. Mesquite-stabilized coppice dunes with active eolian accumulation occur, with limited grass cover between the dunes. The site is about 800 m east of the Aleman Ranch. Southeast-trending Aleman Draw lies 200 m southeast of the site boundary.

Previous Work

LA 155963 was originally recorded by Zia in 2007 (Quaranta and Gibbs 2008) and was described as a large prehistoric artifact scatter with associated features covering an area measuring 1,075 by 498 m (501,654 sq m; 50 ha; 124 acres), with two core areas and artifacts dating to the Late Archaic and the Mesilla phase of the Jornada Mogollon. Features were located and described, and a sample of 37 pieces of chipped stone debitage was analyzed. Core Area 1 is described as a 100 sq m area containing about 20 fire-cracked rock features and chipped and ground stone artifacts. Most of the features in this area are eroded and scattered. Core Area 2 is the same size but has only one defined feature, a burned caliche and fire-cracked rock feature. Also noted were dense concentrations of fire-cracked rock, charcoal stains, midden deposits, numerous small brown ware ceramics, two gray ware ceramics, 10 pieces of ground stone, abundant chipped stone, a San Pedro point, and the potential for buried pit structures. The surface artifact assemblage was estimated in the 10,000s for chipped stone

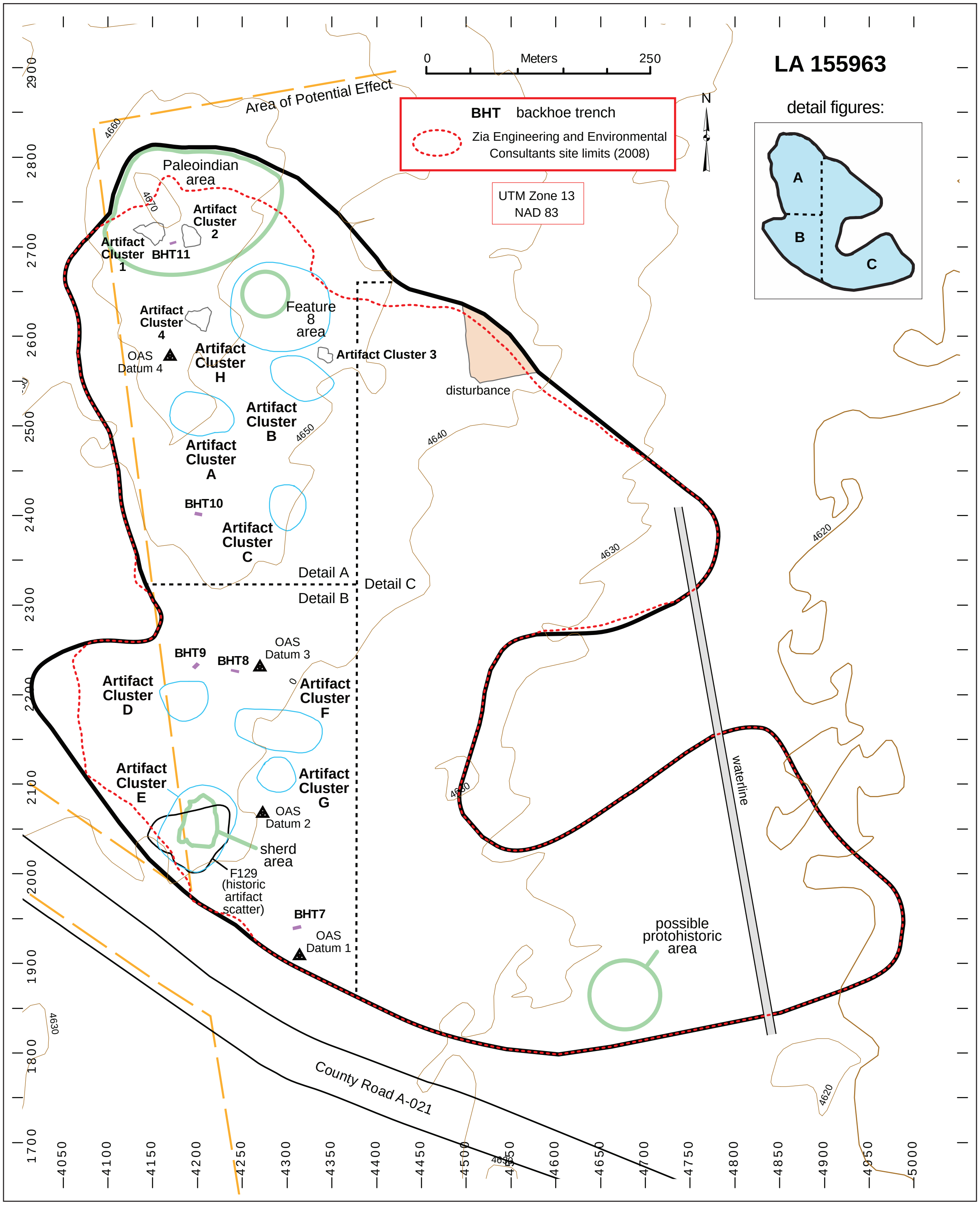

Figure 5.10. LA 155963 site plan.

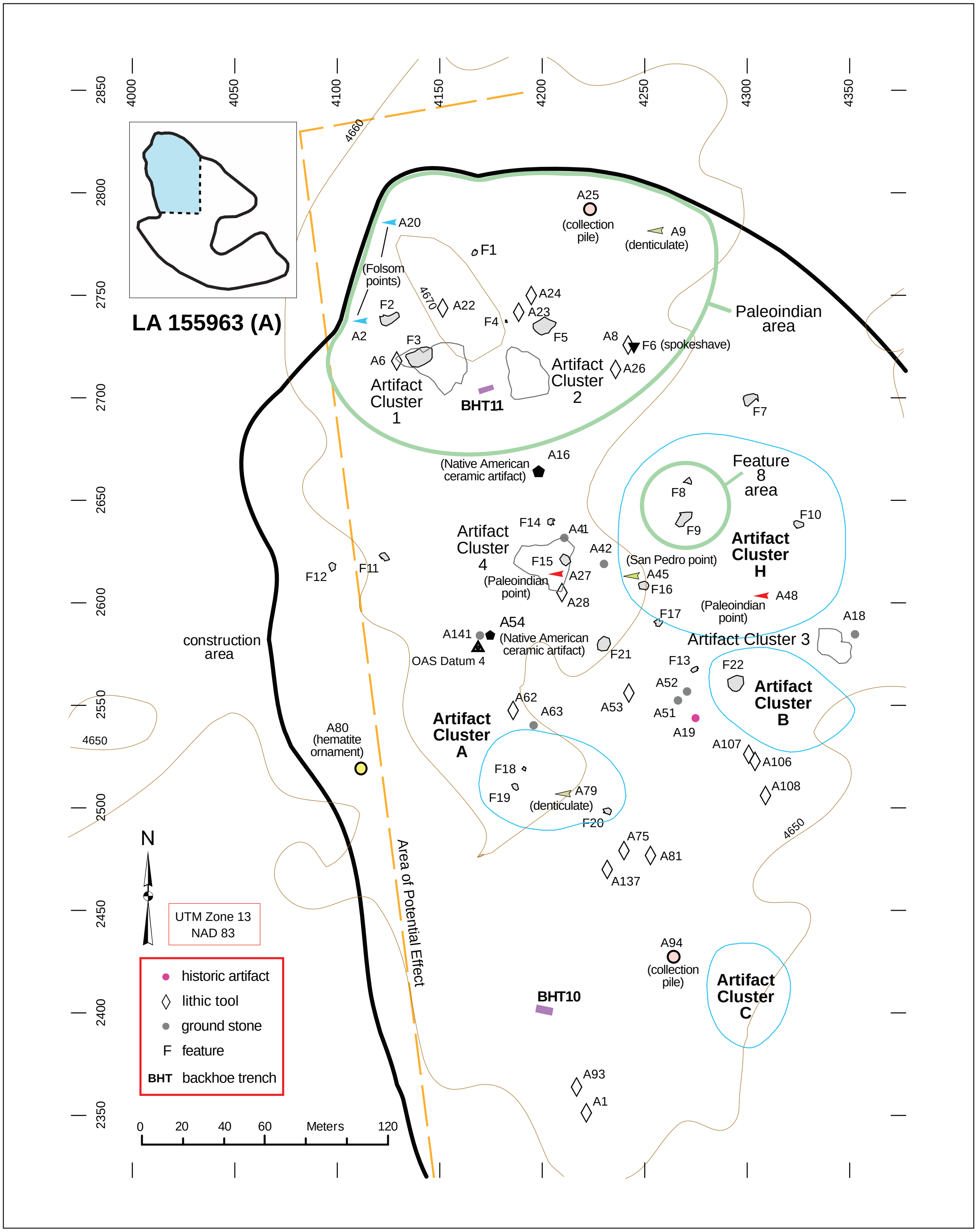

Figure 5.11. Plan of northwest quadrant, LA 155963.

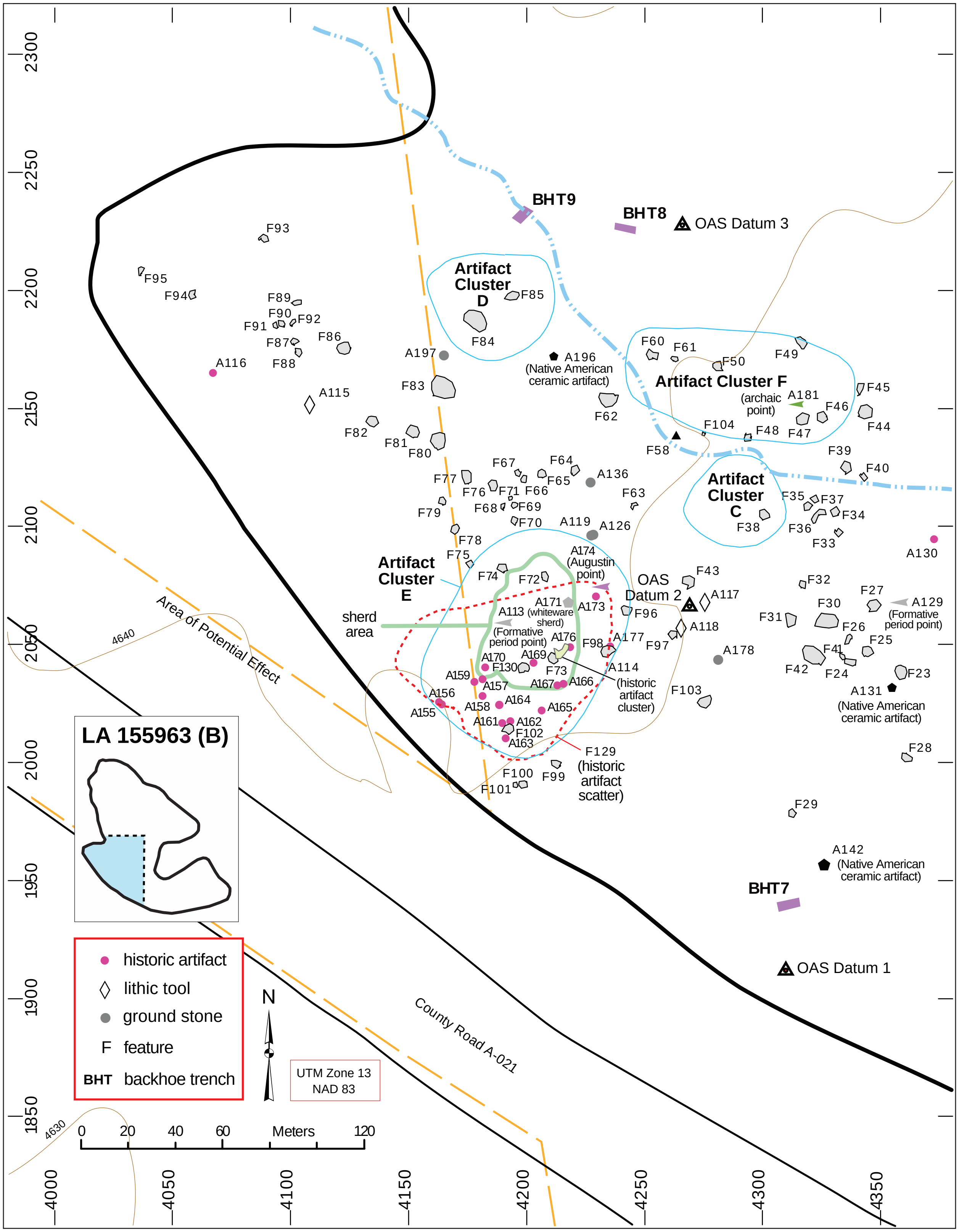

Figure 5.12. Plan of southwest quadrant, LA 155963.

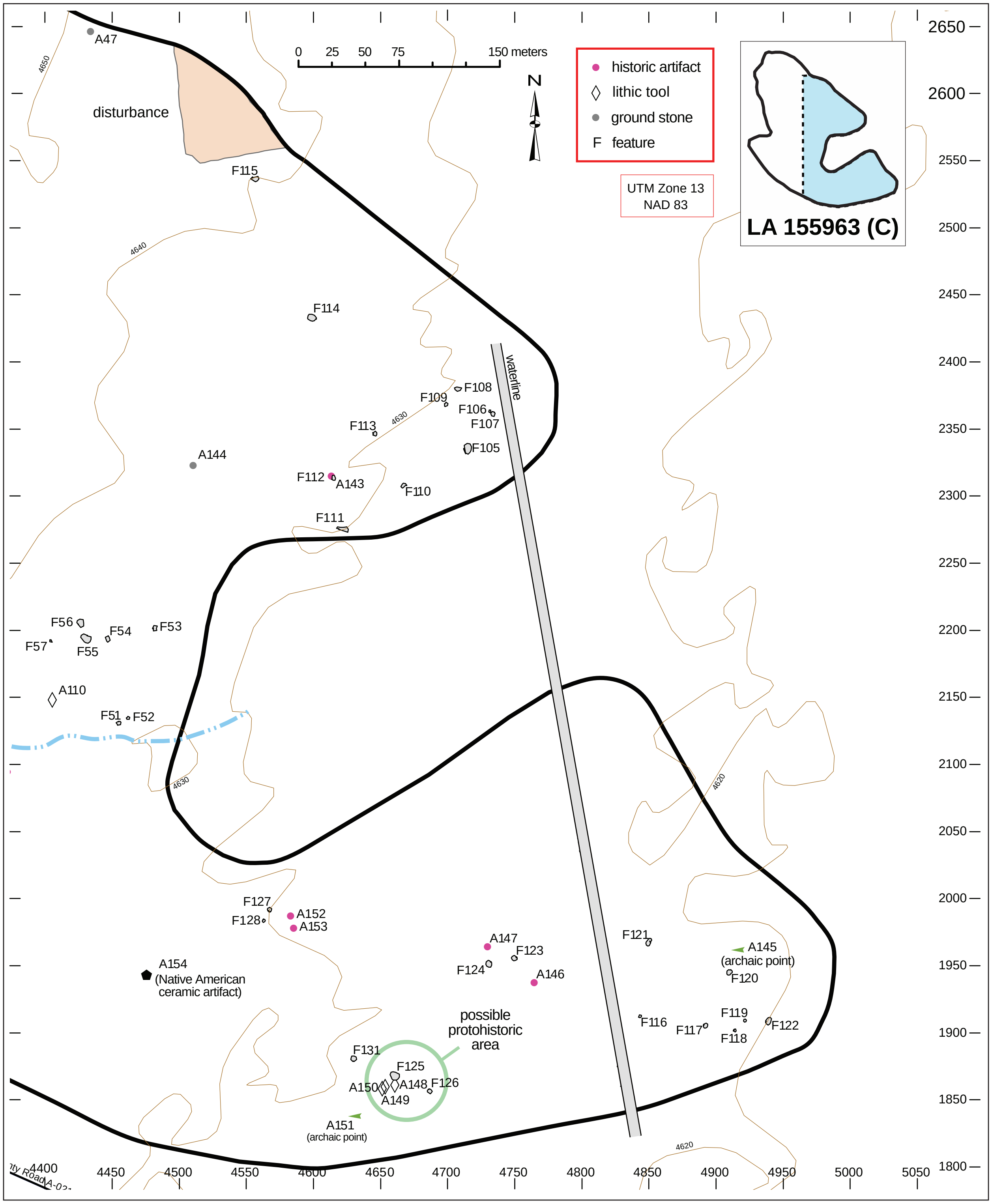

Figure 5.13. Plan of east half, LA 155963.

artifacts, and the recorders stated that 40 cm of cultural deposits were visible in erosion channels. A sample of the ground stone (5 manos, 4–5 metate fragments, a boulder with grinding, and 2 hammerstones), chipped stone tools (the projectile point, 3 flake tools, 3 scrapers, a graver, a chopper, and a drill), and debitage (2 pieces of angular debris and 35 flakes) were analyzed (FAA and NMSA 2010:18, Quaranta and Gibbs 2008:132–133, 139–142).

Zia archaeologists felt that the artifact assemblage and features indicate multiple use-episodes and could represent some of the earliest Formative period use of the area. The proposed Late Archaic or Early Mesilla phase component was based on the presence of a San Pedro point that they felt could represent an early agricultural period occupation (Quaranta and Gibbs 2008:141). El Paso Brown ware and Chupadero Black-on-white ceramics in Core Area 2 suggested a later occupation (FAA and NMSA 2010b:18).

Additional visits to locate site boundaries and mark a protective buffer occurred in 2009 and 2010. The area within a proposed water-line corridor along the east edge of the site was checked for undocumented features, and the documented features in that area were examined to determine if any would be affected by the proposed construction. The corridor was staked, and the integrity of features within the corridor assessed. The features were determined to lack integrity, and the portion of the site within the corridor was found to be unlikely to exhibit subsurface cultural manifestations. Monitoring during water-line construction found no intact subsurface features. A second construction corridor along the south edge of the site was assessed and was also found to be unlikely to contain subsurface cultural manifestations. Monitoring of construction again found no intact cultural features (FAA and NMSA 2010b:19).

Testing

Before work at LA 155963 began, a licensed surveyor working for the OAS established four datums and backsights for horizontal and vertical control. Datum 1 is near the southern site boundary in the southwest quadrant of the site (1910.42N/4311.68E). Datum 2, assigned an arbitrary elevation of 100 mbd, is in the center of an area containing numerous features (2069.78/N 4270.61E). Datum 3 is at the north end of the densest feature area (2232.74N/4247.37E). Datum 4 (2599.08N/4167.00E) is in the northwest quadrant.

Five geomorphology trenches were mechanically excavated, three in the southwest quadrant and two in the northwest quadrant. These were numbered from south to north (BHTs 7–11), were 6.4 to 9.13 m long, 1.5 and 1.75 m wide, and 2.10 to 3.00 m deep. At BHT 7, the coppice dune sand layer was 15 cm thick and capped a 30 cm thick layer of massive sand, probably deposited during the late Holocene. Beneath this was 2 m of the Pleistocene B soil horizon containing some caliche nodules. The coppice dune layer was thicker in BHT 8 (44 cm), overlying about 38 cm of the Pleistocene B soil horizon containing colluvial sand and gravel in its upper levels, then caliche or calcrete to the bottom of the trench at 2.60 bgs. BHT 9 encountered a thick (1.3 m) surface layer of eolian sand mixed with sediments from the Pleistocene B soil horizon containing some caliche, which covered at least 1.8 m of colluvial sand and gravel. BHT 10 was capped by 22 cm of recent eolian sand covering 44 cm of a colluvial mixture of sand and caliche nodules. Beneath this was at least 1.6 m of calcrete. The northernmost trench (BHT 11) was capped by 32 cm of coppice dune sand overlying 46 cm of colluvial sand and caliche nodules, with at least 132 cm of calcrete below that layer. The calcrete or caliche stratum (Fig. 5.14) was a dense white deposit of caliche containing nodules of limestone and other rocks ranging in size from pebbles to small cobbles.

The extent of the artifact scatter provides dimensions for this site of 1,084.74 m north–south by 787.50 m east–west, an area of 533,139 sq m (131.75 acres; 53.32 ha). This is somewhat larger than the dimensions defined by Zia (Fig. 5.10) and resulted from small extensions of site boundaries in the north northeast section of the site, and along the edge of the southwestern lobe. As defined by OAS, LA 155963 is now about 6 percent larger than it was when originally recorded by Zia. This discrepancy resulted from the much longer time that was spent on the site during testing when compared to the amount of time that was spent there during survey.

No attempt was made to examine all surface artifacts at LA 155963 because of their large

Figure 5.14. Backhoe trench, showing extent of caliche deposit, LA 155963.

number. Instead, the locations of visible formal tools and atypical artifacts were plotted, and they were briefly described. Temporally diagnostic specimens were collected for further examination.

Features

Zia located and described 41 features at LA 155963 (Quaranta and Gibbs 2008:139–140). OAS located and numbered 131 features (Appendix 2). Zia shape files loaded into a GPS unit were used to locate and identify features in the northern part of the site, but no attempt was made to determine the Zia equivalents to the OAS numbered features, especially in the dense feature concentrations in the southwest quadrant. Feature inventory forms were completed for 55 features (Table 5.3). All those in the northwest quadrant were inventoried, while only a few in the east half of the site and a sample of those in the southwest quadrant were inventoried. Features in the east half and southwest quadrant were located and numbered, and were then inventoried on an encounter basis aimed at recording the variety represented and as many features as possible in the time allotted. Four of the inventoried features were examined by 20 by 20 cm tests. In addition, Feature 129, a historic artifact scatter, was described, but a feature inventory form was not completed because that form was designed to record fire-cracked rock and similar features, not historic features.

The LA 155963 features are more diverse than those that were examined at LA 111429. Again, most are fire-cracked rock scatters (8 fire-cracked rock scatters, 21 fire-cracked rock scatters with a concentration, 4 fire-cracked rock concentrations, and 13 fire-cracked rock concentrations with scatters). In addition, the site contains a slab-lined feature (Fig. 5.15), a charcoal stain, a charcoal or dark A soil horizon stain, several collectors piles, numerous artifact concentrations, and at least 4 historic burned rock concentrations (Fig. 5.16).

Basic fire-cracked rock feature statistics can be found in Table 5.4. These range in size from small to large with relatively large mean fire-cracked rock counts. Features described as dispersed fire-cracked rock scatters tend to contain more caliche than features that are more concentrated. Material types that are more likely to be found

Table 5.3. Summary of data for recorded features, LA 155963

Feature No.	Feature Type	Estimated FCR Count	Maximum FCR Density	FCR Fragmentation	% Caliche	Feature Tested?	Comment	Information Potential
1	dispersed FCR with concentration	<50	8	highly fragmented	90	yes	subsurface rock present	fair
2	dispersed FCR with concentration	50–100	6	cobbles and highly fragmented	82	no	–	very low
3	dispersed FCR scatter	< 10	2	mostly cobbles	90	no	–	none
4	FCR concentration and dispersed scatter	<50	12	cobbles and highly fragmented	55	no	part under dune	low to fair
5	dispersed FCR with concentration	50–100	5	cobbles and highly fragmented	90	no	–	low
6	FCR concentration and dispersed scatter	<50	20	cobbles and highly fragmented	50	no	stain present	good
7	dispersed FCR with concentration	50–100	18	cobbles and highly fragmented	90	no	part under dune	low
8	dispersed FCR with concentration	20	4	cobbles and highly fragmented	60	no	stain and subsurface rock	fair to good
9	dispersed FCR with concentration	50–100	6	cobbles and highly fragmented	50	yes	stain and subsurface rock	fair to good
10	dispersed FCR with concentration	50–100	4	cobbles and highly fragmented	90	no	subsurface rock present	low to fair
11	dispersed FCR with concentration	<50	6	cobbles and highly fragmented	50	no	quarry area	very low
12	collector's pile	absent	0	absent	0	no	quarry area	none
13	artifact concentration	<50	2	highly fragmented	90	no	–	low to fair
14	FCR concentration and dispersed scatter	>200	18	cobbles and highly fragmented	50	yes	stain present	fair to good
15	dispersed FCR scatter	<50	3	cobbles and highly fragmented	80	no	stain present	fair to good
16	dispersed FCR scatter	50–100	5	cobbles and highly fragmented	85	no	associated with an artifact cluster	very low
17	dispersed FCR with concentration	<50	6	cobbles and highly fragmented	70	no	–	low
18	slab-lined feature	absent	0	absent	0	no	associated with an artifact cluster	low to fair
19	dispersed FCR with concentration	100–200	6	highly fragmented	70	no	associated with an artifact cluster	low
20	FCR concentration and dispersed scatter	100–200	10	cobbles and highly fragmented	40	yes	stain present	good
21	dispersed FCR with concentration	100–200	10	highly fragmented	85	no	associated with an artifact cluster	low
22	dispersed FCR scatter	20	2	highly fragmented	40	no	associated with an artifact cluster	low
23	FCR concentration and dispersed scatter	50–100	16	cobbles and highly fragmented	10	no	subsurface rock present	low to fair
26	FCR concentration and dispersed scatter	50–100	19	mostly cobbles	20	no	associated with an artifact cluster	low
27	dispersed FCR with concentration	100–200	17	cobbles and highly fragmented	60	no	<2 cm fill	low
33	dispersed FCR with concentration	<50	4	cobbles and highly fragmented	20	no	associated with an artifact cluster	low
34	dispersed FCR with concentration	50–100	5	cobbles and highly fragmented	50	no	associated with an artifact cluster	low
40	dispersed FCR with concentration	50–100	10	cobbles and highly fragmented	70	no	<5 cm fill	low
42	dispersed FCR scatter	100–200	12	cobbles and highly fragmented	45	no	<2 cm fill	none
43	historic burned rock pile/scatter	300	50	mostly cobbles	5	no	–	none
44	dispersed FCR with concentration	50–100	12	cobbles and highly fragmented	70	no	associated with an artifact cluster	low
48	FCR concentration and dispersed scatter	100–200	35	cobbles and highly fragmented	50	no	subsurface rock present	low to fair
49	dispersed FCR with concentration	50–100	15	cobbles and highly fragmented	30	no	<5 cm fill	low
50	charcoal stain	20	3	highly fragmented	50	no	stain present	low to fair
55	dispersed FCR with concentration	50–100	10	cobbles and highly fragmented	40	no	<2 cm fill	very low
56	dispersed FCR scatter	50–100	8	cobbles and highly fragmented	60	no	–	low
58	FCR concentration	<50	6	mostly cobbles	0	no	–	none
59	FCR concentration and dispersed scatter	50–100	8	cobbles and highly fragmented	30	no	part under dune	low to fair
66	FCR concentration	30	19	cobbles and highly fragmented	45	no	subsurface rock present	low to fair
67	FCR concentration and dispersed scatter	50–100	10	cobbles and highly fragmented	5	no	–	low
68	FCR concentration	20	12	cobbles and highly fragmented	40	no	–	low
69	FCR concentration and dispersed scatter	<50	14	mostly cobbles	5	no	<5 cm fill	low
70	FCR concentration and dispersed scatter	50–100	12	cobbles and highly fragmented	15	yes	–	very low
71	FCR concentration	40	6	mostly cobbles	25	no	–	low
72	historic burned rock pile/scatter	<50	15	cobbles and highly fragmented	5	no	<5 cm fill	none
73	historic burned rock pile/scatter	100–200	42	mostly cobbles	5	no	–	none
74	dispersed FCR scatter	>200	50	highly fragmented	30	no	<2 cm fill	low
75	dispersed FCR with concentration	<50	24	cobbles and highly fragmented	60	no	stain present	fair
77	dispersed FCR with concentration	<50	8	cobbles and highly fragmented	10	no	<2 cm fill	very low
84	FCR concentration and dispersed scatter	100–200	14	cobbles and highly fragmented	10	no	<2 cm fill	none
85	FCR concentration and dispersed scatter	<50	9	cobbles and highly fragmented	20	no	<2 cm fill	very low
96	historic burned rock pile/scatter	100–200	30	mostly cobbles	5	no	<2 cm fill	none
98	dispersed FCR scatter	<50	6	highly fragmented	70	no	stain present	fair to good
104	stain?	<10	1	highly fragmented	100	no	stain present	very low
130	dispersed FCR with concentration	50–100	15	cobbles and highly fragmented	20	no	stain present	good

Note: *Cobble* includes rounded cobble forms and large chunks of caliche.
FCR = fire-cracked rock

Figure 5.15. Feature 18, slab-lined feature, LA 155963.

Figure 5.16. Feature 43, historic rock pile, LA 155963.

Table 5.4. Fire-cracked rock feature dimensions and rock content, LA 155963

	Dimensions (m)				Rock Content							
	Maximum North-South	Maximum East-West	Core North-South	Core East-West	Estimated FCR Count	FCR Maximum Density (.5 x .5 m)	% Caliche	% Igneous	% Quartzite	% Limestone	% Sandstone	% Other Rock Types
Dispersed FCR Scatter												
n	8	8	8	8	8	8	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Minimum	2.0	4.0	0.0	0.0	<10	2.0	30.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum	17.5	14.0	3.0	3.0	>200	50.0	90.0%	40.0%	10.0%	25.0%	20.0%	5.0%
Mean	7.2	9.5	1.0	1.0	79.0	11.0	62.5%	13.1%	4/4%	9.4%	10.0%	0.6%
SD	4.9	3.2	1.1	1.1	60.9	16.1	22.4%	12.2%	4.9%	9.8%	7.1%	1.7%
Dispersed FCR with Concentration												
n	21	21	21	21	21	21	21.0%	21.0%	21.0%	210%	21.0%	21.0%
Minimum	3.0	2.3	1.0	1.0	20.0	4.0	10.0%	0.0%	0.0%	2.0%	0.0%	0.0%
Maximum	20.0	20.0	2.6	3.5	100–200	24.0	90.0%	40.0%	10.0%	40.0%	20.0%	10.0%
Mean	7.7	8.6	1.6	1.7	82.2	9.5	59.8%	11.8%	1.5%	20.1%	5.7%	0.5%
SD	4.4	4.9	0.5	0.6	27.2	5.5	24.9%	11.4%	3.2%	13.4%	5.5%	2.2%
FCR Concentration												
n	4	4	4	4	4	4	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Minimum	0.0	0.0	0.7	0.8	20.0	6.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum	0.0	0.0	1.4	1.0	<50	19.0	45.0%	30.0%	20.0%	50.0%	40.0%	30.0%
Mean	0.0	0.0	1.1	0.9	35.0	10.8	27.5%	10.0%	5.0%	31.7%	17.5%	8.7%
SD	0.0	0.0	0.3	0.1	12.9	6.2	20.2%	14.1%	10.0%	21.8%	17.1%	14.4%
FCR Concentration and Dispersed Scatter												
n	13	13	13	13	13	13	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
Minimum	2.0	2.2	0.6	0.6	<50	8.0	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum	15.0	16.5	3.0	2.0	>200	35.0	55.0%	40.0%	10.0%	60.0%	30.0%	15.0%
Mean	6.8	8.2	1.6	1.5	92.8	15.2	27.7%	17.3%	3.1%	37.3%	10.8%	1.9%
SD	4.5	5.3	0.6	0.4	40.1	7.1	18.9%	13.2%	4.3%	10.5%	8.6%	4.3%

in larger pieces or whole cobbles (igneous, quartzite, and limestone) are more prevalent in the concentrations. This could suggest that there are two main types of fire-cracked rock features defined mainly by the type of rock rather than the degree of dispersal, but with a good amount of overlap. Combinations of larger and smaller pieces are more common overall (76.1 percent of the fire-cracked rock features). Cobbles or large pieces are almost always found in the two types of concentrated fire-cracked rock features (four of five), and all of the features containing only highly fragmented rocks occurred in the two categories of dispersed features (n = 6).

Most of the inventoried features were located in situations that can be described as interdunal (40 percent; Fig. 5.17). Those recorded as being in brown paleosol (30.9 percent) or red paleosol (10.9 percent) could also be in interdunal situations. Other locations include stabilized soil (3.6 percent), deflated red paleosol (12.7 percent), and dune (1.8 percent). Three fire-cracked rock features may extend under dunes. A good proportion (at least 23.9 percent) have little or no fill (Fig. 5.18), while half that many (10.9 percent) appear to contain subsurface rock, and slightly more (13.0 percent) contain stains.

Ceramics were found at five (10.9 percent) of the fire-cracked rock scatters (all but one in the southern part of the site) and at one other feature type. Ground stone tools and fragments were seen in or near over half of the fire-cracked rock features (60.9 percent), especially those consisting of dispersed fire-cracked rock (75.0 percent), and at half of the other feature types and in a collector's pile. All but one feature (a fire-cracked rock concentration with dispersed scatter) have chipped stone artifacts in or near the feature. Just under half (47.9 percent) have heat-treated chipped stone artifacts in association.

Only four features were tested. Many features are very deflated, and testing would not have provided additional information on their contents or structure. When stains were evident they were not tested so as to conserve any intact fill. Two of the dispersed fire-cracked rock scatters with concentrations were tested (Features 1 and 9). Feature 1 is at a dune edge, and internal fill up to 9 cm deep produced small pieces of burned caliche but no evidence of ash or charcoal. The Feature 9 test revealed both subsurface fire-cracked rock and charcoal. Two of the tested features are fire-cracked rock concentrations with scatters (Features 14 and 70). Feature 14 is a large compact concentration of mainly limestone (Fig. 5.19). The test in this feature located one and possibly two lenses of charcoal as well as unburned or lightly burned large pieces of caliche and a small piece of angular debris. The test in Feature 70, in a deflated area of red paleosol, was less productive. No subsurface rock was found in this test, and the presence of carbonate flecks and hard nodules suggest there are no subsurface deposits associated with this feature. A test was started in Feature 20, a fire-cracked rock concentration and scatter, but was stopped almost immediately because the fill was burned and contained small chipped stone artifacts, indicating the presence of intact deposits.

Features that have the potential to provide information that will aid in answering the questions posed in the research design (Moore et al. 2010b) include:

- Feature 1: subsurface rock may indicate intact deposits outside of the test.
- Feature 6: contains a stain and could provide radiocarbon and subsistence-related samples.
- Feature 8: contains brown ware ceramics, a variety of material, subsurface rock, and a stain at the periphery.
- Feature 9: contains ground stone, a chopper, and subsurface rock and charcoal.
- Feature 13: broken metate that may have a pit in association.
- Feature 14: contains ground stone, charcoal, and subsurface rock, is being destroyed by a drainage, and will disappear if not examined soon.
- Feature 15: near a chipped stone reduction area and has an ash stain extending beyond the concentration.
- Feature 18: small slab-lined feature that could be a storage facility.
- Feature 20: in an area with numerous pieces of ground stone and a wide variety of chipped stone materials, and contains subsurface rock and a charcoal stain.
- Feature 23: contains substantial subsurface rock.
- Feature 50: a good-sized charcoal stain with a few pieces of fire-cracked rock, ground

Figure 5.17. Feature 40, fire-cracked rock in an interdunal location, LA 155963.

Figure 5.18. Feature 84, fire-cracked rock with little or no remaining fill, LA 155963.

Figure 5.19. Feature 14, LA 155963.

stone, and chipped stone artifacts that could produce radiocarbon and subsistence-related samples.

- Feature 75: has a variety of associated lithic materials and ash and charcoal.
- Feature 98: in an area with ceramics and ground stone and has a charcoal stain.
- Feature 130: associated chipped stone, subsurface rock, and a charcoal stain.

Features that were not inventoried will be comprehensively evaluated with the feature inventory form during the excavation phase of the project (Moore et al. 2010b). Some of these features may also have the potential to provide information applicable to the research questions.

Artifact Assemblage

A total of 202 artifacts were analyzed for LA 155963; three collection piles, five artifact clusters, and a concentration of historic artifacts were recorded. The total sample of analyzed artifacts included 29 historic artifacts, 85 ground stone tools, 7 sherds, 2 ornaments, and 79 chipped stone specimens. Of these, 31 chipped stone artifacts, 8 historic artifacts, 2 ornaments, and 2 sherds were collected for more detailed study (see Appendix 1 for artifact data). Because of the size of this site and the number of artifacts included in the artifact clusters, the clusters were defined and described, but individual artifacts were not inventoried. Field analysis focused on formal tools, though a few other interesting specimens were also examined. Thus, this analysis provides a limited view of the assemblage at this site that is useful for planning purposes but is of little use in providing information on occupation types.

The field-analyzed ground stone assemblage includes 14 one-hand manos (8 whole, 6 fragments), 19 metates (3 whole, 13 fragments), 3 undifferentiated mano fragments, and 49 unidentified ground stone tools (1 whole, 48 fragments). Sandstone is the dominant material used for the manufacture of ground stone tools in our sample, with 8 one-hand manos, 2 manos, 16 metates, and 40 unidentified ground stone tools made of this material. Basalt is the second most common material, represented by 3 one-hand manos, 2 metates, and 3 unidentified ground stone tools. Three one-hand manos are made from metaquartzite, 2 unidentified ground stone tools are made from rhyolite, and 2 undifferentiated ground stone tools are made from unidentified materials. The last 4 specimens are made from undifferentiated igneous materials and include a mano, a metate, and 2 unidentified ground stone tools.

The historic artifacts included a variety of specimens, some of which are described in more detail in Chapter 7. Most historic artifacts were recorded in the field and left in place, but 8 were collected for detailed examination, including 5 cartridge casings, 2 lard pails, and a link from a .50 cal. machine gun belt. The field analyzed artifacts included 11 cans (1 sanitary seal, 7 hole-in-top, 1 tobacco, 1 evaporated milk), 5 barrel hoops, 2 metal straps, and single examples of a Euroamerican sherd, metal spout, and metal wagon part. The location of a scatter of Euroamerican artifacts (Feature 129) was also noted, containing 100+ square nails and miscellaneous pieces of metal.

The locations of only seven prehistoric sherds were noted, and these represent specimens that were either rare examples of white wares or sherds that were found at some distance from the main sherd scatter area shown in Figure 5.10. Two specimens of Chupadero Black-on white were collected for further study. The five remaining examples are brown wares that were field analyzed; single specimens were present in four cases, while four sherds occurred in the last case.

Two ornaments were also found during surface examination and collected: a small quartz crystal and a small hematite object that appears to be phallic in nature.

Table 5.5 shows the distribution of artifact morphology by material type for the field and fully analyzed chipped stone artifacts. This assemblage is dominated by cherts (n = 67), which comprise 84.81 percent of the total. Obsidian is the second most common material type (n = 4), making up 5.06 percent of the assemblage, followed by rhyolite (n = 3) at 3.80 percent, and metaquartzite (n = 2) at 2.53 percent. Basalt, limestone, and slate/aragonite are each represented by single specimens, comprising 1.27 percent of the assemblage apiece. These materials are not representative of the overall material type distribution because they represent a nonstatistically derived sample comprised solely of formal tools.

The only piece of debitage in Table 5.5 is an overshot flake, which was analyzed because it represents a mistake made during tool manufacture. Otherwise, only tools are represented in Table 5.5, all of which were collected from the surface of the site. This part of the assemblage includes bifaces (n = 63), followed by unifaces (n = 8), cobble tools (n = 6), and cores (n = 1).

None of the early-stage bifaces could be assigned a more specific function, and all 9 exhibit manufacturing breaks. Similarly, no more specific function could be assigned to 24 of the 25 middle-stage bifaces. Of 21 broken specimens, 14 exhibit manufacturing breaks, and 1 complete chert specimen was discarded because a plateau had developed on one surface. Nondiagnostic breaks are visible on 7 specimens, which could have been broken by either cultural or noncultural processes. No reason for discard could be determined for the 3 remaining complete specimens, which include a single chert projectile point preform. Only 1 of the 29 late-stage bifaces could not be assigned a more specific function, a chert proximal fragment that exhibits a nondiagnostic break. Of the other 28 specimens, 26 are projectile points, 1 chert specimen is a drill, and a slate or aragonite specimen is a knife. The projectile points represent close to 11,000 years of prehistory. Five date to the Paleoindian period, including 3 chert Folsom point fragments (Figs. 5.9c–5.9e) and 2 chert point fragments assigned a general Paleoindian date (Figs. 5.9f–5.9g). The Archaic period is represented by 2 large stemmed specimens (1 basalt, 1 chert), 2 large side-notched chert specimens, and 2 chert San Pedro points. Four medial or distal fragments of chert points can only be roughly assigned a temporal context, and also appear to be Archaic. The Formative period is represented by 6 corner-notched arrow points (5 chert, 1 obsidian), a small stemmed chert arrow point, and a small stemmed chert arrow point with a serrated blade. Three small unnotched obsidian projectile points with convex bases could date to either the Formative or Protohistoric period.

Eight chert unifaces were also recorded, representing three basic tool types including a spokeshave made on an early-stage uniface, a

Table 5.5. Material type by artifact morphology for all chipped stone artifacts that were analyzed or collected, LA 155963

Material Type		Overshot Flake	Multidirectional Core	Bidirectional Cobble Tool	Early-Stage Biface	Middle-Stage Uniface	Late-Stage Uniface	Early-Stage Biface	Middle-Stage Biface	Late-Stage Biface	Total
						In-Field Analysis of Surface Artifacts					
Chert	Count	1	–	2	5	–	–	9	22	1	40
	Row %	2.5%	–	5.0%	12.5%	–	–	22.5%	55.0%	2.5%	83.3%
San Andres chert	Count	–	–	–	–	1	–	–	–	–	1
	Row %	–	–	–	–	100.0%	–	–	–	–	2.1%
Silicified wood	Count	–	–	–	–	–	–	–	1	–	1
	Row %	–	–	–	–	–	–	–	100.0%	–	2.1%
Rhyolite	Count	–	1	2	–	–	–	–	–	–	3
	Row %	–	33.3%	66.7%	–	–	–	–	–	–	6.3%
Limestone	Count	–	–	1	–	–	–	–	–	–	1
	Row %	–	–	100.0%	–	–	–	–	–	–	2.1%
Metaquartzite	Count	–	–	1	–	–	–	–	1	–	2
	Row %	–	–	50.0%	–	–	–	–	50.0%	–	4.2%
Total	Count	1	1	6	5	1	–	9	24	1	48
	Row %	2.1%	2.1%	12.5%	10.4%	2.1%	–	18.8%	50.0%	2.1%	100.0%
						Full Analysis of Excavated Artifacts					
Chert	Count	–	–	–	–	–	2	–	1	22	25
	Row %	–	–	–	–	–	8.0%	–	4.0%	88.0%	80.6%
Obsidian	Count	–	–	–	–	–	–	–	–	4	4
	Row %	–	–	–	–	–	–	–	–	100.0%	12.9%
Basalt	Count	–	–	–	–	–	–	–	–	1	1
	Row %	–	–	–	–	–	–	–	–	100.0%	3.2%
Slate/aragonite	Count	–	–	–	–	–	–	–	–	1	1
	Row %	–	–	–	–	–	–	–	–	100.0%	3.2%
Total	Count	–	–	–	–	–	2	–	1	28	31
	Row %	–	–	–	–	–	6.5%	–	3.2%	90.3%	100.0%
Table total	Count	1	1	6	5	1	2	9	25	29	79
	Row %	1.3%	1.3%	7.6%	6.3%	1.3%	2.5%	11.4%	31.7%	36.7%	100.0%

denticulate made on an early-stage uniface, and 6 scrapers. The latter include specimens made on early- (n = 3) and middle- (n = 1) stage unifaces, and 2 spurred end scrapers made on late-stage unifaces (Figs. 5.9h–5.9i). All 6 cobble tools are choppers, 4 of which are made of durable metaquartzite, rhyolite, and limestone, while 2 are made of nondurable cherts. The single core that was recorded was also used as a hammerstone.

Five artifact clusters were identified in the northwest part of LA 155963 (Fig. 5.11), mapped, and described, but no detailed analysis of individual artifacts was completed. Artifact Cluster 1, a fairly discrete concentration of chipped stone artifacts near the north edge of the site (Fig. 5.11), contains 100+ artifacts, mostly made from various cherts, including San Andres. Some metaquartzite pieces of debitage were also noted in this cluster. Glossy, probably thermally altered chert debitage are common, and many appear to have been struck from bifaces. The presence of a spurred end scraper within the cluster coupled with the recovery of two Folsom point fragments from nearby suggest that Artifact Cluster 1 may represent a Paleoindian component, though an Archaic date cannot be ruled out. Other formal tools noted within Artifact Cluster 1 include a one-hand mano and a biface. Feature 3 is at the west end of this cluster, and Feature 2 is to the northwest, and both are possibly associated with this component.

Artifact Cluster 2 is directly east of Artifact Cluster 1 and could be associated with it. This small cluster contains an estimated 50+ chipped stone artifacts, most of which are chert. Several biface flakes were noted, as was some evidence of thermal alteration. Features 4 and 5 are directly north of this cluster and could be associated with it. Three bifaces, a denticulate, a spokeshave, a chopper, and a Formative-period side-notched arrow point were found in the same general area as Artifact Clusters 1 and 2, and there is a continuous light scatter of artifacts across that part of the site, punctuated by the clusters. A collection pile was also found, indicating some disturbance from relic hunters. The area containing Artifact Clusters 1 and 2 is defined as the Paleoindian Area in Figure 5.10 and could represent a fairly discrete Paleoindian component. However, the presence of a Formative-period projectile point of this area and a Chupadero Black-on-white sherd just to the south of its arbitrary boundary could be evidence for the mixing of components occupied in widely disparate time periods.

Artifact Cluster 3 is a concentration of 50+ artifacts, mostly chert flakes, southeast of Artifact Clusters 1 and 2. A few fragments of ground stone tools were also noted. This scatter of artifacts is between and slightly east of two artifact clusters that were defined as a mapping aid rather than through field observations. Artifact Cluster B, to the southwest of Artifact Cluster 3, contains 10 ground stone tools and a middle-stage biface that was broken during manufacture. Artifact Cluster H, to the northwest of Cluster 3, contains a San Pedro point, a Paleoindian or Archaic projectile point base, a knife, three ground stone tools, three choppers, and three bifaces, two of which were abandoned during manufacture. Another ground stone fragment is to the east of Artifact Cluster 3, and several thermal features occur in this part of LA 155963. Considering the rather large number of ground stone tools in this area, the presence of one or two Archaic projectile points, and the nearby occurrence of several thermal features, this part of the site appears to mainly represent an Archaic component.

Artifact Cluster 4 is west of Cluster 3 and south of Clusters 1 and 2, and contains several hundred pieces of debitage, many fragments of ground stone tools, and several biface fragments and other formal tools. A spurred end scraper and a possible Paleoindian projectile point base were found in this cluster, but the presence of many ground stone tools suggests a possible mixing of Paleoindian and Archaic materials. A thermal feature (Feature 15) is on the east edge of this cluster and may be associated with Cluster 4.

Artifact Cluster 5 is a large dense scatter of chipped stone artifacts in the zone encompassing Features 18–20 and the tools recorded around them. While this cluster is not shown on site plans, Artifact Cluster A in Figures 5.10 and 5.11 essentially represents the boundaries of Artifact Cluster 5 as well. This area is estimated to contain several thousand pieces of debitage, many of which are biface flakes. Evidence of thermal alteration is abundant. The formal tools in this cluster include 13 ground stone tools (2 metate fragments, 1 mano fragment, 10 unidentified ground stone tool fragments), 11 bifaces (2 Formative-period projectile points, 7 specimens broken during manufacture, 2 specimens with indeterminate breaks), and a unifacial scraper. While the character of this scatter seems to mostly reflect an Archaic occupation, the presence of Formative-period projectile points indicates there is probably some mixing of materials from occupations occurring during widely separated time periods.

A sherd area shown in Figures 5.10 and 5.12 represents a concentration of both ceramic and chipped stone artifacts that was one of the main foci of Formative-period occupation at LA 155963. Several hundred brown ware sherds occur in this area, and a Formative-period projectile point as well as a Chupadero Black-on-white sherd were also found there. While the scatter of Historic-period materials recorded as Feature 129 overlaps the sherd area, there does not appear to have been too much impact to the earlier materials. Three prehistoric features (Features 72, 73, and 130) are within the sherd area as defined during testing, while numerous other features occur to all sides, and some could be associated with this component.

Summary and Recommendations

In general, the northwest quadrant of LA 155963 appears to mainly contain Paleoindian and Archaic materials, though there is some evidence of Formative-period use as well. The southwest quadrant appears to be dominated by Formative-period materials, though there was also some Archaic use of this area. The northeast and southeast quadrants contain scattered features and widely scattered artifacts, and were not as heavily used as the western quadrants appear to have been. Four general areas of interest were defined for their research potential. With the exception of one of the Folsom points, Paleoindian materials were mainly concentrated in the northwest quadrant. That area contains mostly chipped stone artifacts, and sherds are comparatively rare. Two Folsom points were found in fairly close proximity in this quadrant, suggesting the presence of a definable Paleoindian component. A second area of interest in the north part of the site is a burned rock feature with several brown ware sherds in association (Feature 8). This seems to represent a discrete short-term Formative period occupation area. The concentration of Formative-period materials in the southwest quadrant is in an area that has suffered heavy erosion but should still contain enough data potential to permit exploration of the Formative-period use of this region. Finally, a small cluster of features with three small unnotched points in close proximity was noted in the southwest quadrant and potentially represents a discrete Protohistoric- or Formative-period occupation area. At least some research-oriented work is anticipated in all four of these parts of the site.

In many ways, LA 155963 is similar to LA 111429, only larger, and with better evidence of Formative-period use. LA 155963 is also near a major watercourse for the area, has exposures of calcrete on site, and displays the same juxtapositioning of floral, faunal, and other resources, making it a prime location for hunter and hunter-gatherer camps. Like LA 111429, there appears to be a well-defined area containing evidence of a Folsom occupation, probably reflecting one or more short-term camp sites focused on the hunting of local game and, perhaps, plant collection. While most materials used for chipped stone reduction during this period appear to have been locally obtained or came from the nearby Rio Grande Valley, there was also some potential evidence for the use of exotic materials. As discussed in Chapter 3, this follows a pattern described by Miller and Kenmotsu (2004:216) for the period in general, as well as the material-procurement pattern described for the Jornada del Muerto by Elyea (2004).

There also appears to have been a heavy use of LA 155963 during the Archaic period, mostly during the Late Archaic to judge from the types of projectile points recovered from the site surface. As would be expected from a site in a basin interior, the Archaic remains appear to represent repeated visits to this location to exploit locally available floral and faunal resources. As suggested by the discussion of the Archaic for this region in Chapter 3, the expected pattern is one of short–term residential use by small hunting-gathering bands during the warm season. Any structures that might be encountered should be small ephemeral huts with little evidence of interior features. Considering the deflated nature of the site, such remains are not expected.

Most Formative-period use of LA 155963 seems to have been concentrated in the section of LA 155963 defined as the sherd area in Figures 5.9 and 5.11. Though most of the sherds seen at this site were El Paso brown wares, two fragments of Chupadero Black-on-white were also recovered, suggesting occupation during the Doña Ana or El Paso phases. As suggested by the discussion in Chapter 3, this type of site location for these periods is not unusual, since several studies have found continuing evidence for the use of basin interiors for hunting and gathering camps or even fieldhouses during the Transitional and Pueblo periods.

The last potential period of early occupation that might be represented at LA 155963 is the Protohistoric, though this is based on the occurrence of three unnotched projectile points that could also date to the Formative period. If a Protohistoric-period occupation is represented, we would expect it to reflect early use by Apacheans. If this is the case, there should be evidence for what Seymour and Church (2007) have termed the Cerro Rojo Complex, exhibiting a focus on expedient chipped stone reduction with retouched tools. However, in the absence of diagnostic Apache pottery or the distinct styles of projectile points manufactured by Apaches, it may be difficult to establish any sense of ethnicity for the remains at LA 155963.

Under current plans, LA 155963 should not be directly impacted by additional construction. Anticipated further archaeological investigations at this site will be research-oriented, and a plan for this work has been developed (Moore et al. 2010b).

Research at this site will be primarily directed toward obtaining datable materials (Research Question 1), subsistence-related samples

(Research Question 4), data on site structure (Research Question 6), and artifacts that will provide information on interactions within and outside the project area (Research Question 8). This information can then be used to address broader questions concerning the fit with regional culture history (Research Question 2), settlement patterns (Research Question 6), site location with respect to a variety of resources (Research Question 4), and aspects of continuity and change throughout the occupation of the area (Research Question 5).

Any future construction disturbance occurring within site limits will require an assessment of the area of potential disturbance, and at least surface collection within it and monitoring of fencing and construction (FAA and NMSA 2010:21).

6. *Chipped Stone Analytic Methods and General Discussion*

James L. Moore

Two levels of analysis were used during this project. In-field analysis consisted of the macroscopic examination of chipped stone artifacts to record attributes considered important to site interpretation. In this abbreviated analysis, we only examined characteristics deemed necessary to a preliminary level of explanation. A full analysis was conducted on artifacts that were collected and returned to the laboratory, where both macro- and microscopic attributes were examined. The attributes used for both the in-field and full laboratory analyses are presented and described in this chapter. The rationale behind the general analytic approach used in this study is discussed to provide a background for explaining why certain attributes were selected. Finally, a very general discussion of the distribution of certain attributes through these assemblages is provided. The latter briefly examines trends seen during both analytic stages. Because of extreme differences caused by varying sample sizes and the amount of data available for these sites as well as differing focuses for site-level analysis, a detailed examination is premature at this time. While all visible surface artifacts were analyzed in the field for smaller sites, LA 111429 and LA 155963 contained assemblages that were too large to complete this level of examination in the amount of time available. Thus, mainly tools and temporally diagnostic artifacts were examined in any detail at those two sites during testing. Since considerably more data are expected to be recovered during a later research-oriented phase, those data will be combined with information recovered during testing to provide larger and more meaningful assemblages for discussion.

Analytic Rationale

Chipped stone artifacts were analyzed using a standardized format developed by the Office of Archaeological Studies (OAS 1994a) that includes both typological and attribute-based approaches. In typological approaches, "individual artifacts are classified into types that have some kind of technological or functional meaning" (Andrefsky 2001:6). A benefit of this type of analysis is that behavior can be immediately inferred from the identification of a single artifact (Andrefsky 2001:6). For instance, the presence of a single notching flake indicates that a notched tool was made at a location, even if no notched tools were found. However, this method can be criticized because there is often a lack of verification between artifact type and functional or technological interpretation (Andrefsky 2001:7). Attribute analysis examines the distribution of one or more characteristics through an entire population, usually of debitage (Andrefsky 2001:7). Among other things, various attributes can be used to assess the prevalence of specific reduction methods in a debitage population. However, problems can also crop up when using this analytic strategy "for a variety of reasons related to the small size of attributes and the number of observations" (Andrefsky 2001:12). Typological and attribute analyses vary in scale; typological analysis is applied to individual artifacts, while attribute analysis is applied to entire assemblages (Andrefsky 2001:12). Andrefsky (2001) notes that there is no one "right" approach to debitage analysis, and the approach used can vary according to the types of information desired.

The analysis methods employed by the OAS assign typological interpretations to individual artifacts, while at the same time gathering attribute data that can be used to test and augment the typological data. For instance, a rigorous set of characteristics is used to define flakes struck from bifaces versus those struck from cores. Flakes that do not fulfill the set of characteristics used to define biface flakes are, by default, considered core flakes. However, the definition used to assign debitage to the biface flake category models ideal examples, and all flakes struck from bifaces (especially those struck in the early stages of manufacture) do not always fit that ideal. By combining attribute analysis with a typological approach, we are able to determine which flakes were definitely struck from bifaces (typological approach), as well as those that were probably struck from bifaces but do not exactly fit the model (attribute analysis). In essence, the two approaches can complement one another and provide a deeper understanding of reduction technology and tool use.

The main questions the OAS analytic scheme was designed to explore include what types of materials were selected for reduction, where those materials were obtained, what techniques were used for chipped stone reduction, and what types of chipped stone tools occur in an assemblage. These topics can provide information about ties to other regions, mobility patterns, and site function. Material selection studies will not always reveal how a toolstone was obtained, but they can usually provide information on where it came from. The type of cortex on artifacts can be used to determine whether materials were obtained at outcrops or from secondary gravel deposits. Studies of reduction technologies can help show how different peoples solved the problem of producing the chipped stone tools they needed from the resources at hand. Various approaches could have been used, depending upon the level of residential mobility, the types of toolstone available, and the range of other materials that could be used to make tools. Examination of the types of chipped stone tools recovered from a site can help define the range of activities that occurred there, and in many cases this will also aid in defining site function. Chipped stone tools can sometimes be used to provide temporal data but are usually less time sensitive than other artifact classes like pottery.

Analytic Methods

During the field analysis, artifacts were macroscopically examined by the naked eye or using a 10x lens. In the laboratory, each chipped stone artifact was examined using a binocular microscope at levels of magnification varying between 10x and 80x, with higher magnification used to identify wear patterns and platform modifications. Utilized and modified edge angles were measured with a goniometer in the laboratory; other dimensions were measured with a sliding caliper in both levels of analysis, and artifacts subjected to full analysis were also weighed on a digital scale.

Four general classes of chipped stone artifacts are recognized: flakes, angular debris, cores, and tools. Flakes are debitage that exhibit definable dorsal and ventral surfaces, bulbs of percussion, and/or striking platforms. Angular debris are debitage that lack these characteristics. Cores are nodules from which debitage were struck and on which negative flake scars originating from one or more platforms are visible. Tools are debitage or cores whose edges were damaged during use or that were modified to create specific shapes or edge angles for use in certain tasks. Formal tools are debitage or cores that had their shapes or edge angles intentionally modified to produce needed attributes: unifaces, bifaces, and cobble tools. Informal tools are debitage or cores whose shapes or edge angles were unintentionally modified by use: utilized debitage and cores.

Analytic Attributes

Attributes recorded for all artifacts at both levels of analysis included material type and quality, artifact morphology and function, amount of surface covered by cortex, type of cortex, portion, evidence of thermal alteration, and dimensions (length, width, and thickness). Attributes that were only recorded during the full analysis included evidence of edge damage, edge angle for utilized edges, and weight. A series of attributes pertaining specifically to flakes was also recorded during the full analysis. They included information on platform type and modification, artifact shape, dorsal surface configuration, and termination type.

Two attributes were used at both levels of analysis to record information on the types of materials used in chipped stone reduction. *Material type* was coded by gross category unless specific sources or distinct varieties were recognized. *Material texture and quality* provided information on the basic flaking characteristics of materials. Texture subjectively measured grain size *within* rather than *across* material types and was scaled from glassy to coarse, with glassy textures exhibiting the smallest grains and coarse the largest. Quality recorded the presence of flaws that could affect flaking including crystalline inclusions, fossils, visible cracks, and voids. Inclusions that did not affect flaking, such as specks of different colored material or dendrites, were not considered flaws. Material texture and quality were recorded together in a single code.

Two attributes were used at both levels of analysis to provide information about artifact form and use. The first was *artifact morphology*, which classified artifacts by general form as well as more specific attributes, placing them in categories like flake or early-stage biface. The second was *artifact function*, which placed artifacts into typological categories by inferred use, such as utilized debitage or scraper. These attributes were coded separately.

Cortex is the chemically or mechanically weathered outer rind on nodules; it is often brittle and chalky and does not flake with the ease or predictability of unweathered material. The amount of cortical coverage was estimated and recorded in 10 percent increments for each artifact at both levels of analysis. The percentage of dorsal surface covered by cortex was estimated on flakes, while for all other artifact classes the percentage of the total surface area covered by cortex was estimated, since artifacts other than flakes lack definable dorsal and ventral surfaces. *Cortex type* can be a clue to the origin of an artifact. Waterworn cortex indicates that a nodule was mechanically transported by water and that its source was a gravel bed. Nonwaterworn cortex suggests that a material was not mechanically transported away from its source and was obtained where it outcrops naturally. Cortex type was identified for artifacts on which it occurred at both levels of analysis; when identification was not possible it was coded as indeterminate. Dorsal cortex coverage and cortex type were recorded separately.

All artifacts were coded as whole or fragmentary at both levels of analysis; when broken, the *portion* was recorded if it could be identified. Artifact portions can provide important functional information for sites. For example, the occurrence of mostly whole formal tools has a completely different meaning than if the tools were predominantly broken and worn out. Proportions of flake sections can also provide data on postreduction impacts to an assemblage. If most flakes are broken, the assemblage may have been exposed on the surface for a long period of time and damaged by traffic across the site. In this case, any wear patterns observed on debitage edges could have been caused by noncultural impacts rather than cultural use. Thus, examination of the condition and distribution of artifact portions can provide critical interpretive information.

Three attributes were examined during the full analysis for flake platforms, when present. *Platform type* recorded the shape of and any modifications to the striking platform on whole flakes and proximal fragments. *Platform lipping* recorded the presence or absence of a lip at the ventral edge of a platform. This attribute provides information on reduction technology and can sometimes be used to help determine whether a flake was removed from a biface or core. Platform lipping was coded as present or absent. *Platform angle* provided an estimate of the angle formed by the dorsal surface of a flake and its striking platform and was recorded as greater or less than 45 degrees. Platform angles of less than 45 degrees can be an indication of removal from a tool edge during manufacture or resharpening.

Thermal alteration was recorded for all artifacts on which it occurred. Cherts can be modified by heating at high temperatures to improve their flaking characteristics. This process realigns crystalline structure and sometimes heals minor flaws like microcracks. When present, the type and location of evidence for thermal alteration were recorded to determine whether an artifact was purposely or incidentally altered.

Three characteristics related to shape were recorded for flakes during full analysis. During initial examination, these attributes were part of a set used to differentiate between core and biface flakes (Fig. 6.1). Recording these attributes separately provided a way in which to define potential biface flakes that were not identified during the initial typological assignment because of the limitations of the attribute set used for that purpose. *Bulb* recorded the presence of diffuse or pronounced bulbs of percussion; this attribute can provide information on reduction technique. Diffuse bulbs tend to indicate soft hammer percussion or pressure flaking, while pronounced bulbs generally result from hard-hammer percussion. Flakes removed from the surface of a biface are often distinctly curved, and the presence or absence of this attribute was recorded as *flake curvature*. Soft-hammer percussion and pressure flaking can also result in the formation of a waist

Whole flakes

1. Platform:
   a. has more than one facet.
   b. is modified (retouched and/or abraded).
2. Platform is lipped.
3. Platform angle is less than 45 degrees.
4. Dorsal scar orientation is:
   a. parallel
   b. multidirectional
   c. opposing
5. Dorsal topography is regular.
6. Edge outline is even.
7. Flake is less than 5 mm thick.
8. Flake has a relatively even thickness from proximal to distal end.
9. Bulb of percussion is diffuse.
10. There is a pronounced ventral curvature.

Broken flakes or flakes with collapsed platforms

1. Dorsal scars orientation is:
   a. parallel
   b. multidirectional
   c. opposing
2. Dorsal topography is regular.
3. Edge outline is even.
4. Flake is less than 5 mm thick.
5. Flake has a relatively even thickness from proximal to distal end.
6. Bulb of percussion is diffuse.
7. There is a pronounced ventral curvature.

Figure 6.1. Polythetic set for defining biface flakes.

between the platform and main body of a flake, and this attribute is often present on biface flakes. The presence or absence of this characteristic was recorded as *waisted*.

Use of debitage or cores as informal tools can cause damage, producing patterns of scars that may be indicative of the use to which they were put. Two attributes were used during full analysis to record edge damage resulting from cultural use. The first described the type of *wear pattern* observed, using a series of descriptive codes. Separate codes was used to record formal tool edges. The utilized *edge angles* of all formal and informal tools were measured and recorded; edges lacking evidence of cultural modification or damage were not measured.

Maximum length, *width*, and *thickness* were measured in millimeters for all chipped stone artifacts. On angular debris and cores, length was the largest measurement, width was the longest dimension perpendicular to the length, and thickness was perpendicular to the width and was the smallest measurement. On flakes and formal tools, length was the distance between the proximal and distal ends, width was the distance between edges paralleling the length, and thickness was the distance between dorsal and ventral surfaces. *Weights* were measured in grams and obtained for all chipped stone artifacts examined during full analysis.

Reduction Strategies

An assessment of strategies used to reduce lithic materials at a site often provides evidence of residential mobility or stability. Two basic reduction strategies have been identified for the Southwest. Efficient (or curated) strategies entail the manufacture of bifaces that served as both unspecialized tools and cores, while expedient strategies were based on the removal of flakes from cores for use as informal tools (Kelly 1985, 1988). Technology was usually related to lifestyle. Efficient strategies were associated with a high degree of residential mobility, while expedient strategies were typically related to sedentism. The reason for this type of variation is fairly simple—groups on the move needed to reduce the risk of being caught unprepared for a task by carrying tools with them. Such tools needed to be transportable, multifunctional, and easily modified. Sedentary groups did not necessarily need to consolidate tools into similar multifunctional, lightweight configurations (Andrefsky 1998:38).

Of course there are exceptions to this general statement. Highly mobile groups living in areas that contained abundant and widely distributed toolstone or suitable substitutes for stone tools would not need to worry about efficiency in lithic reduction (Parry and Kelly 1987). Conversely, efficient reduction may have been impossible in areas where suitable toolstone occurred only as small nodules, requiring the use of a different strategy (Andrefsky 1998; Camilli 1988; Moore 1996).

Southwestern biface reduction strategies focused on efficient reduction with little waste. While the initial manufacture of large bifaces was labor intensive and resulted in much waste, the finished tools could be easily and efficiently reduced further to produce debitage for use as informal tools, or they could be shaped into replacements for broken or exhausted tools. Efficient strategies allowed flintknappers to produce the maximum length of usable edge per biface. By maximizing the return from these biface cores, they were able to reduce the volume of raw material required for the production of informal tools. This helped lower the weight transported between camps. Neither material waste nor transport cost were important considerations in expedient strategies; flakes were simply struck from cores as needed. Thus, analysis of reduction strategy allows us to estimate whether site occupants were residentially mobile or sedentary.

The analytic scheme used in this study was designed to facilitate the examination of chipped stone assemblages and determine what type of reduction strategy was used. This not only permits an assessment of reduction strategy type, it also allows the comparison of degrees of efficiency or expediency in reduction technology through time. Information of this type provides a context in which to examine the nature of mobility in different areas and time periods, facilitating the examination of temporal changes in land-use patterns.

A General Discussion of Chipped Stone Technology at the Spaceport America Sites

As noted earlier, a detailed discussion of the chipped stone assemblages recovered or field analyzed during testing is premature at this time, since we anticipate recovering considerably more artifacts during further investigations at some of these sites as well as from several others. Those additional data should provide a much firmer basis for examining temporal and behavioral trends in chipped stone use in the part of the Jornada del Muerto occupied by Spaceport America. However, we can provide a general discussion of the results of chipped stone analysis during testing, looking for trends that can be further explored with a larger data base. This discussion will mainly concern the six sites discussed in Chapter 4, for which more detailed assemblage data are available. The sites discussed in Chapter 5 will also enter into the discussion but are considered more anecdotally since the same level of detailed information is only available for a limited number of artifacts from these sites, and those are mostly formal tools. Thus, there is little comparability between the current analyzed assemblages for these two groups of sites.

Observational Discrepancies

The first topic to be discussed is discrepancies in artifact counts between the two surveys (HSR

1997; Quaranta and Gibbs 2008) and OAS testing. Table 6.1 presents artifact counts, either actual or estimated, for all three examinations of the tested sites, with the exception of LA 111429 and LA 155963. The numbers of artifacts on the latter two sites could only be roughly estimated because of their size and the huge assemblages observed at both. Since no study was able to provide accurate artifact counts or estimates for these sites, they are not considered in the present discussion. In three cases the HSR count is fairly close to that made by OAS, while HSR counts and estimates for the other three sites were considerably smaller than those made by OAS. In all cases the counts and estimates made by Zia are much smaller than those derived by OAS. This is not a criticism of the earlier examinations of these sites, but an excellent illustration of the limitations of survey recording and, potentially, the types of changes in surface exposures of site materials that can happen over time. During survey, the locations of artifacts tend to be quickly marked to provide a sense of the associated material culture as well as an indication of the extent of an artifact scatter. Since less time is generally spent on a site during survey, fewer artifacts tend to be found. With the greater amount of time available for examination during testing, more artifacts can be located (if present), and site boundaries can be more accurately delimited. Similarly, even more time tends to be spent at a site during data recovery, adding to the artifact count as well as improving the accuracy of site boundaries. Thus, many of the discrepancies seen in these artifact counts result from the level of recording represented by each project. Counts and site boundaries were more accurately defined during testing because of the greater amount of time spent on-site and can be considered a better representation of what is actually at these sites than the counts derived during survey.

Table 6.1. Comparison of chipped stone artifact counts for six of the tested sites

Site	HSR	Zia	OAS
LA 111420	200	66	330
LA 111421	50	40	58
LA 111432	50	18	128
LA 112370	12	4	14
LA 112371	30	15	61
LA 112374	12	1	11

Fifteen or so years had passed between the initial recording of these sites by HSR and the OAS examination. During that time several sites were impacted by the construction of a road through them, erosion has occurred throughout the study area, and many of the sites are within active cattle pastures. All of these processes can effect the surface expressions of sites. Road construction can remove features and deposits that are situated at or just below the surface, thereby altering the surface configuration of a site. Traffic across site surfaces by grazing livestock can result in damage to exposed cultural materials and, combined with erosion, can cause more artifacts and features to become exposed and potentially moved, damaged, or destroyed. In combination with differing levels of examination, the passage of time can be expected to cause widely varying artifact counts, site boundaries, and feature observations.

Material Selection Parameters

An observation was made during testing concerning potential temporally related material selection parameters. The three sites examined along the proposed infrastructure corridor date to the late Paleoindian or Early Archaic periods. Several Early Archaic projectile points were observed by Zia at LA 111420, including a Jay point and two Bajada points, while a Chiricahua point and a Bajada point were collected during testing. A possible Early Archaic projectile point preform was noted at LA 111421 during testing, and an Eden-like projectile point base was recovered from LA 111432 during initial recording by HSR. While examining the surface artifacts during testing, there appeared to have been a heavy use of very fine-grained metaquartzites at these sites that was not replicated at LA 112370, LA 112371, and LA 112374. This suggested that heavy use of more durable fine-grained metaquartzites was a characteristic of the Early Archaic and perhaps Paleoindian periods. However, the latter does not accord with observations made in potential Paleoindian clusters at LA 111429 and LA 155963, where cherts appear to heavily dominate.

Table 6.2 shows the distribution of material types for these sites, with field-analyzed and

Table 6.2. Material type by site

Site		Chert	Silicified Wood	Polvadera Peak Obsidian	Basalt	Rhyolite	Limestone	Siltstone	Metamorphic Undifferentiated	Metaquartzite	Orthoquartzite	Quartz	Total
LA 111420	Count	107	3	1	1	34	1	–	4	192	–	1	344
	Row %	31.1%	0.9%	0.3%	0.3%	9.9%	0.3%	–	1.2%	55.8%	–	0.3%	53.0%
LA 111421	Count	20	2	–	–	5	–	3	–	32	1	–	63
	Row %	31.8%	3.2%	–	–	7.9%	–	4.8%	–	50.8%	1.6%	–	9.7%
LA 111432	Count	81	1	–	–	1	3	–	–	55	–	–	141
	Row %	57.5%	0.7%	–	–	0.7%	2.1%	–	–	39.0%	–	–	21.7%
LA 112370	Count	10	2	–	1	–	–	–	–	1	–	–	14
	Row %	71.4%	14.3%	–	7.1%	–	–	–	–	7.1%	–	–	2.2%
LA 112371	Count	71	–	–	–	–	–	1	–	3	–	–	75
	Row %	94.7%	–	–	–	–	–	1.3%	–	4.0%	–	–	11.6%
LA 112374	Count	12	–	–	–	–	–	–	–	–	–	–	12
	Row %	100.0%	–	–	–	–	–	–	–	–	–	–	1.8%
Total	Count	301	8	1	2	40	4	4	4	283	1	1	649
	Row %	46.4%	1.2%	0.2%	0.3%	6.2%	0.6%	0.6%	0.6%	43.6%	0.2%	0.2%	100.0%

collected samples combined. Fine-grained metaquartzites are indeed dominant at LA 111420 and LA 111421, in each case comprising over half the assemblage. Since Early Archaic occupations are likely for both of these sites, we can suggest that durable metaquartzites were an important material resource during that period. Fine-grained metaquartzites also comprise a large part of the LA 111432 assemblage; in that case, however, cherts are the dominant material, with metaquartzite relegated to a secondary role. This may support the somewhat earlier date assigned to this site, with cherts dominating in late Paleoindian assemblages, but with a significant use of fine-grained metaquartzites. If this is the case, then metaquartzite use expanded during the Early Archaic, when more durable materials tended to be used for formal tool manufacture.

No potential dates other than general Archaic period were available for LA 112370, LA 112371, and LA 112374, and that temporal assignment was based on supposition rather than hard data. Nevertheless, the much smaller percentages of fine-grained metaquartzites in those assemblages, with none at all seen at LA 112374, suggests that these sites may at least belong to a different temporal period than LA 111420, LA 111421, and LA 111432. A later Archaic- or Formative-period affiliation seems more likely for these small, nondescript sites.

Field notes describing components on LA 111429 and LA 155963 partly support the temporal differentiation in material type use, though these data are anecdotal, as noted earlier, and represent initial approximations rather than precise descriptions of assemblage contents. The probable Paleoindian occupational areas at LA 111429 and LA 155963 seem to be heavily dominated by high-quality cherts, which were often thermally altered to improve their flaking qualities. Parts of these sites that appeared to have been occupied during the Formative period also had assemblages that were dominated by cherts, but the quality seemed to be somewhat lower than what was seen in the Paleoindian components, and there was much less evidence for thermal alteration.

These preliminary data suggest a scenario in which material selection parameters varied through time, though not all time periods are represented in our sample, so comprehensive predictions cannot be made. During the Folsom period, there appears to have been a heavy use of high-quality cherts that were often thermally altered to improve their flaking characteristics. Other types of materials were also used but seem to have comprised significantly smaller percentages of assemblages. The use of cherts continued to dominate into the late Paleoindian period, but there was also a substantial reliance on fine-grained metaquartzite. Fine-gained metaquartzite dominates the Early Archaic assemblages in our sample, with chert relegated to a secondary position. Thermal treatment to improve the flaking qualities of chert continued to be commonly used. After the Early Archaic our ability to predict material trends falls apart due to lack of information. However, the few data we have for the later occupational periods suggests that the dominance of fine-grained metaquartzites declined by at least the Formative period, with cherts again dominating. Whether the decline in metaquartzite use began during later parts of the Archaic or that trend is simply representative of the Formative period remains uncertain.

Material Procurement

Cortex was not common on artifacts from any of the tested sites and occurred only in the LA 111420 (n = 20), LA 111421 (n = 9), LA 111432 (n = 24), LA 112370 (n = 1), and LA 112371 (n = 10) assemblages. Waterworn cortex comprised between a low of 80.0 percent of the LA 111420 assemblage to a high of 95.8 percent at LA 111432, with the only cortical specimen from LA 112370 also exhibiting waterworn cortex. This suggests that most raw materials were obtained from gravel deposits rather than at outcrops. Material types exhibiting waterworn cortex included various cherts (n = 41; 87.2 percent), silicified wood (n = 1; 100.0 percent), basalt (n = 1; 100.0 percent), and fine-grained metaquartzite (n = 14; 93.3 percent). Nonwaterworn cortex was only seen on specimens of gray chert (n = 2) and yellow chert (n = 1). Cortex type on other specimens, including the last cortical example of fine-grained metaquartzite, could not be identified to type. Thus, it seems likely that nearly all materials used in chipped stone reduction at these sites were obtained from gravel beds, presumably not too far away. The few examples of nonwaterworn cortex that were identified may represent nonlocal materials.

Reduction Strategies

Table 6.3 presents some preliminary information on reduction strategy for all sites except LA 111429 and LA 155963. At least some biface manufacture occurred at all six of these sites, with biface flakes comprising between 2.71 percent of the flakes at LA 111420 to 22.22 percent of the flakes at LA 112370. Biface flake percentages are small for LA 111420 and LA 111421, though both of these sites are probably Early Archaic in date, and each contains multiple fragments of unfinished bifaces, with at least one specimen apiece that was broken during manufacture, indicating that biface production occurred at these locations. Moderate percentages of biface flakes occur in the LA 111432 and LA 112371 assemblages, with a biface that was discarded after being broken in manufacture occurring only at the latter. The last two assemblages—LA 112370 and LA 112374—both contain fairly large percentages of biface flakes, but in both cases only small numbers of artifacts were recovered, and the only biface fragment that was found on these sites occurred at LA 112370 and exhibited an indeterminate type of break. Flake to angular debris ratios were fairly large for LA 111421, LA 112370, and LA 112371, suggesting a dominance of efficient reduction. In contrast, ratios were fairly low for LA 111432 and LA 112374, suggesting a dominance of expedient reduction.

Table 6.3. Reduction strategy by site

Site		Debitage			Biface			
		Core Flake	Biface Flake	Flake:Angular Debris	Total	Projectile Point	Manufacturing Break/Discard	Indeterminate Breakage/Whole
LA 111420	Count	287	8	7.20:1	4	2	1	1
	Row %	97.3%	2.7%					
LA 111421	Count	49	2	10.20:1	4	1	1	2
	Row %	96.1%	3.9%					
LA 111432	Count	102	10	4.67:1	0	0	0	0
	Row %	91.1%	8.9%					
LA 112370	Count	10	2	12.00:1	1	0	0	1
	Row %	83.3%	16.7%					
LA 112371	Count	60	4	10.70:1	1	0	1	0
	Row %	93.8%	6.3%					
LA 112374	Count	7	2	3.00:1	0	0	0	0
	Row %	77.8%	22.2%					

Since only 7 of the 28 biface flakes were less than 15 mm long, most or all of these specimens are probably indicative of the manufacture of large bifacial tools, which tends to be a hallmark of the Paleoindian and Archaic traditions. Flakes struck from large bifaces occur in all six assemblages, and in each case where smaller biface flakes occur, they are outnumbered by large biface flakes. This may indicate a general Archaic date for all of these sites, with the possible exception of LA 111432, which may date to the late Paleoindian period.

In all six cases, the current data suggest the use of a mixture of expedient and efficient reduction strategies for these six sites. Thus, flakes were struck from cores for use as cutting or scraping tools, while at the same time flakes were struck from large bifaces, either for use as informal tools or to shape the bifaces into more specific tool forms. There is no evidence for large-scale biface reduction in any of these assemblages, and none of these six sites appears to have served as a workshop where bifacial tools were made in anticipation of future need.

Similar data are not available for LA 111429 or LA 155963, so we cannot yet determine the scale of efficient versus expedient reduction or the level of biface reduction/manufacture at those locales. However, field observations suggest that considerable evidence for efficient reduction may occur in the Paleoindian components at those sites, and potentially also occurs in areas occupied during the Archaic period, but these possibilities can only be explored when more detailed data are available.

Tool Use/Site Function

Table 6.4 illustrates the array of task categories in which chipped stone tools were potentially used that can currently be defined for each site. While LA 111429 and LA 155963 both represent multioccupational locales with long histories of use extending from the Paleoindian period to the Formative period, each of the other six sites were occupied much less extensively, both in terms of stay duration and number of occupations. Indeed, there is a good likelihood that many of these sites were only occupied once. Thus, we would expect to see evidence for wider ranges of tasks in the assemblages from the two larger sites. While this is essentially true, the same number of tasks is visible at LA 111420 as at LA 111429, the number of tasks identified at LA 111421 is nearly the same, and LA 111432 is not far behind. Figure 6.2 plots numbers of chipped stone artifacts against numbers of tasks represented in these assemblages, with the two larger assemblages simply presented as counts of 1,000. The number of tasks roughly covaries with assemblage size. The fewest activities are represented in the two smallest assemblages (LA 112370 and LA 112374), both of which yielded fewer than 20 artifacts. Between four and five tasks are represented in the somewhat larger assemblages, which contain 60–150 artifacts (LA 111421, LA 111432, and LA

Table 6.4. Tool use by site

Site	Number of Artifacts	Core Reduction	Biface Manufacture	Projectile Point Manufacture	Hunting	Leatherworking	Woodworking	General Manufacture and Maintenance	Number of Tasks Represented
LA 111420	344	x	x	–	x	x	x	x	6
LA 111421	63	x	x	x	x	x	–	–	5
LA 111432	141	x	x	–	–	x	–	x	4
LA 111429	1000s	x	x	–	x	x	x	x	6
LA 112370	14	x	x	–	–	–	–	–	2
LA 112371	75	x	x	–	–	x	–	x	4
LA 112374	12	x	x	–	–	–	–	–	2
LA 155963	1000s	x	x	x	x	x	x	x	7

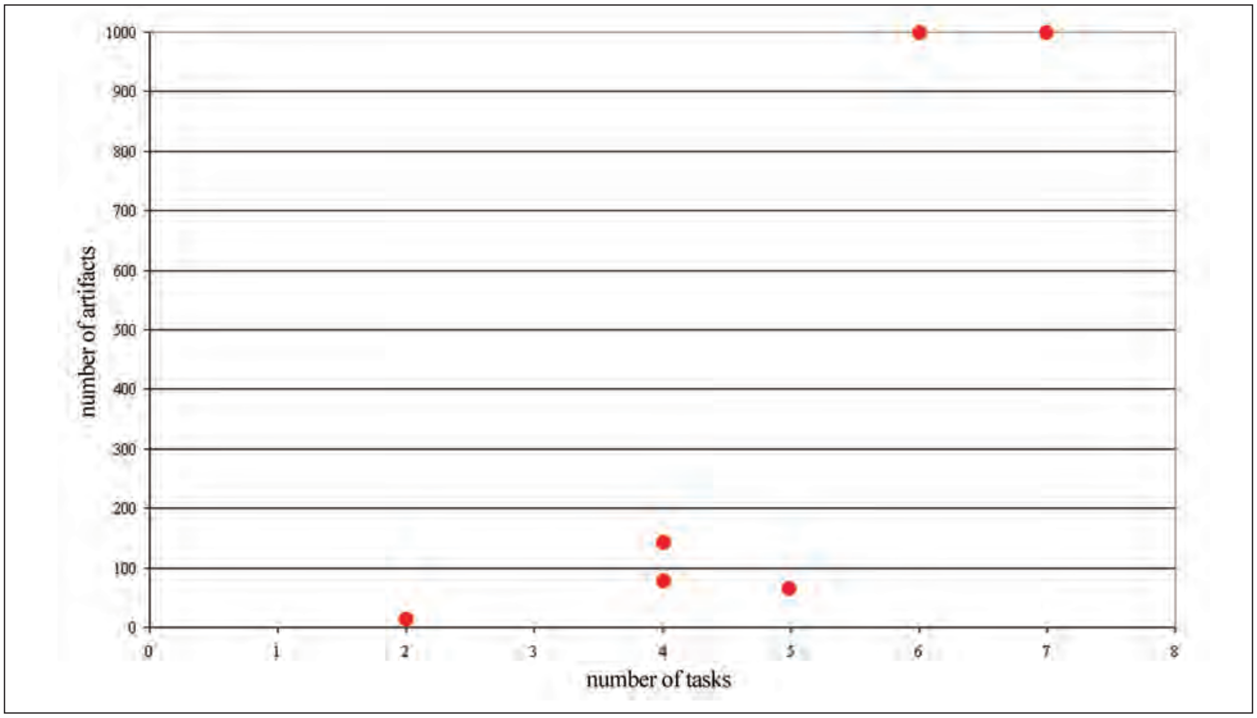

Figure 6.2. Number of chipped stone artifact per site plotted against number of tasks represented.

112371). Six tasks are represented in a moderate-sized assemblage containing 344 artifacts (LA 111420), and six or more occur in the very large assemblages from the multioccupational sites (LA 111429 and LA 155963).

Thus, the number of task categories represented in chipped stone assemblages varies according to the number of artifacts discarded at a site, which in turn is a function of occupational intensity and/or duration. All eight sites in our sample appear to represent base camps used for varying lengths of time, and in two cases at least, on multiple occasions scattered over a very long period of time. Even the two smallest sites—LA 112370 and LA 112374—most likely represent camps used for brief periods. During the initial recording of LA 112370 by HSR, a scraper and a biface fragment were noted that were not found during later examinations because the site was impacted by construction of a road at some point following that survey. This would increase the number of tasks recorded for this site to three or four, a number that is out of proportion to the small size of the assemblage. Similarly, a possible projectile point fragment was noted at LA 112374 during the initial HSR recording that was not seen during subsequent examinations. This tool would increase the number of tasks represented at LA 112374 to at least three, again out of proportion to the small overall size of the assemblage. Resource-extractive locales are expected to evidence the performance of a very limited range of tasks. The comparatively large number of tasks represented in the assemblages from these sites is more indicative of a residential function, with intensity/duration of stay varying widely.

Conclusions

Though limited in extent, information on the chipped stone assemblages from these sites was sufficient to allow us to develop a set of preliminary conclusions concerning stone tool manufacture and use. Future research should provide data on additional sites as well as more detailed information on some of the tested sites that can be used to examine these questions in greater detail. In particular, we will be able to provide more exhaustive studies of material selection parameters, material sources, reduction strategies, and tool use/site function. This preliminary study of chipped stone assemblages suggests that material selection parameters varied through time, and with more data from a wider range of temporal components, that possibility can be tested and expanded. Most materials used in chipped stone reduction appear to have been obtained locally, mainly from gravel deposits. Evidence for a mixture of expedient and efficient reduction strategies was noted in most assemblages and considered indicative of residential locales in which bifaces were used, shaped, and had flakes struck from them, but the manufacture of large bifaces was not a major focus of site activities. Finally, all eight sites appear to represent residential locales displaying varying degrees of occupational intensity. These possibilities can be explored further and in more depth with additional data available from more detailed excavations.

7. Euroamerican Artifact Analysis

Matthew J. Barbour

A total of 130 Euroamerican artifacts were analyzed from two archaeological sites—LA 111429 (n = 2) and LA 155963 (n = 128)—during testing (Table 7.1, Appendix 1). These materials were examined using the standard methods outlined in OAS (1994b) to describe the assemblage.

LA 111429

Two 35 mm motion picture film reels, measuring 10 inches in diameter, were collected and analyzed from LA 111429 (Fig. 7.1, Table 7.1). These reels were made by the "Genuine Stamping Co." of "Cleveland OH." An internet search of the company name found no information on when this business was in operation. The motion picture industry has used 35 mm film since 1892 (http://en.wikipedia.org/wiki/35_mm_film). The film reels appear to be isolated occurrences associated with filming in the Jornada del Muerto during the twentieth century. It is unclear if any Hollywood motion pictures were shot in the area, but the US military filmed their experiments on the nearby White Sands Missile Range quite extensively. It is plausible to speculate that these reels are debris associated with the documentation of government nuclear tests in the mid-twentieth century.

LA 155963

A total of 128 Euroamerican artifacts were identified at LA 155963 (Table 7.1). The vast majority (n = 120) were subjected to in-field analysis and left in place (see Appendix 1 for artifact descriptions). These materials include quantities of fruit and vegetable cans (n = 8), machine-cut square nails (n ≈ 100), barrel hoops (n = 5), and scrap strap/strip metal (n = 2). Most of these artifacts are believed to have been

Table 7.1. Euroamerican artifacts by site, category, type, and function

Category	Type	Function	Total
		LA 111429	
Entertainment and leisure	photography	film reel	2
		LA 115963	
Unassignable	unidentifiable	spout	1
Food	canned goods	condensed milk	1
		lard bucket	2
		vegetable or fruit can	8
Indulgences	tobacco, smoking	tobacco can	1
Domestic	dinnerware	vessel, indeterminate	1
Construction and maintenance	unidentifiable	strap/band/strip	2
	hardware	nail, common	100
	storage	barrel hoop	5
Transportation	wagons and buggies	wagon part, indeterminate	1
Military and arms	small arms	centerfire cartridge	4
		rimfire cartridge	1
		machine gun link	1
Total			130

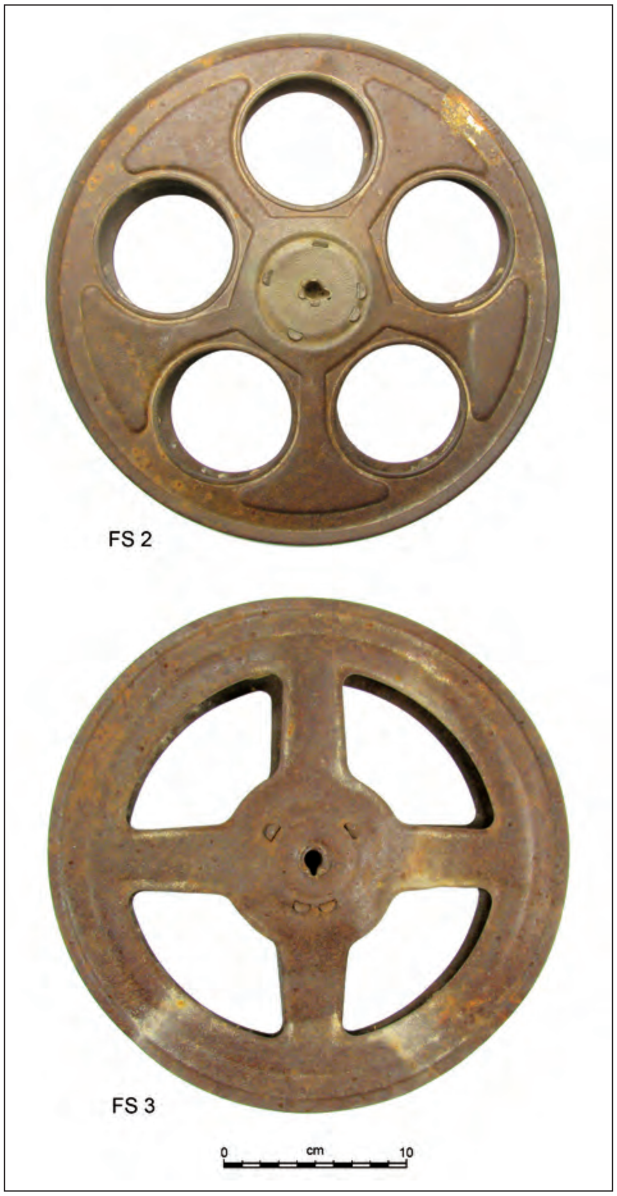

Figure 7.1. 35 mm motion picture reels, LA 111429.

Figure 7.2. Lard cans, LA 155963: (a) Anglo American Packing & Provision Company Refined Lard; (b) Plankinton & Armour Choice Refined Family Lard.

associated with construction and demolition activities at the nearby Aleman Ranch (LA 80070) or the consumption of goods and discard of domestic refuse by its inhabitants. While the assemblage appears to date to the nineteenth or twentieth centuries, nine additional artifacts were collected and subjected to laboratory analysis because they were considered to be temporally diagnostic. These artifacts include two lard cans with manufacture marks, five spent cartridges, and a machine gun belt link.

The two lard cans/pails had clearly embossed brands (Fig. 7.2). One was a "Plankinton & Armour Choice Refined Family Lard Kansas City MO." Plankinton & Armour opened their meat packing facility in Kansas City, Missouri in 1871, and it was reorganized as Armour Brothers in 1885 (Find a Grave 2011). The other can was "Anglo American Packing & Provision Company Refined Lard," a brand that was available for consumption sometime prior to 1910 (*National Provisioner*, March 5, 1910:24). Both cans are approximately 6 1/2 inches in height and 5 inches in diameter.

The five cartridges include one rimfire and

Figure 7.3. Cartridges and ammunition belt link, LA 155963: (a–b) .44 cal.; (c) .45 cal.; (d) .50-70 cal.; (e) .45-70 cal.; (f) .50 cal. machine gun belt link.

four centerfire ignition systems (Fig. 7.3). The rimfire cartridge is .50-70, a caliber was used widely by the US in many firearms models between 1866 and 1873, but it was not commonly adopted for civilian use (Barnes 2003:161). The centerfire cartridge cases include two .44s produced by the Union Metallic Company, an unidentifiable .45, and a .45-70 produced by the Remington Arms Company. The .45-70 was used in the single shot "Trapdoor" Springfield rifle, which replaced firearms using the .50-70 in 1873 (Barnes 2003:96). While the .50-70 and .45-70 caliber munitions seem out of place on a civilian ranch, archival research concerning the Aleman Ranch suggests sporadic use of the complex by the US Army between 1867 and 1880 (Quaranta and Gibbs 2008:58–64). If so, these cartridges may be associated with US Army military operations in the Jornada del Muerto.

One .50 caliber machine gun belt link was also encountered. It was presumably jettisoned from an aircraft while performing operations on the nearby White Sands Missile Range. Many different bombers and combat planes used the .50 caliber machine gun, including the Boeing B-17 Flying Fortress, which was introduced in the 1930s (http://en.wikipedia.org/wiki/Boeing_B-17_Flying_Fortress).

Analysis of these artifacts suggests historic use of LA 155963 during the late nineteenth and early twentieth centuries (ca. 1870–1910). However, artifact manufacture dates do not overlap with one another, suggesting discard over a period of time instead of a single discrete depositional event. Most of the Euroamerican artifacts are believed to be associated with a wide range of activities occurring at the nearby Aleman Ranch headquarters. These activities might have included the construction, demolition, or maintenance of structures, target practice or hunting in the surrounding area, military campaigns against the Apaches, and the consumption and discard of store-bought foodstuffs by the ranch's inhabitants. The exception is the .50 caliber machine gun belt link, which is assumed to represent later use of the area by the US Army Air Force or the US Air Force.

Summary

No Spanish Colonial–, Mexican–, or early American Territorial–period Euroamerican artifacts directly associated with early use of the Camino Real de Tierra Adentro were encountered. Only one site, LA 155963, appears to have a recognizable historic component. Most of the materials from this site date between 1870 and 1910. These artifacts are presumably related to activities occurring at the nearby Aleman Ranch (LA 80070). The film reels from LA 111429 are isolated occurrences associated with motion picture filming in the Jornada del Muerto during the twentieth century.

8. Summary and Recommendations

Nancy J. Akins and James L. Moore

Eight sites were examined during this study with three rationales in mind. An undetermined *National Register* eligibility status was assigned to four sites during survey because they lacked visible features, temporally diagnostic artifacts, and definite evidence for subsurface cultural deposits. The rationale behind examining these sites—LA 111421, LA 112370, LA 112371, and LA 112374—was to evaluate whether or not they are eligible for inclusion on the *National Register*. The other four sites have all been determined eligible for inclusion in the *National Register*, and three of them—LA 111420, LA 111432, and LA 111429—are within potential construction zones: LA 111420 and LA 111432 are within the limits of a potential infrastructure corridor, and LA 111432 and LA 111429 are bisected by County Road A020. All three of these sites could potentially be impacted by future construction activities. Thus, they were tested to determine whether potentially important cultural features or subsurface deposits occur within construction corridors and adjacent 15 m wide buffer zones. The other site—LA 155963—is primarily outside planned construction zones but appears to have great potential for providing important information on the prehistory of the project area through research-driven studies. This potential was also assessed for the other seven sites, but only LA 111429 was concluded to have a similar level of potential. The following discussion is structured like Chapters 4 and 5, presenting conclusions and recommendations for the eligibility and assessment sites first, followed by the research sites.

Eligibility and Assessment Sites

LA 111420

LA 111420 was determined eligible to the *National Register* during Section 106 review. Assessment during testing indicates that the site has potential to contribute to our knowledge of the prehistory of the Spaceport America project area.

The results of surface reconnaissance, auger testing, and hand-excavated test pits indicate that LA 111420 has considerable data potential. Projectile point styles identified during previous surveys and OAS testing suggest occupations occurred through the Early to Middle Archaic periods, and that the artifacts are distributed in clusters that could suggest distinct activity areas. While these artifacts are on a secondary geologic horizon, they could represent a discrete deposit that is likely to yield information on site structure and local subsistence strategies in the Jornada del Muerto during the Archaic period.

Although the goal of the fieldwork was assessment, data collected at the site will be used to address the research questions posed in the research design for investigation of Spaceport America's cultural landscape (Moore et al. 2010b). If LA 111420 will be impacted by future construction, a strategy for additional investigation and monitoring consistent with the archaeology mitigation plan (FAA and NMSA 2010) should be prepared for work within that corridor.

LA 111421

The Section 106 process found that LA 111421 was of undetermined eligibility to the *National Register*. Archaeological testing indicated that LA 111421 has limited data potential. An intensive search of the surface of this site located few artifacts (1 per 74 sq m). Auger holes and hand-excavated test pits placed in areas with the greatest artifact densities failed to locate more than a few subsurface artifacts. None of the observed or recovered artifacts are temporally diagnostic, and no evidence of features was encountered. Testing at this site did not provide information that would support the site's eligibility, and the OAS recommends that LA 111421 be determined not eligible for inclusion in the *National Register*. No future work is recommended for this site. Data collected from LA 111421 will, however, be used to help address the research questions posed in the research design for investigation of Spaceport America's cultural landscape (Moore et al. 2010b).

LA 111432

LA 111432 was determined eligible to the *National Register* during Section 106 review. Assessment during testing indicates that the site has potential to contribute to our knowledge of the prehistory of the Spaceport America project area. Testing at this site resulted in the recovery of a fairly substantial quantity of surface and subsurface artifacts. The quality of chipped stone materials and the presence of a probable Paleoindian point found by HSR suggest that LA 111432 has the potential to contribute to our understanding of the Paleoindian-period occupation of the study area. Artifacts at this site appear to represent a discrete deposit from which information regarding site structure and the nature of subsistence strategies in the Jornada del Muerto during the Paleoindian period can be ascertained. Although the goal of the fieldwork was assessment, data collected at the site during testing will contribute to addressing the research questions posed in the plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010b). If the site will be impacted by future construction along the proposed infrastructure corridor, a strategy for additional investigation and monitoring consistent with the archaeology mitigation plan (FAA and NMSA 2010) should be prepared for work within that corridor.

LA 112370

The Section 106 process found that LA 112370 was of undetermined eligibility to the *National Register*. Surface reconnaissance and assessment of this site located very few artifacts (1 per 483 sq m), no artifact clusters could be defined, and no evidence of cultural features was noted. No subsurface artifacts were found in the auger tests or hand-excavated test pits. Archaeological testing indicates that LA 112370 has limited data potential, and the OAS recommends that this site be determined not eligible for inclusion in the *National Register*. Data collected at the site during testing will, however, contribute to addressing the research questions posed in the plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010b).

LA 112371

The Section 106 process found that LA 112371 was of undetermined eligibility to the *National Register*. OAS evaluation of the site indicated that a small number of artifacts (1 per 76 sq m) are present on the surface of this site, including a scraper and a fragment of ground stone. Test pits placed in or near the artifact clusters recovered a fair number of chipped stone artifacts (15 pieces) from subsurface contexts. Fire-cracked rock was observed during previous surveys but not relocated during testing. Archaeological testing indicates that LA 112371 has the potential to provide further information on the prehistory of this region. Based on these findings, the OAS recommends that this site be considered eligible for inclusion in the *National Register*. No additional research is proposed for this site at this time. Although the goal of the fieldwork was assessment, data collected will contribute to addressing the research questions posed in the plan for the investigation of Spaceport America's cultural landscape (Moore et al. 2010b). If the site will be impacted by future construction activities, a strategy for additional investigation and monitoring consistent with the archaeology mitigation plan (FAA and NMSA 2010) should be prepared for work within that area.

LA 112374

The Section 106 process found that LA 112374 was of undetermined eligibility to the *National Register*. Very few artifacts are present on the surface of this site (1 per 332 sq m), and no artifact clusters could be defined. Auger testing and hand excavations suggested that few artifacts are present subsurface (one was found). This indicates that LA 112374 has limited data potential, and the OAS recommends that this site be determined not eligible for inclusion in the *National Register*. Data collected at the site during testing will, however, contribute to addressing the research questions posed in the plan for investigation of Spaceport America's cultural landscape (Moore et al. 2010).

Research Sites

LA 111429

LA 111429 was determined eligible to the *National Register* during Section 106 review. Initial investigations during testing were directed toward determining the nature and extent of cultural deposits along County Road A020 and to locate and assess the features defined during survey and examine the artifact distribution in order to plan for research-oriented investigations. This site has substantial potential for contributing to our knowledge of the prehistory of the region through research-oriented investigations. Use of the site spanned as much as 12,000 years of prehistory, yet it is fairly well preserved, and distinct periods of occupation may be identified.

Auger tests and hand-excavated test pits placed within 15 m of the county road in a variety of geological settings recovered only a few subsurface artifacts and found no indications of features. The discovery of a paleosol in one test pit could indicate that the southern coppice dune ridge has the potential to contain subsurface deposits. Because of this potential, and because the tests were only able to examine a small portion of the road buffer, any contemplated disturbance along the road should require that construction corridors be surface-collected and monitored during construction (FAA and NMSA 2010b:34). Additional formal testing may also be necessary, especially in the area on top of the southern coppice dune where the paleosol was identified. Should any archaeologically significant features or deposits be encountered during construction, construction activities should stop, and the procedures for dealing with unexpected discoveries defined in the mitigation plan for archaeology (FAA and NMSA 2010) should be activated. Further testing or data recovery may be necessitated in this eventuality.

Investigations at LA 111429 identified areas to be targeted for research-oriented investigations, as discussed in the research design for the next phase of investigation at Spaceport America (Moore et al. 2010b). These include areas that could contain subsurface deposits or that exhibit an abundance of surface materials and could yield information on site chronology, settlement, land use, access to resources, and subsistence practices that would allow us to more fully characterize site occupations. Features at this site are continually being degraded by wind, weather, and cattle grazing. In many areas, more charcoal can be found on the surface of sands in small erosional channels than can be expected to occur in most features. Thus, further investigations are needed at this site in order to recover important data that might otherwise be lost over the next few years.

Features selected for excavation will be those judged to have the most potential for providing chronometric samples and subsistence-related samples, or are associated with diagnostic artifacts. This type of study will allow us to address several of the questions posed in the research design for the next phase of investigation (Moore et al. 2010b). Research Question 1 can be addressed by obtaining chronometric samples, allowing us to better define the chronology of occupation/use for this site as well as the study area. Chronometrics will also allow us to address Research Question 3, which explores how site types and locations might have varied through time in relation to the availability of water. Subsistence information will help address parts of Research Question 4 by defining the types of resources exploited from a particular location may help determine whether their availability varied through time.

As specified in the research design, these excavations will include a buffer area around features, allowing the recovery of artifacts associated with them. To aid in identifying specific temporal or functional components at LA 111429, research-oriented investigations will also include in-field analysis of surface artifacts in selected areas, surface collection within artifact clusters, and hand excavations within select artifact clusters. Artifacts from clusters identified with the most potential to provide useful information will be sampled through surface collection and hand-excavated units. Clusters that will be targeted include the three possible Paleoindian artifact clusters, the ground stone area, and the feature area shown in Figures 5.1–5.3 (Moore et al. 2010b). This part of the study will allow us to address Research Question 6, and analysis of the structure of various parts of LA 111429 will be used to determine how site occupational patterns might have varied through time.

LA 155963

LA 155963 was determined eligible to the *National Register* during Section 106 review. Investigations at this site were aimed at providing detailed information for planning research-oriented excavations. LA 155963 has significant time depth and research potential, and as discussed in the research design for the next phase of investigation (Moore et al 2010b), the primary objectives of that phase will be to obtain datable materials, subsistence-related samples, information on site structure, and materials that will provide information on interactions within and outside the project area.

Initial investigations during testing defined a large number of features and substantial artifact clusters. As at LA 111429, features at this site are degrading and disappearing into arroyos, or the fill is being eroded away. The remaining unrecorded features will be recorded, and a sample will be excavated before they have lost their potential to contribute dating and subsistence-related samples. Areas around the excavated features will be stripped to obtain information on possible activity areas and site structure. In addition to feature excavations, samples of artifact clusters from the varying occupations will be excavated or collected to obtain information on activity areas, site structure, range and interaction, and chronology. These will target the potential Paleoindian, Jornada Mogollon, and possible Protohistoric occupational areas (Moore et al. 2010b).

This study will allow us to address several questions posed in the research design for the next phase of investigation (Moore et al. 2010b). Research Question 1 can be addressed by obtaining chronometric samples, allowing us to better define the chronology of occupation/use for this site as well as the study area. Chronometrics will also allow us to address Research Question 3, which explores how site types and locations might have varied through time in relation to the availability of water. Subsistence information will help address parts of Research Question 4 by defining the types of resources exploited from a particular location and will perhaps aid in determining whether their availability varied through time. By recovering information about the structure of various parts of LA 155963, we will be able to address Research Question 6 and explore the ways in which site occupational patterns might have varied through time. Should Protohistoric-period remains be identified, they will enable us to address Research Question 7 and determine whether those remains provide any information about concurrent military operations conducted by the US Army.

Once the targeted excavations have been completed, any future construction disturbance will require assessment of the area of potential disturbance, surface collection within it, and monitoring of fencing and construction (FAA and NMSA 2010:21).

Conclusions

As described at the outset, three distinct but related goals informed the approaches to the investigations of the sites studied during the research reported in this document. These included (1) evaluation of the eligibility of four sites—LA 111421, LA 112370, LA 112371, and LA 112374 to the *National Register*; (2) assessment of potential future construction disturbance within the boundaries of three sites that had formerly been determined as eligible (LA 111420, LA 111432, and LA 111429); and (3) development of information and strategies that would be employed for planned research-driven excavations at LA 155963 and LA 111429. Field and laboratory procedures and methodologies employed throughout the investigations and analyses were complementary and in conformance with the standards outlined in the previously approved testing plan (Moore et al. 2010a). Thus, while the specific goals of the research varied from site to site, the data sets that were produced provide a substantial basis for the research.

Three of the four sites whose eligibility for inclusion in the *National Register* was evaluated by this project yielded no temporally diagnostic artifacts or potentially important subsurface deposits, and all lack visible cultural features. The lack of a temporal association, especially, limits the use of any data that might be recovered from these sites. Thus, the OAS recommends that LA 111421, LA 112370, and LA 112374 be considered not eligible to the *National Register*. No further archaeological investigations are recommended for any of these sites. The presence of potentially important subsurface deposits at LA 112371 indicates that this site can be considered eligible to the *National Register*.

The four remaining sites have all been previously found eligible to the *National Register*. LA 111420, LA 111429, and LA 111432 were tested to assess whether potentially significant cultural features or subsurface deposits occur within potential construction zones and adjacent buffer areas. Since potentially significant cultural deposits and artifact distributions were identified at LA 111420 and LA 111432, stipulations for treatment in the archaeology mitigation plan (FAA and NMSA 2010) will be followed should construction activities occur at these two sites. Evidence for significant cultural deposits or features within a buffer corridor along County Road A020 that runs through LA 111429 was not found, but the potential that such are present remains a consideration. Any further construction activities within the corridor assessed by testing at LA 111429 or improvements along County Road A020 should include archaeological collection and monitoring, and further testing may be necessary. Sections of LA 111429 that are outside the road corridor and adjacent buffer zones have not been assessed by testing.

Both LA 111429 and LA 155963 were shown to have great potential for research-oriented investigations. Research-oriented investigations are planned and detailed in Moore et al. (2010b). Since research-oriented investigations will not be aimed at recovering all available information from these sites, that phase does not constitute a program of archaeological data recovery. While the results of research-oriented investigations can be used to help guide any future data recovery studies, should such become necessary, they will not provide clearance for any future construction activities within the limits of either of these sites, except where specified above for LA 111429.

All records and artifacts recovered during this testing phase are currently stored at the Office of Archaeological Studies in Santa Fe. Upon completion of research-oriented studies and any further data recovery investigations that might be necessary, all records and artifacts will be transferred to the Archaeological Research Collection of the Museum of New Mexico for permanent curation.

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Appendix 1. In-Field Analysis and Surface Collection (UTM Zone 13, NAD 83)

Site Number	Artifact Number	Cluster	Northing	Easting	Elevation	Material Type	Material Quality (grain size)	Artifact Morphology	Artifact Function	Cortex	Portion	Break	Cortex Type	Thermal Alteration	Length	Width	Thickness	Comments
111420	1	B	3647811.46	318699.39	10.07	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	8	13	3	–
111420	2	B	3647815.20	318698.74	10.01	Gray chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	36	24	7	–
111420	3	B	3647806.56	318698.84	10.12	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	15	23	4	–
111420	4	B	3647805.54	318699.48	10.10	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	14	23	4	–
111420	5	B	3647807.62	318698.43	10.11	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	19	12	2	–
111420	6	B	3647809.04	318694.61	10.10	Quartz	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	19	20	7	–
111420	7	B	3647808.42	318694.90	10.13	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	41	32	9	–
111420	8	B	3647805.33	318697.14	10.12	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	15	23	7	–
111420	9	B	3647796.76	318695.27	10.13	Yellow metaquartzite	Fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	20	19	6	–
111420	10	B	3647800.79	318691.98	10.10	Limestone	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	23	35	5	–
111420	11	B	3647799.45	318688.09	10.07	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	21	23	6	–
111420	12	B	3647799.66	318687.95	10.06	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	20	20	8	–
111420	13	–	3647799.51	318679.61	10.04	Rhyolite	Fine	AD	Unutilized AD	0	Whole	–	–	–	40	26	12	–
111420	14	–	3647799.42	318679.14	10.02	Gray chert	Fine	Biface flake	Unutilized flake	0	Lateral	–	–	–	24	21	4	–
111420	15	A	3647798.30	318670.71	10.09	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	16	15	4	–
111420	16	A	3647799.18	318670.18	10.12	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	42	37	10	–
111420	17	A	3647797.30	318667.05	10.16	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	15	19	4	–
111420	18	A	3647797.70	318668.00	10.14	Silicified wood	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	18	10	2	–
111420	19	A	3647796.56	318668.99	10.15	Silicified wood	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	12	10	2	–
111420	20	A	3647799.96	318664.65	10.15	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	16	21	4	–
111420	21	A	3647801.03	318662.43	10.16	Yellow metaquartzite	Fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	18	23	5	–
111420	22	A	3647802.90	318662.33	10.16	Gray metaquartzite	Fine	AD	Unutilized AD	10	Whole	–	WW	–	29	18	7	–
111420	23	A	3647796.92	318662.58	10.16	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	18	16	4	–
111420	24	A	3647796.27	318661.42	10.18	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	16	15	5	–
111420	25	A	3647796.83	318660.56	10.15	Silicified wood	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	17	18	5	–
111420	26	A	3647800.48	318660.67	10.17	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	14	17	5	–
111420	27	A	3647799.89	318660.23	10.17	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	26	17	5	–
111420	28	A	3647797.32	318656.82	10.16	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	WW	–	15	26	7	Cortical Platform
111420	29	A	3647799.78	318656.79	10.19	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	25	29	7	–
111420	30	A	3647805.05	318657.84	10.18	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	14	13	4	–
111420	31	A	3647804.57	318657.94	10.15	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	19	15	5	–
111420	32	A	3647805.43	318659.00	10.17	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	16	3	–
111420	33	A	3647805.95	318659.85	10.16	Brown chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	15	21	3	–
111420	34	A	3647806.32	318658.94	10.16	Brown chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	20	13	7	–
111420	35	A	3647806.55	318659.17	10.16	Gray chert	Medium	Core flake	Unutilized flake	0	Medial	–	–	–	11	18	3	–
111420	36	A	3647806.91	318658.89	10.14	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	44	24	9	–
111420	37	A	3647809.27	318655.24	10.10	Tan chert	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	26	27	7	–
111420	38	A	3647809.14	318655.70	10.09	Gray chert	Medium	Core flake	Unutilized flake	0	Medial	–	–	–	14	20	3	–
111420	39	A	3647804.61	318650.61	10.18	Rhyolite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	28	19	6	–
111420	40	A	3647805.03	318649.87	10.17	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	40	20	8	–
111420	41	A	3647805.63	318650.11	10.20	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	16	20	4	–
111420	42	A	3647803.84	318654.85	10.16	Metamorphic	Medium	Core flake	Unutilized flake	0	Distal	–	–	–	23	19	5	–
111420	43	A	3647800.40	318652.05	10.21	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	18	4	–
111420	44	A	3647798.91	318651.66	10.21	Tan chert	Medium	Core flake	Unutilized flake	0	Lateral	–	–	–	47	25	11	–
111420	45	A	3647799.49	318648.51	10.18	Rhyolite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	25	26	6	–
111420	46	A	3647802.81	318646.34	10.20	Rhyolite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	24	4	–
111420	47	A	3647801.82	318645.36	10.20	Tan chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	27	32	10	–
111420	48	A	3647802.12	318644.70	10.21	Metamorphic	Fine	AD	Unutilized AD	0	Whole	–	–	–	38	30	15	–
111420	49	A	3647801.79	318644.33	10.20	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	13	20	5	–

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111420	50	A	3647801.46	318644.49	10.18	Yellow/gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	19	18	4	–
111420	51	A	3647802.04	318640.32	10.20	Rhyolite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	25	24	5	–
111420	52	A	3647806.32	318640.20	10.19	Gray chert	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	30	17	7	–
111420	53	A	3647804.26	318639.17	10.21	Red-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	20	21	5	–
111420	54	A	3647805.63	318638.69	10.19	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	29	41	7	–
111420	55	A	3647803.61	318637.63	10.19	Red-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	17	23	5	–
111420	56	A	3647803.33	318637.98	10.22	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	23	30	5	–
111420	57	A	3647803.09	318637.54	10.20	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	20	25	5	–
111420	58	A	3647803.19	318637.80	10.19	Yellow metaquartzite	Medium	AD	Unutilized AD	0	Whole	–	–	–	12	11	2	–
111420	59	A	3647802.33	318636.97	10.21	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	19	16	3	–
111420	60	A	3647807.65	318638.59	10.20	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	10	11	2	–
111420	61	A	3647807.00	318636.37	10.20	Black chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	21	22	5	–
111420	62	A	3647805.78	318633.49	10.20	Gray metaquartzite	Fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	18	17	3	–
111420	63	A	3647805.37	318631.72	10.18	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	15	4	–
111420	64	A	3647805.34	318629.76	10.19	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	29	26	6	–
111420	65	A	3647803.25	318630.78	10.20	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	18	11	4	–
111420	66	A	3647802.17	318630.68	10.19	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	10	12	2	–
111420	67	A	3647800.01	318636.05	10.21	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	21	25	6	–
111420	68	A	3647798.55	318635.68	10.24	Yellow-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	16	32	4	–
111420	69	A	3647797.95	318635.08	10.22	Gray chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	Lustrous	27	16	7	–
111420	70	A	3647797.77	318634.86	10.22	Gray chert	Fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	43	34	16	–
111420	71	A	3647803.95	318628.77	10.19	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	25	31	6	–
111420	72	A	3647803.25	318628.20	10.19	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	24	23	7	–
111420	73	A	3647803.71	318627.89	10.21	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	11	14	4	–
111420	74	A	3647804.16	318627.67	10.20	Sandstone	.	One-hand mano	.	.	Fragment	–	–	–	–	–	–	–
111420	75	A	3647804.59	318626.48	10.19	Gray chert	Medium	Core flake	Unutilized flake	0	Medial	–	–	–	27	41	7	–
111420	76	A	3647804.92	318626.20	10.19	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	18	13	4	–
111420	77	A	3647806.24	318625.86	10.19	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	23	25	4	–
111420	78	A	3647805.63	318625.43	10.23	Rhyolite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	18	4	–
111420	79	A	3647805.08	318625.44	10.22	Rhyolite	Fine	AD	Unutilized AD	0	Whole	–	–	–	29	21	10	–
111420	80	A	3647807.62	318626.33	10.18	Gray chert	Fine	Late stage biface	Chiricahua point	0	Distal	–	–	Lustrous	28	23	5	Collected
111420	81	A	3647801.96	318628.00	10.22	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	31	31	7	–
111420	82	A	3647801.12	318627.70	10.21	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	19	22	5	–
111420	83	A	3647799.11	318625.72	10.22	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	19	39	8	–
111420	84	A	3647799.11	318625.27	10.23	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	13	17	3	–
111420	85	A	3647799.37	318625.40	10.23	Rhyolite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	24	28	6	–
111420	86	A	3647797.57	318623.24	10.26	Gray chert	Coarse/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	26	30	9	–
111420	87	A	3647798.80	318623.41	10.22	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	38	26	6	–
111420	88	A	3647800.02	318622.41	10.24	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	18	27	5	–
111420	89	A	3647800.19	318620.63	10.23	Gray chert	Coarse/flawed	Tested cobble	Unutilized core	80	Whole	–	WW	–	120	70	68	–
111420	90	A	3647800.48	318619.08	10.21	Rhyolite	Fine/flawed	Middle stage biface	Biface	0	Distal	Ind	–	–	48	34	15	–
111420	91	A	3647803.42	318620.82	10.23	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	21	25	5	–
111420	92	A	3647803.48	318622.39	10.24	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	19	21	5	–
111420	93	A	3647804.75	318622.82	10.23	Gray metaquartzite	Fine	Middle stage biface	Biface	0	Distal	Lateral snap	–	–	45	14	–	–
111420	94	A	3647804.14	318623.60	10.22	Gray chert	Fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	21	14	11	–
111420	95	A	3647804.99	318622.53	10.23	Rhyolite	Fine	AD	Unutilized AD	0	Whole	–	–	–	39	38	13	–
111420	96	A	3647807.67	318618.82	10.19	Brown chert	Fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	22	16	5	–
111420	97	A	3647804.32	318614.58	10.24	Metamorphic	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	64	36	14	–
111420	98	E	3647695.38	318698.60	10.52	Gray chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	Lustrous	15	16	2	–
111420	99	E	3647695.15	318698.41	10.52	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	18	19	5	–

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111420	100	E	3647704.98	318698.47	10.47	Tan chert	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	29	20	9	–
111420	101	E	3647709.83	318698.14	10.44	Gray chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	17	12	10	–
111420	102	E	3647711.02	318698.29	10.45	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	15	12	4	–
111420	103	E	3647711.92	318698.56	10.47	Alibates chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	Lustrous	32	20	4	–
111420	104	E	3647715.58	318696.91	10.45	Gray chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	33	27	9	–
111420	105	–	3647729.38	318669.81	10.43	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	23	35	5	–
111420	106	–	3647731.25	318680.26	10.44	Gray chert	Medium	Core flake	Unutilized flake	0	Lateral	–	–	–	8	10	2	–
111420	107	–	3647735.04	318699.30	10.53	Gray chert	Fine	Core	Unutilized core	20	Whole	–	WW	–	34	33	21	–
111420	108	D	3647740.32	318698.96	10.46	Gray chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	12	17	6	–
111420	109	C	3647738.58	318683.55	10.44	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	14	16	3	–
111420	110	C	3647738.86	318683.07	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	28	20	4	–
111420	111	C	3647739.42	318682.11	10.45	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	16	13	3	–
111420	112	C	3647738.44	318678.24	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	14	18	6	–
111420	113	C	3647740.36	318680.52	10.42	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	15	16	5	–
111420	114	C	3647740.97	318681.53	10.42	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	13	3	–
111420	115	C	3647742.04	318681.51	10.42	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	14	21	5	–
111420	116	C	3647742.03	318681.81	10.40	Red-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	12	14	3	–
111420	117	C	3647742.28	318681.94	10.42	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	8	11	2	–
111420	118	C	3647741.30	318682.49	10.40	Gray chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	18	12	4	–
111420	119	C	3647743.06	318681.38	10.41	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	20	22	5	–
111420	120	C	3647743.48	318681.46	10.40	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	14	17	4	–
111420	121	C	3647742.78	318682.34	10.39	Red-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	16	14	3	–
111420	122	C	3647742.73	318682.76	10.41	Cream chert	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	21	14	3	–
111420	123	C	3647744.39	318681.56	10.41	White chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	20	41	6	–
111420	124	C	3647744.56	318681.33	10.40	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	16	20	3	–
111420	125	C	3647744.47	318682.35	10.39	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	15	17	4	–
111420	126	C	3647745.32	318682.32	10.39	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	30	21	5	–
111420	127	C	3647745.02	318682.60	10.39	Yellow-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	18	24	6	–
111420	128	C	3647745.26	318682.72	10.36	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	14	17	3	–
111420	129	C	3647744.46	318683.21	10.39	Gray chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	14	11	3	–
111420	130	C	3647743.35	318683.12	10.41	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	15	13	2	–
111420	131	C	3647742.14	318682.99	10.40	White chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	10	11	2	–
111420	132	C	3647741.41	318684.10	10.43	Gray metaquartzite	Fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	14	21	3	–
111420	133	C	3647741.43	318683.91	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	16	16	2	–
111420	134	C	3647741.13	318684.56	10.42	Gray chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	11	13	2	–
111420	135	C	3647740.18	318685.49	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	14	20	5	–
111420	136	C	3647742.41	318685.84	10.42	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	22	19	3	–
111420	137	C	3647742.87	318685.81	10.40	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	13	18	3	–
111420	138	C	3647744.00	318687.36	10.41	Gray chert	Medium/flawed	Core flake	Unutilized flake	0	Whole	–	–	–	37	34	9	–
111420	139	C	3647743.43	318689.34	10.46	Tan chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	28	22	7	–
111420	140	C	3647744.85	318684.74	10.42	Gray chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	15	16	3	–
111420	141	C	3647744.67	318685.86	10.38	Gray chert	Fine	Core flake	Unutilized flake	10	Lateral	–	Ind	–	11	11	2	–
111420	142	C	3647744.74	318686.61	10.35	Brown chert	Medium	Core flake	Unutilized flake	0	Lateral	–	–	–	27	22	7	–
111420	143	D	3647744.53	318699.51	10.45	Rhyolite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	36	45	12	–
111420	144	D	3647745.48	318697.67	10.42	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	10	20	5	–
111420	145	D	3647751.76	318699.46	10.38	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	20	21	3	–
111420	146	D	3647751.11	318698.39	10.39	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	15	4	–
111420	147	D	3647757.39	318698.13	10.33	Gray chert	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	11	16	3	–
111420	148	D	3647759.49	318700.17	10.31	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	30	34	6	–
111420	149	C	3647759.28	318691.09	10.36	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	41	33	8	–
111420	150	C	3647761.54	318685.02	10.34	Rhyolite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	23	4	–

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111420	151	C	3647754.68	318684.53	10.35	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	19	5	–
111420	152	C	3647753.47	318685.84	10.34	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	19	22	5	–
111420	153	C	3647748.74	318687.80	10.43	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	13	19	3	–
111420	154	C	3647744.45	318677.61	10.38	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	13	14	3	–
111420	155	C	3647744.13	318677.43	10.37	Gray chert	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	25	14	3	–
111420	156	–	3647742.93	318666.56	10.41	Gray chert	Fine	Core flake	Utilized debitage	0	Proximal	–	–	–	48	40	14	–
111420	157	–	3647740.62	318664.56	10.41	Gray chert	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	19	21	7	–
111420	158	C	3647747.45	318672.37	10.36	Gray chert	Fine	Core flake	Unutilized flake	20	Distal	–	WW	–	14	17	6	–
111420	159	C	3647748.69	318675.90	10.35	Rhyolite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	21	19	5	–
111420	160	C	3647749.06	318677.32	10.35	Gray chert	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	28	23	5	–
111420	161	C	3647751.39	318675.60	10.34	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	15	35	11	–
111420	162	C	3647751.17	318676.01	10.34	Red-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	23	37	9	–
111420	163	C	3647749.51	318680.76	10.34	Gray chert	Fine	Core flake	Unutilized flake	0	Medial	–	–	Lustrous	27	26	6	–
111420	164	C	3647752.55	318677.51	10.33	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	29	21	5	–
111420	165	C	3647754.47	318676.70	10.33	Rhyolite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	35	29	10	–
111420	166	C	3647755.15	318672.11	10.32	Rhyolite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	27	21	10	–
111420	167	C	3647755.20	318672.40	10.34	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	39	17	13	–
111420	168	C	3647755.43	318671.31	10.33	Gray chert	Fine	Core flake	Unutilized flake	60	Whole	–	NWW	–	26	30	6	–
111420	169	–	3647761.74	318664.09	10.31	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	27	30	5	–
111420	170	C	3647760.96	318673.65	10.31	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	15	23	6	–
111420	171	C	3647758.17	318678.17	10.33	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	27	36	5	–
111420	172	C	3647758.27	318679.04	10.34	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	50	33	14	–
111420	173	C	3647758.78	318679.59	10.33	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	21	23	5	–
111420	174	C	3647759.60	318682.32	10.35	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	19	22	3	–
111420	175	C	3647764.21	318679.86	10.29	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	22	27	5	–
111420	176	C	3647763.83	318677.78	10.28	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	11	14	3	–
111420	177	C	3647764.32	318676.50	10.30	Tan chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	24	17	6	–
111420	178	–	3647783.23	318595.38	10.29	Rhyolite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	14	20	4	–
111420	179	–	3647777.75	318601.09	10.34	Gray chert	Fine	AD	Unutilized AD	20	Whole	–	WW	–	22	15	7	–
111420	180	–	3647776.60	318601.95	10.37	Yellow-brown metaquartzite	Fine	Core flake	Unutilized flake	10	Lateral	–	WW	–	42	37	8	–
111420	181	–	3647776.89	318604.56	10.37	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Whole	–	–	–	34	32	20	–
111420	182	–	3647776.63	318625.45	10.32	Gray metaquartzite	Fine	Core flake	Unutilized flake	60	Proximal	–	Ind	–	28	24	5	–
111420	183	–	3647777.10	318628.49	10.31	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	17	15	3	–
111420	184	–	3647772.93	318634.18	10.30	Rhyolite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	21	15	5	–
111420	185	–	3647776.04	318634.42	10.31	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	17	13	3	–
111420	186	–	3647790.32	318626.82	10.26	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	21	22	5	–
111420	187	A	3647796.23	318622.94	10.25	Gray metaquartzite	Fine	Early stage uniface	scraper-spokeshave	0	Whole	–	–	Lustrous	44	35	11	–
111420	188	A	3647795.63	318629.76	10.24	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	WW	–	23	24	7	Cortical Platform
111420	189	A	3647797.26	318629.59	10.24	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	23	24	6	–
111420	190	–	3647790.62	318633.01	10.26	Gray chert	Medium	AD	Unutilized AD	0	Whole	–	–	–	38	21	10	–
111420	191	–	3647787.60	318633.16	10.23	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	26	14	5	–
111420	192	–	3647766.84	318647.82	10.31	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	23	25	4	–
111420	193	–	3647776.99	318663.99	10.30	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	24	31	5	–
111420	194	–	3647771.10	318677.14	10.28	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	16	17	3	–
111420	195	–	3647771.48	318677.98	10.26	Red-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	22	4	–
111420	196	–	3647778.70	318676.99	10.24	Red-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	26	15	5	–
111420	197	–	3647776.68	318686.10	10.27	Gray chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	28	27	17	–
111420	198	–	3647779.73	318685.10	10.25	Gray chert	Medium	Core flake	Unutilized flake	0	Medial	–	–	–	17	29	7	–
111420	199	B	3647772.38	318698.81	10.21	Metaquartzite	.	One-hand mano	.	.	Fragment	–	–	–	–	–	–	–
111420	200	B	3647776.06	318698.82	10.17	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	17	22	4	–
111420	201	B	3647779.51	318699.65	10.21	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	31	21	6	–

Site Number	Artifact Number	Cluster	Northing	Easting	Elevation	Material Type	Material Quality (grain size)	Artifact Morphology	Artifact Function	Cortex	Portion	Break	Cortex Type	Thermal Alteration	Length	Width	Thickness	Comments
111420	202	B	3647780.15	318700.50	10.25	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	23	19	6	–
111420	203	B	3647783.38	318698.99	10.20	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	21	28	4	–
111420	204	B	3647783.63	318697.39	10.21	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	37	25	7	–
111420	205	B	3647786.07	318694.25	10.18	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	42	42	9	–
111420	206	B	3647787.39	318694.23	10.18	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	58	35	20	–
111420	207	B	3647786.76	318692.74	10.16	Red-brown metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	18	6	–
111420	208	B	3647788.39	318692.17	10.15	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	18	24	4	–
111420	209	B	3647790.08	318692.03	10.18	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	12	22	6	–
111420	210	B	3647791.05	318694.52	10.17	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	16	22	5	–
111420	211	B	3647789.77	318695.68	10.18	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	17	24	7	–
111420	212	B	3647790.16	318697.58	10.18	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	10	14	2	–
111420	213	B	3647793.64	318693.24	10.16	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	14	16	4	–
111420	214	B	3647793.52	318694.11	10.16	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	10	16	5	–
111420	215	B	3647806.59	318701.47	10.11	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	35	17	6	–
111420	216	B	3647807.71	318705.95	10.09	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	10	15	2	–
111420	217	B	3647777.37	318701.09	10.24	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	19	12	7	–
111420	218	B	3647777.29	318701.45	10.25	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	15	14	4	–
111420	219	B	3647775.62	318701.03	10.25	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	16	14	4	–
111420	220	B	3647772.68	318700.95	10.19	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	20	20	6	–
111420	221	B	3647772.70	318701.38	10.23	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	15	15	5	–
111420	222	B	3647772.36	318701.19	10.22	Yellow & gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	10	17	3	–
111420	223	B	3647772.80	318702.18	10.30	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	19	16	5	–
111420	224	B	3647772.07	318702.18	10.31	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	29	17	5	–
111420	225	D	3647762.42	318703.09	10.36	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	14	18	5	–
111420	226	D	3647762.10	318703.77	10.36	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	11	7	3	–
111420	227	D	3647760.85	318701.99	10.38	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	23	33	5	–
111420	228	D	3647760.24	318700.85	10.32	Polvadera Peak obsidian	Glassy	Core flake	Unutilized flake	0	Proximal	–	–	–	14	17	3	–
111420	229	D	3647759.95	318700.93	10.32	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	23	19	8	–
111420	230	D	3647762.88	318702.08	10.35	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	18	17	4	–
111420	231	D	3647764.75	318700.40	10.29	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	10	17	2	–
111420	232	D	3647758.37	318702.85	10.38	Black chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	14	10	4	–
111420	233	D	3647758.09	318703.07	10.37	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	19	17	4	–
111420	234	D	3647753.89	318700.98	10.37	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	23	36	6	–
111420	235	D	3647754.26	318702.64	10.40	Gray chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	12	18	4	–
111420	236	D	3647751.70	318700.21	10.36	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	22	19	6	–
111420	237	D	3647756.43	318705.73	10.31	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	17	3	–
111420	238	D	3647753.13	318705.79	10.28	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	11	13	2	–
111420	239	D	3647752.39	318705.53	10.31	Yellow & gray metaquartzite	Fine	Late stage biface	Bajada point	0	Proximal	–	–	–	40	20	8	Collected
111420	240	D	3647751.25	318706.46	10.29	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	15	13	2	–
111420	241	D	3647750.55	318706.26	10.30	San Andres chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	18	19	5	–
111420	242	D	3647750.30	318705.55	10.33	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	11	11	2	–
111420	243	D	3647747.57	318706.09	10.31	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	16	20	3	–
111420	244	D	3647746.71	318704.74	10.40	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	17	18	5	–
111420	245	D	3647748.91	318701.98	10.43	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	13	12	4	–
111420	246	D	3647746.94	318700.55	10.42	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	19	14	9	–
111420	247	D	3647746.87	318700.05	10.43	Tan chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	28	19	5	–
111420	248	D	3647743.03	318703.96	10.43	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	25	25	10	–
111420	249	D	3647742.21	318704.22	10.44	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	14	13	4	–
111420	250	D	3647741.62	318704.57	10.42	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	12	18	3	–

Site Number	Artifact Number	Cluster	Northing	Easting	Elevation	Material Type	Material Quality (grain size)	Artifact Morphology	Artifact Function	Cortex	Portion	Break	Cortex Type	Thermal Alteration	Length	Width	Thickness	Comments
111420	251	D	3647741.19	318705.40	10.38	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	49	30	7	–
111420	252	D	3647743.10	318705.47	10.36	Gray chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	7	8	1	–
111420	253	D	3647743.03	318705.09	10.38	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	5	10	2	–
111420	254	D	3647744.28	318704.89	10.38	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	19	25	4	–
111420	255	D	3647739.44	318699.92	10.46	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	22	25	5	–
111420	256	E	3647716.85	318700.06	10.51	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	20	25	6	–
111420	257	E	3647711.47	318699.77	10.46	Gray metaquartzite	Fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	18	14	3	–
111420	258	E	3647709.48	318699.99	10.47	Gray chert	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	14	13	3	–
111420	259	E	3647709.31	318701.21	10.53	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Distal	–	–	–	29	27	11	–
111420	260	E	3647694.78	318700.30	10.55	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Whole	–	–	–	33	27	8	–
111420	261	E	3647692.49	318699.33	10.52	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Distal	–	–	Lustrous	17	15	5	–
111420	262	E	3647685.92	318700.24	10.59	Gray chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	15	9	5	–
111420	263	E	3647685.98	318700.80	10.60	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	15	11	3	–
111420	264	E	3647686.66	318700.64	10.58	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	32	24	6	–
111420	265	E	3647686.55	318701.19	10.58	Red chert	Fine	AD	Unutilized AD	10	Whole	–	WW	–	12	11	6	–
111420	266	E	3647685.21	318699.51	10.57	Yellow metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	22	18	4	–
111420	267	E	3647683.83	318699.81	10.58	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	14	21	4	–
111420	268	E	3647673.18	318699.55	10.65	Basalt	Fine	AD	Unutilized AD	0	Whole	–	–	–	32	25	14	–
111420	269	E	3647672.16	318702.35	10.68	Gray chert	Fine	Core flake	Unutilized flake	100	Whole	–	WW	–	23	21	4	–
111420	270	E	3647677.35	318706.07	10.63	Gray chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	17	22	5	–
111420	271	E	3647677.33	318709.05	10.55	Gray chert	Fine	AD	Unutilized AD	30	Whole	–	Ind	–	19	15	9	–
111420	272	E	3647684.20	318707.95	10.57	Yellow & purple chert	Fine/flawed	Core flake	Unutilized flake	0	Whole	–	–	–	19	30	8	–
111420	273	E	3647685.84	318711.02	10.59	Yellow & purple chert	Fine/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	28	25	4	Same mater– as 272
111420	274	E	3647686.49	318706.54	10.58	Gray chert	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	26	19	6	–
111420	275	E	3647686.63	318706.18	10.60	Brown chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	40	26	8	–
111420	276	E	3647689.89	318706.56	10.57	Brown chert	Coarse	Core flake	Unutilized flake	0	Lateral	–	–	–	23	17	4	–
111420	277	E	3647689.06	318706.41	10.54	Rhyolite	Fine/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	17	13	4	–
111420	278	E	3647692.33	318708.12	10.53	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	26	17	7	–
111420	279	E	3647710.45	318706.55	10.50	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Lateral	–	–	–	32	26	10	–
111420	280	E	3647712.47	318707.35	10.48	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Distal	–	–	–	12	12	4	–
111420	281	E	3647711.15	318709.64	10.44	Gray chert	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	16	18	3	–
111420	282	–	3647726.88	318707.17	10.41	Black chert	Fine	Core flake	Unutilized flake	30	Proximal	–	WW	–	–	–	–	–
111420	283	–	3647728.09	318705.37	10.47	White & black chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	12	10	2	–
111420	284	–	3647731.80	318705.80	10.45	White chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	7	9	2	–
111420	285	–	3647728.95	318716.60	10.44	Gray chert	Fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	25	10	4	–
111420	286	–	3647738.63	318726.37	10.40	Tan chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	24	18	3	–
111420	287	–	3647720.44	318729.17	10.42	Yellow & gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	12	14	3	–
111420	288	–	3647713.42	318731.00	10.45	Brown chert	Medium	Biface flake	Unutilized flake	0	Proximal	–	–	–	16	13	3	–
111420	289	–	3647721.01	318747.85	10.48	Black chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	12	12	2	–
111420	290	–	3647726.33	318748.14	10.49	Red chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	20	15	9	–
111420	291	–	3647728.85	318749.19	10.45	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Lateral	–	–	–	16	22	4	–
111420	292	–	3647731.61	318750.59	10.45	Brown chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	Lustrous	20	17	3	–
111420	293	–	3647739.52	318748.18	10.42	Gray chert	Medium	Core flake	Unutilized flake	0	Distal	–	–	–	26	22	5	–
111420	294	–	3647730.21	318768.23	10.52	Gray chert	Fine/flawed	Early stage uniface	Scraper	0	Whole	–	–	–	42	33	10	–
111420	295	F	3647723.31	318778.28	10.56	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	21	23	4	–
111420	296	F	3647725.80	318778.58	10.56	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	28	23	5	–
111420	297	F	3647726.03	318780.08	10.58	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	22	18	3	–
111420	298	F	3647729.89	318777.89	10.53	Pink metaquartzite	Medium	Core flake	Unutilized flake	0	Proximal	–	–	–	23	26	9	–
111420	299	F	3647733.84	318779.83	10.52	Rhyolite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	30	24	8	–
111420	300	F	3647736.19	318779.44	10.54	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	70	32	17	–
111420	301	F	3647726.68	318782.97	10.58	Gray chert	Fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	32	26	7	–

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111420	302	F	3647726.79	318784.22	10.58	Rhyolite	Fine/flawed	Core flake	Unutilized flake	0	Medial	–	–	–	32	22	6	–
111420	303	F	3647725.94	318785.25	10.60	Rhyolite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	20	16	4	–
111420	304	F	3647728.29	318785.82	10.60	Tan chert	Fine/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	29	26	5	–
111420	305	F	3647726.45	318787.06	10.59	Tan chert	Fine/flawed	Core flake	Unutilized flake	0	Distal	–	–	–	22	26	8	–
111420	306	F	3647725.14	318788.43	10.59	Gray chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	18	19	4	–
111420	307	F	3647724.36	318788.64	10.60	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	17	12	3	–
111420	308	F	3647722.55	318787.88	10.60	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	17	3	–
111420	309	F	3647726.51	318790.07	10.59	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	15	16	4	–
111420	310	F	3647727.69	318790.15	10.59	Gray chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	14	6	2	–
111420	311	F	3647726.91	318790.83	10.64	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	19	22	3	–
111420	312	F	3647728.25	318790.99	10.61	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	12	8	2	–
111420	313	F	3647728.15	318791.74	10.61	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	19	4	–
111420	314	F	3647728.05	318793.95	10.62	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	17	14	4	–
111420	315	F	3647731.71	318796.37	10.60	Rhyolite	Fine	AD	Unutilized AD	0	Whole	–	–	–	20	11	7	–
111420	316	F	3647730.82	318797.63	10.61	Brown chert	Fine	Core flake	Utilized debitage	0	Whole	–	–	–	35	40	8	–
111420	317	F	3647719.57	318802.34	10.65	Tan & cream chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	24	18	4	–
111420	318	F	3647716.93	318794.83	10.64	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	14	13	4	–
111420	319	F	3647712.18	318792.09	10.71	Gray chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	30	34	11	–
111420	320	F	3647709.73	318792.82	10.69	Gray chert	Fine/flawed	Core flake	Unutilized flake	40	Whole	–	WW	–	39	27	10	–
111420	321	F	3647708.55	318795.08	10.69	Yellow & gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	25	23	7	–
111420	322	–	3647701.26	318789.06	10.68	White chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	18	15	11	–
111420	323	–	3647707.97	318772.30	10.60	Black chert	Medium	Core flake	Unutilized flake	0	Whole	–	–	–	36	23	8	–
111420	324	–	3647706.41	318767.58	10.58	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	21	12	7	–
111420	325	–	3647767.82	318720.68	10.26	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	24	18	4	–
111420	326	–	3647768.00	318720.38	10.24	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	16	19	4	–
111420	327	–	3647768.78	318720.39	10.23	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	19	18	3	–
111420	328	–	3647765.52	318718.47	10.25	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	21	26	5	–
111420	329	–	3647777.91	318731.64	10.23	Metamorphic	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	26	24	8	–
111420	330	–	3647788.14	318729.39	10.17	Brown chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	14	20	4	–
111421	1	–	3647618.35	318704.47	10.10	Gray chert	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	9	13	2	–
111421	2	–	3647604.73	318710.10	10.17	Gray chert	Fine	AD	Unutilized AD	0	Whole	–	–	–	32	20	13	–
111421	3	–	3647594.84	318706.50	10.22	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	17	24	5	–
111421	4	–	3647593.25	318716.53	10.21	Gray chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	33	31	10	–
111421	5	–	3647589.04	318717.13	10.19	Yellow/gray metaquartzite	Fine	Core	Unutilized core	0	Whole	–	–	–	60	41	30	–
111421	6	–	3647587.84	318702.47	10.25	Yellow chert	Fine	Early stage uniface	End/side scraper	40	Whole	–	NWW	–	33	23	9	–
111421	7	–	3647577.25	318704.57	10.31	Silicified wood	Fine	Core flake	Unutilized flake	40	Distal	–	WW	–	32	24	12	–
111421	8	–	3647560.29	318705.85	10.38	Black chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	49	24	8	–
111421	9	B	3647550.44	318705.93	10.43	Siltstone	Fine	Middle stage biface	Biface	0	Whole	Plateau	–	–	62	54	17	–
111421	10	B	3647549.97	318706.06	10.41	Brown/gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	27	35	7	–
111421	11	A	3647557.63	318696.82	10.38	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	20	16	3	–
111421	12	–	3647575.77	318698.68	10.30	Brown/gray metaquartzite	Fine/flawed	Tested cobble	Unutilized core	80	Whole	–	WW	–	91	78	56	–
111421	13	–	3647586.47	318697.44	10.26	Gray chert	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	21	27	4	–
111421	14	A	3647552.17	318696.35	10.40	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	14	33	4	–
111421	15	A	3647553.14	318696.57	10.39	Gray metaquartzite	Fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	17	22	4	–
111421	16	–	3647543.59	318696.17	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	17	28	7	–
111421	17	B	3647548.32	318709.81	10.42	Gray chert	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	10	17	4	–
111421	18	–	3647546.56	318710.63	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	14	11	3	–
111421	19	B	3647544.93	318711.71	10.40	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	24	25	3	–
111421	20	B	3647545.01	318710.81	10.39	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	26	28	5	–
111421	21	B	3647544.68	318710.77	10.40	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	34	28	8	–

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111421	22	B	3647548.41	318713.55	10.37	Yellow/gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	WW	–	15	22	4	Cort– Plat–
111421	23	B	3647545.95	318707.72	10.43	Gray metaquartzite	Fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	17	23	7	–
111421	24	B	3647546.01	318707.99	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	23	30	5	–
111421	25	B	3647545.48	318708.57	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	22	28	4	–
111421	26	B	3647545.38	318708.99	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	25	20	5	–
111421	27	–	3647545.26	318706.05	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	37	21	7	–
111421	28	–	3647543.51	318704.07	10.44	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	36	22	6	–
111421	29	–	3647543.59	318703.47	10.44	Yellow/gray metaquartzite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	41	24	7	–
111421	30	C	3647534.41	318711.71	10.43	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	25	30	7	–
111421	31	C	3647533.97	318712.14	10.43	Gray chert	Fine	Core flake	Unutilized flake	10	Proximal	–	WW	–	13	13	3	–
111421	32	C	3647538.24	318705.27	10.44	Gray metaquartzite	Fine	AD	Unutilized AD	0	Whole	–	–	–	36	19	8	–
111421	33	C	3647533.49	318703.12	10.46	Yellow chert	Fine	Late stage biface	Large projectile point	0	Distal	–	–	–	25	23	6	–
111421	34	C	3647533.56	318702.57	10.46	Yellow/gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	17	11	3	–
111421	35	–	3647527.67	318695.82	10.53	Gray chert	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	14	21	4	–
111421	36	–	3647537.16	318695.70	10.49	Gray chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	Lustrous	24	20	4	–
111421	37	–	3647538.52	318694.54	10.41	Gray chert	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	33	31	9	–
111421	38	A	3647555.35	318695.53	10.39	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	17	25	5	–
111421	39	A	3647556.01	318695.16	10.39	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	26	28	5	–
111421	40	–	3647527.04	318684.80	10.39	Gray metaquartzite	Fine	Late stage biface	Projectile point preform	0	Proximal	–	–	–	58	32	13	–
111421	41	A	3647556.42	318694.58	10.36	Gray chert	Fine/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	15	23	4	–
111421	42	A	3647556.38	318694.01	10.36	Rhyolite	Fine	Core flake	Unutilized flake	0	Lateral	–	–	–	19	21	5	–
111421	43	A	3647557.40	318694.49	10.36	Brown metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	26	20	6	–
111421	44	A	3647557.43	318693.72	10.33	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	26	26	9	–
111421	45	A	3647557.47	318693.57	10.33	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	23	21	4	–
111421	46	A	3647557.95	318693.39	10.33	Rhyolite	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	26	30	6	–
111421	47	A	3647558.60	318695.13	10.37	Brown metaquartzite	Fine	Core flake	Unutilized flake	10	Medial	–	WW	–	25	25	6	–
111421	48	A	3647560.33	318693.80	10.32	Siltstone	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	29	32	8	–
111421	49	A	3647560.02	318692.17	10.32	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	28	29	8	–
111421	50	–	3647560.32	318685.66	10.27	Rhyolite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	25	19	5	–
111421	51	–	3647568.02	318689.21	10.31	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Proximal	–	–	–	26	26	5	–
111421	52	–	3647567.91	318689.28	10.28	Gray metaquartzite	Fine	Core flake	Unutilized flake	0	Distal	–	–	–	23	20	6	–
111421	53	–	3647566.54	318693.87	10.29	Orthoquartzite	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	26	4	–
111421	54	–	3647588.84	318681.39	10.17	Gray chert	Fine	Core flake	Unutilized flake	40	Distal	–	WW	–	18	29	8	–
111421	55	–	3647600.16	318684.05	10.15	Gray chert	Fine	Core flake	Unutilized flake	0	Medial	–	–	–	12	18	3	–
111421	56	–	3647610.36	318679.38	10.13	Gray chert	Fine	Core flake	Unutilized flake	0	Whole	–	–	–	14	16	4	–
111421	57	–	3647610.04	318694.56	10.13	Siltstone	Fine	AD	Unutilized AD	0	Whole	–	–	–	68	49	20	–
111421	58	–	3647628.67	318697.29	10.05	Silicified wood	Fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	25	20	10	–
111429	1		3647089.45	319379.65	13.11	Rhyolite	fine	Core flake	Unutilized core	0	Whole	–	–	–	104	100	77	–
111429	2		3647091.02	319367.32	13.60	Basalt	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
111429	3		3647094.21	319368.67	11.61	Limestone	fine	Core flake	Unutilized core	40	Whole	–	WW	–	52	40	30	–
111429	4		3647094.69	319367.77	12.61	Basalt	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
111429	5	6	3647195.40	319353.51	12.61	Rhyolite	medium	Core flake	Unutilized core	0	Whole	–	–	–	68	67	58	–
111429	6		3647095.77	319368.57	12.05	Rhyolite	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
111429	7	6	3647193.30	319355.55	12.46	Basalt	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	8	6	3647201.59	319358.05	12.46	Basalt	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
111429	9	6	3647201.59	319361.15	12.35	Sandstone	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	10	6	3647205.87	319357.20	12.36	Metaquartzite	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
111429	11	6	3647209.02	319357.83	12.33	Gray chert	fine	Early stage uniface	Scraper	0	Whole	–	–	–	40	29	9	–
111429	12	6	3647214.06	319364.93	12.24	Unknown	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	13	6	3647222.09	319366.92	12.17	Igneous	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	14	6	3647200.52	319361.56	12.50	Basalt	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
111429	15		3647240.70	319351.96	11.71	Basalt	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–

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111429	16		3647221.43	319345.86	12.03	Yellow metaquartzite	fine	Late stage biface	Biface	0	Distal	Ind break	–	–	33	28	12	–
111429	17	6	3647214.77	319353.73	10.98	Igneous	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
111429	18		3647214.79	319415.17	10.71	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
111429	19		3647214.50	319435.54	11.01	Igneous	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
111429	20		3647216.12	319435.75	9.88	Gray chert	fine/flawed	Core flake	Unutilized core	10	Whole	–	WW	–	73	54	44	–
111429	21		3647214.10	319436.70	10.98	Limestone	fine	Core flake	Unutilized core	30	Whole	–	WW	–	78	50	23	–
111429	22		3647301.92	319347.73	11.55	Gray chert	fine/flawed	Late stage biface	Biface	0	Proximal	Ind break	–	Lustrous	24	23	7	–
111429	23	3	3647301.55	319327.83	12.03	Gray chert	fine	Late stage biface	Folsom point	0	Distal	–	–	Lustrous	31	21	3	Collected
111429	24		3647332.93	319344.18	11.65	Alibates chert	fine	Core flake	Unutilized core	0	Whole	–	–	–	66	38	18	–
111429	25		3647357.03	319362.07	11.61	Yellow-gray chert	fine	Early stage uniface	Scraper	80	Whole	–	WW	–	37	40	8	–
111429	26		missing	missing		Gray chert	fine	Early stage uniface	Scraper	0	Distal	–	–	Lustrous	34	23	8	–
111429	27		3647340.92	319359.79	11.44	Limestone	fine	Cobble tool	Chopper	0	Whole	–	–	–	180	79	33	–
111429	28		3647295.72	319346.06	11.63	Gray chert	fine	Late stage uniface	Denticulate	0	Whole	–	–	Lustrous	43	20	10	–
111429	29		3647363.44	319395.70	11.31	Basalt	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	30		3647531.49	319457.64	10.32	Limestone	fine	Cobble tool	Chopper	90	Whole	–	Ind	–	135	110	32	–
111429	31		3647534.44	319472.23	10.16	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
111429	32	2	3647519.77	319448.10	10.30	Orthoquartzite	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
111429	33	2	3647499.28	319410.28	10.76	–	.	Historic artifact	Film reel	.	.	–	–	–	–	–	–	Collected
111429	34		3647463.32	319414.67	10.84	Gray chert	fine	Middle stage biface	Biface	0	Ind fragment	Lateral snap	–	–	95	60	22	–
111429	35		3647464.54	319419.51	10.86	Metamorphic	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
111429	36		3647602.36	319585.72	8.58	Gray chert	fine	Middle stage uniface	scraper-spokeshave	0	Whole	–	–	Lustrous	45	25	3	–
111429	37		3647599.89	319583.38	8.67	Sandstone	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
111429	38		3647602.08	319572.62	8.82	Tan chert	fine	Late stage uniface	Thumbnail scraper	0	Whole	–	–	–	35	27	4	–
111429	39		3647587.92	319590.37	8.56	Gray chert	medium	Early stage uniface	Scraper	0	Whole	–	–	–	51	40	8	–
111429	40		3647582.69	319570.92	9.03	Black chert	fine/flawed	Late stage biface	Biface	0	Ind fragment	Lateral snap	–	Lustrous	31	16	8	–
111429	41	1	3647554.55	319562.07	9.52	Pink chert	fine	Middle stage uniface	Scraper	0	Whole	–	–	–	28	22	10	–
111429	42	2	3647510.84	319407.49	10.96	–	.	Historic artifact	Film reel	.	.	–	–	–	–	–	–	Collected
111429	43	2	3647496.35	319417.94	10.69	Gray chert	fine	Late stage biface	Biface	0	Proximal	Lateral snap	–	–	38	32	9	–
111429	44	2	3647491.04	319411.98	10.74	Tan chert	fine	Late stage biface	Unident. projectile point	0	Medial	Ind break	–	–	17	17	3	–
111429	45	2	3647489.00	319410.87	10.85	Cream chert	medium	Early stage uniface	Uniface	0	Whole	–	–	–	46	32	20	–
111429	46	2	3647482.42	319431.99	9.96	Gray chert	medium/flawed	Early stage uniface	Scraper	0	Whole	–	–	–	60	36	15	–
111429	47	2	3647492.50	319405.85	10.86	Rhyolite	fine/flawed	Middle stage biface	Biface	0	Proximal	Ind break	–	–	49	33	11	–
111429	48	2	3647506.98	319405.18	10.98	Gray chert	fine	Late stage biface	Biface	0	Ind fragment	Reverse fracture	–	Lustrous	24	18	4	–
111429	49	2	3647473.79	319454.17	10.64	Gray chert	fine	Late stage biface	Paleoindian point	0	Proximal	Impact fracture	–	Lustrous	27	18	3	Collected
111429	50		3647452.41	319477.33	10.54	Gray chert	fine	Middle stage biface	Biface	0	Ind fragment	Ind break	–	–	63	32	10	–
111429	51		3647422.70	319479.11	10.63	Metamorphic	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	21	17	5	In road corridor
111429	52		3647415.35	319478.40	10.67	Gray chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	31	22	6	In road corridor
111429	53		3647388.75	319492.36	10.39	Brown chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	17	19	4	In road corridor
111429	54	2	3647515.80	319427.44	10.44	Gray chert	fine	Late stage biface	Biface	0	Distal	Lateral snap	–	–	36	34	8	–
111429	55		3647621.96	319391.15	11.00	Red chert	medium/flawed	Cobble tool	Chopper	20	Whole	–	WW	–	119	74	35	–
111429	56		3647648.71	319609.95	8.09	Rhyolite	medium	Cobble tool	Chopper	0	Whole	–	–	–	151	70	37	–
111429	57	3	3647303.73	319323.93	11.87	Yellow-gray chert	fine	Early stage uniface	Scraper	0	Ind fragment	–	–	–	23	10	3	–
111429	58	3	3647299.12	319316.03	11.97	Metamorphic	fine	Core flake	Chopper	0	Ind fragment	–	–	–	102	63	22	–
111429	59	3	3647286.99	319323.76	11.81	Black chert	fine	Late stage biface	Biface	0	Ind fragment	Ind break	–	–	24	23	6	–
111429	60	4	3647231.91	319337.64	11.23	Gray metaquartzite	fine	Late stage biface	Biface	0	Distal	Lateral snap	–	–	57	45	11	–
111429	61		3647211.92	319337.76	10.92	Black chert	fine	Middle stage biface	Biface	0	Ind fragment	Lateral snap	–	Lustrous	28	13	10	–
111429	62	6	3647209.74	319342.74	11.28	Metaquartzite	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
111429	63	6	3647194.06	319371.45	12.38	Basalt	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	64	6	3647216.03	319376.65	11.87	Gray chert	medium	Cobble tool	Chopper	50	Whole	–	WW	–	125	75	60	–
111429	65		3647212.79	319384.43	11.76	Basalt	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	66		3647181.60	319338.03	12.39	Sandstone	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	67		3647181.69	319340.53	12.49	Sandstone	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–

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111429	68		3647206.45	319408.55	11.45	Metaquartzite	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
111429	69		3647208.51	319417.60	11.12	Basalt	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
111429	70		3647209.10	319419.49	10.99	Gray chert	fine	Middle stage biface	Biface	0	Medial	Lateral snap	–	–	37	29	11	–
111429	71		3647206.97	319422.07	11.17	Basalt	medium	Cobble tool	Chopper	0	Whole	–	–	–	129	70	46	–
111429	72		3647304.37	319339.30	11.25	Brown & black chert	fine	Overshot flake	Unutilized flake	0	Whole	–	–	Lustrous	36	50	9	–
111429	73		3647304.37	319339.30	11.25	Gray chert	fine/flawed	Early stage uniface	Scraper	0	Whole	–	–	Lustrous	47	29	13	–
111429	74		3647222.74	319462.28	10.08	Limestone	fine	Cobble tool	Chopper	0	Whole	–	–	–	149	67	21	–
111429	75		3647405.11	319349.72	12.23	Gray chert	fine	Early stage uniface	Thumbnail scraper	20	Distal	–	Ind	–	28	24	6	–
111429	76		3647463.91	319414.52	12.04	Gray chert	medium	Middle stage biface	Biface	0	Ind fragment	Lateral snap	–	–	93	58	23	–
111432	80	C	3648191.50	318654.18	10.02	Brown metaquartzite	fine	Core flake	Unutilized flake	0	Distal	–	–	–	22	24	3	–
111432	81	C	3648191.28	318652.82	10.08	Gray chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	11	10	2	–
111432	82	C	3648199.97	318651.94	10.11	Tan chert	fine/flawed	Core flake	Unutilized flake	0	Medial	–	–	–	15	20	5	–
111432	83	C	3648192.93	318642.29	10.10	Gray chert	fine	Core flake	Unutilized flake	40	Whole	–	WW	–	33	23	9	–
111432	84	–	3648193.35	318638.54	10.11	Pink metaquartzite	medium	Core flake	Unutilized flake	0	Distal	–	–	–	44	44	7	–
111432	85	C	3648190.91	318644.29	10.11	Black chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	23	22	8	–
111432	86	C	3648190.45	318649.71	10.10	Brown chert	medium	Core flake	Unutilized flake	0	Medial	–	–	–	23	19	5	–
111432	87	C	3648188.73	318650.23	10.08	Yellow metaquartzite	fine	Core flake	Unutilized flake	0	Whole	–	–	–	19	21	6	–
111432	88	C	3648186.78	318654.00	10.02	Gray chert	fine/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	19	14	6	–
111432	89	C	3648183.49	318648.05	10.04	Gray metaquartzite	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	21	18	4	–
111432	90	C	3648183.19	318648.97	10.02	Gray metaquartzite	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	16	20	4	–
111432	91	C	3648182.91	318649.51	10.04	Gray chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	24	24	3	–
111432	92	C	3648177.53	318648.73	9.95	Gray chert	medium	Core flake	Unutilized flake	0	Lateral	–	–	–	15	16	2	–
111432	93	C	3648177.45	318651.64	9.96	Gray chert	fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	14	13	5	–
111432	94	C	3648178.05	318653.60	9.95	Gray chert	fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	30	17	12	–
111432	95	–	3648168.57	318650.86	9.86	Brown chert	fine	Biface flake	Unutilized flake	0	Proximal	–	–	Lustrous	20	11	3	–
111432	96	–	3648168.36	318655.08	9.85	Silicified wood	fine	Core flake	Unutilized flake	0	Whole	–	–	–	15	16	3	–
111432	97	–	3648159.50	318643.82	9.78	Gray metaquartzite	fine	Core flake	Unutilized flake	0	Distal	–	–	–	14	20	3	–
111432	98	E	3648159.11	318652.71	9.80	Gray chert	coarse/flawed	AD	Unutilized AD	40	Whole	–	Ind	–	40	23	16	–
111432	99	E	3648160.69	318654.00	9.80	Brown chert	fine	Biface flake	Unutilized flake	0	Whole	–	–	–	13	11	2	–
111432	100	E	3648151.56	318651.55	9.75	Gray chert	fine	AD	Unutilized AD	0	Whole	–	–	–	38	30	12	–
111432	101	E	3648151.21	318652.94	9.73	Gray metaquartzite	fine	Core flake	Unutilized flake	0	Distal	–	–	–	20	23	5	–
111432	102	E	3648146.31	318652.81	9.67	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	28	18	6	–
111432	103	E	3648138.32	318649.19	9.57	Pink/white chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	20	27	6	–
111432	104	E	3648134.49	318645.66	9.56	Red chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	11	12	2	–
111432	105	E	3648131.05	318644.54	9.54	Yellow chert	fine	AD	Unutilized AD	0	Whole	–	–	Potlids	12	10	4	–
111432	106	–	3648118.10	318647.53	9.44	White chert	medium	Core flake	Unutilized flake	100	Whole	–	WW	–	20	37	8	–
111432	107	A	3648131.09	318705.74	9.61	Tan chert	fine/flawed	Core flake	Unutilized flake	0	Whole	–	–	–	41	31	9	Collected
111432	108	–	3648178.15	318738.75	9.89	White/tan chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	22	23	6	–
111432	109	–	3648175.05	318748.64	9.91	Gray chert	medium/flawed	Core flake	Unutilized flake	0	Distal	–	–	–	14	17	4	–
111432	110	–	3648185.15	318754.14	9.93	Gray chert	fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	30	18	7	–
111432	111	–	3648175.07	318757.46	9.90	Yellow chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	7	8	1	–
111432	112	–	3648172.04	318760.26	9.86	Gray chert	fine/flawed	Core flake	Unutilized flake	0	Lateral	–	–	–	30	18	4	–
111432	113	–	3648166.91	318763.38	9.86	Gray chert	fine/flawed	Core flake	Unutilized flake	0	Whole	–	–	–	18	19	5	–
111432	114	–	3648157.93	318762.47	9.80	Gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	14	14	3	–
111432	115	–	3648157.85	318761.83	9.80	Limestone	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	70	31	11	–
111432	116	–	3648170.87	318773.42	9.95	Yellow/tan chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	24	15	4	–
111432	117	–	3648167.40	318797.67	9.93	Gray chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	31	21	9	–
111432	118	–	3648168.34	318803.28	9.93	Red/gray chert	fine/flawed	Core flake	Unutilized flake	0	Distal	–	–	–	14	17	4	–
111432	119	–	3648168.25	318810.81	9.90	Gray chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	17	15	3	–
111432	120	–	3648158.40	318843.76	9.79	Purple chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	17	21	5	–
111432	121	–	3648147.53	318784.22	9.69	Gray chert	fine	Core flake	Unutilized flake	0	Distal	–	–	Lustrous	9	12	1	–
111432	122	–	3648143.49	318740.31	9.58	Red chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	28	16	5	–

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111432	123	–	3648143.42	318728.60	9.60	Gray chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	27	23	5	–
111432	124	–	3648159.88	318726.84	9.71	Gray metaquartzite	fine	Core flake	Unutilized flake	0	Whole	–	–	–	23	15	3	–
112370	1	–	3646980.04	319665.46	9.49	White chert	fine/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	30	16	10	–
112370	2	–	3646983.95	319655.93	9.59	Gray chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	30	34	8	–
112370	3	–	3646986.24	319643.46	9.79	Silicified wood	fine	Core flake	Unutilized flake	0	Whole	–	–	–	19	22	4	–
112370	4	–	3646986.45	319642.30	9.81	Silicified wood	fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	37	36	11	–
112370	5	–	3646974.28	319639.34	9.92	Basalt	fine	Core flake	Unutilized flake	60	Proximal	–	WW	–	45	36	25	–
112370	6	–	3646995.30	319636.72	9.89	Deleted	.	.	.	.	.	–	–	–	–	–	–	–
112370	7	–	3646989.06	319615.44	10.21	Gray chert	fine	Biface flake	Unutilized flake	0	Medial	–	–	–	14	13	2	–
112370	8	–	3646976.25	319594.43	10.47	Gray chert	fine	Biface flake	Unutilized flake	0	Proximal	–	–	–	30	22	3	–
112370	9	–	3646974.43	319619.06	10.21	Red-brown chert	medium	Core flake	Unutilized flake	0	Proximal	–	–	–	29	26	6	–
112370	10	–	3646966.58	319665.84	9.45	Gray chert	fine/flawed	Core flake	Unutilized flake	0	Lateral	–	–	Lustrous	21	20	3	–
112370	11	–	3646971.55	319626.28	10.09	Gray chert	fine/flawed	Core flake	Unutilized flake	0	Proximal	–	–	–	47	65	29	–
112370	12	–	3646936.86	319629.27	10.14	Gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	uster variatio	28	20	3	–
112370	13	–	3646910.54	319636.58	10.02	Gray metaquartzite	fine	Late stage biface	Biface	0	Distal	–	–	–	47	34	10	Collected
112370	14	–	3646908.85	319630.20	10.13	Gray chert	fine/flawed	Core flake	Unutilized flake	0	Whole	–	–	–	59	37	8	–
112370	15	–	3646925.09	319596.27	10.56	Gray chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	10	8	2	–
112371	1	–	3646964.71	319763.52	9.89	Yellow-brown chert	medium	Core	Unutilized core	40	Whole	–	WW	–	109	75	53	–
112371	2	–	3646961.82	319750.44	10.04	Gray chert	fine	Core flake	Unutilized flake	20	Whole	–	WW	–	44	16	6	–
112371	3	–	3646965.94	319714.89	10.30	Gray chert	fine	Core flake	Unutilized flake	10	Lateral	–	NWW	–	60	24	10	–
112371	4	–	3646952.26	319755.35	9.90	Gray chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	24	13	6	–
112371	5	–	3646946.61	319748.20	10.03	White chert	Glassy/flawed	Core flake	Utilized debitage	0	Whole	–	–	–	12	12	2	–
112371	6	–	3646946.36	319743.25	10.06	Tan chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	27	15	4	–
112371	7	–	3646937.45	319737.58	10.12	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	19	26	5	–
112371	8	–	3646935.71	319736.58	10.09	Gray chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	15	15	4	–
112371	9	–	3646931.95	319742.60	10.01	Gray chert	fine	Biface flake	Unutilized flake	0	Proximal	–	–	Lustrous	16	21	3	–
112371	10	–	3646930.31	319741.89	10.02	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	20	15	4	–
112371	11	A	3646928.80	319741.97	10.05	White chert	fine/flawed	AD	Unutilized AD	0	Whole	–	–	–	23	16	12	–
112371	12	A	3646928.04	319738.27	10.05	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	22	19	5	–
112371	13	–	3646930.15	319747.96	10.00	Basalt	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
112371	14	–	3646923.06	319747.22	9.94	Gray chert	fine	Core flake	Unutilized flake	0	Whole	–	–	l & ventral	21	31	8	–
112371	15	A	3646920.99	319744.48	9.93	Gray chert	fine/flawed	Core flake	Unutilized flake	0	Whole	–	–	–	21	31	8	–
112371	16	A	3646922.43	319743.77	9.97	Red-brown chert	medium	Core flake	Unutilized flake	0	Proximal	–	–	–	14	23	6	–
112371	17	A	3646922.30	319743.22	9.97	Gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	17	24	5	–
112371	18	A	3646922.86	319742.20	9.98	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	14	25	5	–
112371	19	–	3646910.22	319757.27	9.78	Yellow-white chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	34	23	6	–
112371	20	–	3646913.40	319746.59	9.90	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	28	24	6	–
112371	21	A	3646920.95	319739.80	9.98	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	18	15	3	–
112371	22	A	3646922.51	319737.77	10.02	Gray chert	fine	Edge Bite	Biface	0	Whole	–	–	–	20	29	8	–
112371	23	A	3646922.80	319737.07	10.03	Gray chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	20	28	3	–
112371	24	C	3646931.36	319728.99	10.14	Yellow chert	medium	Core flake	Unutilized flake	0	Distal	–	–	–	10	9	2	–
112371	25	C	3646928.29	319728.90	10.10	Siltstone	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	23	20	5	–
112371	26	C	3646926.23	319727.29	10.14	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	23	33	9	–
112371	27	A	3646926.40	319732.55	10.08	Tan chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	29	25	3	–
112371	28	C	3646927.47	319723.56	10.21	Black chert	fine	Biface flake	Unutilized flake	0	Medial	–	–	–	22	20	5	–
112371	29	–	3646935.02	319714.77	10.38	Gray metaquartzite	fine	Core	Unutilized core	30	Whole	–	WW	–	60	58	40	–
112371	30	–	3646915.69	319720.15	10.21	Tan chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	33	21	6	–
112371	31	–	3646914.69	319719.56	10.22	Gray chert	fine/flawed	Core flake	Unutilized flake	0	Lateral	–	–	–	26	18	8	–
112371	32	–	3646910.83	319712.18	10.30	Red chert	fine	Core flake	Unutilized flake	0	Whole	–	–	Dorsal potlid	16	18	5	–
112371	33	–	3646904.87	319705.80	10.45	Gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	Lustrous	18	11	3	–
112371	34	–	3646902.23	319704.10	10.49	White chert	fine	AD	Unutilized AD	0	Whole	–	–	–	13	11	4	–
112371	35	–	3646902.03	319706.49	10.48	Gray chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	12	11	2	–

Site Number	Artifact Number	Cluster	Northing	Easting	Elevation	Material Type	Material Quality (grain size)	Artifact Morphology	Artifact Function	Cortex	Portion	Break	Cortex Type	Thermal Alteration	Length	Width	Thickness	Comments
112371	36	–	3646909.33	319702.08	10.45	Yellow-gray chert	fine/flawed	Core flake	Unutilized flake	0	Lateral	–	–	–	29	27	9	–
112371	37	–	3646902.89	319714.89	10.34	Brown chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	17	21	4	–
112371	38	B	3646900.69	319726.01	10.14	Brown chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	57	34	15	–
112371	39	B	3646902.73	319725.76	10.16	Yellow-red chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	23	12	3	–
112371	40	B	3646898.20	319729.73	10.13	White chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	10	13	3	–
112371	41	B	3646898.30	319731.46	10.13	Yellow-brown chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	28	24	7	–
112371	42	B	3646901.59	319731.51	10.12	Yellow-brown chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	5	14	2	–
112371	43	B	3646904.98	319733.76	10.10	Yellow-brown chert	fine/flawed	Core flake	Unutilized flake	0	Medial	–	–	–	11	11	2	–
112371	44	B	3646907.36	319734.98	10.01	Pink & tan chert	fine/flawed	Biface flake	Unutilized flake	0	Proximal	–	–	–	22	22	4	–
112371	45	B	3646907.58	319734.90	10.04	Gray chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	23	12	6	–
112371	46	B	3646911.09	319734.19	10.04	Gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	14	16	5	–
112371	47	B	3646906.09	319730.64	10.03	Green metaquartzite	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	28	28	4	–
112371	48	B	3646906.49	319728.97	10.16	Red-brown chert	fine/flawed	Core flake	Unutilized flake	0	Distal	–	–	–	25	18	7	–
112371	49	B	3646906.85	319726.79	10.16	Pink/gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	17	5	–
112371	50	–	3646908.78	319723.48	10.18	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	41	35	11	–
112371	51	B	3646908.55	319727.87	10.16	Yellow-brown chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	13	16	4	–
112371	52	–	3646909.14	319728.43	10.15	Cream/brown chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	25	27	7	–
112371	53	–	3646910.07	319730.58	10.11	Cream/brown chert	fine	Core flake	Unutilized flake	0	Proximal	–	–	–	40	30	12	–
112371	54	–	3646908.17	319744.23	9.90	Yellow-red chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	24	30	4	–
112371	55	–	3646914.32	319736.73	10.01	Brown chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	9	16	4	–
112371	56	–	3646916.67	319735.29	10.03	Brown chert	medium	Core flake	Unutilized flake	0	Medial	–	–	–	33	23	4	–
112371	57	–	3646914.34	319732.04	10.09	Cream/brown chert	medium	Core flake	Unutilized flake	0	Whole	–	–	–	56	47	19	–
112371	58	–	3646914.17	319731.52	10.09	Red chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	9	5	2	–
112371	59	–	3646919.19	319732.52	10.08	Yellow chert	fine	AD	Unutilized AD	0	Whole	–	–	–	17	13	5	–
112371	60	–	3646922.45	319730.68	10.09	Gray chert	fine	Core flake	Unutilized flake	0	Distal	–	–	Lustrous	18	15	5	–
112371	61	–	3646898.11	319751.83	9.85	Gray chert	fine	Early stage uniface	Scraper	0	Whole	–	–	–	32	28	9	–
112374	1	–	3646743.75	320001.50	10.19	Gray chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	26	18	11	–
112374	2	–	3646740.53	320003.61	10.14	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	18	18	4	–
112374	3	–	3646712.77	320032.86	9.95	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Medial	–	–	–	18	24	5	–
112374	4	–	3646708.47	320042.40	9.74	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Distal	–	–	–	13	22	3	–
112374	5	–	3646701.27	320046.82	9.59	Yellow-gray chert	fine	Core flake	Unutilized flake	0	Whole	–	–	–	21	39	8	–
112374	6	–	3646700.64	320047.53	9.55	Yellow-gray chert	fine	AD	Unutilized AD	0	Whole	–	–	–	29	17	7	–
112374	7	–	3646687.21	320061.25	9.36	Yellow-gray chert	fine	AD	Unutilized AD	0	Whole	–	–	–	23	13	4	–
112374	8	–	3646676.31	320053.66	9.58	Gray chert	fine	Core flake	Unutilized flake	0	Lateral	–	–	–	17	14	4	–
112374	9	–	3646715.62	320070.04	9.37	Gray chert	medium	Core flake	Unutilized flake	0	Proximal	–	–	–	18	18	4	–
112374	10	–	3646744.82	320020.69	10.04	Yellow-brown chert	fine	Biface flake	Unutilized flake	0	Distal	–	–	–	24	19	3	–
112374	11	–	3646742.81	320020.33	10.04	Yellow-brown chert	fine	Biface flake	Unutilized flake	0	Medial	–	–	–	23	32	5	–
115963	1		3652351.44	314221.38	95.25	–	.	Late stage biface	Folsom point	.	.	–	–	–	–	–	–	Collected
115963	2		3652730.96	314113.11	91.92	–	.	Late stage biface	Folsom point	.	.	–	–	–	–	–	–	Collected
155963	3	1	3652726.22	314152.08	90.16	–	.	Historic artifact	.45-.70 casing	.	.	–	–	–	–	–	–	Collected
155963	4	1	3652724.68	314152.25	90.66	Chert	.	Middle stage uniface	Thumbnail scraper	.	.	–	–	–	–	–	–	Collected
155963	5	1	3652718.41	314136.48	90.72	Metaquartzite	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
155963	6		3652718.07	314128.81	91.36	Silicified wood	fine	Middle stage biface	Biface	0	Whole	–	–	Lustrous	45	29	8	–
155963	7		3652709.86	314185.32	92.98	Gray chert	fine	Early stage uniface	Scraper	0	Whole	–	–	–	33	30	10	–
155963	8		3652726.05	314242.06	92.89	Gray chert	fine	Early stage uniface	Spokeshave	0	Whole	–	–	–	43	29	12	–
155963	9		3652773.56	314256.04	96.22	White chert	fine	Early stage uniface	Denticulate	0	Whole	–	–	–	46	27	9	–
155963	10	H	3652650.40	314325.20	96.06	Tan chert	fine	Early stage biface	Biface	0	Whole	Too thick	–	–	51	30	12	–
155963	11	H	3652646.06	314318.23	94.51	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	12	H	3652662.48	314252.89	95.77	Yellow metaquartzite	fine	Cobble tool	Chopper	30	Whole	–	WW	–	101	72	43	–
155963	13	H	3652625.90	314326.21	95.05	–	.	Historic artifact	Sanitary can	.	.	–	–	–	–	–	–	–
155963	14	H	3652640.27	314267.01	95.45	Gray chert	coarse	Cobble tool	Chopper	50	Whole	–	WW	–	122	85	29	–
155963	15	H	3652632.20	314290.97	95.45	Gray chert	.	Biface	Proj. point preform	.	.	–	–	–	–	–	–	Collected

Site Number	Artifact Number	Cluster	Northing	Easting	Elevation	Material Type	Material Quality (grain size)	Artifact Morphology	Artifact Function	Cortex	Portion	Break	Cortex Type	Thermal Alteration	Length	Width	Thickness	Comments
155963	16		3652664.72	314198.94	91.79	–	.	Sherd	Chupadero B/w sherd	.	.	–	–	–	–	–	–	Collected
155963	17		3652585.52	314335.57	95.98	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	18		3652585.45	314353.51	96.18	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	19		3652544.09	314274.92	94.96	–	.	Historic artifact	Wagon part	.	.	–	–	–	–	–	–	–
155963	20		3652777.97	314123.09	92.25	Chert	.	Late stage biface	Folsom point	.	.	–	–	–	–	–	–	Collected
155963	21		3652752.34	314142.73	90.96	Brown chert	medium	Early stage biface	Biface	0	Whole	Too thick	–	–	72	40	18	–
155963	22		3652743.95	314151.54	90.89	Gray chert	fine	Middle stage biface	Biface	0	Distal	Reverse fracture	–	Lustrous	27	27	9	–
155963	23		3652741.82	314188.62	91.17	Rhyolite	medium	Cobble tool	Chopper	0	Whole	–	–	–	191	122	39	–
155963	24	D	3652185.98	314184.22	91.24	Gray metaquartzite	fine	Middle stage biface	Biface	0	Distal	Ind break	–	–	29	34	9	–
155963	25		3652791.87	314223.44	92.07	–	.	Collection Pile	Collection Pile	.	.	–	–	–	–	–	–	–
155963	26		3652714.06	314235.79	92.95	Chert	.	Late stage biface	SN arrow point	.	.	–	–	–	–	–	–	Collected
155963	27		3652605.32	314209.55	93.64	Chert	.	Early stage uniface	Thumbnail scraper	.	.	–	–	–	–	–	–	Collected
155963	28		3652609.11	314202.31	93.49	Chert	.	Late stage biface	Paleoindian point	.	.	–	–	–	–	–	–	Collected
155963	29	4	3652618.18	314196.46	93.39	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	30		3652618.99	314186.66	93.27	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	31	4	3652623.64	314188.13	93.47	–	.	Collection Pile	Collection Pile	.	.	–	–	–	–	–	–	–
155963	32	4	3652625.92	314189.07	93.48	Gray chert	fine	Middle stage biface	Biface	0	Ind fragment	Crenated fracture	–	–	33	36	11	–
155963	33	4	3652626.03	314194.57	93.57	Green chert	medium	Middle stage biface	Biface	0	Proximal	Ind break	–	–	60	46	18	–
155963	34	4	3652618.32	314202.35	93.74	Gray chert	medium	Cobble tool	Chopper	10	Whole	–	Ind	–	63	59	33	–
155963	35	4	3652621.23	314203.30	93.72	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	36	4	3652621.67	314204.15	93.75	San Andres chert	fine	Middle stage uniface	Scraper	0	Distal	–	–	Lustrous	16	17	5	–
155963	37	4	3652625.52	314205.34	93.73	Tan chert	medium	Late stage biface	Biface	0	Proximal	Ind break	–	–	45	43	12	–
155963	38	4	3652624.64	314204.39	93.77	Quartz	.	Ornament	Quartz crystal	.	.	–	–	–	–	–	–	Collected
155963	39	4	3652621.51	314211.55	93.87	Chert	.	Late stage biface	Large projectile point	.	Medial	–	–	–	–	–	–	Collected
155963	40	4	3652626.98	314214.74	93.92	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	41		3652632.51	314211.56	93.91	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	42		3652619.76	314230.99	94.23	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	43	H	3652657.84	314297.49	95.65	Rhyolite	fine	Cobble tool	Chopper	20	Whole	–	WW	–	121	91	54	–
155963	44	H	3652623.37	314271.90	94.96	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	45	H	3652606.60	314244.44	94.30	Chert	.	Late stage biface	San Pedro point	.	.	–	–	–	–	–	–	Collected
155963	46	H	3652607.37	314261.00	94.54	Limestone	.	Biface	Biface	.	.	–	–	–	–	–	–	Collected
155963	47		3652646.65	314434.26	96.17	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	48	H	3652596.30	314307.03	95.02	Chert	.	Late stage biface	Paleoindian point	.	.	–	–	–	–	–	–	Collected
155963	49	H	3652592.53	314311.42	95.42	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	50	H	3652589.07	314275.96	94.80	Gray chert	fine	Early stage biface	Biface	0	Whole	Too thick	–	–	68	44	24	–
155963	51		3652557.75	314271.49	95.09	Rhyolite	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	52		3652553.37	314267.05	95.08	Sandstone	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
155963	53		3652556.29	314242.25	94.40	Gray chert	fine	Middle stage biface	Biface	0	Proximal	Lateral snap	–	–	34	41	12	–
155963	54		3652586.33	314174.55	92.79	–	.	Sherd	Brownware sherd	.	.	–	–	–	–	–	–	–
155963	55	A	3652514.80	314189.84	93.69	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	56	A	3652518.13	314192.09	93.70	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	57	A	3652518.93	314191.33	93.69	Black chert	fine	Middle stage biface	Biface	0	Ind fragment	Lateral snap	–	–	30	50	10	–
155963	58	A	3652514.13	314204.71	94.05	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	59	A	3652527.33	314198.51	93.73	Gray chert	fine	Middle stage biface	Biface	0	Distal	Edge bite removed	–	–	48	37	12	–
155963	60	A	3652526.29	314195.14	93.64	White chert	fine	Middle stage biface	Biface	0	Ind fragment	Manufacturing break	–	–	27	37	9	–
155963	61	A	3652526.82	314188.30	93.55	Tan chert	fine	Middle stage biface	Biface	0	Whole	Plateau	–	–	52	22	8	–
155963	62		3652547.79	314185.92	93.44	Tan chert	fine/flawed	Middle stage biface	Biface	0	Distal	Broke at flaw	–	–	45	42	9	–
155963	63	A	3652519.10	314183.75	93.58	Purple chert	fine	Middle stage biface	Biface	0	Lateral	Overshot flake removed	–	–	16	54	8	–
155963	64		3652540.87	314196.52	93.69	Basalt	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	65	A	3652517.45	314180.89	93.54	Gray chert	fine	Middle stage biface	Biface	0	Ind fragment	Lateral snap	–	–	18	32	10	–
155963	66	A	3652522.17	314211.57	94.10	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	67	A	3652513.33	314212.69	94.35	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–

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155963	68	A	3652516.93	314214.12	94.27	Pink & gray chert	fine	Middle stage biface	Biface	0	Distal	Ind break	–	–	34	25	7	–
155963	69	A	3652516.78	314216.82	94.27	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	70	A	3652516.93	314214.07	94.27	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	71	A	3652513.30	314212.77	94.33	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	72	A	3652514.16	314217.63	94.36	Metaquartzite	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
155963	73	A	3652514.01	314221.47	94.40	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	74	A	3652509.87	314221.62	94.48	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	75		3652479.33	314239.75	95.05	Tan chert	fine	Middle stage biface	Biface	0	Proximal	Ind break	–	–	34	59	14	–
155963	76	A	3652493.16	314206.26	94.08	Basalt	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	77	A	3652495.84	314211.26	94.20	White chert	fine/flawed	Middle stage biface	Biface	0	Ind fragment	Ind break	–	–	31	30	9	–
155963	78	A	3652502.00	314208.79	94.11	Sandstone	coarse	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
155963	79	A	3652500.87	314209.31	94.18	Chert	.	Late stage biface	Eccentric point	.	.	–	–	–	–	–	–	Collected
155963	80		3652519.18	314112.14	95.87	–	.	Ornament	Hematite ornament	.	.	–	–	–	–	–	–	Collected
155963	81		3652477.10	314252.92	95.37	Gray chert	fine/flawed	Middle stage biface	Biface	0	Proximal	Lateral snap	–	–	40	53	16	–
155963	82	C	3652418.68	314295.79	96.77	Sandstone	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
155963	83	C	3652419.15	314295.46	96.76	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	84	C	3652419.81	314295.64	96.78	Sandstone	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
155963	85	C	3652418.22	314294.48	96.75	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	86	C	3652432.47	314289.75	96.55	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	87	C	3652418.15	314299.65	96.80	Gray chert	fine	Middle stage biface	Biface	0	Whole	–	–	–	38	32	12	–
155963	88	C	3652416.43	314303.07	96.86	Cream chert	fine	Early stage biface	Biface	0	Distal	Lateral snap	–	–	33	47	17	–
155963	89	C	3652414.38	314297.75	96.77	Cream chert	fine	Overshot flake	Biface	0	Distal	–	–	Lustrous	51	19	10	–
155963	90	C	3652403.31	314298.77	96.85	Gray chert	fine	Early stage biface	Biface	0	Distal	Manufacturing Break	–	Lustrous	51	19	10	–
155963	91	C	3652399.28	314290.68	96.76	Rhyolite	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	92	C	3652391.10	314294.39	96.88	White chert	fine/flawed	Middle stage biface	Biface	0	Distal	Broke at flaw	–	–	36	23	8	–
155963	93		3652364.10	314216.56	95.67	White chert	fine/flawed	Middle stage biface	Biface	0	Proximal	Ind break	–	–	26	34	8	–
155963	94		3652427.37	314264.46	96.14	–	.	Collection Pile	Collection Pile	.	.	–	–	–	–	–	–	–
155963	95	B	3652569.54	314297.35	95.85	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	96	B	3652567.24	314295.60	95.99	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	97	B	3652564.80	314295.88	95.66	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	98	B	3652564.32	314296.30	95.45	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	99	B	3652545.19	314324.11	96.63	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	100	B	3652543.61	314323.07	97.44	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	101	B	3652547.06	314327.30	96.30	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	102	B	3652545.53	314331.56	96.04	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	103	B	3652550.88	314332.92	96.82	Gray chert	medium	Middle stage biface	Biface	0	Distal	Lateral snap	–	–	37	37	7	–
155963	104	B	3652546.42	314336.17	96.69	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	105	B	3652531.11	314321.91	96.18	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	106		3652522.80	314303.94	95.20	Gray chert	fine/flawed	Early stage biface	Biface	0	Proximal	Broke at flaw	–	–	36	32	13	–
155963	107		3652526.36	314300.72	95.76	Rhyolite	fine	Core	Core-hammerstone	30	Whole	–	WW	–	65	63	54	–
155963	108		3652506.28	314308.74	96.18	White chert	fine	Early stage uniface	Scraper	0	Whole	–	–	–	38	36	16	–
155963	109	H	3652625.65	314245.95	94.94	Gray chert	fine	Middle stage biface	Biface	0	Lateral	Ind break	–	–	29	20	8	–
155963	110		3652147.54	314404.74	100.11	White chert	.	Late stage biface	Unident. proj. point	.	.	–	–	–	–	–	–	Collected
155963	111	E	3652061.18	314202.69	98.99	Chert	.	Late stage biface	CN arrow point	.	.	–	–	–	–	–	–	Collected
155963	112	E	3652061.18	314202.69	0.00	Obsidian	.	Late stage biface	CN arrow point	.	.	–	–	–	–	–	–	Collected
155963	113	E	3652057.96	314190.33	97.32	Chert	.	Late stage biface	Form. Period Point	.	.	–	–	–	–	–	–	Collected
155963	114		3652046.92	314214.76		–	.	Historic artifact	Historic artifact scatter	.	.	–	–	–	–	–	–	–
155963	115		3652151.69	314108.02	98.61	White chert	.	Late stage biface	CN arrow point	.	.	–	–	–	–	–	–	Collected
155963	116		3652165.30	314067.12	97.50	–	.	Historic artifact	Euroamerican sherd	.	.	–	–	–	–	–	–	–
155963	117		3652067.96	314275.39	99.82	White chert	fine	Early stage biface	Biface	0	Proximal	Lateral snap	–	–	52	33	12	–
155963	118		3652057.08	314265.26	99.80	Black chert	fine	Middle stage biface	Biface	0	Distal	Lateral snap	–	–	18	21	6	–
155963	119		3652096.32	314227.75	100.71	Sandstone	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–

Site Number	Artifact Number	Cluster	Northing	Easting	Elevation	Material Type	Material Quality (grain size)	Artifact Morphology	Artifact Function	Cortex	Portion	Break	Cortex Type	Thermal Alteration	Length	Width	Thickness	Comments
155963	120	E	3652073.85	314218.38	100.74	Gray chert	medium	Early stage biface	Biface	0	Whole	Plateau	–	–	83	34	18	–
155963	121	E	3652072.54	314216.28	100.81	Sandstone	.	Ground stone	Metate	.	Whole	–	–	–	–	–	–	–
155963	122	E	3652081.87	314206.89	101.00	White chert	fine	Middle stage biface	Biface	0	Distal	Lateral snap	–	–	34	30	7	–
155963	123	E	3652081.98	314202.09	101.04	Limestone	fine	Cobble tool	Chopper	0	Whole	–	–	–	64	60	29	–
155963	124	E	3652086.97	314201.85	101.08	Sandstone	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
155963	125	E	3652073.14	314192.97	101.12	Sandstone	.	Ground stone	Metate	.	Whole	–	–	–	–	–	–	–
155963	126		3652096.30	314227.76	100.73	Sandstone	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
155963	127	G	3652103.94	314277.02	99.73	Igneous	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	128	G	3652100.05	314283.25	99.51	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	129		3652062.02	314358.30	98.70	Chert	.	Late stage biface	Form. Period Point	.	.	–	–	–	–	–	–	Collected
155963	130		3652094.64	314372.55	98.55	–	.	Historic artifact	Tobacco can	.	.	–	–	–	–	–	–	–
155963	131		3652032.81	314355.45	98.52	–	.	Sherd	El Paso brown sherd	.	.	–	–	–	–	–	–	–
155963	132	G	3652105.22	314288.90	99.65	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	133	G	3652105.93	314288.44	99.66	Igneous	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	134	G	3652115.34	314287.90	99.72	Igneous	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	135	G	3652122.28	314284.06	99.66	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	136		3652118.88	314227.47	100.72	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	137		3652470.12	314231.85	105.06	Chert	.	Biface	Drill	.	.	–	–	–	–	–	–	Collected
155963	138	A	3652503.82	314232.85	105.31	Gray chert	fine	Early stage uniface	Scraper	0	Whole	–	–	–	28	22	5	–
155963	139	A	3652502.08	314188.69	106.34	Chert	.	Late stage biface	SN arrow point	.	.	–	–	–	–	–	–	Collected
155963	140	A	3652502.77	314189.02	106.33	Green chert	fine	Early stage biface	Biface	0	Whole	Too thick	–	–	64	32	13	–
155963	141		3652584.72	314170.60	107.36	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	142		3651957.26	314326.69	102.24	–	.	Sherd	El Paso brown sherd	.	.	–	–	–	–	–	–	–
155963	143		3652314.38	314613.01	102.08	–	.	Historic artifact	.50 Gun belt link	.	.	–	–	–	–	–	–	Collected
155963	144		3652323.17	314510.95	100.37	Basalt	.	Ground stone	Metate	.	Whole	–	–	–	–	–	–	–
155963	145		3651954.69	314916.66	104.42	–	.	Late stage biface	Archaic point	.	.	–	–	–	–	–	–	Collected
155963	146		3651936.86	314763.92	102.24	–	.	Historic artifact	Hole-in-top can	.	.	–	–	–	–	–	–	–
155963	147		3651963.42	314729.11	102.36	–	.	Historic artifact	.50 Rimfire casing	.	.	–	–	–	–	–	–	–
155963	148		3651858.20	314661.44	101.55	Obsidian	.	Late stage biface	UN arrow point	.	.	–	–	–	–	–	–	Collected
155963	149		3651857.63	314650.58	102.35	Obsidian	.	Late stage biface	UN arrow point	.	.	–	–	–	–	–	–	Collected
155963	150		3651859.41	314652.66	101.72	Obsidian	.	Late stage biface	UN arrow point	.	.	–	–	–	–	–	–	Collected
155963	151		3651833.41	314631.75	102.14	Chert	.	Late stage biface	Archaic point	.	.	–	–	–	–	–	–	Collected
155963	152		3651986.63	314582.65	101.96	–	.	Historic artifact	Hole-in-top can	.	.	–	–	–	–	–	–	–
155963	153		3651977.49	314584.83	101.86	–	.	Historic artifact	Hole-in-top can	.	.	–	–	–	–	–	–	–
155963	154		3651943.09	314475.68	100.88	–	.	Sherd	4 El Paso brown sherds	.	.	–	–	–	–	–	–	–
155963	155	E	3652025.75	314162.86	99.36	–	.	Historic artifact	Lard pail	.	.	–	–	–	–	–	–	Collected
155963	156	E	3652024.67	314164.07	97.56	–	.	Historic artifact	7/8 inch metal strap	.	.	–	–	–	–	–	–	–
155963	157	E	3652034.19	314177.99	98.60	–	.	Historic artifact	Barrel hoop	.	.	–	–	–	–	–	–	–
155963	158	E	3652028.34	314181.41	98.32	–	.	Historic artifact	Barrel hoop	.	.	–	–	–	–	–	–	–
155963	159	E	3652035.51	314181.34	97.83	–	.	Historic artifact	Barrel hoop	.	.	–	–	–	–	–	–	–
155963	160	E	3652023.12	314194.14	98.17	–	.	Late stage biface	CN arrow point	.	.	–	–	–	–	–	–	Collected
155963	161	E	3652016.84	314189.78	98.34	–	.	Historic artifact	1 in metal strap	.	.	–	–	–	–	–	–	–
155963	162	E	3652017.59	314193.26	98.50	–	.	Historic artifact	Barrel hoop	.	.	–	–	–	–	–	–	–
155963	163	E	3652010.32	314191.22	98.36	–	.	Historic artifact	.44 Casing	.	.	–	–	–	–	–	–	Collected
155963	164	E	3652024.61	314188.33	98.99	–	.	Historic artifact	Metal spout	.	.	–	–	–	–	–	–	–
155963	165	E	3652022.29	314206.31	98.55	–	.	Historic artifact	Hole-in-top can	.	.	–	–	–	–	–	–	–
155963	166	E	3652032.80	314213.02	98.93	–	.	Historic artifact	.44 Casing	.	.	–	–	–	–	–	–	Collected
155963	167	E	3652033.53	314215.55	98.33	–	.	Historic artifact	.44 Casing	.	.	–	–	–	–	–	–	Collected
155963	168	E	3652039.88	314208.54	98.96	–	.	Historic artifact	Evap. Milk can	.	.	–	–	–	–	–	–	–
155963	169	E	3652042.35	314202.97	98.69	–	.	Historic artifact	Hole-in-top can	.	.	–	–	–	–	–	–	–
155963	170	E	3652040.19	314182.61	97.70	–	.	Historic artifact	Barrel hoop	.	.	–	–	–	–	–	–	–
155963	171	E	3652067.92	314217.59	97.60	–	.	Sherd	Chupadero B/w sherd	.	.	–	–	–	–	–	–	Collected

Site Number	Artifact Number	Cluster	Northing	Easting	Elevation	Material Type	Material Quality (grain size)	Artifact Morphology	Artifact Function	Cortex	Portion	Break	Cortex Type	Thermal Alteration	Length	Width	Thickness	Comments
155963	172	E	3652056.54	314203.69	98.58	Basalt	.	Ground stone	Ground stone	.	Whole	–	–	–	–	–	–	–
155963	173	E	3652070.57	314229.50	98.84	–	.	Historic artifact	Lard can	.	.	–	–	–	–	–	–	Collected
155963	174	E	3652074.13	314232.51	98.53	Chert	.	Late stage biface	Augustin point	.	.	–	–	–	–	–	–	Collected
155963	175	E	3652082.25	314220.85	97.54	–	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	176	E	3652049.00	314218.49	98.86	–	.	Historic artifact	Hole-in-top can	.	.	–	–	–	–	–	–	–
155963	177	E	3652049.13	314235.42	98.58	–	.	Historic artifact	Hole-in-top can	.	.	–	–	–	–	–	–	–
155963	178		3652043.74	314281.39	99.84	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	179	F	3652141.56	314315.97	99.40	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	180	F	3652143.43	314315.24	100.11	Metaquartzite	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
155963	181	F	3652149.39	314316.18	99.14	Chert	.	Late stage biface	Archaic point	.	.	–	–	–	–	–	–	Collected
155963	182	F	3652144.41	314320.66	98.66	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	183	F	3652162.28	314329.74	99.25	Igneous	.	Ground stone	Mano	.	Ind fragment	–	–	–	–	–	–	–
155963	184	F	3652175.19	314316.81	98.86	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	185	F	3652165.49	314309.13	99.28	Basalt	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
155963	186	F	3652158.28	314290.77	97.90	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	187	F	3652152.18	314268.51	97.65	Chert	.	Late stage biface	Small projectile point	.	Distal	–	–	–	–	–	–	Collected
155963	188	F	3652161.51	314259.12	99.40	Chert	.	Late stage biface	Large projectile point	.	Medial	–	–	–	–	–	–	Collected
155963	189	F	3652164.13	314255.97	98.95	Sandstone	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
155963	190	F	3652162.91	314255.11	99.08	Sandstone	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
155963	191	F	3652171.35	314250.98	97.76	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	192	F	3652172.25	314251.24	97.78	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	193	F	3652167.78	314266.26	97.91	Sandstone	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
155963	194	F	3652167.26	314267.16	98.44	San Andres chert	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	195	F	3652170.12	314282.44	98.70	Unknown	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	196		3652173.11	314212.06	97.30	–	.	Sherd	El Paso brown sherd	.	.	–	–	–	–	–	–	–
155963	197		3652172.52	314165.28	97.85	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	198	D	3652203.36	314172.26	98.31	Basalt	.	Ground stone	One-hand mano	.	Ind fragment	–	–	–	–	–	–	–
155963	199	D	3652201.17	314177.01	98.16	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	200	D	3652204.29	314179.43	97.73	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	201	D	3652204.25	314191.76	97.61	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–
155963	202	D	3652199.11	314183.17	97.27	Basalt	.	Ground stone	One-hand mano	.	Whole	–	–	–	–	–	–	–
155963	203	D	3652191.82	314176.15	97.92	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	204		3652185.98	314184.22	98.18	Sandstone	.	Ground stone	Metate	.	Ind fragment	–	–	–	–	–	–	–
155963	205	D	3652194.02	314193.75	98.14	Sandstone	.	Ground stone	Ground stone	.	Ind fragment	–	–	–	–	–	–	–

Abbreviations:

AD = angular debris; Ind = indeterminate; WW = waterworn; NWW = nonwaterworn; SN = side-notched; CN = corner-notched; UN = unnotched

Artifacts Recovered from Test Pits: Full Analysis

Site Number	FS Number	Test Pit	Level	Artifact Number	Material Type	Material Quality	Artifact Morphology	Artifact Function	Cortex	Portion	Platform Type	Platform Lipping	Cortex Type	Platform Angle	Bulb of Percussion	Ventral Curvature	Waisting	Distal Termination	Thermal Alteration	Length	Width	Thickness	Weight
111420	7	Test Pit 1	1	1	Brown & gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Proximal	Multifacet	Not present	–	< 45	not pronounced	no	no	Snap fracture	–	10	12	3	0.6
111420	7	Test Pit 1	1	2	Yellow & gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Whole	Single facet	Present	–	> 45	pronounced	no	no	Feather	–	16	13	2	0.7
111420	7	Test Pit 1	1	3	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Proximal	Multifacet	Present	–	< 45	not pronounced	no	no	Naturally obscured	–	13	12	4	0.5
111420	7	Test Pit 1	1	4	Cream chert	Fine-grained	Core flake	Unutilized flake	0	Proximal	Collapsed	Not present	–	N/A	not pronounced	no	no	Manufacturing fracture	–	12	13	5	0.7
111420	7	Test Pit 1	1	5	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Medial	Absent	–	–	N/A	N/A	N/A	N/A	Snap fracture	–	16	10	3	0.6
111420	7	Test Pit 1	1	6	Cream chert	Fine-grained and flawed	Angular debris	Unutilized angular debris	0	Whole	–	–	–	–	–	–	–	–	–	12	16	3	0.7
111420	7	Test Pit 1	1	7	Cream chert	Fine-grained and flawed	Angular debris	Unutilized angular debris	40	Whole	–	–	ww	–	–	–	–	–	–	26	12	6	2.9
111420	8	Test Pit 1	2	1	Gray chert	Fine-grained	Core flake	Unutilized flake	0	Proximal	Collapsed	–	–	N/A	not pronounced	no	yes	Manufacturing fracture	–	19	20	3	1.3
111420	8	Test Pit 1	2	2	Gray metaquartzite	Fine-grained	Angular debris	Unutilized angular debris	0	Whole	–	–	–	–	–	–	–	–	–	12	15	2	0.5
111420	9	Test Pit 2	1	1	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	10	Medial	Absent	–	ww	N/A	N/A	N/A	N/A	Snap fracture	–	15	16	5	1.6
111420	9	Test Pit 2	1	2	Brown chert	Fine-grained and flawed	Core flake	Unutilized flake	0	Lateral	Absent	–	–	N/A	N/A	N/A	N/A	Axial	Dorsal potlids	28	22	5	2.9
111420	6	Test Pit 3	2	1	Yellow-brown metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Whole	Collapsed	–	–	< 45	not pronounced	no	no	Plunging	–	11	16	3	0.8
111420	1	Test Pit 5	0	1	Cream chert	Fine-grained and flawed	Angular debris	Unutilized angular debris	10	Whole	–	–	ww	–	–	–	–	–	Luster variation	17	13	7	2.2
111420	1	Test Pit 5	0	2	Gray chert	Fine-grained and flawed	Angular debris	Unutilized angular debris	20	Whole	–	–	ww	–	–	–	–	–	Luster variation	18	18	8	3.3
111421	3	Test Pit 1	1	1	Brown & black chert	Fine-grained	Angular debris	Unutilized angular debris	0	Whole	–	–	–	–	–	–	–	–	Luster variation & potlids	16	12	4	1.2
111421	3	Test Pit 1	1	2	Gray chert	Fine-grained and flawed	Core flake	Unutilized flake	40	Medial	Absent	–	ww	N/A	N/A	N/A	N/A	Snap fracture	Luster variation	9	13	4	0.7
111421	2	Test Pit 3	2	1	Gray chert	Fine-grained and flawed	Early stage biface	Biface	10	Whole	–	–	ww	–	–	–	–	–	–	71	49	17	62.7
111421	2	Test Pit 3	2	2	Cream chert	Fine-grained and flawed	Core flake	Unutilized flake	0	Distal	Absent	–	–	N/A	N/A	N/A	N/A	Hinge	–	14	13	3	0.5
111421	1	Test Pit 4	1	1	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Whole	Single facet	Not present	–	> 45	pronounced	no	no	Step	–	8	9	2	0.2
111429	6	Test Pit 1	1	1	Yellow-brown chert	Fine-grained	Biface flake	Unutilized flake	0	Whole	Multifacet and abraded	Not present	–	< 45	not pronounced	no	no	Hinge	Luster variation	38	29	7	7.7
111429	5	Test Pit 6	1	1	Cream chert	Fine-grained	Core flake	Unutilized flake	20	Whole	Multifacet	Not present	ww	< 45	not pronounced	no	no	Feather	Luster variation	24	17	3	2
111432	83	Test Pit 1	1	1	Yellow metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Whole	Multifacet	Present	–	< 45	not pronounced	no	no	Hinge	–	18	30	6	3.3
111432	83	Test Pit 1	1	2	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Medial	Absent	–	–	N/A	N/A	N/A	N/A	Snap fracture	–	21	19	6	3.2

Site Number	FS Number	Test Pit	Level	Artifact Number	Material Type	Material Quality	Artifact Morphology	Artifact Function	Cortex	Portion	Platform Type	Platform Lipping	Cortex Type	Platform Angle	Bulb of Percussion	Ventral Curvature	Waisting	Distal Termination	Thermal Alteration	Length	Width	Thickness	Weight
111432	83	Test Pit 1	1	3	Yellow-brown chert	Fine-grained	Core flake	Unutilized flake	10	Distal	Absent	–	ww	N/A	N/A	N/A	N/A	Feather	–	12	17	3	0.8
111432	83	Test Pit 1	1	4	Brown chert	Fine-grained	Angular debris	Unutilized angular debris	20	Whole	–	–	ww	–	–	–	–	–	–	11	11	4	0.5
111432	83	Test Pit 1	1	5	Yellow metaquartzite	Fine-grained	Angular debris	Unutilized angular debris	0	Whole	–	–	–	–	–	–	–	–	–	10	72	2	0.2
111432	83	Test Pit 1	1	6	Gray metaquartzite	Fine-grained	Angular debris	Unutilized angular debris	0	Whole	–	–	–	–	–	–	–	–	–	15	13	3	0.8
111432	87	Test Pit 2	1	1	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Lateral	Absent	–	–	N/A	N/A	no	N/A	Hinge	–	21	23	5	2.4
111432	87	Test Pit 2	1	2	Yellow metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Distal	Absent	–	–	N/A	N/A	no	N/A	Feather	–	18	19	3	1.3
111432	87	Test Pit 2	1	3	Yellow metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Lateral	Single facet	Not present	–	> 45	pronounced	no	no	Step	–	21	16	5	1.6
111432	87	Test Pit 2	1	4	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Medial	Absent	–	–	N/A	N/A	N/A	N/A	Snap fracture	–	14	21	4	1.3
111432	87	Test Pit 2	1	5	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Medial	Absent	–	–	N/A	N/A	N/A	N/A	Snap fracture	–	16	15	2	0.8
111432	87	Test Pit 2	1	6	Gray metaquartzite	Fine-grained	Core flake	Unutilized flake	0	Medial	Absent	–	–	N/A	N/A	N/A	N/A	Snap fracture	–	13	12	2	0.6
111432	87	Test Pit 2	1	7	Yellow metaquartzite	Fine-grained and flawed	Unidirectional core	Unutilized core	50	Whole	–	–	ww	–	–	–	–	–	–	45	21	10	13.3
111432	81	Test Pit 4	0	1	Red-brown chert	Fine-grained	Core flake	Unutilized flake	0	Proximal	Multifacet	–	–	> 45	not pronounced	no	no	Snap fracture	–	16	18	4	1.2
111432	82	Test Pit 4	1	1	Cream chert	Fine-grained	Core flake	Unutilized flake	0	Distal	–	–	–	N/A	N/A	no	N/A	Feather	–	14	14	4	1
111432	82	Test Pit 4	1	2	Brown chert	Fine-grained	Core flake	Unutilized flake	0	Medial	–	–	–	N/A	N/A	N/A	N/A	Snap fracture	–	9	11	2	0.3
111432	85	Test Pit 4	2	1	Brown metaquartzite	Fine-grained	Biface flake	Unutilized flake	0	Whole	Multifacet	Not present	–	< 45	not pronounced	no	no	Step	–	11	15	4	0.7
111432	84	Test Pit 5	1	1	Yellow metaquartzite	Fine-grained	Biface flake	Unutilized flake	0	Whole	Multifacet	Not present	–	< 45	not pronounced	yes	no	Hinge	–	36	21	5	3.4
111432	84	Test Pit 5	1	2	Cream chert	Fine-grained	Core flake	Unutilized flake	0	Whole	Multifacet	Not present	–	> 45	pronounced	no	no	Feather	–	13	17	3	1
111432	84	Test Pit 5	1	3	Yellow metaquartzite	Fine-grained	Core flake	Unutilized flake	20	Whole	Multifacet	Present	ww	< 45	not pronounced	no	no	Feather	–	19	15	4	1
112371	2	Test Pit 1	1	1	Gray chert	Fine-grained and flawed	Core flake	Unutilized flake	0	Proximal	Multifacet	Not present	–	< 45	pronounced	no	no	Snap fracture	–	24	19	5	2.7
112371	3	Test Pit 1	2	1	Brown chert	Fine-grained	Core flake	Unutilized flake	0	Proximal	Single facet	Not present	–	< 45	not pronounced	yes	no	Snap fracture	–	39	20	9	6
112371	3	Test Pit 1	2	2	Cream chert	Fine-grained	Core flake	Unutilized flake	0	Lateral	Multifacet	Not present	–	> 45	pronounced	no	no	Snap fracture	–	42	25	12	12.1
112371	7	Test Pit 2	2	1	Yellow-gray chert	Fine-grained	Core flake	Unutilized flake	0	Distal	Absent	–	–	N/A	N/A	N/A	N/A	Hinge	–	18	24	6	2.9
112371	7	Test Pit 2	2	2	Tan chert	Fine-grained and flawed	Unidirectional core	Unutilized core	30	Whole	–	–	ww	–	–	–	–	–	–	40	38	19	29.8
112371	7	Test Pit 2	2	3	Red & gray chert	Fine-grained	Angular debris	Unutilized angular debris	10	Whole	–	–	ww	–	–	–	–	–	–	43	28	7	9.2

Site Number	FS Number	Test Pit	Level	Artifact Number	Material Type	Material Quality	Artifact Morphology	Artifact Function	Cortex	Portion	Platform Type	Platform Lipping	Cortex Type	Platform Angle	Bulb of Percussion	Ventral Curvature	Waisting	Distal Termination	Thermal Alteration	Length	Width	Thickness	Weight
112371	1	Test Pit 3	1	1	Cream chert	Fine-grained and flawed	Core flake	Unutilized flake	0	Medial	Absent	–	–	N/A	N/A	N/A	N/A	Manufacturing fracture	Luster variation	19	26	6	4
112371	1	Test Pit 3	1	2	Yellow-red chert	Fine-grained	Biface flake	Utilized/retouched debitage	0	Proximal	Single facet and abraded	Present	–	< 45	not pronounced	no	no	Snap fracture	–	13	11	2	0.5
112371	1	Test Pit 3	1	3	Tan & cream chert	Fine-grained	Angular debris	Unutilized angular debris	10	Whole	–	–	ww	–	–	–	–	–	–	20	11	7	1.7
112371	1	Test Pit 3	1	4	Tan & cream chert	Fine-grained	Angular debris	Unutilized angular debris	10	Whole	–	–	ww	–	–	–	–	–	–	17	16	28	3.9
112371	5	Test Pit 4	1	1	Tan chert	Fine-grained	Core flake	Unutilized flake	0	Proximal	Single facet	Not present	–	< 45	pronounced	no	no	Snap fracture	–	10	12	4	0.5
112371	5	Test Pit 4	1	2	Tan chert	Fine-grained	Core flake	Unutilized flake	0	Proximal	Multifacet	Not present	–	> 45	pronounced	no	no	Snap fracture	–	16	15	7	1.6
112371	5	Test Pit 4	1	3	Brown metaquartzite	Fine-grained	Core flake	Unutilized flake	20	Distal	Absent	–	ww	N/A	N/A	N/A	N/A	Axial	–	13	16	4	0.8
112371	6	Test Pit 4	2	1	Cream chert	Fine-grained	Core flake	Unutilized flake	0	Whole	Single facet	Not present	–	> 45	pronounced	no	no	Axial	–	10	10	2	0.3
112374	1	Test Pit 1	1	1	Cream & brown chert	Fine-grained	Angular debris	Unutilized angular debris	0	Whole	–	–	–	–	–	–	–	–	Luster variation	12	10	2	0.3

Appendix 2. Summary of Feature Data (UTM Zone 13, NAD 83)

Site Number	Feature Number	Centerpoint Northing	Centerpoint Easting	Elevation	Feature Type	Estimated FCR Count	FCR Maximum Density	FCR Fragmentation	% Caliche	Feature Tested?	Comment	Information Potential
LA 111429	1	3647164.48	319332.07	n/a	dispersed fcr with concentration	50-100	5	cobbles and highly fragmented	30	yes	ash and biface flake in test	fair to good
LA 111429	2	3647183.96	319327.63	7.16	dispersed fcr with concentration	50-100	5	cobbles and highly fragmented	60	yes	part under dune	very low
LA 111429	3	3647251.25	319365.87	8.64	fcr concentration and dispersed scatter	50-100	8	mostly cobbles	20	yes	stain present	fair to good
LA 111429	4	3647220.77	319349.03	n/a	dispersed fcr with concentration	<50	10	cobbles and highly fragmented	80	no	<5 cm fill	very low
LA 111429	5	3647219.61	319423.99	9.07	dispersed fcr with concentration	<50	7	highly fragmented	100	no	–	very low
LA 111429	6	3647216.63	319469.46	9.25	fcr concentration and dispersed scatter	50-100	15	cobbles and highly fragmented	75	yes	subsurface rock present	fair to good
LA 111429	7	3647230.26	319464.09	9.41	fcr concentration	12	7	cobbles and highly fragmented	90	yes	–	low
LA 111429	8	3647300.01	319348.22	8.37	dispersed fcr with concentration	300	26	highly fragmented	96	yes	<5 cm fill	very low
LA 111429	9	3647329.42	319337.70	8.25	dispersed fcr with concentration	> 200	24	cobbles and highly fragmented	94	no	–	low
LA 111429	10	3647277.03	319335.27	8.22	dispersed fcr with concentration-cluster 1	50-100	21	highly fragmented	94	no	large scatter with 2 core areas	low
LA 111429					dispersed fcr with concentration-cluster 2	100-200	16	highly fragmented	80	no		
LA 111429	11	3647542.47	319464.16	10.26	fcr concentration and dispersed scatter	> 200	50	cobbles and highly fragmented	80	no	stain present	good
LA 111429	12	3647525.61	319450.87	9.87	dispersed fcr with concentration	100-200	27	cobbles and highly fragmented	95	yes	biface flake in test	fair
LA 111429	13	3647519.80	319453.71	9.78	fcr concentration and dispersed scatter	50-100	25	cobbles and highly fragmented	80	yes	<5 cm fill	very low
LA 111429	14	3647516.43	319444.52	9.72	dispersed fcr with concentration	> 200	16	highly fragmented	95	no	–	low
LA 111429	15	3647543.67	319439.78	9.55	dispersed fcr scatter	11	4	cobbles and highly fragmented	10	no	–	low to fair
LA 111429	16	3647542.98	319432.07	9.36	fcr concentration and dispersed scatter	75	16	cobbles and highly fragmented	60	yes	<5 cm fill	low
LA 111429	17	3647519.76	319440.22	9.65	dispersed fcr with concentration	50-100	12	cobbles and highly fragmented	90	no	subsurface rock present	fair
LA 111429	18	3647466.59	319415.52	9.17	dispersed fcr with concentration	<50	4	cobbles and highly fragmented	80	no	–	low
LA 111429	19	3647300.59	319286.35	7.67	dispersed fcr with concentration	50-100	3	highly fragmented	95	no	–	low to fair
LA 111429	20	3647679.48	319462.33	10.30	dispersed fcr with concentration	300	50	cobbles and highly fragmented	95	no	<5 cm fill	very low
LA 111429	21	3647622.71	319596.63	11.76	dispersed fcr scatter	50-100	20	cobbles and highly fragmented	95	no	–	very low
LA 111429	22	3647485.22	319458.23	9.46	dispersed fcr scatter	20	8	highly fragmented	0	yes	subsurface rock present	very low
LA 111429	23	3647511.17	319452.45	9.60	dispersed fcr with concentration	<50	10	mostly cobbles	90	no	<5 cm fill	very low
LA 111429	24	3647522.39	319444.08	9.78	dispersed fcr with concentration	100-200	20	cobbles and highly fragmented	90	no	part under dune	low
LA 155963	1	3652770.86	314167.17	n/a	dispersed fcr with concentration	<50	8	highly fragmented	90	yes	subsurface rock present	fair
LA 155963	2	3652738.59	314125.42	n/a	dispersed fcr with concentration	50-100	6	cobbles and highly fragmented	82	no	–	very low
LA 155963	3	3652720.03	314140.45	n/a	dispersed fcr scatter	<10	2	mostly cobbles	90	no	–	none
LA 155963	4	3652737.51	314182.52	n/a	fcr concentration and dispersed scatter	<50	12	cobbles and highly fragmented	55	no	part under dune	low to fair
LA 155963	5	3652735.09	314200.81	n/a	dispersed fcr with concentration	50-100	5	cobbles and highly fragmented	90	no	–	low
LA 155963	6	3652726.40	314244.10	106.99	fcr concentration and dispersed scatter	<50	20	cobbles and highly fragmented	50	no	stain present	good
LA 155963	7	3652699.44	314301.40	105.04	dispersed fcr with concentration	50-100	18	cobbles and highly fragmented	90	no	part under dune	low
LA 155963	8	3652659.44	314271.32	104.81	dispersed fcr with concentration	20	4	cobbles and highly fragmented	60	no	stain and subsurface rock	fair to good
LA 155963	9	3652641.13	314269.07	104.93	dispersed fcr with concentration	50-100	6	cobbles and highly fragmented	50	yes	stain and subsurface rock	fair to good
LA 155963	10	3652638.41	314325.08	104.39	dispersed fcr with concentration	50-100	4	cobbles and highly fragmented	90	no	subsurface rock present	low to fair

Site Number	Feature Number	Centerpoint Northing	Centerpoint Easting	Elevation	Feature Type	Estimated FCR Count	FCR Maximum Density	FCR Fragmentation	% Caliche	Feature Tested?	Comment	Information Potential
LA 155963	11	3652622.62	314123.01	n/a	dispersed fcr with concentration	<50	6	cobbles and highly fragmented	50	no	quary area	very low
LA 155963	12	3652617.78	314097.70	n/a	collector's pile	absent	0	absent	0	no	quary area	none
LA 155963	13	3652567.73	314274.44	n/a	artifact concentration	<50	2	highly fragmented	90	no	–	low to fair
LA 155963	14	3652639.79	314204.32	n/a	fcr concentration and dispersed scatter	> 200	18	cobbles and highly fragmented	50	yes	stain present	fair to good
LA 155963	15	3652621.03	314211.23	n/a	dispersed fcr scatter	<50	3	cobbles and highly fragmented	80	no	stain present	fair to good
LA 155963	16	3652608.48	314249.64	n/a	dispersed fcr scatter	50-100	5	cobbles and highly fragmented	85	no	associated with an artifact cluster	very low
LA 155963	17	3652590.44	314256.70	n/a	dispersed fcr with concentration	<50	6	cobbles and highly fragmented	70	no	–	low
LA 155963	18	3652519.17	314191.29	n/a	slab-lined feature	absent	0	absent	0	no	associated with an artifact cluster	low to fair
LA 155963	19	3652510.47	314186.90	n/a	dispersed fcr with concentration	100-200	6	highly fragmented	70	no	associated with an artifact cluster	low
LA 155963	20	3652498.61	314231.93	n/a	fcr concentration and dispersed scatter	100-200	10	cobbles and highly fragmented	40	yes	stain present	good
LA 155963	21	3652580.04	314230.21	n/a	dispersed fcr with concentration	100-200	10	highly fragmented	85	no	associated with an artifact cluster	low
LA 155963	22	3652560.95	314294.48	n/a	dispersed fcr scatter	20	2	highly fragmented	40	no	associated with an artifact cluster	low
LA 155963	23	3652038.40	314358.62	n/a	fcr concentration and dispersed scatter	50-100	16	cobbles and highly fragmented	10	no	subsurface rock present	low to fair
LA 155963	24	3652042.49	314337.20	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	25	3652047.07	314344.40	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	26	3652052.33	314336.34	n/a	fcr concentration and dispersed scatter	50-100	19	mostly cobbles	20	no	associated with an artifact cluster	low
LA 155963	27	3652066.52	314347.20	n/a	dispersed fcr with concentration	100-200	17	cobbles and highly fragmented	60	no	<2 cm of fill	low
LA 155963	28	3652002.07	314361.00	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	29	3651978.50	314312.50	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	30	3652059.94	314327.29	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	31	3652060.50	314311.91	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	32	3652075.44	314316.94	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	33	3652097.42	314332.09	n/a	dispersed fcr with concentration	<50	4	cobbles and highly fragmented	20	no	associated with an artifact cluster	low
LA 155963	34	3652106.20	314330.74	n/a	dispersed fcr with concentration	50-100	5	cobbles and highly fragmented	50	no	associated with an artifact cluster	low
LA 155963	35	3652111.48	314322.13	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	36	3652108.55	314319.12	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	37	3652104.79	314323.47	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	38	3652105.00	314300.68	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	39	3652125.05	314335.51	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	40	3652121.01	314342.88	n/a	dispersed fcr with concentration	50-100	10	cobbles and highly fragmented	70	no	<5 cm fill	low
LA 155963	41	3652045.42	314321.46	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	42	3652044.90	314333.79	n/a	dispersed fcr scatter	100-200	12	cobbles and highly fragmented	45	no	<2 cm of fill	none
LA 155963	43	3652076.75	314268.61	n/a	historic burned rock pile/scatter	300	50	mostly cobbles	5	no	–	none
LA 155963	44	3652148.55	314343.52	n/a	dispersed fcr with concentration	50-100	12	cobbles and highly fragmented	70	no	associated with an artifact cluster	low
LA 155963	45	3652158.73	314341.39	n/a	Unrecorded	–	–	–	–	–	–	–

Site Number	Feature Number	Centerpoint Northing	Centerpoint Easting	Elevation	Feature Type	Estimated FCR Count	FCR Maximum Density	FCR Fragmentation	% Caliche	Feature Tested?	Comment	Information Potential
LA 155963	46	3652146.22	314325.15	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	47	3652145.49	314316.99	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	48	3652137.56	314293.76	n/a	fcr concentration and dispersed scatter	100-200	35	cobbles and highly fragmented	50	no	subsurface rock present	low to fair
LA 155963	49	3652178.00	314316.36	n/a	dispersed fcr with concentration	50-100	15	cobbles and highly fragmented	30	no	<5 cm fill	low
LA 155963	50	3652168.00	314280.91	n/a	charcoal stain	20	3	highly fragmented	50	no	stain present	low to fair
LA 155963	51	3652130.69	314454.94	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	52	3652134.61	314461.97	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	53	3652201.57	314481.94	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	54	3652193.64	314446.84	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	55	3652193.90	314430.57	n/a	dispersed fcr with concentration	50-100	10	cobbles and highly fragmented	40	no	<2 cm of fill	very low
LA 155963	56	3652205.51	314426.62	n/a	dispersed fcr scatter	50-100	8	cobbles and highly fragmented	60	no	–	low
LA 155963	57	3652191.93	314404.27	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	58	3652139.36	314263.41	n/a	fcr concentration	<50	6	mostly cobbles	0	no	–	none
LA 155963	59	3652164.96	314257.69	n/a	fcr concentration and dispersed scatter	50-100	8	cobbles and highly fragmented	30	no	part under dune	low to fair
LA 155963	60	3652172.74	314253.11	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	61	3652171.04	314262.72	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	62	3652153.85	314234.53	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	63	3652109.02	314245.43	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	64	3652123.77	314220.42	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	65	3652122.35	314206.41	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	66	3652120.13	314198.87	n/a	fcr concentration	30	19	cobbles and highly fragmented	45	no	subsurface rock present	low to fair
LA 155963	67	3652122.70	314196.25	n/a	fcr concentration and dispersed scatter	50-100	10	cobbles and highly fragmented	5	no	–	low
LA 155963	68	3652111.99	314193.15	n/a	fcr concentration	20	12	cobbles and highly fragmented	40	no	–	low
LA 155963	69	3652109.11	314194.87	n/a	fcr concentration and dispersed scatter	<50	14	mostly cobbles	5	no	<5 cm fill	low
LA 155963	70	3652102.59	314194.76	n/a	fcr concentration and dispersed scatter	50-100	12	cobbles and highly fragmented	15	yes	–	very low
LA 155963	71	3652108.61	314189.96	n/a	fcr concentration	40	6	mostly cobbles	25	no	–	low
LA 155963	72	3652078.84	314207.69	n/a	historic burned rock pile/scatter	<50	15	cobbles and highly fragmented	5	no	<5 cm fill	none
LA 155963	73	3652044.12	314211.16	n/a	historic burned rock pile/scatter	100-200	42	mostly cobbles	5	no	–	none
LA 155963	74	3652082.48	314189.75	n/a	dispersed fcr scatter	> 200	50	highly fragmented	30	no	<2 cm of fill	low
LA 155963	75	3652084.13	314176.00	n/a	dispersed fcr with concentration	<50	24	cobbles and highly fragmented	60	no	stain present	fair
LA 155963	76	3652117.42	314185.85	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	77	3652121.02	314174.64	n/a	dispersed fcr with concentration	<50	8	cobbles and highly fragmented	10	no	<2 cm of fill	very low
LA 155963	78	3652098.87	314169.67	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	79	3652110.79	314164.32	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	80	3652136.36	314162.66	n/a	Unrecorded	–	–	–	–	–	–	–

Site Number	Feature Number	Centerpoint Northing	Centerpoint Easting	Elevation	Feature Type	Estimated FCR Count	FCR Maximum Density	FCR Fragmentation	% Caliche	Feature Tested?	Comment	Information Potential
LA 155963	81	3652140.24	314151.87	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	82	3652144.60	314134.66	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	83	3652158.78	314164.52	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	84	3652187.34	314178.41	n/a	fcr concentration and dispersed scatter	100-200	14	cobbles and highly fragmented	10	no	<2 cm of fill	none
LA 155963	85	3652197.67	314193.97	n/a	fcr concentration and dispersed scatter	<50	9	cobbles and highly fragmented	20	no	<2 cm of fill	very low
LA 155963	86	3652175.54	314122.56	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	87	3652178.44	314101.55	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	88	3652173.80	314103.31	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	89	3652186.41	314100.91	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	90	3652186.01	314096.10	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	91	3652185.26	314093.52	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	92	3652194.90	314102.75	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	93	3652222.08	314088.75	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	94	3652198.23	314058.38	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	95	3652208.55	314036.56	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	96	3652064.54	314242.35	n/a	historic burned rock pile/scatter	100-200	30	mostly cobbles	5	no	<2 cm of fill	none
LA 155963	97	3652054.25	314261.96	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	98	3652047.28	314234.30	n/a	dispersed fcr scatter	<50	6	highly fragmented	70	no	stain present	fair to good
LA 155963	99	3651999.45	314212.43	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	100	3651990.80	314198.52	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	101	3651990.36	314195.25	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	102	3652014.20	314192.28	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	103	3652025.71	314275.56	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	104	3652139.17	314274.97	n/a	stain?	<10	1	highly fragmented	100	no	stain present	very low
LA 155963	105	3652335.44	314715.09	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	106	3652363.39	314731.51	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	107	3652361.19	314733.80	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	108	3652379.77	314707.69	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	109	3652368.31	314698.96	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	110	3652307.85	314667.19	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	111	3652275.42	314622.34	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	112	3652313.48	314615.14	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	113	3652346.44	314645.88	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	114	3652432.95	314598.77	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	115	3652536.29	314556.77	n/a	Unrecorded	–	–	–	–	–	–	–

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LA 155963	116	3651912.27	314843.44	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	17	3651905.34	314892.18	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	118	3651901.85	314914.02	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	119	3651909.05	314921.64	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	120	3651945.06	314910.04	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	121	3651967.56	314849.90	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	122	3651908.70	314939.18	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	123	3651955.49	314749.76	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	124	3651951.26	314730.66	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	125	3651867.77	314660.67	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	126	3651856.36	314686.73	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	127	3651991.65	314567.33	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	128	3651983.51	314563.16	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	129	3652042.08	314194.42	n/a	Unrecorded	–	–	–	–	–	–	–
LA 155963	130	3652040.13	314198.72	n/a	dispersed fcr with concentration	50-100	15	cobbles and highly fragmented	20	no	stain present	good
LA 155963	131	3651880.78	314629.98	n/a	Unrecorded	–	–	–	–	–	–	–