# MUSEUM OF NEW MEXICO

## OFFICE OF ARCHAEOLOGICAL STUDIES

**ARCHAEOLOGY OF THE MOGOLLON HIGHLANDS: SETTLEMENT SYSTEMS AND ADAPTATIONS**

edited by
Yvonne R. Oakes and Dorothy A. Zamora

**VOLUME 5. ANCILLARY STUDIES: BOTANY, PALYNOLOGY, PHYTOLITH AND PARASITE ANALYSIS, RESIDUE STUDY, AND GEOMORPHOLOGY**

by
Pamela J. McBride
Richard G. Holloway
Linda Scott Cummings
Mollie S. Toll
Dennis McMahon
Kathryn Puseman

Submitted by
Timothy D. Maxwell
Principal Investigator

ARCHAEOLOGY NOTES 232

SANTA FE 1999 NEW MEXICO

## CONTENTS



## VOLUME 5. ANCILLARY STUDIES: BOTANY, PALYNOLOGY, PHYTOLITH AND PARASITE ANALYSIS, RESIDUE STUDY, AND GEOMORPHOLOGY

## FIGURES



## TABLES

# *BOTANICAL ANALYSIS OF ARCHAIC TO ATHABASKAN SITES IN THE LUNA AND PINE LAWN VALLEYS*

Pamela J. McBride and Mollie S. Toll

At elevations in the range of 1,880 to 2,170 m (5,900 to 7,120 feet), the vegetal resource base of Luna/Reserve sites benefits from an average annual precipitation of 40.6 cm (16 inches). Sites are on foothills, terraces, and ridges above major and minor drainages (Table 5.1). The Luna/Reserve area is in the upper elevational range of the Great Basin conifer woodland (Brown 1994:55), intergrading with montane conifer forests. This area contains ample quantities of piñon and juniper, providing fuel and construction materials and valuable intermittent piñon nut crops. Ponderosa pine and shrub and tree species such as oak, walnut, squawberry, and mountain mahogany are most common in canyons. At elevations above 2,200 m (7,218 feet) to the south and southeast of the project area, Petran Montane Forest takes over, affording sources of Douglas fir, white fir, and spruce (Brown 1994:43). A freeze-free period of 150 days and mean annual temperature of 9 degrees C limits both dependability and productivity of agricultural endeavors (USDA Forest Service 1986). Crops such as beans, gourds, and cotton are close to the limit of where they can be grown. Thin, rocky soils on this ash flow of the Datil formation limit long-term agricultural productivity.

Luna/Reserve sites suffer from the poor state of preservation of perishables seen at many sites sharing the heavy clay soils of the Quemado-Reserve area. This hampers our ability to answer questions about subsistence in the region, making it particularly difficult to monitor changes through time. When preservation is such a limiting factor, it is difficult to determine whether lack of plant remains from a particular period is a reflection of diet or poor preservation.

The Luna/Reserve project, however, is well suited to address some persistent questions about the role of early agriculture in the Mogollon Highlands and more broadly in the Southwest. Because some of the Southwest's earliest examples of corn come from nearby dry shelters at Bat, Tularosa, and Cordova Caves (Cutler 1952; Kaplan 1963; Dick 1965), questions of how and why agriculture entered the economic lives of these mountain residents have been debated for decades (Martin 1943; Martin and Rinaldo 1947; Wills 1988a; Mauldin 1991, 1993; Diehl 1994, 1996). The ample array of Luna/Reserve subsistence data encompasses Archaic to Athabaskan occupations at sites from briefly occupied camps to extensive sedentary villages (Table 5.2).

## METHODS

The 291 soil samples collected during excavation were processed at the Office of Archaeological Studies by the simplified "bucket" version of flotation (Bohrer and Adams 1977). The volume of each sample was first measured (samples averaged 1.98 l, with a broad range of .1 to 7.5 l). Each sample was immersed in a bucket of water, and a 30-40 second interval was allowed for settling out of heavy particles. The solution was then poured through a fine screen (about .35 mm mesh) lined with a square of chiffon fabric, catching floating or suspended organic materials. The fabric was lifted out and laid flat on coarse mesh screen trays, until the recovered material dried. Each sample was sorted using a series of nested geological screens (4.0, 2.0, 1.0, and .5 mm mesh) and then reviewed under a binocular microscope at 7-45x. In most cases we were able to examine the entire volume of processed material. In a few cases, it was necessary to subsample some screen sizes and calculate an estimated number of seeds for the total sample.

From each flotation sample with sufficient charcoal (n=104), a sample of 20 pieces of charcoal was identified (10 from the 4 mm screen, and 10 from the 2 mm screen). Each piece was snapped to expose a fresh transverse section and identified at 45x. Prior to submission for radiocarbon dating, charcoal specimens (n=190) were examined in the same fashion, but selection was adapted to secure a minimal sufficient sample (the objective was 5 g) with the fewest pieces, rather than aiming to examine both large and small pieces. Low-power, incident-light identification of wood specimens does not often allow species- or even genus-level precision but can provide reliable information for distinguishing broad patterns of utilization of a major resource class.

## RESULTS

### *Archaic Sites*

*LA 43766: The Old Peralta Site*. This site is in what could be viewed as a precarious position in the middle of the floodplain of SU Canyon. The site probably served as a temporary camp, never occupied for more than a few days or weeks at a time, so flooding was probably not a concern. The site has two distinct occupations and 8-10 cm of fill between cultural surfaces.

Samples from the upper hearth and small pit yielded charred goosefoot and juniper seeds, an indeterminate plant part, and uncharred seeds of several noncultural species. Three samples were examined from different areas of Occupation Surface 2 (at 1120 B.C.), and charred pigweed and goosefoot seeds and three indeterminate plant parts were recovered. Charred goosefoot seeds were recovered from the lower hearth, and the roasting pit produced charred juniper seeds and uncharred goosefoot seeds. The presence of charred weedy annual seeds suggests the economic use of these plants, which are ubiquitous in prehistoric assemblages from numerous time periods and geographic areas. The charred juniper seeds could represent residue from using the wood for fuel or processing the mealy cones for emergency food or seasoning (Tables 5.12, 5.13).

Ponderosa, juniper, piñon, and oak were identified in wood charcoal samples submitted for analysis. Vegetation is sparse on the floodplain of SU Canyon, but piñon, juniper, and oak grow on the western ridge of the canyon (Tables 5.33, 5.46).

*LA 70188: Raven's Roost*. LA 70188 is in a small rincon at the base of Prairie Point Peak in the San Francisco Mountains at an elevation of 2,054 m (6,740 ft). The nearest source of water is the Leggett Canyon drainage, 1 km to the south. Radiocarbon dates from Raven's Roost suggest multiple occupations of the site, including Late Archaic, and an Athabaskan occupation beginning around A.D. 1430 and persisting sporadically possibly as late as the early 1800s.

Three samples were examined from a pit structure and six from extramural pits associated with the Archaic (Tables 5.15, 5.24). Three of the pits lacked plant remains. Cultural plant remains consisted of charred pigweed and seepweed seeds, along with juniper leaves and nonreproductive pine plant parts. Ethnographic accounts document that pigweed was widely used as a potherb, and the seeds were ground into a meal. Seepweed grows in saline and alkaline soils and was used by the Pima to flavor foods (Curtin 1949:71). Although maize pollen was identified from several Archaic contexts on the site, evidence of maize is absent from the macrobotanical record at LA 70188. The juniper leaves and pine parts are probably related to firewood use. Evidence of fuelwood use is predominately coniferous, including piñon, ponderosa, unknown conifer, and juniper (Tables 5.34, 5.53). Intrusive uncharred plant remains were minimal, consisting of evening primrose seeds and unidentifiable plant parts.

The presence of charred pigweed and seepweed seeds suggests the possible use of these plants for food or seasoning. Maize pollen indicates cultigen use, but the location of the site in dense forest and steep terrain precludes the cultivation of maize in the immediate vicinity of the site. The coniferous woods were most likely growing on the site, as they do today, and could have been easily procured.

*LA 78439: Leaping Deer Ridge*. Leaping Deer Ridge is on one of several finger ridges that extend along the southern slopes of Prairie Point Peak in the San Francisco Mountains. The site is at an elevation of 2, 048 m (6,720 ft). The nearest source of water is the Dry Leggett, .2 km to the south. Contrary to its moniker, it flows consistently only with mountain runoff.

A roasting pit on the west side of the site dates to the Late Archaic. Samples from this feature and a burn area near the roasting pit produced a charred juniper seed and pine bark, and an unidentifiable plant part. Uncharred noncultural plant remains included goosefoot, purslane, seepweed, and juniper seeds along with juniper leaves and piñon nutshell (Tables 5.16, 5.24).

The juniper seed and pine bark could represent residue from firewood use. Wood taxa identified during C-14 analysis were predominately coniferous and included juniper. Small amounts of unknown conifer and unknown ring-porous wood also occur (Table 5.55).

*LA 89846: Haca Negra*. LA 89846, at the base of a hill slope between U.S. 180 and the Luna Irrigation Ditch, consists of three subsurface thermal features. Radiocarbon samples from a small, rodent-disturbed hearth (Feature 2) indicate Athabaskan use of the feature. The other two features are associated with the Archaic period.

The location of the features next to the ditch and years of ditch-cleaning activities have contributed to the abundance of modern uncharred seeds recovered from all three features. Eighteen uncharred seed taxa were recovered from the hearth flotation sample, including spurge, mullein, sunflower, borage, evening primrose, and groundcherry (Tables 5.17, 5.24). Charred pinecone umbos were the only cultural remains recovered. Wood charcoal remains consisted of minute amounts of locally available juniper and unknown conifer recovered from Feature 2 hearth (Tables 5.36, 5.56).

*Pithouse Period Sites*

*LA 39972: SU Tanks*. SU Tanks is on a low knoll above a seep and a drainage, which may have made the site a prime location for sighting game. Two distinct areas of occupation could be distinguished from ceramic distributions on the site. A possible use surface (Area B) was associated with a Pinelawn occupation, and a trash pit (Area A) with the Reserve phase. Three flotation samples documented the possible use-surface and a charcoal concentration in the use-surface area

(Table 5.12). A fourth sample serves as a modern surface control.

A single charred goosefoot seed was recovered from the sample analyzed from the charcoal concentration, representing the only potentially cultural plant remain recovered from the site. The presence of one- and two-hand manos and grass, sunflower, and cheno-am pollen on groundstone surfaces indicates that a variety of plants may have been processed and consumed at the site.

Locally available oak, piñon, ponderosa, and juniper were identified in two C-14 samples submitted for wood species identification (Table 5.45).

*LA 39975: Lazy Meadows.* LA 39975 is on a low knoll. Features occur on both sides of U.S. 180. The alluvium at the site forms a divide between the drainages of Starkweather Canyon. These drainages could have provided site occupants with water.

A pooled C-14 date of A.D. 325 places this cluster of three pithouses in the Pinelawn phase, overlapping the early occupation of the nearby SU site. Excavated proveniences at this site are generally shallow and poorly preserved. The flotation samples from the fill of Pit Structure 1 (FS 481) and a possible storage pit (FS 287), for instance, contained only unburned purslane seeds, probably intrusive. On the other hand, a roasting pit northwest of Pit Structure 2 produced several carbonized economic taxa (FS 470, 473). Abundant maize cupules confirm a farming adaptation, consistent with occupation dates. Pigweed, goosefoot, and purslane seeds (all in low frequency) point to utilization of some weedy annuals found widely in a broad array of prehistoric food assemblages (Tables 5.12, 5.20).

Juniper was the dominant conifer identified in C-14 samples submitted for analysis. Piñon, ponderosa, and undetermined conifer were also present. Small amounts of oak were identified as well. These taxa would have been readily available for use by site occupants as fuelwood or construction materials (Tables 5.33, 5.45).

*LA 45507: Luna Village*. The site is on the second terrace above the San Francisco River at an elevation of 2,158 m (7,080 ft). LA 3279 lies 1.7 km west of the river. Five pit structures were excavated from this extensive Late Pithouse period village. Pit Structures 3, 12, and 13 are contemporaneous, within the Early Three Circle phase, while Pit Structures 1 and 9 were occupied later in the Three Circle phase.

Charred seeds of the weedy annual plants goosefoot, purslane, and pigweed dominate the plant assemblage from LA 45507. Maize is scanty, but it is present in samples from Pit Structures 3, 9, and 12. The only nonwood perennial plant remains were prickly pear seeds recovered from the extramural trash pit at Pit Structure 12. Sixteen out of nineteen full-sort samples contained pine bark or other nonreproductive parts, probably representing fuelwood residue. Although rodent disturbance and/or damage from erosion or highway construction was present at all five pit structures, evidence of contamination by uncharred noncultural plant remains was minimal at Pit Structures 1, 12, and 13. Uncharred contaminants are more in evidence in flotation samples from Pit Structures 3 and 9. This is not a surprising phenomenon for Pit Structure 9, because erosion and highway construction left only a portion of the shallow structure intact at the time of excavation. No such factors that could have contributed to increased contamination were present at Pit Structure 3 (Tables 5.13, 5.14, 5.20–5.22).

Conifer is the dominant wood type from LA 45507. A small amount of unknown conifer (.31 g) had morphological characteristics resembling *Picea* sp. (spruce), but this taxon is difficult to identify with certainty. Therefore, the .31 grams were combined with other wood specimens in the general category of unknown conifer. Trace amounts of oak, ash, mountain mahogany, and indeterminate nonconifer were also present in samples (Tables 5.34, 5.47–5.49).

Archaeobotanical remains indicate a minimal dependence on maize agriculture and the use of locally available resources for fuel and food. This picture of subsistence is most likely colored by poor preservation and disturbance and is probably far removed from the true array of resources that were exploited.

*LA 45508: Humming Wire*. LA 45508 consists of two shallow pit structures that sit in a low saddle between two hills on a small ridge overlooking the San Francisco River at Luna. The site is about 130 m (427 ft) south of the river at an elevation of 2,145 m (7,040 ft). Pit Structure 1 dates to the Georgetown phase, and Pit Structure 2 (not sampled) dates to the Archaic.

Samples examined from fill near Pit Structure 1 and the floor of the structure produced only uncharred noncultural seed taxa, including goosefoot, scorpionweed, buckwheat family, purslane, mustard, pigweed, spurge, prickly pear, dropseed grass, and composite family (Tables 5.14, 5.22). Although the majority of these plants have documented ethnobotanical uses, they probably represent noncultural intrusives.

Coniferous taxa dominate the wood assemblage identified from LA 45508 (Table 5.50). Juniper, piñon, and ponderosa were among the conifers present in the three samples examined. A trace amount of unknown conifer (.04 grams) had morphological characteristics resembling *Picea* sp. (spruce). This taxon is difficult to identify with certainty, so the .04 grams were combined with other wood specimens in the general category of unknown conifer. A small amount of sage charcoal was also present.

*LA 45510: SAK Site*. LA 45510 is on top of a broad, low ridge at an elevation of 2,158 m (7,080 ft), overlooking a southern offshoot of the Luna Valley. The nearest source of water is the San Francisco River, 1.7 km (1 mile) to the north and an intermittent drainage 250 m (820 ft) to the east.

Ceramic artifacts place the occupation of this pithouse site in the transitional period between the Three Circle and Reserve phases. The pithouse was outside the right-of-way, and no other structural features were encountered. A hearth, several pits, compacted surfaces, and charcoal-stained areas were uncovered in the right-of-way in the vicinity of the pit structure. A single sample was analyzed from the hearth, and only one unidentifiable charred seed was recovered, along with several uncharred genera, including pine needles (Table 5.22). This is not particularly surprising, considering the shallowness of the feature (20 cm). Evidence of wood use is solely coniferous, including ponderosa pine and juniper (Table 5.50).

*LA 70196: Fence Corner*. The Fence Corner site is on a flat floodplain southeast of the junction of Leggett Canyon and Oak Springs Canyon drainages in the Pine Lawn Valley. The site elevation is 1,877 m (6,160 ft). The drainages of Leggett Canyon and Oak Springs Canyon would have provided sufficient water for agriculture and domestic use.

The site consists of a single component pit structure and an associated outside pit. Based on C-14 and ceramic data, the pit structure dates to the A.D. 800s of the San Francisco phase. Two floors were encountered in the pit structure. A rock-lined hearth, a trough metate, and several manos were found on the upper floor. The lower floor had a basin-shaped hearth and a mano. The lower floor surface was charcoal-stained and burned near a posthole and along the east wall. Samples from roof fall, the lower hearth, and under the mano and metate on the upper floor were examined from the pit structure (Tables 5.15, 5.16).

Charred pine bark was the most common cultural remain recovered. Maize kernels were recovered from under a slab in the roof fall and from a lower hearth sample. Noncultural remains were limited to one unidentifiable seed, recovered from a lower hearth sample. Juniper was the dominant wood charcoal identified, along with a small quantity of ponderosa pine (Tables 5.35, 5.54).

Plant remains from the Fence Corner site are far from representing the likely wide array of plants utilized by site occupants. Maize was the only nonwood plant taxon recovered and could have been cultivated on the flat floodplain where the site is located. The two coniferous wood taxa identified are locally available.

*Pueblo Period Sites*

*LA 3279: Hough Site*. LA 3279, a late Tularosa phase roomblock, is on the first terrace 60 m north of the San Francisco River in the Luna Valley. The steep slopes of the San Francisco Mountains rise behind the site at 2,170 m (7,120 ft) in elevation. Excellent farmland is immediately southeast of the site, where the valley opens up. Ten rooms, including one that functioned as a great kiva, were excavated and samples of plant remains. Eighty samples were examined from LA 3279.

Charred seeds of weedy annuals dominate the plant assemblage from the Hough site (Tables 5.3–5.9). Goosefoot, purslane, and pigweed are the most prevalent economic taxa (found in 78, 59, and 31 percent of samples, respectively. Minor economics include the grass family (10 percent of samples); stickleaf (9 percent); sunflower, sage, and tobacco (each found in 6 percent of samples); dropseed grass (5 percent); and globemallow and groundcherry (4 percent each). Rare occurrences include winged pigweed, sedge, and verbena (each found in only two samples), and six taxa found in only one sample each (beeweed, spurge, ricegrass, mint family, evening primrose, and buckwheat family). The recovery of charred scorpionweed seeds in nearly 14 percent of samples is unusual. *Phacelia* has hairy, pinnatafid leaves, glandular pubescence, and a peculiar onionlike smell. Contact with the plant "causes dermatitis in susceptible persons" (Kearney and Peebles 1964:698; see also Lampe 1986:34). No economic uses of this taxon are noted in the literature, and it was probably avoided.

One sample examined from Pit 3, Room 7, contained an unusually high number of charred sunflower seeds (45). As the pit was burned, this could indicate that sunflower seeds were stored in the pit. Alternatively, they may have been discarded into the pit. The only charred tobacco seed from the project was recovered from Posthole 3 of the great kiva, indicating possible ceremonial use of this plant.

Maize was the only positively identified cultigen. A strong dietary dependency on maize is indicated by the ubiquity of charred cob fragments (found in nearly every flotation sample, a ubiquity approached only by cheno-ams and purslane). Kernel fragments were rarer; these were found in a pit and two thermal features.

Fragments of *Cucurbita* sp. rind were recovered from six proveniences, but it cannot be determined if these specimens are from buffalo gourd (*Cucurbita foetidissima*) or from a domesticated squash such as *Cucurbita pepo*. With exocarp specimens, thickness is the single available criterion for distinguishing wild from domesticated taxa (King 1985:91). This attribute is only useful in distinguishing very thin (<1 mm), often twisted specimens that are likely to be buffalo gourd, or very thick specimens (>2 mm) that must be a domesticated type. *Cucurbita* rind fragments from the Hough site fall within the 1-2 mm zone of overlap. Therefore, all *Cucurbita* sp. rind remains were consigned to the hybrid category of squash/buffalo gourd.

Uncharred contaminants were abundant. They included prickly poppy seeds, which proliferate along the roadsides of Catron County, and mullein, a European transplant that populates most open spaces in New Mexico.

Potentially cultural perennial plant remains were restricted to coniferous duff such as pine needles, cone fragments, and juniper leaves. These are probably present because of the use of conifer woods for fuel. Wood charcoal specimens identified were predominately coniferous, including juniper, piñon, and ponderosa (Tables 5.25–5.32, 5.37–5.39). Oak was the most abundant nonconifer wood identified, and mountain mahogany, rose family, and cottonwood/willow also occurred. These woods would have been available locally for use as firewood or construction material.

The archaeobotanical assemblage from LA 3279 indicates a mixed economy with an emphasis on maize agriculture with the possible addition of squash, combined with the exploitation of weedy annuals, grasses, and other wild plant resources as important additions to the subsistence regime.

*LA 39968: Spurgeon Draw*. LA 39968 is on a knoll on the southeast side of State Road 12, 4 km (2.5 miles) from Spurgeon Draw, the nearest source of water. The site consists of a pit structure, two small roomblocks (only one of which was excavated), a jacal structure, and a water storage basin. An archaeomagnetic date from a pit structure hearth places occupation of the structure in the Tularosa phase of the Late Pueblo period.

The pit structure floor underwent remodeling sometime during occupation, and samples were taken from the two successive floors encountered during excavation. Nine samples were examined from the upper, remodeled floor proveniences. Plant remains from the hearth, a Reserve Smudged bowl, two postholes, and behind and under two metates were limited to uncharred goosefoot, pigweed, tobacco, and stickleaf seeds, as well as uncharred nonreproductive pine, juniper, and grass family plant parts. Cultural plant remains included charred goosefoot seeds, pine bark, maize cupules, and a maize kernel fragment recovered from Pit 2, comprising the only evidence of cultigens from Floor 1.

Samples analyzed from the lower floor were more productive. Hearths 2 and 3 produced evidence of maize as well as charred goosefoot and pigweed seeds and pine bark. Hearth 2 may have been used more extensively for cooking or was not cleaned out as thoroughly before it ceased to be used, because in addition to the four taxa already mentioned, charred purslane, seepweed, patata, and yucca seeds were recovered. A partially charred scorpionweed seed and charred goosefoot and pigweed seeds comprised the cultural remains recovered from a roof fall ash lens sample from the pit structure (Tables 5.10, 5.11, 5.18, 5.19).

Two samples were examined from the roomblock. An uncharred prickly pear embryo was the only plant remain recovered from a vessel associated with Burial 2 from Room 1. Uncharred juniper leaflets were the only plant remains recovered from two feature samples taken from Room 1. Thought to be possible postholes during excavation, the features were identified later as rodent burrows.

Two extramural features were sampled for plant remains. The only cultural plant remains from extramural features were charred purslane seeds and corn cupules in Pit 12.

Coniferous taxa dominated the wood charcoal assemblage including juniper, ponderosa, pine, and piñon. Small amounts of oak were also identified. Unburned and partially charred wood included some substantial pieces of juniper, ponderosa, and undetermined conifer. Juniper, piñon, ponderosa, and oak comprise the arboreal species that grow on the site today, suggesting that prehistorically, these taxa would have been readily available for fuelwood or construction material (Tables 5.33, 5.41, 5.42, 5.57).

Maize was the only cultigen recovered in flotation samples from LA 39968. Low frequencies of charred weedy annuals were also present and could indicate use of these plants for food. The seeds and leaves were valued resources for ground meal or potherbs (Castetter 1935). Evidence of perennial use was restricted to a single yucca seed. Pine bark recovered from four proveniences probably represents firewood residue.

*LA 39969: Haury's Site*. LA 39969 is on a small, predominately level area near the top of an east-facing, steep hillside at an elevation of 1,873 m (6,145 ft). Water sources consist of a minor drainage, 20 m downslope, and SU Canyon, .35 km to the southeast. The site consists of a roomblock, outside pits, a probable jacal structure, burial pits, and activity areas. Radiocarbon and ceramic dates point to an occupation in the A.D. 1000s.

Charred goosefoot and purslane seeds were the predominant annual plant remains recovered from all proveniences (Tables 5.11, 5.20). An unusual extramural pit discovered under slab paving produced the only evidence of cultigens from the site (charred maize cupules).

Four of nine vessels that were found in the two burial pits were examined for plant remains. A Reserve

Smudged bowl from Burial 1 contained a charred unidentifiable seed. The contents of three vessels examined from Burial 2 produced charred goosefoot and winged pigweed seeds. Stevenson (1915:51) recorded the use of *Cycloloma* blossoms in Zuni stories. When the blossoms were chewed and rubbed between the hands of the gods of war, the world would become enshrouded with a yellow light, preventing the enemy from seeing where to aim their arrows. Although food uses of winged pigweed seeds have been documented, no ceremonial uses of the seeds are recorded. Winged pigweed seeds in the burial vessels may be offerings of food or part of the surrounding fill.

Wood charcoal specimens from LA 39969 were predominately coniferous, including piñon, ponderosa, and undetermined conifer (Tables 5.33, 5.43, 5.44, 5.58). Oak, small quantities of creosotebush, and undetermined nonconifer were also present. The closest creosotebush in the area today is probably 125 miles to the south and east of LA 39969 (Donart et al. 1978). All other wood species would have been locally available. Unburned and partially burned wood encountered at LA 39969 was all juniper or undetermined conifer (Table 5.29).

*LA 39972: SU Tanks*. A Reserve phase trash pit from this multicomponent site was the only feature encountered during data recovery that was associated with the Pueblo period (Table 5.12). Uncharred modern contaminants were the only remains recovered from this component of the site.

*LA 70185: DZ Site*. The DZ site is on the east side of U.S. 180 and sits on top of a small finger ridge overlooking Mail Hollow Canyon. The site consists of a four-room Tularosa phase roomblock and associated outside activity area.

The disparity in the number of taxa recovered from Rooms 1 and 2 may have a great deal to do with the number of samples analyzed (Tables 5.14, 5.15, 5.23). Only four samples were analyzed from Room 2, as opposed to ten from Room 1. Nonreproductive pine parts from Room 2 most likely represent fuelwood residue. In Room 1, charred goosefoot, unidentified, and pigweed seeds were recovered in low frequency and abundance along with maize cupules.

On the other hand, seven taxa were identified in only two samples examined from extramural features, the most productive of which was the extramural hearth east of Room 3. Charred pigweed, goosefoot, purslane, and unidentified seeds along with maize cupules were recovered from the extramural hearth, while charred goosefoot seeds, maize cupules, and nonreproductive pine parts were recovered from the ash pit southwest of Roomblock 1. These findings could indicate that food preparation took place primarily in the outside activity area or that interior features were cleaned out before abandonment. Samples collected from general fill contexts were devoid of cultural plant remains or produced charred fuelwood debris (the two samples from Room 2).

The greatest number of charred seeds was recovered from the posthole sample, which may be associated with Room 4, and from the extramural hearth. These offer convincing evidence that purslane was used as a food source. Other weedy annuals were found in such low abundance and frequency that their interpretation is difficult. It is impossible to say whether these are present because of production and consumption or accidental charring of seeds that were blown or tracked into rooms and features. The archaeobotanical assemblage does provide evidence that maize and weedy annuals were both part of the diet of site occupants.

Evidence of wood use is predominately coniferous, including juniper, piñon, and ponderosa pine (Tables 5.51, 5.52). A minute amount of oak was also recovered from a single provenience (FS 1246).

*LA 70189: Lightning Strike.* LA 70189 is at the southeast base of the San Francisco Mountains, where the foothills level out, and the land gradually slopes down into the Pine Lawn Valley. The site elevation is 1,987 m (6,520 ft), and the closest source of water is the Wet Leggett drainage, 600 m to the southwest. A pit structure excavated at Lightning Strike may be associated with a late Reserve phase roomblock outside of the project limits.

The flotation sample examined from the pit structure produced charred maize cupules and a yucca seed, indicating maize was carried in to the site or cultivated nearby (Table 5.15). Yucca does not grow on the site today, suggesting that if the fruits were exploited for food, they were transported there.

*LA 75792: Thunder Ridge*. The Thunder Ridge site overlooks the juncture of a small stream and the narrow Saliz Canyon at an elevation of 1,831 m (6,010 ft). Within a utilized surface, a probable ramada was excavated within the right-of-way. The ramada is probably associated with a six-room pueblo dating to the Reserve phase that lies to the northwest.

One sample from under a metate on the floor of the ramada (Table 5.16) produced an unidentifiable charred seed and an unknown noncultural seed. These meager plant remains do not shed light on the identity of plants that could have been processed using the manos and metates found at the site. Excavation of the roomblock and examination of more flotation samples might help to further our understanding of subsistence activities at LA 75792.

*LA 78439: Leaping Deer Ridge*. A complex of five hearths on the east side of the site date to A.D. 1205, or the Late Pueblo period. Samples from Hearths 1, 4, and 5 were examined for plant remains (Tables 5.16, 5.24). A plant part that resembles a maize cupule was recovered from Hearth 1 but lacks morphological characteristics to enable positive identification. An unidentifiable seed and juniper leaves comprise the remainder of the cultural plant remains recovered from Late Pueblo period contexts. The majority of the wood charcoal identified during C-14 analysis was juniper, and small amounts of undetermined conifer were present as well. The juniper leaves probably represent residue from firewood use. Wood taxa identified could have been collected locally for use as firewood.

*Athabaskan Sites*

*LA 37917: Rocky Hill*. No architectural features were defined at Rocky Hill, an Athabascan lithic scatter. The site is on a southwest-facing ridge within the Gila National Forest at an elevation of 2,036 m. Only uncharred plant remains were recovered from Hearths 1 and 3 of Area A, including *Monolepis* and *Portulaca* seeds, juniper leaves, and pine needles (Table 5.10). These are most likely modern contaminants.

Wood charcoal identified from LA 37917 was predominately juniper. Small amounts of piñon and undetermined conifer and nonconifer were also present (Tables 5.33, 5.40).

*LA 37919: Apache Woods*. LA 37919 is another Athabaskan lithic artifact scatter lacking any architectural features. The site sits in the foothills at the base of Prairie Point Peak at an elevation of 1,987 m (6,520 ft). The intermittent flow of Dry Leggett Canyon, .6 km to the southwest, is the nearest water source.

One flotation sample from a test pit yielded one unidentifiable charred seed (Table 5.10). Ponderosa pine and piñon were identified during C-14 wood analysis (Table 5.40). These woods would have been available locally for use as fuelwood by the occupants of LA 37919.

*LA 70188: Raven's Roost*. Radiocarbon dates from Raven's Roost suggest the Athabaskan occupation of the site began around A.D. 1430 and possibly extended to as late as the early 1800s. A stone ring, a burned area in the northwest area of the site, a rock pile, and a possible rock-lined surface are associated with the Athabaskan component. Of the samples that were examined for plant remains, only one unidentifiable plant part was recovered from the center of the stone ring (Tables 5.15, 5.24). Juniper, ponderosa, unknown conifer, oak, and unknown ring-porous wood were identified during C-14 wood analysis (Tables 5.34, 5.53). In addition, mountain mahogany was identified during flotation analysis. The most that can be said is that the Athabaskan occupants of the site were using locally available woods for fuel.

*LA 70189: Lightning Strike.* Features that were excavated within the highway right-of-way include a shallow pit structure and a roasting pit. The roasting pit dates securely after A.D. 1430, indicating an Athabaskan occupation.

Charred nonreproductive plant parts were the only cultural remains recovered from the roasting pit, along with an intrusive uncharred goosefoot seed. The charred unknown leaves and pine bark could represent fuelwood residue (Table 5.15).

Wood charcoal species were predominately coniferous including piñon, ponderosa, and juniper (Tables 5.35, 5.54). Small quantities of oak were also identified. So, firewood and construction material, at least, consisted of locally available taxa.

*LA 75791: Ladybug Junction.* LA 75791 is a short-term Athabaskan encampment consisting of three shallow pit structures, two roasting pits, a cluster of three small hearths, and four pits. The site is on a gently sloping floodplain at an elevation of 1,884 m (6,180 ft) about 40 m northwest of the Leggett Canyon drainage. Flooding occurs in the area and has probably impacted fill and artifact deposition at the site. Artifacts from the Late Pueblo period, mixed into deposits, could have either washed in from sites upstream or represent an ephemeral use of the site by Late Pueblo people.

Samples were examined from the two roasting pits, Pit Structure 1 fill, and a burned stain in the southwest portion of the site (Tables 5.16, 5.24). The burned stain was the most productive context, yielding charred purslane, goosefoot, and globemallow seeds along with maize kernel remains. Kernel fragments were also recovered from Roasting Pit 1. Nonreproductive pine plant parts were the only other cultural remains recovered. Wood charcoal taxa consisted primarily of juniper, with small amounts of undetermined conifer and piñon also occurring (Tables 5.36, 5.55).

Athabaskan people who occupied the site around A.D. 1650 may have used purslane and goosefoot seeds for food along with maize. The nonreproductive pine parts probably represent firewood residue. Wood identified from the site would have been locally available.

*LA 89846: Haca Negra*. Features 1 and 3, both rock-filled roasting pits, yielded C-14 dates from the Archaic period. Feature 1 yielded 14 uncharred taxa, but no cultural plant specimens were present (Tables 5.17, 5.24). Feature 3 produced charred pine bark and goosefoot seeds. During the protohistoric period, occupants of Haca Negra were possibly exploiting goosefoot for the small seeds, which were an abundant and nutritious food resource used by many Native American groups, as documented in numerous ethnographic accounts.

## DISCUSSION: LUNA-RESERVE PLANT REMAINS ABOVE THE INDIVIDUAL SITE LEVEL

### *Results by Provenience Category*

*Thermal Features*. By examining samples from thermal features, we hoped to get some idea of what might have been on the prehistoric menu shortly before abandonment of a site and determine what woods were selected for fuel. Eighteen charred plant taxa were recovered from interior thermal features (Table 5.59). It is quite likely that the high number of taxa is a reflection of the significant number of samples examined (40). Most taxa recovered from interior thermal features were also recovered from postholes and undetermined pits, contexts where taxonomic richness is also high. The exceptions are yucca, beeweed, and Indian ricegrass. Beeweed and Indian ricegrass were only recovered in interior thermal features. The similarity in the assemblages suggests that plant remains from postholes and undetermined pits probably represent the residue from hearth cleaning activities.

Extramural thermal features were not nearly as productive. Only eight taxa were identified in the 24 samples that were analyzed. Plantago seeds were restricted to extramural thermal features. The only documented ethnographic use of plantago seeds is for the treatment of diarrhea and does not require any preparation using heat. The Keres used the young shoots of plantago for food (Swank 1932:61), but the seeds are not documented as edible. These seeds may have been accidentally charred and ended up in the fill of an extramural hearth.

*Storage Features*. Plant remains recovered from the three samples falling into this provenience category do not offer convincing evidence about the use of storage features. The assemblage from this provenience category includes weedy annuals, conifer parts, maize cupules, and *Cucurbita* rind. This mixture of taxa could contain components of materials that were actually stored in the features, but there is no way to differentiate the background fill from feature contents. This is the usual scenario at open air sites. LA 5407 (Gallo) offered another exceptional case that allowed an unusual glimpse into storage practices. Fragments of *Cucurbita* rind were found in close proximity to each other on the floor of the pit structure with goosefoot and amaranth seeds still adhering to them (Toll and McBride 1996).

*Undetermined Pits*. The greatest number of taxa (25) was recovered from undetermined pits, but the diversity per number of samples from this provenience category was low. The majority of plants comprising assemblages from pits suggest trashy fill rather than any definition of the original function of the feature. The only pit with plant remains that may be directly linked to the original contents was Pit 3, Room 7, at LA 3279. A sufficient concentration of sunflower achenes was recovered from the pit to suggest the storage or processing of achenes in the pit. Sunflower seeds were a widely utilized resource, eaten raw, roasted, or ground into a meal (Curtin 1949:103-104). Sunflower achenes were identified in lower densities from Room 6 and 13.

*Floors*. Floor samples can offer a picture of activity areas where maize was ground into meal or goosefoot was accidentally spilled next to a hearth before processing, or grass mats were located in sleeping areas. The seven floor samples that were examined from the Luna project do not exhibit any concentrations of plant remains that might indicate the presence of special activity areas. This is not unusual for open-air sites, especially in the Reserve and Luna areas, where sites are shallow, preservation is poor, and soils rock hard. An exception to this scenario is a pit structure that dates to the Early Pithouse period at LA 5407, near Gallo Mountain, to the north of Reserve (Toll and McBride 1996). A catastrophic burn resulted in unusual Pompeii-like preservation conditions. Activity areas were easily discernible on the floor where vessels still full of their original contents were found and concentrations of plant remains were distributed in close proximity to hearths and ground stone artifacts. However, the conditions that allowed for such excellent preservation are extremely rare.

*Postholes*. Although plant materials recovered from postholes cannot be tied to a specific event in time, postholes trap concentrations of floor debris and can offer a broad view of dietary constituents. The current project is a case in point. Twenty-eight samples were examined from postholes, and 18 taxa were identified. The only piñon nutshell (Great Kiva and Room 7) and tobacco seeds (Great Kiva) on the site were recovered from postholes at LA 3279. These are rarely encountered taxa, and their recovery in this context category argues for the collection of flotation samples from postholes.

*Vessels*. Original vessel contents are rarely found undisturbed, and samples generally contain roof fall or general fill. They generally collect moisture and provide very poor conditions for the preservation of unburned organics. The vessels that were found at LA 5407 (Gallo) are unusual exceptions. The carbonized contents of any one of these vessels included more floral specimens than are usually recovered from an entire site, or *many* sites, in the area. Vessels found in caves with their contents still intact are other examples of unusual preservation. An Alma Plain Ware jar found at Cordova Cave contained over 1 kg of stickleaf seeds (Kaplan 1963:354). The diversity and low densities of plant remains from vessels examined from the Luna project suggest that they contain general fill rather than the original contents.

*General Fill*. Plant remains identified in general fill can tell us what plants site occupants were exploiting after the abandonment of a structure. General fill samples often contain a richer diversity of plant taxa because the fill can take years to accumulate, representing many trash disposal episodes. Luna general fill samples (n=14) yielded charred remains, but diversity was low (six taxa). This could indicate that features and structures were filled in quickly after abandonment, but this interpretation would have to agree with the deposition record at individual sites and features.

*Results by Site Types*

*Lithic Artifact Scatters*. LA 37917 and LA 37919 are Athabaskan lithic artifact scatters that, like many other sites of this type, displayed poor preservation. These sites are generally shallow in nature, increasing the possibility of degradation of fragile plant remains. Wood charcoal from both sites and one unidentified seed from LA 37919 are the only cultural plant remains associated with these scatters, offering insight into a small slice of Athabaskan plant utilization.

*Activity Areas with Thermal or Storage Features*. This site type usually displays poor preservation as well. The lack of structures with walls to help prevent erosion and destruction of plant materials accounts for some of the poor preservation. These sites are also often shallow. Plant remains that probably represent firewood residue (juniper seeds, pine bark, and cone scales) dominate the scanty remains recovered from this site type. The juniper seeds could also be residue from processing the fleshy cones for food. Two weedy annual taxa comprise the remainder of the assemblage.

Occupants of this site type could have been processing piñon nuts, but the only evidence is indirect (cone scales that hold the nuts). Reagan (1928:146-147) refers to the practice of roasting piñon nuts in the cone by the White Mountain Apache of Arizona: "The females go in large numbers to gather piñon nuts every fall. . . . The nuts are gathered in the cone which is either burned off the nuts near where gathered or after the return home. In this process of charring the cones, the nuts are roasted." The juniper seeds could also represent the remains from processing the fleshy cones for food. More extensive sampling of these site types is indicated, floating the fill from an entire feature if possible.

*Sites with Structures*. The diversity of taxa recovered from *single pit structures* is slightly higher, including five weedy annual taxa, scorpionweed, maize, and yucca. Most of the single pit structures are from the Pithouse or Pueblo periods, when maize was cultivated extensively, and weedy annual plants could be encouraged to grow in the disturbed ground of agricultural fields. Although dry cave sites have given us information on perennial plant use (yucca quids, sandals, and twine for example), evidence for the exploitation of perennials is scarce at open-air sites.

Maize, possible squash remains, 8 weedy annual taxa, grasses, juniper seeds, coniferous nonreproductive plant parts, and 10 miscellaneous taxa were recovered from *roomblocks*. The majority of these taxa were recovered from LA 3279, an extensive roomblock, where 10 rooms were excavated, compared to 2 at LA 39968 and LA 70185 and 3 at LA 39969. The extent of excavation and large sample size at LA 3279 probably contribute to the number of taxa recovered from this site type.

Maize, six weedy annuals, prickly pear, globemallow, and pine bark were recovered from *large pithouse villages*. Though large villages presuppose higher population densities, generating higher densities and a richer diversity of plant materials, prickly pear was the only taxon present in samples from this site type that was not recovered from other site types. The data are definitely skewed by the disparity in the number of samples analyzed from LA 3279 of the roomblock site type (n = 80) and those analyzed from large pit structure villages (n = 56).

*Taphonomic and Preservation Biases*

Site preservation conditions differ depending on site type and abandonment modes. Shallow sites without structures generally offer little in the way of charred botanical remains. Sites with structures may have better preservation, but the lack of catastrophic burning and the rock-hard clay fill, typical at sites in the Luna/Reserve area, are not conducive to the optimal preservation of plant remains. The SU site offers an example. This extensive pithouse village, approximately 8 miles from the town of Reserve, was occupied in the Late Archaic through the Late Pithouse periods. Paul Martin of the Chicago Field Museum excavated the SU site between 1939 and 1941. Martin's reports mention no subsistence remains other than the occasional maize cob fragment. In the 1980s, Chip Wills reopened the SU site during the University of New Mexico's summer field school. Nearly 3,000 l of soil were water-screened. Even with this enormous effort, only 59 juniper seeds, a few pine cone parts and walnut shell fragments, a handful of maize parts, a prickly pear seed, and one possible bean fragment were recovered. This averaged out to about one plant part for every 4 l of processed soil.

The situation at LA 5407 (Gallo) stands in sharp contrast to other sites in the area. At many locations at LA 5407, carbonized botanical remains number in the thousands or hundreds of thousands per liter of soil matrix. The catastrophic burn allowed for an unexpected detailed view of Early Pithouse period subsistence practices.

Other sites at the high end of the preservation spectrum include the well-known Bat, Tularosa, and Cordova Caves. These were originally investigated in the 1940s and 1950s by the same Field Museum team that excavated the SU site. These sites consist largely of unburned vegetal remains, many of which have been rearranged or added to by rodent rather than human cave occupants. Pinning down cultural or chronological landmarks is difficult, and few of the remains can be tied to a particular context of human use. In a shelter we may have a lot of floral material to work with, but very few clues about how it all goes together. Occasional finds point directly to strategies for collection, storage, and use of wild plant resources, such as an Alma Plain Ware jar from the Early Pithouse period found at Cordova Cave, which contained more than 1 kg of stickleaf seeds (Kaplan 1963). Despite problems of context and chronology, the sheer volume of food by-products, stock-piled raw materials, and cordage, basketry, and sandals found in these caves reveals the major part such materials played in economic life. Agave leaf fragments and fiber masses from Cordova Cave and wads of corn husks from Tularosa Cave are good examples of such remains.

The majority of sites in the Reserve and Luna areas, however, fall into the low end of the preservation spectrum. Here, weedy annuals appear to be the only wild plant resources that were exploited, and maize agriculture seems minimal. With finds like LA 5407 and cave deposits to balance the data, we know that weedy annuals were probably a major component of the prehistoric diet, perennial plants like yucca were used for cordage and sandals, and maize agriculture was fairly intensive by the Early Pithouse period.

*Geographic Differences: Pine Lawn Valley versus Luna Valley*

Mountainous, forested country with steep slopes leading down to deeply cut drainages surround sites in both the Pine Lawn and Luna Valleys. The greatest differences between the two areas can be seen in water sources and the number of frost-free days. The San Francisco River was a permanent, reliable source of water for the residents of the Luna Valley, while occupants of the Pine Lawn Valley in the Reserve area had only the intermittent water sources of Wet Leggett Spring, Wet Leggett Canyon, and Bull Basin Spring. Although Luna Valley residents may have had a more reliable water source, the Pine Lawn Valley offered a growing season of 120 frost-free days, compared to 87 in the Luna Valley.

Though length of growing season was quite different in the two areas, there are no differences in the proportion of sites yielding cultivated plant remains. Variations in wild plant assemblages recovered from the two areas are also minor, perhaps because poor preservation and rock-hard soil are prevalent in both areas. Bugseed and prickly pear seeds were recovered from Luna sites and not from Pine Lawn Valley sites, and yucca and globemallow seeds were restricted to Pine Lawn sites. Possible squash rind fragments and charred tobacco were only recovered from Luna site LA 3279, but sample size and site function differences could be factors here.

Subtle differences in local woody vegetation communities are revealed in the wood assemblages from the two valleys (Table 5.60). Overall wood use locks in at essentially identical 91 vs. 92 percent coniferous. However, it is readily apparent that juniper was a more prominent part of the wood-use repertoire in the lower Pine Lawn Valley. In both valleys, nonconiferous woods play a minor role in wood utilization. This pattern is repeated elsewhere in the Southwest, wherever coniferous woods are locally abundant (e.g., M. Toll 1983). Oak is the most frequently used dicot wood, in both valleys. Oak is a very dense, hard wood, suitable for a variety of manufacturing uses and fuel (Lamb 1975:14). Mountain mahogany puts in a small but recurring presence at the Pueblo period LA 3279 in the Luna Valley, and only trace appearances at other sites of multiple periods in both areas. Interestingly, woody species that grow along water courses were no more frequently exploited in the wetter Luna Valley than in the Pine Lawn Valley. Riparian woods share poor fuel and construction qualities (they tend to be light, weak, and are damaged more quickly by insects and rot) but are easily carved (when special shapes are needed for tools or decorative elements) and grow more quickly (Vines 1960:87, 677).

*Results by Chronological Eras*

The diversity of plant taxa recovered from Archaic, Pinelawn, Late Pithouse, Pueblo, and Athabascan flotation samples is illustrated in Table 5.61. The Pueblo period, from which we have the largest number of flotation samples, taken from the best-preserved sites, yielded the greatest variety of plant taxa. Less than ten taxa were recovered from each of the remaining periods.

Seeds of weedy annual species are the most common plant remains recovered from all periods. In general, the diversity of plants is lower at Archaic and Apache period sites, but this may have more to do with systematic differences in site type by period than

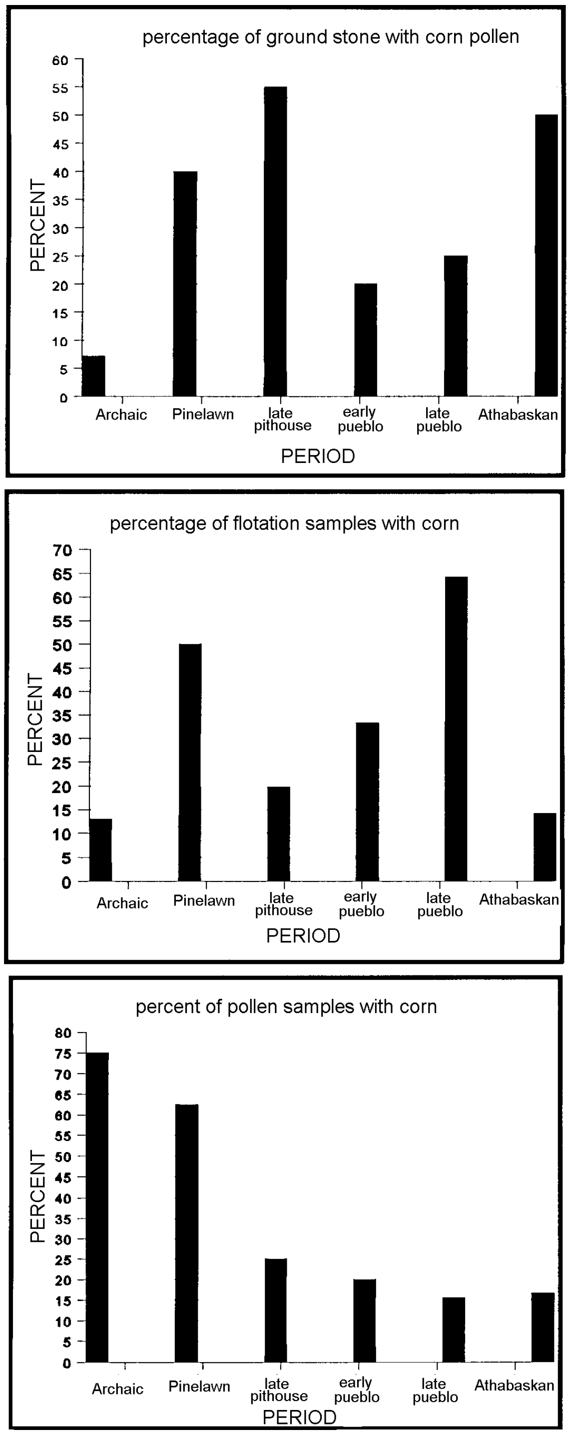



*Figure 5.1. Percentage of flotations and pollen samples with corn.*

dietary composition. Maize begins to show up from sites dating to the Pithouse period and continues into the Late Pueblo period. Maize remains were identified at LA 75791, an Apache site, but these remains may have washed into the site (located on the floodplain) from a nearby Late Pueblo site. Cucurbita rind fragments represent the only evidence of another possible cultigen and were restricted to LA 3279, a Late Tularosa phase site. Perennial species were scarce, limited to prickly pear remains recovered from LA 45507 from the Pithouse period and yucca from the Pueblo period (LA 39968).

The pattern of scarce perennial species and weedy annuals dominating plant assemblages holds true at the majority of the open-air sites in the region. Poor preservation and difficult excavation conditions caused by hard soil have left us with a meager record of plant remains. Detailed chronological comparison is not possible. LA 5407 is the only exception to this pattern. Remains from protected sites such as Tularosa Cave or Cordova Cave can give us a view of a wider range of subsistence activities. However, the information potential of items like uncharred maize cobs and yucca fibers in dry caves is often compromised by a lack of temporal and functional association. Figure 5.1, compiled by Dorothy Zamora, illustrates that evidence of maize in flotation samples is greatest during the Early Pithouse and Late Pueblo periods. The number of pollen samples with maize sharply declines after the Pinelawn phase. The number of ground stone artifacts with maize pollen is highest during the Late Pithouse and fluctuates for the other periods. The Pinelawn or Early Pithouse period is the only one that shows consistency in the number of flotation and pollen samples with maize.

Luna/Reserve wood specimens are chiefly from burn features and trash, and are considered to be fuelwood debris. We know from other isolated studies where structural timbers can be identified that construction-wood selection and selection of fuel wood can be very different (Minnis 1978, 1984; M. Toll 1985:733-740, 1993). However, we do not have a similar body of data for Luna sites. The most prominent aspect of prehistoric wood use on the Luna/Reserve project is its consistency and stability over time. Conifers form the great majority of wood burned at Luna sites, and juniper is the chief identifiable taxon in all time periods and site types (Table 5.62). Given the variable and high percentage of wood classified as undetermined conifer (ranges from 6 to 74 percent of assemblages by time period), we are unfortunately hampered in our search for sensible trends in the relative composition of different conifer species. Dicot shrubs and fast-growing but weak riparian woods are minor in all time periods.

Diversity in wood use is naturally most apparent in the much larger assemblages from the Pueblo (55 percent of all identified wood) and Pithouse (31 percent) periods. Very low frequency taxa (sage, creosote bush, undetermined shrubs of the rose family, ash, reed grass) occur only or mostly in these periods. This is likely a characteristic of sample size, rather than of human wood utilization trends.

Since the local woody vegetation is dominated by conifers (Brown 1994) with excellent fuel qualities of high resin content and density (Graves 1919), a trend of slightly diminishing conifer usage after the Pithouse period may indicate some pressure on choice fuel wood resources (Kohler and Matthews 1988; M. Toll 1985:740).

## Comparisons with Other Regional Data Sets

In many areas of the Southwest, small open-air sites make up the bulk of the archaeological site sample; such sites tend to have relatively low density and a variety of cultural floral remains. In the Mogollon Highlands, however, the Luna/Reserve project provides the first substantial sample of small open sites, from Archaic to Athabaskan time periods. Much of previous excavation has focused on unusual site types (early dry cave sites, and catastrophic burns at Gallo and Castle Rock; Toll and McBride 1996; Kayser 1973) or on later, larger sites with multiple structures (SU, Carter Ranch, Higgins Flat; Martin 1943; Martin and Rinaldo 1947; Cutler 1956, 1964).

Plant remains from the Luna/Reserve project are most like those from the Gallo project (Table 5.63). The plant remains from the Gallo project represent an in-depth perspective on how resources were stored and processed. Here, concentrations of charred remains on the floors of structures or in the fill of features, associated with the artifacts used to process the plant material, allowed mapping of distinct activity areas. The remains from the current project and others in the Mogollon Highlands represent minute components of the whole. Keeping LA 5407 well in mind, we know that small sites with limited floral assemblages in the Luna/Reserve area are not necessarily special-use sites but may reveal only a fraction of plant taxa actually utilized. Preservation conditions may systematically prohibit the recovery of the entire range of taxa at any given site.

Based on the number of samples that produced maize remains, a strong dependence on maize agriculture can be implied for the Early Pithouse and Late Pueblo periods. The recovery of significant quantities of corn in storage vessels and on the pithouse floor, as well as approximately 7 kg of maize kernels from an exterior storage pit at Gallo, lends support to this interpretation in the Mogollon Highlands.

Conifers dominate macrobotanical and flotation wood taxa (Tables 5.61, 5.63). The Reserve and Luna sites are in the Rocky Mountain conifer forest biotic community (Brown 1994:43-48). This community is dominated by ponderosa pine. Alligator juniper (*Juniperus deppeana*), Arizona white oak (*Quercus arizonica*), scrub oaks, and piñon are also prominent. Shrub species such as saltbush/greasewood and mountain mahogany, and river-corridor species (cottonwood/willow) round out the available woody biomass. Abundant and diverse locally available woods were utilized for fuelwood and construction materials, as seen in wood assemblages throughout the Mogollon Highlands.

## Summary

Our most detailed picture of Luna/Reserve area prehistoric subsistence from the Pueblo period site LA 3279 shows substantial dietary reliance on corn with possible contributions from squash. Several weedy annuals are present, while grasses and perennial fruit and nut crops such as piñon, walnut, squawberry, prickly pear, and yucca are relatively rare or absent from the record entirely. Sites in the Pine Lawn Valley from this period display fewer taxa, but this is most likely a reflection of sample size rather than any real difference in subsistence.

Remains from Luna/Reserve Archaic, Pithouse, and Athabaskan sites were sparse, and preservation was probably the main factor influencing recovery. Comparisons of botanical abundance and diversity between time periods are seriously hampered by very different scales of available data. Archaeobotanical data from the Pithouse period site at Gallo stand in distinct contrast to those of other sites from the same period, or any period, in the Mogollon Highlands. Many sites, such as the early excavations at SU and Higgins Flat, are lacking a substantial array of plant remains because the flotation technique for recovering floral material was not yet used routinely. Unique preservation conditions such as those at Gallo are extremely rare, but the Gallo assemblage lends interpretive support to poorly preserved assemblages from similar site types in the Mogollon Highlands.

Table 5.1. Luna Sites: Phase, Description, Elevation, Botanical Data

| Site | Phase | Description | Location/ Elevation | Botanical Data | |
|---|---|---|---|---|---|
| | | | | Flotation Samples | Wood Samples |
| LA 3279<br>Hough Site | Tularosa | roomblock | | [80] | 37 C14<br>79 float |
| LA 3563<br>South Leggett Pueblo | Three Circle | pithouse associated with pueblo roomblock (outside of right-of-way) | | -- | 1 C14 |
| LA 21153 | | | | | 2 C14 |
| LA 37917<br>Rocky Hill | Apache<br>A.D. 1530, 1805 | extensive lithic scatter | ridge top<br>2,036 m | 2 f | 4 C14<br>1 float |
| LA 37919<br>Apache Woods | Apache<br>A.D. 1450 | lithic scatter | base of foothills<br>1,987 m | 1 f | 2 C14 |
| LA 39968<br>Spurgeon Draw | Reserve/Tularosa<br>A.D. 1185 | large stone-lined pithouse, 2 roomblocks, and external pits | knoll<br>4 km from Spurgeon Draw | 22 sc (12)<br>12 f (11) | 21 C14<br>5 float |
| LA 39969<br>Haury's Site | Reserve<br>A.D. 1040 | roomblock with 3 rooms; external pits and activity areas | | 6 sc (4)<br>12 f (10) | 18 C14<br>1 float |
| LA 39972<br>SU Tanks | Pinelawn/ Reserve<br>20 B.C., A.D. 380 | no features | low knoll above a seep and drainage | 4 f (3) | 2 C14 |
| LA 39975<br>Lazy Meadows | early Pinelawn<br>A.D. 325<br>(similar to nearby SU site) | (shallow, poorly preserved)<br>3 pithouses, 1 roasting pit | low knoll dividing two drainages of Starkweather Canyon | 2 sc<br>4 f | 6 C14 |
| LA 43766<br>Old Peralta Site | Archaic<br>1055, 1195 B.C. | hearth and roasting pit on lower level (1195 B.C.); hearth on upper level (1055 B.C.) | SU Canyon flood plain | 7 f | 11 C14<br>1 float |
| LA 45507<br>Luna Village | Three Circle<br>(pooled site: A.D. 865) | extensive pithouse village (5 excavated pithouses), external pits | | 32 sc (24)<br>19 f | 40 C14<br>3 float |
| LA 45508<br>Humming Wire | Archaic/<br>Georgetown<br>A.D. 600 | 2 shallow pit structures (no features) | low saddle on a ridge overlooking the San Francisco River<br>2,145 m | 1 sc<br>1 f | 3 C14<br>(no float) |

| Site | Phase | Description | Location/ Elevation | Botanical Data | |
|---|---|---|---|---|---|
| | | | | Flotation Samples | Wood Samples |
| LA 45510<br>SAK Site | Three Circle<br>A.D. 950 | external activity area (nearby pithouse and roomblock outside of right-of-way?) | broad low ridge<br>2,158 m | 1 sc | 3 C14<br>(no float) |
| LA 70185<br>DZ Site | Reserve - Tularosa<br>A.D. 1085 | roomblock (2 excavated rooms; site includes up to 4 more) | ridge overlooking Mail Hollow Canyon | 37 sc (12)<br>4 f | 15 C14<br>(no float) |
| LA 70188<br>Raven's Roost | Late Archaic - Early Pinelawn/ Apache<br>A.D. 90<br>A.D. 1410, 1725 | Deep early component (pit structure, rock pile, stone ring). Late component is above pit structure (consisting of what?) and Pit 5 at east end of site. | rincon at base of San Francisco Mountains<br>2,054 m | 3 sc<br>11 f (7) | 6 C14<br>2 float |
| LA 70189<br>Lightning Strike | Reserve/ Apache<br>A.D. 1015<br>A.D. 1365, 1575 | (Reserve roomblock outside right-of-way.) Reserve sherd and lithic scatter. Apache shallow pit structure and roasting pit. | base of San Francisco Mountains<br>1,987 m | 4 f (3) | 3 C14<br>4 float |
| LA 70196<br>Fence Corner | San Francisco<br>A.D. 860 | pithouse with two floors | floodplain<br>1,877 m | 7 f (5) | 8 14<br>5 float |
| LA 75791<br>Ladybug Junction | Late Pithouse/ Apache<br>A.D. 1650 | 3 shallow pit structures, 5 external burn features | floodplain<br>1,884 m | 1 sc<br>5 f (4) | 4 C14<br>1 float |
| LA 75792<br>Thunder Ridge | Reserve<br>A.D. 1000 | (Reserve roomblock outside right-of-way.) Ramada | | 1 f | -- |
| LA 78439<br>Leaping Deer Ridge | Late Archaic/ Late Pueblo<br>A.D. 100<br>A.D. 1205 | West side with large roasting pit is Archaic. East side may be Archaic (old wood?). | | 2 sc<br>7 f (5) | 6 C14 |
| LA 89846<br>Haca Negra | Archaic/ Athabaskan | | base of a hill | 2 f<br>1 sc | 3 C14<br>2 float |

Flotation sample totals in (parentheses) indicate the number of samples containing plant remains. Samples *without plant remains* do not occur in data tables.

## Table 5.2. Botanical Data by Time Period and Site Type

| Period | Lithic Scatter | Special Activity | Single Pit Structure | Pithouse Village | Roomblock | Total |
|---|---|---|---|---|---|---|
| Archaic | | [LA 43766, LA 89846]<br>11 float<br>2 float wood<br>16 macro wood | [LA 70188]<br>6 float<br>1 float wood<br>3 macro wood | | | 17 float<br>3 float wood<br>19 macro wood |
| Pithouse | | [LA 39972]<br>2 float<br>2 macro wood | [LA 45510, LA 70196]<br>4 float<br>5 float wood<br>11 macro wood | [LA 39975, LA 45507, LA 45508]<br>51 float<br>5 float wood<br>50 macro wood | | 57 float<br>10 float wood<br>63 macro wood |
| Pueblo | | [LA 39972, LA 75792, LA 78439]<br>6 float | [LA 70189]<br>1 float<br>1 float wood<br>2 macro wood | | [LA 3279, LA 39968, LA 39969, LA 70185]<br>176 float<br>84 float wood<br>90 macro wood | 183 float<br>85 float wood<br>92 macro wood |
| Apache | [LA 37917, LA 37919]<br>3 float<br>1 float wood<br>6 macro wood | [LA 70189, LA 89846]<br>3 float<br>3 float wood<br>1 macro wood | [LA 70188]<br>5 float<br>1 float wood<br>3 macro wood | [LA 75791]<br>6 float<br>1 float wood<br>4 macro wood | | 17 float<br>6 float wood<br>14 macro wood |
| Total | 3 float<br>1 float wood<br>6 macro wood | 21 float<br>5 float wood<br>19 macro wood | 16 float<br>8 float wood<br>19 macro wood | 57 float<br>6 float wood<br>54 macro wood | 176 float<br>84 float wood<br>90 macro wood | 273 float<br>104 float wood<br>188 macro wood |

## Table 5.3. LA 3279 Full-Sort Flotation Analysis Results

| | Room 2 | Room 5 | Room 6 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 175 hearth | FS 168 S W corner | FS 229 Vessel 2 | FS 269 upper hearth | FS 283 ash pit | FS 289 ash pit north ½ | FS 289 ash pit south ½ | FS 300 posthole fill | FS 302 roasting pit SE ¼ | FS 303 pit | FS 308 Pit 8 | FS 314 Pit 9 from above Vessel 7 |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | | | | | 5*/1* | |

| | Room 2 | Room 5 | Room 6 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 175 hearth | FS 168 S W corner | FS 229 Vessel 2 | FS 269 upper hearth | FS 283 ash pit | FS 289 ash pit north ½ | FS 289 ash pit south ½ | FS 300 posthole fill | FS 302 roasting pit SE ¼ | FS 303 pit | FS 308 Pit 8 | FS 314 Pit 9 from above Vessel 7 |
| Chenopodiaceae | | | 1*/.8* | | | | | | | | | |
| *Chenopodium* goosefoot | | 4*/2.5* | | 1*/1* | | | | 1*/.9* | 29*/10* | 1*/.3* | 61*/14* | 2*/.6* |
| Cheno-am goosefoot/ pigweed | 2pc/.5pc | 1*/.63* | | 1*/1* | | | 1*/.7* | 1*/.9* | 18*/6* | 2*/.6* | 52*/12*; 7pc/2pc | 1*/.3* |
| Cycloloma winged pigweed | | | | | | | | | | | 1*/.2* | |
| *Helianthus* sunflower | | | | | | | | | | 1*/.3* | 1pc/..2pc | |
| *Mentzelia albicaulis* whitestem stickleaf | | | | | | | | | 1*/.3* | | 1*/.2* | |
| *Portulaca* purslane | | | | | | 42*/14.4* | | | 11*/4* | | 30*/7* | 4*/1* |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* maize | c+* | c+* | c+* | | c+* | c+* | c+* | | c+* | c+* | c+*; 1e*/.2e* | |
| Grasses: | | | | | | | | | | | 4*/1* | |
| Gramineae grass family | | | | | | | | | | | | |
| *Sporobolus* dropseed grass | | | | | | | | | | | 3*/.7* | |

Table 5.3 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 2 | Room 5 | Room 6 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 175 hearth | FS 168 SW corner | FS 229 Vessel 2 | FS 269 upper hearth | FS 283 ash pit | FS 289 ash pit north ½ | FS 289 ash pit south ½ | FS 300 posthole fill | FS 302 roasting pit SE ¼ | FS 303 pit | FS 308 Pit 8 | FS 314 Pit 9 from above Vessel 7 |
| Perennials: | | | | | | | | | | | | |
| *Juniperus*<br>juniper | 1*/.3* | | | | | 1*/.3* | 1*/.3* | | | | | |
| *Pinus*<br>pine | | | b+* | | | b+* | b+* | | b+* | | cs+*; b+* | b+* |
| *Pinus edulis*<br>piñon | | | | | | n+* | | | | | | |
| *Pinus ponderosa*<br>pine | | n+* | | | | | | n+* | n+* | | n+* | |
| Other: | | | | | | | | | | | | |
| Cyperaceae<br>sedge family | | | | | | | | | | | 2*/.5* | |
| Monocotyledoneae<br>monocot | | | | | | | | s+* | s+* | | | |
| *Phacelia*<br>scorpionweed | | | | 1*/1* | | | | | | | | |
| *Salvia*<br>sage | | | | | | | | | | | 1*/.2* | |
| Unidentifiable | | 4pp*/2.5pp* | | 1*/1*; 1pp*/1pp* | 3pp*/2pp* | | b+* | 4pp*/3.6pp* | | | 4*/ 1*; s+* | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus*<br>pigweed | 2/.5 | | | | 9/6 | 6/2 | 19/6 | 5/4.5 | | 3/1 | | 2/.7 |
| *Chenopodium*<br>goosefoot | 23/6 | | 1/.8 | 2/2.1 | 54/37 | 125/43 | 28/9 | 28/25 | | 56/18 | | 5/2 |
| Cheno-am<br>goosefoot/pigweed | | | | | | | 1/.3 | 1/.9 | | | 2/.5 | 1/.3 |
| *Portulaca*<br>purslane | 581/149 | 3/1.9 | 3/2.4 | 40/42 | 187/129 | 488/168 | 159/53 | 133/121 | 1/.3 | 311/100 | | 25/8 |

Table 5.3 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 2 | Room 5 | Room 6 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 175 hearth | FS 168 S W corner | FS 229 Vessel 2 | FS 269 upper hearth | FS 283 ash pit | FS 289 ash pit north ½ | FS 289 ash pit south ½ | FS 300 posthole fill | FS 302 roasting pit SE ¼ | FS 303 pit | FS 308 Pit 8 | FS 314 Pit 9 from above Vessel 7 |
| Grasses: | 2/.5 | | | 1/1 | 1/.7 | 7/2.4 | 1/.3 | 3/2.7 | | 1f | | 1/.3 |
| Gramineae grass family | | | | | | | | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Argemone* prickly poppy | 3/.8 | | | | 2/1.4 | 4/1.4 | 2/.7 | 2/1.8 | | 1/.3 | | |
| *Juniperus* juniper | | | | | | l+ | | | | | | |
| *Pinus* pine | | | | | | | | | | | | n+ |
| *Pinus ponderosa* ponderosa pine | | | | n+ | | n+ | n+ | | | | | |
| Sphaeralcea globemallow | | | | | | | | | | | | 1/.3 |
| Other: | | | | | | | | | | | | |
| Cyperaceae sedge family | | | | 1/1 | | | 1/.3 | | | | | |
| *Euphorbia* spurge | 3/.8 | | | 1/1 | 1/.7 | 11/3.8 | 2/.7 | 2/1.8 | | | | |
| Leguminosae bean family | 2/.5 | | | | | | | | | | | |
| *Oenothera* evening primrose | | | | | | 6/2 | | 2/1.8 | | | | |
| *Physalis* groundcherry | 2/.5 | | | | 1/.7 | | | | | 1/.3 | | |
| Unidentifiable | 1/.3 | | | | | 1/.3 | | | | | | |
| *Verbascum* mullein | 7/2 | | | 14/14.7 | 48/33 | 225/77.6 | 223/74 | 32/29 | | 43/14 | | 13/4 |

Key: * = charred, + = 1-10/liter, b = bark, c = cupule, l = leaf, n = needle, pp = plant part

## Table 5.4. LA 3279 Full-Sort Flotation Analysis Results

| | Room 6 | | | | | | | Rooms 2 and 6 | | Room 7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 317 Pit 11 fill | FS 328 Firepit 14 fill | FS 332 Posthole 14 | FS 339 Pit 15 fill | FS 342 Posthole 16 | FS 344 Posthole 17 | FS 345 Pit 12 | FS 348 storage bin, Vessel 4 | FS 747 storage bin | FS 347 stone bowl | FS 357 Vessel 8 | FS 358 small pit |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | 1*/.3* |
| *Amaranthus* pigweed | | | | | | | | 1*/1* | 1*/1* | | 1*/.2* | |
| *Chenopodium* goosefoot | 2*/.8* | 45*/9* | 4*/2* | 4*/3* | | | | | | | 3*/.7* | 3*/1* |
| Cheno-am goosefoot/pigweed | 2*/.8* | 16*/3* | 3*/1* | 3*/2* | 1*/.6* | 1*/.7* | | | 2*/1.9* | | | |
| *Cycloloma* winged pigweed | | | | | | | | | 1*/1* | | | |
| *Portulaca* purslane | | 12*/3* | | 3*/2* | | 1*/.7* | | | 1*/1* | 1*/1* | | |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* maize | c+* | c+* | c+* | c+* | c+* | c+* | c+* | c+* | c+* | | c+* | c+* |
| Grasses: | | | | | | | | | | | | |
| Gramineae grass family | | | | | | | 1*/1* | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Juniperus* juniper | | | | | | | | 1*/1* | | | | |
| *Pinus* pine | b+* | b+* | | b+* | | b+* | b+* | | | | b+* | b+* |
| *Pinus edulis* piñon | | n+* | | n+* | | | | | n+* | | n+* | |
| *Pinus ponderosa* ponderosa pine | | n+* | n+* | n+* | | | | | | | | |
| Other: | | | | | | | | | | | | |
| *Cucurbita* squash/coyote gourd | | | r+* | | r+* | | | | | | | |

## Table 5.4 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 6 | | | | | | | Rooms 2 and 6 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 317 Pit 11 fill | FS 328 Fire pit 14 fill | FS 332 Posthole 14 | FS 339 Pit 15 fill | FS 342 Posthole 16 | FS 344 Posthole 17 | FS 345 Pit 12 | FS 348 storage bin, Vessel 4 | FS 747 storage bin | FS 347 stone bowl | FS 357 Vessel 8 | FS 358 small pit |
| Monocotyledoneae monocot | | | | s+* | | | | | | | | |
| Unidentifiable | | 1pp*/.2pp* | 1*/.4*; 1pp*/.4pp* | 2pp*/1pp* | | | | 1*/1* | | | | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Chenopodium* goosefoot | | | | | | | | | 1/1 | | | |
| *Portulaca* purslane | 21/9 | | 3/1 | | | | | | 1/1 | | | |
| Grasses: | | | | | | | | | | | | |
| Gramineae grass family | | 1/.2 | | | | | | | | | | |
| Other: | | | 1/.4 | | | | | | | | | |
| *Papaver* poppy | | | | | | | | | | | | |
| *Verbascum* mullein | 1/.4 | | | | | | | | | | | |

Key: * = charred, + = 1-10/liter, b = bark, c = cupule, n = needle, pp = plant part, r = rind.
Note: FS 347 and FS 348 volumes not recorded, assumed to be 1 liter.

## Table 5.5. LA 3279 Full-Sort Flotation Analysis Results

| | Room 7 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 365 ash pit | FS 366 storage pit | FS 367 Ash Pit 2 | FS 369 Ash Pit 2 | FS 370 posthole | FS 371 Posthole 1 | FS 372 pit | FS 373 posthole | FS 374 Vessel 9 | FS 375 Pit 2 | FS 376 hearth in fill above floor | FS 377 hearth N ½ |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | 3*/1* | 6*/1* | | 10*/1.8* | | | | | | 1*/.2* | 4*/.8* | 1*/.2* |
| *Chenopodium* goosefoot | 15*/4* | 12*/1.8* | | 8*/1.4* | | 6*/1.4* | 1*/.3* | 2*/.6* | 5*/1.5* | 3*/.6* | 3*/.6* | 3*/.5* |

| | Room 7 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 365 ash pit | FS 366 storage pit | FS 367 Ash Pit 2 | FS 369 Ash Pit 2 | FS 370 posthole | FS 371 Posthole 1 | FS 372 pit | FS 373 posthole | FS 374 Vessel 9 | FS 375 Pit 2 | FS 376 hearth in fill above floor | FS 377 hearth N ½ |
| Cheno-am<br>goosefoot/pigweed | | | | | | 6*/1.4* | 5*/1.3* | 1pc/.3pc;<br>15*/4.7* | 7*/2*;<br>2pc/.6pc | 5*/5*;<br>1pc/.2pc | 6*/1*;<br>2pc/.4pc | 3*/.5* |
| *Mentzelia albicaulis*<br>whitestem stickleaf | | | | 2*/.4* | | | | | | | | |
| *Portulaca*<br>purslane | 1*/.3* | 3*/.4* | | 5*/1* | | 1*/.2* | 2*/.5* | | 3*/1* | 2*/.4* | | 2*/.3* |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays*<br>maize | c+* | c+* | c+* | c+* | c+* | c+* | c+* | c+* | c+* | c+* | c+* | c+* |
| Grasses: | | | | | | | | | | | | |
| *Sporobolus*<br>dropseed grass | | | | | | | | 1*/.3* | | | | |
| Perennials: | | | | | | | | | | | | |
| *Juniperus*<br>juniper | | | | | | | 1*/.3* | l+* | 1pc/.3pc | | l+* | |
| *Pinus*<br>pine | b+* | b+* | b+* | | | | b+* | | | | | |

Table 5.5 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 7 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 365 ash pit | FS 366 storage pit | FS 367 Ash pit 2 | FS 369 Ash pit 2 | FS 370 posthole | FS 371 Posthole 1 | FS 372 pit | FS 373 posthol e | FS 374 Vessel 9 | FS 375 Pit 2 | FS 376 hearth in fill above floor | FS 377 hearth n ½ |
| *Pinus edulis*<br>piñon | | | | | | | | n+;<br>ns+* | | | | |
| *Pinus ponderosa*<br>pine | | | | | | n+* | n+* | n+* | n+* | | n+* | |
| *Sphaeralcea*<br>globe mallow | | | | | | | | | | | | 1*/.2* |
| Other: | | | | | | | | | | | | |
| *Cucurbita*<br>squash/coyote gourd | | r+* | | | | | | | | | | |
| Labiatae<br>mint family | | | | | | | | | | | 1*/.2* | |
| Monocotyledoneae<br>monocot | | | | s+* | | | | s+* | | | | |
| *Oenothera*<br>evening primrose | | | | | | | | | 1*/.3* | | | |

| | Room 7 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 365 ash pit | FS 366 storage pit | FS 367 Ash pit 2 | FS 369 Ash pit 2 | FS 370 posthole | FS 371 Posthole 1 | FS 372 pit | FS 373 posthol e | FS 374 Vessel 9 | FS 375 Pit 2 | FS 376 hearth in fill above floor | FS 377 hearth n ½ |
| *Phacelia* scorpionweed | | | | | | 1*/.2* | 2*/.5* | 1pc/.3p c | | | | |
| Unidentifiable | 3*/1* | 6*/1* | 1e*/.25e* | 18*/3.2* | | 1*/.2* | 6pp*/1.6pp* | | | 1*/.2* | 1pp*/.2pp* 1*/.2* | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | | | | | 1/.2 | |
| *Chenopodium* goosefoot | | | | | | 1/.2 | | | | 1/.2 | | |
| Cheno-am goosefoot/pigweed | | | | | | | | | | 1/.2 | | |

Table 5.5 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 7 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 365 ash pit | FS 366 storage pit | FS 367 Ash pit 2 | FS 369 Ash pit 2 | FS 370 posthole | FS 371 Posthole 1 | FS 372 pit | FS 373 posthole | FS 374 Vessel 9 | FS 375 Pit 2 | FS 376 hearth in fill above floor | FS 377 hearth n ½ |
| *Mentzelia albicaulis* whitestem stickleaf | | 2/.3 | | | | | 1/.3 | | | | | |
| *Portulaca* purslane | | | | | | 2/.5 | | 2/.6 | | 3/.6 | 8/1.6 | 1/.2 |
| Perennials: | | | | | | | | | | | | |
| *Pinus ponderosa* ponderosa pine | | | | | | | n+ | | | | | |
| Other: | | | | | | | | | | | | |
| *Croton* croton | | 1/.1 | | | | | | | | | | |
| Cyperaceae sedge family | | | | | | | 1/.3 | | | | | |
| Unidentifiable | | | | | | | | | | | | 1/.2 |

Key: * = charred, + = 1-10/liter, b = bark, c = cupule, e = embryo, n = needle, ns = nutshell, pc = partially charred, pp = plant part, s = stem.

## Table 5.6. LA 3279 Full-Sort Flotation Analysis Results

| | Room 7 | | | | | | Room 8 | | | | Room 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 378 pit | FS 379 Pot Rest 3 | FS 385 Ash Pit 1 | FS 386 Pit 3 | FS 387 Posthole 2 | FS 492 metate on floor | FS 382 Hearth 2 | FS 383 pit | FS 384 posthole | FS 388 posthole | FS 506 hearth S1/2 | FS 508 ceramic vessel on floor |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus*<br>pigweed | | | | | | | 1*/.2* | | | | 3*/ | |
| *Chenopodium*<br>goosefoot | 10*/1.9* | 6*/1.8* | 5*/2.3* | 2*/1.3* | 2*/1.3* | 3*/.5* | 7*/1.3* | 15*/3* | 2*/2* | 2*/.3* | 16*/ | 2*/.9* |
| Cheno-am<br>goosefoot/pigweed | 16*/3*;<br>8pc/1.5pc | 4*/1.2*;<br>1pc/.3pc | 12*/5.5* | 10*/7*;<br>1pc/.7pc | 1*/.7* | 5*/.9* | 6*/1*;<br>12pc/2.3pc | 8*/1.7* | 5*/5* | 1*/.1*;<br>2pc/.3pc | 24*/ ;<br>6pc/ | 3*/1.3*;<br>1pc/.4pc |
| *Helianthus*<br>sunflower | | | | 45*/30*;<br>3pc/2pc | | | | | | | | |
| *Mentzelia albicaulis*<br>whitestem stickleaf | | | | | | | | | 1*/1* | | | |
| *Portulaca*<br>purslane | 1*/.2* | | | 2*/1.3* | | 1*/.2* | | 4*/1* | 1*/1* | | | |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays*<br>maize | c+* | | c+* | c+* | c+* | c+* | c+*; k+*;<br>1e*/.2e* | c+* | c+* | c+* | c+* | c+* |
| Grasses: | | | | | | | | | | | | |
| Gramineae<br>grass family | | | | 2*/1.3* | | | | | | | | |
| *Oryzopsis hymenoides*<br>Indian ricegrass | | | | | | | | | | | 1*/1* | |
| *Sporobolus*<br>dropseed grass | | | | | | | | | | | 1*/1* | |
| Perennials: | | | | | | | | | | | | |
| *Juniperus*<br>juniper | 1*/.2* | | | | l+* | | | | | | | |

Table 5.6 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 7 | | | | | | Room 8 | | | | Room 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 378 pit | FS 379 Pot Rest 3 | FS 385 Ash Pit 1 | FS 386 Pit 3 | FS 387 Posthole 2 | FS 492 metate on floor | FS 382 Hearth 2 | FS 383 pit | FS 384 posthole | FS 388 posthole | FS 506 hearth S ½ | FS 508 ceramic vessel on floor |
| *Pinus* pine | | | | | | cs+* | | | | | | |
| *Pinus edulis* piñon | | | n+* | n+* | | | n+* | | | | | |
| *Pinus ponderosa* pine | n+* | n+* | | n+* | n+* | | n+* | n+* | n+* | | | |
| *Sphaeralcea* globe mallow | | | | 1*/.7* | | | | | | | | |
| Other: | | | | | | | | | | | | |
| Compositae sunflower family | | | | | | | | 1*/.2* | | | | |
| *Cucurbita* squash/coyote gourd | | | | | | | | r+* | | | r+* | |
| *Phacelia* scorpionweed | | | | | | | | | | | | |
| Polygonaceae buckwheat family | | | | 1*/.7* | | | | | | | | |
| *Salvia* sage | | | | | | | | | 1*/1* | | | |
| Unidentifiable | 3*/.6*; 2pp*/.4pp* | | 3*/1.4*; 1pp*/.5pp* | 1e*/.7e*; 1pp*/.7pp* | | 2pp*/.4pp*; 2*/.4* | 1pp*/.2pp* | 1*/.2*; 1pp*/.2pp* | | | 1pp*/1pp; 2*/2* | |
| *Verbena* vervain | | | | 2*/1.3* | | | | | | | | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | 1/.2 | | | | | | |
| *Chenopodium* goosefoot | 2/.4 | | | 5/3 | | 16/2.9 | 1/.2 | | | | | 1/.4 |

Table 5.6 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 7 | | | | | | Room 8 | | | | Room 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 378<br>pit | FS 379<br>Pot<br>Rest 3 | FS 385<br>Ash Pit 1 | FS 386<br>Pit 3 | FS 387<br>Posthole 2 | FS 492<br>metate on<br>floor | FS 382<br>Hearth 2 | FS 383<br>pit | FS 384<br>posthole | FS 388<br>posthole | FS 506<br>hearth S<br>½ | FS 508<br>ceramic<br>vessel on<br>floor |
| Cheno-am<br>goosefoot/pigweed | 1/.2 | | | 1/.7 | | 2/.4 | | | | | | |
| *Helianthus*<br>sunflower | | | | 2/1.3 | | | | | | | | |
| *Portulaca*<br>purslane | 4/.8 | 1/.3 | | 21/14 | | 146/26 | 1/.2 | | 1/1 | | 1/1 | 6/2.7 |
| Grasses: | | | | | | | | | | | | |
| Gramineae<br>grass family | | | | 1/.7 | | | | 1/.2 | | | | |
| Perennials: | | | | | | | | | | | | |
| *Argemone*<br>prickly poppy | | | | 1/.7 | | | | | | | | |
| Cactaceae<br>cactus family | | | | | | | | nr+ | | | | |
| *Juniperus*<br>juniper | | l+ | l+ | | | l+ | | l+ | | | | |
| *Pinus ponderosa*<br>ponderosa pine | n+ | | | n+ | | | | | | n+ | | n+ |
| Other: | | | | | | | | | | | | |
| Compositae<br>sunflower family | | | | 1/.7 | | | | | | | | |
| *Descurainia*<br>tansy mustard | | | | | | 1/.2 | | | | | | |
| Dicotyledonae<br>dicot | | | | | | | | | | | l+ | l+ |

Table 5.6 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 7 | | | | | | Room 8 | | | | Room 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 378 pit | FS 379 Pot Rest 3 | FS 385 Ash Pit 1 | FS 386 Pit 3 | FS 387 Posthole 2 | FS 492 metate on floor | FS 382 Hearth 2 | FS 383 pit | FS 384 posthole | FS 388 posthole | FS 506 hearth S ½ | FS 508 ceramic vessel on floor |
| *Euphorbia* spurge | | 1/.3 | | | | | | | | | | |
| *Guara* guara | | | | | | | | 1/.2 | | | | |
| *Oenothera* evening primrose | | | | 3/2 | | 2/.4 | | | | | | |
| *Phacelia* scorpionweed | | | | | | | | | | | | |
| *Physalis* groundcherry | | | | | | 1/.2 | | | | | | |
| *Salvia* sage | | | | | | | | | | | | 1/.4 |
| Unidentifiable | | | | | | 1/.2 | | | | | | |
| *Verbascum* mullein | | | | | | 8/1.4 | | | | | | |

Key: * = charred, + = 1-10/liter, c = cupule, cs = cone scale, e = embryo, k = kernel, l = leaf, n = needle, nr = nonreproductive, ns = nutshell, pc = partially charred, pp = plant part.
Note: FS 506 volume not recorded, assumed to be 1 liter.

Table 5.7. LA 3279 Full-Sort Flotation Analysis Results

| | Room 9 | | | | | | Room 10 | | | | Room 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 509 NW ¼ floor | FS 522 Pit 2 | FS 524 Pit 1 | FS 556 subwall hearth | FS 562 Vent 2 | FS 563 center posthole | FS 565 hearth lower fill | FS 613 pit | FS 626 ash from ash pit | FS 628 pit fill | FS 560 Vessel 1 | FS 631 hearth |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | 14*/4.3* | | | 3*/.5* | | | 1*/.3* | | | | |
| *Chenopodium* goosefoot | 9*/1.6* | 24*/7.4* | 8*/1.6* | 5*/.8* | 13*/2* | 13*/2.4* | 2*/.7* | 13*/3.5* | 60*/32* | | 3*/2* | 3*/.6* |
| Cheno-am goosefoot/pigweed | 11*/1.9*; 1pc/.2pc | 18*/5.5* | 9*/1.7* | 3*/.5* | 16*/2.3* | 13*2.4* | 1*/.3* | 6*/1.6* | 4*/2.3* | 6*/2.8* | 5*/3.3* | |

| | Room 9 | | | | | | Room 10 | | | | Room 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 509 NW ¼ floor | FS 522 Pit 2 | FS 524 Pit 1 | FS 556 subwall hearth | FS 562 Vent 2 | FS 563 center posthole | FS 565 hearth lower fill | FS 613 pit | FS 626 ash from ash pit | FS 628 pit fill | FS 560 Vessel 1 | FS 631 hearth |
| *Portulaca*<br>purslane | 1*/.2* | 1*/.3* | 1*/.2* | 1*/.2* | 3*/.5* | | 1*/.3* | 5*/1.3* | 1*/.5* | 1*/.5* | | |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays*<br>maize | c+* | c+* | c+* | | c+* | c+* | c+* | c+* | | c+* | | c+* |
| Grasses: | | | | | | | | | | | | |
| Gramineae<br>grass family | | | | | 1*/.2* | | | 1*/.3* | | | | |
| Perennials: | | | | | | | | | | | | |
| *Juniperus*<br>juniper | l+* | | | | | | | | | | | |
| *Pinus*<br>pine | | | | | b+* | b+* | b+* | b+* | | b+* | b+* | b+* |

Table 5.7 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 9 | | | | | | Room 10 | | | | Room 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 509 NW ¼ floor | FS 522 Pit 2 | FS 524 Pit 1 | FS 556 subwall hearth | FS 562 Vent 2 | FS 563 center posthole | FS 565 hearth lower fill | FS 613 pit | FS 626 ash from ash pit | FS 628 pit fill | FS 560 Vessel 1 | FS 631 hearth |
| *Pinus edulis*<br>piñon | n+* | | | | | | | n+* | n+* | | n+* | n+* |
| *Pinus ponderosa*<br>pine | n+* | | | | n+* | n+* | | n+* | n+* | n+* | | n+* |
| Other: | | | | | | | | | | | | |
| Monocotyledoneae<br>monocot | | | | | | | | s+* | | | | |
| *Phacelia*<br>scorpionweed | 1pc/.2pc | | 1*/.2* | | 1pc/.2pc | | | | | | | |
| *Physalis*<br>groundcherry | | | | | | | | | | | | 1*/.2* |
| *Salvia*<br>sage | | | 1*/.2* | | | | | | | | | |
| Unidentifiable | 1pp*/.2pp* | 1*/.3* | | 1pp*/.2pp*; 1*/.2* | 1*/.2* | 2*/.8* | | 2pp*/.5pp* | | | | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus*<br>pigweed | | | 5/1 | | | | | | | | | |

| | Room 9 | | | | | | Room 10 | | | | Room 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 509 NW ¼ floor | FS 522 Pit 2 | FS 524 Pit 1 | FS 556 subwall hearth | FS 562 Vent 2 | FS 563 center posthole | FS 565 hearth lower fill | FS 613 pit | FS 626 ash from ash pit | FS 628 pit fill | FS 560 Vessel 1 | FS 631 hearth |
| *Chenopodium* goosefoot | | | | 1/.2 | | | | | | | | 5/1 |
| Cheno-am goosefoot/pigweed | | | 2/.4 | | 2/.3 | | 2/.7 | | | 3/1.4 | | 1/.2 |

Table 5.7 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 9 | | | | | | Room 10 | | | | Room 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 509 NW ¼ floor | FS 522 Pit 2 | FS 524 Pit 1 | FS 556 subwall hearth | FS 562 Vent 2 | FS 563 center posthole | FS 565 hearth lower fill | FS 613 pit | FS 626 ash from ash pit | FS 628 pit fill | FS 560 Vessel 1 | FS 631 hearth |
| *Nicotiana* tobacco | | | 1/.2 | | | | | | | 1/.5 | | |
| *Portulaca* purslane | | | 2/.4 | | 2/.3 | | | 1/.3 | | | | 122/26.2 |
| Grasses: | | | | | | | | | | | | |
| Gramineae grass family | 1/.2 | | 4/.8 | 1/.2 | | | | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Argemone* prickly poppy | | | | | | | | | | | | |
| *Pinus ponderosa* ponderosa pine | | | n+ | | | | | n+ | | n+ | | n+ |
| Other: | l+ | | | | | | | | | | | |
| Dicotyledonae dicot | | | | | | | | | | | | |
| *Euphorbia* spurge | | | | | | | | | | | | 2/.4 |
| *Oenothera* evening primrose | | | | | | | | | | | | 7/1.5 |
| *Phacelia* scorpionweed | 1/.2 | | | | | | | | | | | |
| Unidentifiable | | | | | | | | | | | | 1/.2 |
| *Verbascum* mullein | | | | | | | | | | | | 1/.2 |

Key: * = charred, + = 1-10/liter, b = bark, c = cupule, n = needle, pc = partially charred, pp = plant part, s = stem.

Table 5.8. LA 3279 Full-Sort Flotation Analysis Results

| | Room 13 | | | | | | Kiva | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 564 Vessel 1 | FS 646 Pit 2 | FS 648 Pit 1 | FS 649 slab-lined hearth | FS 651 ash pit | FS 670 hearth | FS 675 possible posthole | FS 678 Pit 5 | FS 704 possible sipapu | FS 705 Pit 3 | FS 708 hearth | FS 709 posthole |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | 1*/.3* | | 3*/.9* | 1*/.2* | 1*/.2* | | 1*/.2* | | 1*/.25* | 1*/.3* | | |
| *Chenopodium* goosefoot | | 2*/.7* | 8*/2.4* | 34*/5.9* | 49*/11* | 7*/1.6* | 3*/.6* | 1*/.3* | 4*/1* | 7*/1.9* | | 3*/.75* |
| Cheno-am goosefoot/pigweed | 1*/.3* | 3*/1* | 22*/6.6* | 38*/6.6* | 51*/11.6* 5pc/1pc | 4*/.9* | 5*/1* | 3*/1* | 19*/4.8*; 2pc/.5pc | 4*/1*; 4pc/1pc | | 17*/4.25*; 2pc/.5pc |
| *Cleome* bee plant | | | | | | | | | | | 1e*/.25e * | |
| *Helianthus* sunflower | | 1*/.4* | | 2*/.3* | 1*/.2* | | | | | | | |
| *Mentzelia albicaulis* whitestem stickleaf | | | | | | | 1*/.2* | | 12*/3* | | | |
| *Portulaca* purslane | 1*/.3* | | 4*/1.2* | 25*/4.3* | 115*/26* | | 3*/.6* | 1*/.3* | 32*/8* | 4*/1* | 1*/.25* | 12*/4* |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* maize | c+* | c+* | c+*; 1e* | c+* | c+*; 1k*/.2k* | c+* | c+* | c+* | c+* | c+* | | c+* |
| Grasses: | | | | | | | | | | | | |
| Gramineae grass family | | | | | | | | | | 1*/.3* | | |
| Perennials: | | | | | | | | | | | | |
| *Juniperus* juniper | | l+* | | l+* | l+* | | | | | | | |
| *Pinus* pine | b+* | | b+* | b+* | b+* | n+* | | | b+* | | | |

Table 5.8 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 13 | | | | | | Kiva | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 564 Vessel 1 | FS 646 Pit 2 | FS 648 Pit 1 | FS 649 slab-lined pit | FS 651 ash pit | FS 670 hearth | FS 675 possible posthole | FS 678 Pit 5 | FS 704 possible sipapu | FS 705 Pit 3 | FS 708 hearth | FS 709 posthole |
| *Pinus edulis* piñon | | n+* | n+* | n+* | n+* | | | | n+* | | | n+* |
| *Pinus ponderosa* pine | | n+* | n+* | n+* | n+* | n+* | n+* | n+* | | n+* | | |
| Other: | | | | | | | | | | | | |
| *Cucurbita* squash/coyote gourd | | | | | r+* | | | | | | | |
| Cyperaceae sedge family | | | | | | | | | 2*/.5* | | | |
| *Euphorbia* spurge | | | 1*/.3* | | | | | | | | | |
| *Phacelia* scorpionweed | 1pc/.3pc | | 1*/.3* | | | | | | 1*/.25* | | | |
| *Salvia* sage | | | | | | | | | 2*/.5*; 1pc/.25pc | | | |
| Solanaceae nightshade family | | | 1*/.3* | | | | | 1*/.3* | | | | |
| Unidentifiable | 1pp*/ .3pp* | 1pp*/.4pp* | | | 5pp*/ 1.1pp*; 1e*/.2e*; 5*/1.1* | | 1pp*/.2pp*; 2rep*/.4rep* | 1*/.3* | 3*/.75* | 2pp*/ .5pp* | 1pp*/ .25pp* | |
| Unknown #9178 | | | 1*/.3* | | | | | | | | | |
| *Verbena* vervain | | | 1*/.3* | | | | | | | | | |

## Table 5.8 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 13 | | | | | | Kiva | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 564 Vessel 1 | FS 646 Pit 2 | FS 648 Pit 1 | FS 649 slab-lined hearth | FS 651 ash pit | FS 670 hearth | FS 675 possible posthole | FS 678 Pit 5 | FS 704 possible sipapu | FS 705 Pit 3 | FS 708 hearth | FS 709 posthole |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* | 1/.3 | | | | | | | | | | | |
| pigweed | | | | | | | | | | | | |
| *Chenopodium* | 2/.6 | | 1/.3 | 1/.2 | | | | | 2/.5 | | | |
| goosefoot | | | | | | | | | | | | |
| Cheno-am | | | | 1/.2 | | | | | | 12/3.3 | | |
| goosefoot/pigweed | | | | | | | | | | | | |
| *Mentzelia albicaulis* | | | | | 1/.2 | | | 1/.3 | | 2/.5 | | |
| whitestem stickleaf | | | | | | | | | | | | |
| *Nicotiana* | 1/.3 | | | | | | | | | | | |
| tobacco | | | | | | | | | | | | |
| *Portulaca* | 4/1 | 31/11.3 | 9/2.7 | 19/3.3 | | 10/2.2 | | 1/.3 | 2/.5 | 3/.8 | | |
| purslane | | | | | | | | | | | | |
| Grasses: | | | | | | | | | | | | |
| Gramineae | | l+ | l+ | | | | | | | | | |
| grass family | | | | | | | | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Argemone* | | 1/.4 | | | | | | | | | | |
| prickly poppy | | | | | | | | | | | | |
| *Juniperus* | | | | | | | | | | | | |
| juniper | | | | | | | | | | | | |
| *Pinus ponderosa* | | n+ | n+ | | | n+ | | | n+ | | n+ | |
| ponderosa pine | | | | | | | | | | | | |
| *Sphaeralcea* | 1/.3 | | | 1/.2 | | | | | | | | |
| globe mallow | | | | | | | | | | | | |
| Other: | | | | | | | | | | | | |
| Compositae | | 1/.4 | 1/.3 | 2/.3 | | | | | 2/.5 | 1/.3 | | |
| sunflower family | | | | | | | | | | | | |

## Table 5.8 (continued). LA 3279 Full-Sort Flotation Analysis Results

| | Room 13 | | | | | | Kiva | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 564 Vessel 1 | FS 646 Pit 2 | FS 648 Pit 1 | FS 649 slab-lined hearth | FS 651 ash pit | FS 670 hearth | FS 675 possible posthole | FS 678 Pit 5 | FS 704 possible sipapu | FS 705 Pit 3 | FS 708 hearth | FS 709 posthole |
| Dicotyledonae dicot | | | | l+ | | | | | | | | |
| *Euphorbia* spurge | | 1/.4 | | 1/.2 | | | | | | | | |
| Leguminosae bean family | | | | | | | | 1/.3 | | | | |
| *Oenothera* evening primrose | | 1/.4 | | | | | | | | | | |
| Unidentifiable | | l+; 1/.4 1pp/.4pp | | | | | | | | | | |
| Verbascum mullein | | 2/.7 | 1/.3 | 1/.2 | | | | | | | | |

Key: * = charred, + = 1-10/liter, b = bark, c = cupule, e = embryo, k = kernel, l = leaf, n = needle, pc = partially charred, pp = plant part, r = rind, rep. = reproductive plant part,

## Table 5.9. LA 3279 Full-Sort Flotation Analysis Results

| | Kiva | | | | | | |
|---|---|---|---|---|---|---|---|
| | FS 712 W. footdrum | FS 713 lower hearth | FS 714 Burial 1, Vessel 3 | FS 716 Posthole 3 | FS 726 Posthole 4 | FS 719 Posthole 5 | FS 730 subfloor ashpit |
| CULTURAL | | | | | | | |
| Annuals: | | | | | | | |
| *Amaranthus* pigweed | | | | 2*/.5* | | 5*/1* | |
| *Chenopodium* goosefoot | 23*/6* | 1*/.4* | | 39*/9.75* | 6*/3* | 17*/3.5* | 5*/.8* |
| Cheno-am goosefoot/pigweed | 38*/10* | 4*/2.6*; 1pc/.4pc | | 21*/5.25* | 19*/9.5* | 33*/6.9*; 3pc/.6pc | 21*/3.3* |
| *Mentzelia albicaulis* whitestem stickleaf | | | | | | | 1*/.2* |
| *Nicotiana* tobacco | | | | 1*/.25* | | | |
| *Portulaca* purslane | 9*/2.3* | 3*/1* | | 19*/4.75* | 1*/.5* | 10*/2* | 6*/.9* |

| | Kiva | | | | | | |
|---|---|---|---|---|---|---|---|
| | FS 712 W. footdrum | FS 713 lower hearth | FS 714 Burial 1, Vessel 3 | FS 716 Posthole 3 | FS 726 Posthole 4 | FS 719 Posthole 5 | FS 730 subfloor ashpit |
| Cultigens: | | | | | | | |
| *Zea mays* maize | c+* | c+* | c+* | c+* | | c+* | c+* |
| Grasses: | | | | | | | |
| Gramineae grass family | | | | 1*/.25* | | | 3*/.5* |
| *Sporobolus* dropseed grass | | | | 1*/.25* | | | |
| Perennials: | | | | | | | |
| *Juniperus* juniper | 1*/.3*; l+ | | | | | l+* | l+* |
| *Pinus* pine | | | | cs+* | | | |
| *Pinus edulis* piñon | | | | | ns+* | n+* | |
| *Pinus ponderosa* pine | n+* | | | n+* | n+* | n+* | n+* |
| Other: | | | | 1*/.25* | | | |
| Malvaceae globe mallow family | | | | | | | |
| *Phacelia* scorpionweed | | | | | | | 1*/.2* |
| *Salvia* sage | | | | | | 1*/.2* | |
| Unidentifiable | | | | 3pp*/.75pp* | 3pp*/ 1.5pp* | | 2pp*/ .3pp* |
| Unknown #9178 | 1*/.3* | | | | | | |

Table 5.9. LA 3279 Full-Sort Flotation Analysis Results

| | Kiva | | | | | | |
|---|---|---|---|---|---|---|---|
| | FS 712 Vessel 1 | FS 713 lower hearth | FS 714 Burial 1, Vessel 3 | FS 716 Posthole 3 | FS 726 Posthole 4 | FS 719 Posthole 5 | FS 730 subfloor ash pit |
| NONCULTURAL | | | | | | | |
| Annuals: | | | | | | | |
| Cheno-am<br>goosefoot/pigweed | | | | 2/.5 | | | |
| *Mentzelia albicaulis*<br>whitestem stickleaf | | | | | | | 1/.2 |
| *Nicotiana*<br>tobacco | 1/.3 | | | | | | 1/.2 |
| *Portulaca*<br>purslane | | 2/.7 | | 1/.25 | | | |
| Perennials: | | | | | | | |
| *Juniperus*<br>juniper | l+ | | | | | | |
| *Pinus ponderosa*<br>ponderosa pine | n+ | n+ | | | | n+ | n+ |
| Other: | | | | | | | |
| Compositae<br>sunflower family | 1/.3 | 2/.7 | | 1/.25 | | 1/.2 | |
| Dicotyledonae<br>dicot | | l+ | | | | | |
| *Oenothera*<br>evening primrose | 1/.3 | | | | | | |
| Unidentifiable | | 1/.4 | | | | | |
| *Verbascum*<br>mullein | 1/.3 | | | | | | |

Key: * = charred, + = 1-10/liter, c = cupule, cs = cone scale, n = needle, ns = nutshell, pc = partially charred, pp = plant part.

Table 5.10. LA 37917, LA 37919, and LA 39968 Full-Sort Flotation Analysis Results

| | LA 37917 | | LA 37919 | LA 39968 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hearth 1 | Hearth 3 | Test Pit 10 | Roomblock 1, Room 2 | Pit Structure, Floor 1 | | | | Pit Structure, Floor 2 | | |
| | FS 36 fill | FS 332 fill | FS 486 charcoal concentration | FS 449 Burial 2 vessel fill | FS 2125 Hearth 1 fill | FS 2126 Reserve Smudged bowl fill | FS 2177 Pit 2 fill | FS 2186 floor fill | FS 2428 Hearth 2 fill | FS 2175 Hearth 2 fill, west ½ | FS 2176 Hearth 2 fill, east ½ | FS 2178 Hearth 3 fill |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | | | | | | 1*/.4* |
| *Chenopodium* goosefoot | | | | | | 1*/.7* | 1*/.3* | | 1*/.4* | 1*/.3* | | 41*/15* |
| Cheno-am goosefoot/pigweed | | | | | | | | | | | | 3*/1* |
| *Monolepis* patata | | | | | | | | | 1*/.4* | | | |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* maize | | | | | | | c+*, 1k*/.3k* | | | c++*, 1k*/.3k* | | c+*, 1k*/.4k* |
| Perennials: | | | | | | | | | | | | |
| *Pinus* pine | | | | | | | b+* | b+* | b+* | | | b+* |
| *Suaeda* seepweed | | | | | | | 1*/.3* | | | | | |
| Other: | | | | | | | | | | | | |
| Unidentifiable | | | 1*/1* | | | | | | | | | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Chenopodium* goosefoot | | | | | 1/1 | | 1/.3 | | 2/.8 | | 1/.2 | |
| *Helianthus* sunflower | | | | | | | | | | | 1/.2 | |

Table 5.10 (continued). LA 37917, LA 37919, and LA 39968 Full-Sort Flotation Analysis Results

| | LA 37917 | | LA 37919 | LA 39968 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hearth 1 | Hearth 3 | Test Pit 10 | Roomblock 1, Room 2 | Pit Structure, Floor 1 | | | | Pit Structure, Floor 2 | | | |
| | FS 36 fill | FS 332 fill | FS 486 charcoal concentration | FS 449 Burial #2 vessel fill | FS 2125 Hearth 1 fill | FS 2126 Reserve Smudged bowl fill | FS 2177 Pit 2 fill | FS 2186 floor fill | FS 2428 Hearth 2 fill | FS 2175 Hearth 2 fill, west ½ | FS 2176 Hearth 2 fill, east ½ | FS 2178 Hearth 3 fill |
| *Monolepis* patata | 1/1 | 1/1.8 | | | | | | | | | 1/.2 | |
| *Nicotiana attenuata* tobacco | | | | | | | | | | 1/.3 | | |
| *Portulaca* purslane | 3/3 | 6/10.7 | | | | | | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Echinocereus* hedgehog cactus | | | | | | | | | | | | |
| *Juniperus* juniper | l+++ | | | | | | | | | | | l+ |
| *Opuntia* prickly pear cactus | | | | 1e/3.3e | | | | | | | | |
| *Pinus* pine | n+++ | | | | | | | | | | n+ | |
| Other: | | | | | | | | | | | | |
| *Euphorbia* spurge | 2/2 | 1/1.8 | | | | | | | | | | |
| *Mentzelia* stickleaf | | | | | 1/1 | 3/2 | 1/.3 | | | | | 4/1.5 |
| *Oenothera* evening primrose | | | 2/2 | | | | | | | | | |
| Polygonaceae buckwheat family | 2/2 | | | | | | | | | | | |
| Unknown | 4/4 | | | | | | | | | | | |

Key: * = charred, + = 1-10/liter, ++ = 11-25/liter, b = bark, c = cupule, e = embryo, k = kernel, l = leaf, n = needle

# Table 5.11. LA 39968 and LA 39969 Full-Sort Flotation Analysis Results

| | LA 39968 | | LA 39969 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure, Floor 2 | Possible Extramural Hearth | Large Extramural Pit | Extramural Hearth | Extramural Pit under Slab Paving | Room 1, Posthole Inside Collar | Room 2, Possible Posthole | Posthole or Pit under Collapsed Wall of Room 2 | Room 3 | | | |
| | FS 2475 Hearth 3 fill | FS 2477 fill | FS 375 fill | FS 833 south ½ fill | FS 1142 fill | FS 1003 fill | FS 501 fill | FS 1186 fill | FS 920 hearth fill | FS 921 small pit fill | FS 1122 two associated pits under paving | FS 1165 posthole fill |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Chenopodium* goosefoot | 11*/2.8* | | | 1e*/1e* | 1*/.5* | | | 1*/.5* | | | | |
| *Portulaca* purslane | | | | | | | | 1*/.5* | | | | |
| Cultigens: | | | | | c+* | | | | | | | |
| *Zea mays* maize | | | | | | | | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Pinus* pine | b+* | | | | | | | | | | | |
| Other: | | | | | | | | | | | | |
| Unidentifiable | 7*/2* | | | | | | | | 3*/.9* | | | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Chenopodium* goosefoot | | | | | | 1/.5 | | 1/.5 | | | 1/.4 | 1/.4 |
| *Monolepis* patata | | | | | | 1/.5 | | | | | | |
| *Portulaca* purslane | | | 3/1.5 | | | 1/.5 | | | | | 3/1.3 | |
| Grasses: | | | | | | | | | | 1/.4 | | |
| *Sporobolus* dropseed grass | | | | | | | | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Echinocereus* hedgehog cactus | | | | | 1/.5 | | | | | | | |
| *Juniperus* juniper | | | | | | | l+ | | l+ | | | l+ |
| *Pinus* pine | | | | | | | | | | | | n+ |
| *Pinus edulis* piñon | | | | | | | | | n+ | n+, 1ns/ .4ns, cs+ | | n+ |

| | LA 39968 | | LA 39969 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure, Floor 2 | Possible Extramural Hearth | Large Extramural Pit | Extramural Hearth | Extramural Pit under Slab Paving | Room 1, Posthole Inside Collar | Room 2, Possible Posthole | Posthole or Pit under Collapsed Wall of Room 2 | Room 3 | | | |
| | FS 2475 Hearth 3 fill | FS 2477 fill | FS 375 fill | FS 833 south ½ fill | FS 1142 fill | FS 1003 fill | FS 501 fill | FS 1186 fill | FS 920 hearth fill | FS 921 small pit fill | FS 1122 two associated pits under paving | FS 1165 posthole fill |
| *Iva* marsh-elder | | 1/.4 | | | | | | | | | | |
| Unidentifiable | | 1/.4 | | | | | | | | | | |

Key: * = charred, + = 1-10/liter, ++ = 11-25/liter, +++ = 25-100/liter, b = bark, c = cupule, cs = conescale, e = embryo, l = leaf, n = needle, ns = nutshell

Table 5.12. LA 39972, LA 39975, and LA 43766 Full-Sort Flotation Analysis Results

| | LA 39972 | | LA 39975 | | | | | LA 43766 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | charcoal concentration | trash pit | possible use surface | Pit Structure 1 | floor of Pit Structure 1 | extramural Pit 2 | roasting pit, NW of Pit Structure 1 | upper hearth | small pit | roasting pit, east 1/2 | Cultural Surface 2 | stained use surface (west of roasting pit) |
| | FS 375 fill | FS 497 fill | FS 654 fill | FS 235 fill above floor | FS 666 fill under partial vessel | FS 287 fill | FS 473 Level 2a | FS 108 fill | FS 288 fill | FS 313 fill | FS 434 fill | FS 479 bottom of grid |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Chenopodium* goosefoot | 1*/1.3 | | | | | | 4*/4* | 13*/2.9* | 10*/6.7* | | 60*/30* | 1*/.4* |
| *Portulaca* purslane | | | | | | | 2*/2* | | | | | |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* maize | | | | c+* | c+* | | c++* | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Juniperus* juniper | | | | | | | | 6*/1.3* | | 3*/.9 | | |
| Other: | | | | | | | | | | | | |
| Unidentifiable | | | | | | | | 1pp*/2pp* | | | 3pp*/1.5pp* | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | 1/.6 | | | | | | 1/.2 | 1/.7 | | | |
| *Chenopodium* goosefoot | | 4/.6 | | 2/2 | | | 1/1 | | 43/28.7 | 1/.3 | | |
| *Portulaca* purslane | | 63/37 | 2/1.3 | 3/3 | 40/40 | 158/197.5 | 1/1 | 1/.2 | 1/.7 | | | |
| Perennials: | | | | | | | | | | | | |
| *Juniperus* juniper | | | | 28/28 | l+++; 12/12 | | l+ | | | | | |

Table 5.12 (continued). LA 39972, LA 39975, and LA 43766 Full-Sort Flotation Analysis Results

| | LA 39972 | | | LA 39975 | | | | LA 43766 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | burn area | trash pit | use surface | Pit Structure 1 | floor of Pit Structure 1 | extramural Pit 2 | roasting pit, NW of Pit Structure 1 | upper hearth | small pit | roasting pit, east 1/2 | cultural Surface 2 | stained use surface (west of roasting pit) |
| | FS 375 fill | FS 497 fill | FS 654 fill | FS 235 fill above floor | FS 666 fill under partial vessel | FS 287 fill | FS 473 level 2a | FS 108 fill | FS 288 fill | FS 313 fill | FS 434 fill | FS 479 bottom of grid |
| *Pinus* | n+ | | | | n+ | | | | | | | |
| pine | | | | | | | | | | | | |
| Other: | | | | | | | | | | | | |
| Compositae | | | | 1/1 | | | | | | | | |
| composite family | | | | | | | | | | | | |
| *Euphorbia* | | 1/6 | | | | | | | | | | |
| spurge | | | | | | | | | | | | |
| *Phacelia crenulata* | | | | | | | | 1/.2 | | | | |
| scorpionweed | | | | | | | | | | | | |
| Unknown 9151 | | | | | | | | 1/.2 | | | | |

Key: * = charred, + = 1-10/liter, ++ = 11-25/liter, +++ = 25-100/liter, c = cupule; k = kernel, l = leaf, n = needle, pp = plant part

Table 5.13. LA 43766 and LA 45507 Full-Sort Flotation Analysis Results

| | LA 43766 | | LA 45507 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Living Surface 2 | Hearth 2 | Pit Structure 3 | | Pit Structure 9 | | | overlying Pit Structure 12 | Pit Structure 12 | | | |
| | FS 515 fill | FS 629 fill | FS 1167 bottom of roasting pit | FS 1168 hearth fill | FS 1166 trash pit | FS 1342 upper hearth fill | FS 1343 lower hearth fill | FS 1605 extramural burial pit fill | FS 1484 fill, possibly associated with pot | FS 1896 Pit 2 fill | FS 1982 hearth fill | FS 1983 Roasting Pit 1 fill |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* | 1*/.2* | | | | | | | | 4*/4* | | | |
| pigweed | | | | | | | | | | | | |
| *Chenopodium* | 16*/3.9* | 1*/.4* | 2e*/2e* | 3*/3* | | 13*/6.5* | 8*/8* | | 10*/10* | 3*/3* | | 1*/1* |
| goosefoot | | | | | | | | | | | | |
| Cheno-am | 2*/.5* | | | | | | | | 8*/8* | 1*/1* | | |
| *Corispermum* | | | | | | | | | 3*/3* | | | |
| bugseed | | | | | | | | | | | | |
| *Cycloloma* | | | | | | | | | | 1*/1* | | |
| *Portulaca* | 5*/1* | | | 1*/1* | | | | | 1*/1* | | | |
| purslane | | | | | | | | | | | | |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* | | | | | 2k*/2k* | 1k*/.5k* | | | | | | |
| maize | | | | | | | | | | | | |
| Perennials: | | | | | | | | | | | | |
| *Pinus* | | | | nr+* | | nr++* | nr+* | nr+* | nr++* | nr+* | nr++* | |
| pine | | | | | | | | | | | | |
| Other: | | | | | | | | | | | | |
| Solanaceae | 1*/.2* | | | | | | | | | | | |
| nightshade family | | | | | | | | | | | | |
| Unidentifiable | | | 1e*/1e*; 1*/1* | | | | | | 1*/1* | | | |

Table 5.13 (continued). LA 43766 and LA 45507 Full-Sort Flotation Analysis Results

| | LA 43766 | | LA 45507 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Living Surface 2 | Hearth 2 | Pit Structure 3 | | Pit Structure 9 | | | overlying Pit Structure 12 | Pit Structure 12 | | | |
| | FS 515 fill | FS 629 fill | FS 1167 bottom of roasting pit | FS 1168 hearth fill | FS 1166 trash pit | FS 1342 upper hearth fill | FS 1343 lower hearth fill | FS 1605 extramural burial pit fill | FS 1484 fill, possibly associated with pot | FS 1896 Pit 2 fill | FS 1982 hearth fill | FS 1983 roasting Pit 1 fill |
| NONCULTURAL | | | | | 7/7 | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Chenopodium* *goosefoot* | | | | | | | | | | | | |
| *Portulaca* purslane | | | | | 88/88 | | 2/2 | | | | | |
| Grasses: | | | | | | | | | | | | |
| Gramineae grass family | | | nr+ | | | | | | | | | |
| Other: | | | | | | | | | | | | |
| *Euphorbia* spurge | | | | | 2/2 | | | | | | | |
| *Physalis* groundcherry | | | | | 1/1 | | | | | | | |
| Polygonaceae buckwheat family | | | | | 1/1 | | | | | | | |
| *Suaeda* seepweed | | | | | 1/1 | | | | | | | |
| Unidentifiable | | | | | 2/2 | | | | | | | |

Key: * = charred, + = 1-10/liter, ++ = 11-25/liter, +++ = 25-100/liter, e = embryo, k = kernel, nr = nonreproductive plant part

## Table 5.14. LA 45507, LA 45508, and LA 70185 Full-Sort Flotation Analysis Results

| | LA 45507 | | | | | | | | | LA 45508 | LA 70185 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure 12 | | | | Pit Structure 13 | | | | | north of Pit Structure 1 | Roomblock 1, Room 2 | |
| | FS 2159 general fill 72 cm | FS 2304 general fill 20-70 cm | FS 2305 general fill 20-70 cm | FS 2306 general fill 20-70 cm | FS 1476 burned roof fall | FS 1577 fill inside partial vessel | FS 1893 Posthole 1 fill | FS 1894 hearth fill | FS 1915 hearth fill | FS 311 general fill | FS 408 from metate in fill at 49 cm | FS 670 fill above metate in Room 2 fill |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | | 1*/1* | 2*/1.3* | | | |
| *Chenopodium* goosefoot | | 2*/2* | | 5*/5* | 1*/1.5* | | 2*/2* | 1*/1* | 1*/.6* | | | |
| Cheno-am | | | | | | | | 1*/1* | 1*/.6* | | | |
| *Portulaca* purslane | | | | 3*/3* | | | 1*/1* | | | | | |
| Perennials: | | | | | | | | | | | | |
| Pinus pine | nr+* | nr+* | nr+* | nr+* | nr+++* | nr+* | nr++* | nr+* | nr+++* | | nr+* | nr+* |
| Other: | | | | | | | | | | | | |
| Unidentifiable | | | 1*/1* | | | | | | | | | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | | 1/1 | | 2/2 | | |
| *Chenopodium* goosefoot | | | | | | | | | | 83/83 | | 3/3 |
| *Portulaca* purslane | | 8/8 | 3/3 | 8/8 | | | | | | 133/133 | | 6/6 |
| Grasses: | | | | | | | | | | | | |
| *Sporobolus* dropseed grass | | | | | | | | | | 1/1 | | |

Table 5.14 (continued). LA 45507, LA 45508, and LA 70185 Full-Sort Flotation Analysis Results

| | LA 45507 | | | | | | | | | LA 45508 | LA 70185 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure 12 | | | | Pit Structure 13 | | | | | north of Pit Structure 1 | Roomblock 1, Room 2 | |
| | FS 2159 general fill 72 cm | FS 2304 general fill 20-70 cm | FS 2305 general fill 20-70 cm | FS 2306 general fill 20-70 cm | FS 1476 burned roof fall | FS 1577 fill inside partial vessel | FS 1893 Posthole 1 fill | FS 1894 hearth fill | FS 1915 hearth fill | FS 311 general fill | FS 408 from metate in fill at 49 cm | FS 670 fill above metate in Room 2 fill |
| Perennials: | | | | | | | | | | | | |
| *Juniperus* juniper | | | | | | | | | | | | l+ |
| *Opuntia* prickly pear/cholla | | | | | | | | | | 1/1 | | |
| *Pinus* pine | | | | | | | | | | | | n+ |
| Other: | | | | | | | | | | | | |
| Compositae composite family | | | | | | | | | | 1/1 | | |
| *Descurainia* tansy mustard | | | | | | | | | | 1/1 | | |
| *Euphorbia* spurge | | | | | | | | | | 1/1 | | 1/1 |
| *Phacelia* scorpionweed | | | | | | | | | | 10/10 | | |
| Polygonaceae | | | | | | | | | | 2/2 | | 1/1 |
| Unidentifiable | | | 1/1 | | | | | 1/1 | | 1/1 | | |
| Unknown | | | | | | | 1/1 | | | 3/3 | | |

Key: * = charred, + = 1-10/liter, ++ = 11-25/liter, +++ = 25-100/liter, l = leaf, n = needle, nr = nonreproductive plant part

Table 5.15. LA 70185, LA 70188, LA 70189, and LA 70196 Full-Sort Flotation Analysis Results

| | LA 70185 | | LA 70188 | | | | | LA 70189 | | | LA 70196 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | extramural hearth, east of Room 3 | ash pit SW of Roomblock 1 | Extramural Pit 1, east of pit structure | Extramural Pit 2, southeast of pit structure | burned area in pit structure | pit structure, SE quad | center of stone ring | roasting pit | roasting pit | PS | PS upper floor | PS lower floor |
| | FS 524 fill | FS 525 fill | FS 1130 fill | FS 1268 fill | FS 1341 fill | FS 1497 fill 80 cm | FS 1503 fill | FS 200 fill | FS 202 fill | FS 203 floor | FS 222 under mano, metate | FS 182 hearth fill |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | 1*/1* | | | | | | | | | | | |
| *Chenopodium* goosefoot | 7*/7* | 6*/6* | | | | | | | | | | |
| *Portulaca* purslane | 33*/33* | | | | | | | | | | | |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* maize | c++* | c+* | | | | | | | | c+* | | |
| Perennials: | | | | | | | | | | | | |
| *Juniperus* juniper | | | | | l+++* | | | | | | | |
| Pinus pine | | nr+* | | | nr+* | | | | b+* | | b+* | b+* |
| *Yucca* yucca | | | | | | | | | | 1*/1* | | |
| Other: | | | | | | | | | | | | |
| *Plantago* plantain | 2*/2* | | | | | | | | | | | |
| *Suaeda* seepweed | | | | 2*/2* | | | | | | | | |
| Unidentifiable | 10e*/10e* | | 1e*/1e* | | | | 1pp*/1pp* | l+* | | | | |

Table 5.15 (continued). LA 70185, LA 70188, LA 70189, and LA 70196 Full-Sort Flotation Analysis Results

| | LA 70185 | | LA 70188 | | | | | LA 70189 | | | LA 70196 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | extramural hearth, east of Room 3 | ash pit, SW of Roomblock 1 | extramural Pit 1, east of pit structure | Extramural Pit 2, southeast of pit structure | burned area in pit structure | Pit structure SE quad | center of stone ring | roasting pit | roasting pit | PS | PS upper floor | PS lower floor |
| | FS 524 | FS 525 | FS 1130 fill | FS 1268 fill | FS 1341 fill | FS 1497 fill | FS 1503 fill | FS 200 fill | FS 202 fill | FS 203 floor | FS 222 under mano, metate | FS 182 hearth fill |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* | 3/3 | | | | | | | | | | | |
| pigweed | | | | | | | | | | | | |
| *Chenopodium* | | | | | | | | 1/1 | | | | |
| goosefoot | | | | | | | | | | | | |
| Other: | | | | | | | | | | | | |
| *Euphorbia* | | 1/1 | | | | | | | | | | |
| spurge | | | | | | | | | | | | |
| *Oenothera* | | | | | 1/1.1 | | | | | | | |
| evening primrose | | | | | | | | | | | | |
| Unidentifiable | | 1/1 | | | | 1pp/1pp | | | | | | 1/1 |

Key: * = charred, + = 1-10/liter, ++ = 11-25/liter, +++ = 25-100/liter, b = bark, c = cupule, e = embryo, k = kernel, l = leaf, nr = nonreproductive plant part, pp = plant part, PS = pit structure

Table 5.16. LA 70196, LA 75791, LA 75792, and LA 78439 Full-Sort Flotation Analysis Results

| | LA 70196 | | | LA 75791 | | | | LA 75792 | LA 78439 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PS lower floor hearth | PS roof fall | PS below roof fall | PS 1 | | extramural Roasting Pit 1 | extramural Roasting Pit 2 | PS floor | roasting pit | burn area | Hearth 1 | Hearth 4 | Hearth 5 |
| | FS 348 fill | FS 150 fill | FS 215 under hatch cover | FS 50 fill | FS 140 fill | FS 2 fill | FS 158 fill | FS 273 fill under metate | FS 29 fill | FS 52 fill | FS 165 fill | FS 181 fill | FS 166 fill |
| CULTURAL | | | | | | | | | | | | | |
| Cultigens: | | | | | | | | | | | | | |
| *Zea mays* maize | k+* | | k+* | | | k+* | | | | | | | |
| Perennials: | | | | | | | | | | | | | |
| *Juniperus* juniper | | | | | | | | | 1*/1* | | | l+* | |
| *Pinus* pine | nr+* | b+* | b++* | nr+* | | nr+* | | | b+* | | | | |
| Other: | | | | | | | | | | | | | |
| Unidentifiable | 2pp*/2pp * | | | | | | | 1*/1* | | 1*/1* | 1pp*/1pp* | | |
| NONCULTURAL | | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | | | | | | 2/2.9 | |
| cheno-am | | | | | | | | | | 44/44 | | | |
| *Chenopodium* goosefoot | | | | | | | | | | 1/1 | | | |
| *Portulaca* purslane | | | | | 19/19 | | 10/10 | | | 1/1 | 1/1 | 2/2.9 | |
| Perennials: | | | | | | | | | | | | | |
| *Juniperus* juniper | | | | | | | l+ | | | 3/3 | | l+; 1/1.5; 1 cone/1.5 cone | |

Table 5.16 (continued). LA 70196, LA 75791, LA 75792, and LA 78439 Full-Sort Flotation Analysis Results

| | LA 70196 | | | LA 75791 | | | | LA 75792 | LA 78439 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PS lower floor hearth | PS roof fall | | PS 1 | | extramural Roasting Pit 1 | extramural Roasting Pit 2 | PS floor | roasting pit | burn area | Hearth 1 | Hearth 4 | Hearth 5 |
| | FS 348 fill | FS 150 fill | FS 215 under slab | FS 50 fill | FS 140 fill | FS 2 fill | FS 158 fill | FS 273 fill under metate | FS 29 fill | FS 52 fill | FS 165 fill | FS 181 fill | FS 166 fill |
| *Pinus edulis* piñon | | | | | | | | | | 7ns/7ns | | | |
| Other: | | | | | | | | | | | | | |
| *Oenothera* evening primrose | | | | | 1/1 | | 6/6 | | | | | | |
| Polygonaceae buckwheat family | | | | | | | | | | | | | 1/1 |
| *Suaeda* seepweed | | | | | | | | | | 1/1 | | | |
| Unidentifiable | | | | | | | | | | | | | 1/1 |
| Unknown 9145 | | | | | 1/1 | | | 1/1 | | | | | |
| Unknown 9146 | | | | | | | | | | 1/1 | | | |
| Unknown 9147 | | | | | 1/1 | | | | | | | | |

Key: * = charred, + = 1-10/liter, ++ = 11-25/liter, b = bark, c = cupule, k = kernel, l = leaf, nr = nonreproductive plant part, ns = nutshell, pp = plant part, PS = pit structure

Table 5.17. LA 89846 Full-Sort Flotation Analysis Results

| | Hearth | Slab-Lined Roasting Pit |
|---|---|---|
| | FS 189 fill | FS 191 general fill |
| Cultural | | |
| Perennials: | | |
| *Pinus* | u++* | |
| NONCULTURAL | 81/41 | 57/29 |
| Annuals: | | |
| *Amaranthus* | | |
| pigweed | | |
| *Chenopodium* | 289/145 | 48/24 |
| goosefoot | | |
| *Helianthus* | 205/103 | 7/4 |
| sunflower | | |
| *Portulaca* | 924/462 | 254/127 |
| purslane | | |
| Grasses: | | |
| Gramineae | 16/8 | 9/5 |
| *Sporobolus* | 6/3 | 27/14 |
| dropseed grass | | |
| Perennials: | 11/6 | |
| cf. *Celtis* | | |
| hackberry | | |
| *Juniperus* | t+ | |
| juniper | | |
| Other: | 3/2 | |
| Boraginaceae | | |
| borage family | | |
| Compositae | 13/7 | |
| *Descurainia* | | 23/12 |
| tansy mustard | | |
| Other: | | |
| *Euphorbia* | 7/4 | |
| spurge | | |
| *Melilotus* | | 16/8 |
| sweet clover | | |
| *Oenothera* | 281/141 | 14/7 |
| evening primrose | | |
| *Physalis* | 8/4 | 5/3 |
| groundcherry | | |
| Polygonaceae | 8/4 | 4/2 |
| buckwheat family | | |
| Unknown 9173 | 2/1 | |
| Unknown 9174 | 43/22 | 1/.5 |
| Unknown 9177 | | 4/2 |
| *Verbascum* | 235/118 | 4/2 |
| mullein | | |
| *Euphorbia* | 7/4 | |
| spurge | | |
| *Melilotus* | | 16/8 |
| sweet clover | | |
| *Oenothera* | 281/141 | 14/7 |
| evening primrose | | |

| | Hearth | Slab-Lined Roasting Pit |
|---|---|---|
| | FS 189 fill | FS 191 general fill |
| Polygonaceae buckwheat family | 8/4 | 4/2 |
| Unknown 9173 | 2/1 | |
| Unknown 9174 | 43/22 | 1/.5 |
| Unknown 9177 | | 4/2 |
| *Verbascum* mullein | 235/118 | 4/2 |

Key: u = umbo; t = twig; * = charred; + = 1-10/liter

Table 5.18. LA 39968 Flotation Scan Results

| | Roomblock, Room 1 | | | | Pit Structure | Pit Structure, Floor 1 | | | | | Pit Structure, Floor 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 552.2 Vessel 2 Burial 1 | FS 554 rodent hole fill | FS 555 rodent hole fill | FS 1105 stone bowl | FS 1199 roof fall ash lens | FS 2181 Posthole 3 bottom fill | FS 2187 Posthole 6 fill | FS 2522 fill under Metate 1 | FS 2523 fill under Metate 1 | FS 2179 fill from behind Metate 3 | FS 2429 Hearth 2 east ½ fill |
| CULTURAL | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | +* | | | | | | +* |
| *Chenopodium* goosefoot | | | | | e+* | | | | | | +* |
| *Portulaca* purslane | | | | | | | | | | | +* |
| Perennials: | | | | | | | | | | | |
| *Yucca* yucca | | | | | | | | | | | +* |
| Other: | | | | | | | | | | | |
| *Phacelia crenulata* scorpionweed | | | | | +pc | | | | | | |
| NONCULTURAL | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | |
| *Amaranthus* Pigweed | | | | | | | | | | + | |
| *Chenopodium* goosefoot | + | | | + | | | | | + | | |
| *Nicotiana attenuata* | | | | | | | | | | + | |
| *Portulaca* purslane | | | | + | | | | | | | |
| Grasses: | | | | | | | | | | | |
| Gramineae grass family | | | | | | | | nr+ | | | |

| | Roomblock, Room 1 | | | Pit Structure | | Pit Structure, Floor 1 | | | | | Pit Structure, Floor 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 552.2 Vessel 2 Burial 1 | FS 554 rodent hole fill | FS 555 rodent hole fill | FS 1105 stone bowl | FS 1199 roof fall ash lens | FS 2181 Posthole 3 bottom fill | FS 2187 Posthole 6 fill | FS 2522 fill under Metate 1 | FS 2523 fill under Metate 1 | FS 2179 fill from behind Metate 3 | FS 2429 Hearth 2 east ½ fill |
| Perennials: | | | | | | | | | | | |
| *Juniperus* | | | | l+ | | | | | | | |
| juniper | | | | | | | | | | | |
| *Pinus* | | | | n+ | | | | | n+ | | |
| pine | | | | | | | | | | | |
| *Quercus* | | | | | | | | | | l+ | |
| oak | | | | | | | | | | | |
| Other: | | | | | | | + | + | | | |
| *Mentzelia* | | | | | | | | | | | |
| stickleaf | | | | | | | | | | | |
| Unknown 9143 | | | | | | | | | | | + |

Key: c = cupule; e = embryo; l = leaf; n = needle; nr = nonreproductive plant part; pc = partially charred; * = charred; + = 1-10/liter; ++ = 11-25/liter; +++ = 25-100/liter

Table 5.19. LA 39968 Flotation Scan Results

| | Pit Structure, Floor 2 FS 2180 Hearth 3 fill | Extramural Pit 11 FS 2476 fill | Extramural Pit 12 FS 1539 fill |
|---|---|---|---|
| CULTURAL | | | |
| Annuals: | | | |
| *Chenopodium* goosefoot | +++*; e+* | | |
| *Portulaca* purslane | | | +* |
| Cultigens: | | | |
| *Zea mays* maize | c++* | | c+* |
| NONCULTURAL | | | |
| Annuals: | | | |
| *Chenopodium* goosefoot | | + | + |
| *Portulaca* purslane | | + | |
| Other: | | | |
| Unknown #9143 | | | + |

Key: c = cupule; e = embryo; + = 1-10/liter; ++ = 11-25/liter; +++ = 25-100/liter

Table 5.20. LA 39969, LA 39975, and LA 45507 Flotation Scan Results

| | LA 39969 | | | | LA 39975 | | LA 45507 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Burial 1, Reserve Smudged bowl | Burial 2, Reserve Smudged bowl | Burial 2, Alma Plain jar | Burial 2, Alma rough jar | Extramural Roasting Pit | Pit Structure 1 | Pit Structure 1 | | | | | |
| | FS 956 fill | FS 1050 fill | FS 1050 fill | FS 1050 fill | FS 470 fill | FS 481 hearth fill | FS 51 burned roof fall | FS 48 Posthole 1 fill | FS 64 Posthole 2 fill | FS 65 Posthole 2 fill | FS 70 hearth fill | FS 93 hearth fill |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | +*; e+* | | +++* | +* | +* | +* | +* | +* |
| *Chenopodium* goosefoot | | +* | +* | | +* | | +++* | +* | +* | +* | +* | +* |
| *Corispermum* bugseed | | | | | | | | | | | | +* |
| *Cycloloma* winged pigweed | | +* | | +* | | | | | | | | |
| *Monolepis* patata | | | | | | | | +* | | | | |
| *Portulaca* purslane | | | | | +* | | | +* | | | +* | |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* maize | | | | | c+++* | | | | | | | |
| Other: Unidentifiable | +* | | | | +* | | | | | | | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | | | | | | + |
| *Chenopodium* goosefoot | | | | | | | | | | | + | |
| *Portulaca* purslane | | + | | | | + | | | | | + | |

c = cupule; e = embryo; * = charred; + = 1-10/liter; ++ = 11-25/liter; +++ = 25-100/liter

## Table 5.21. LA 45507 Flotation Scan Results

| | Pit Structure 1 | Pit Structure 3 | | | | | | | | | Pit Structure 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 94 hearth, fill | FS 649 bowl on floor, fill | FS 665 broken pot on floor, fill | FS 674 hearth fill | FS 675 fill above metate in fill | FS 676 fill from metate in fill | FS 891 subfloor pit fill | FS 894 hearth fill | FS 896 upper surface, metate in fill | FS 890 exterior pit | FS 1223 ash pit fill | FS 1431 possible posthole fill |
| CULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | +* | +* | | | | | | | | +* | |
| *Chenopodium* goosefoot | +* | +* | | +* | | +* | | | +* | | | +*; e+* |
| *Portulaca* purslane | | | | | | | | | | +* | | +* |
| Cultigens: | | | | | | | | | | | | |
| *Zea mays* maize | | | | k+* | | | | | | | | |
| Unknown 9138 | | | | +* | | | | | | | | |
| NONCULTURAL | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | + | | | + | | | | | |
| *Chenopodium* goosefoot | | | | | | | | + | | | + | |
| *Corispermum* bugseed | | | | | | | | | + | | | |
| *Portulaca* purslane | | | | | | | | | | + | | + |
| Grasses: | | | | | | | | | | | | |
| Gramineae grass family | | | | | + | | | | | | | |
| Other: Unknown | | | | | | | | | + | | | |

Key: k = kernel; * = charred; + = 1-10/liter; ++ = 11-25/liter; +++ = 25-100/liter

Table 5.22. LA 45507, LA 45508, and LA 45510 Flotation Scan Results

| | LA 45507 | | | | | | LA 45508 | LA 45510 |
|---|---|---|---|---|---|---|---|---|
| | Pit Structure 12 | | | | | extramural trash pit | Pit Structure 1 | hearth |
| | FS 1347 roof fall | FS 1455 general fill 40-60 cm | FS 1472 general fill 60 cm | FS 1715 general fill 70-80 cm | FS 1716 general fill 70-80 cm | FS 1179 fill | FS 523 floor | FS 300 fill |
| CULTURAL | | | | | | | | |
| Annuals: | | | | | | | | |
| *Amaranthus* pigweed | +* | +* | +* | +* | | | | |
| *Chenopodium* goosefoot | | +* | +++* | | e+* | | | |
| *Portulaca* purslane | +* | +* | +* | | | | | |
| Cultigens: | | | | | | | | |
| *Zea mays* maize | c+++* | c++*; k+* | c+* | c+++*; k+*; s+* | c+++*; s+* | | | |
| Perennials: | | | | | | | | |
| *Platyopuntia* prickly pear cactus | | | | | | +* | | |
| Other: | | | | | | | | |
| Unidentifiable | | | | | | | | +* |
| Unknown 9142 | | | | | | +* | | |
| Unknown 9143 | | | | | +* | | | |
| NONCULTURAL | | | | | | | | |
| Annuals: | | | | | | | | |
| *Amaranthus* pigweed | | + | | | | | + | |
| *Chenopodium* goosefoot | | + | | | | | ++ | |
| *Helianthus* sunflower | | | | | | | | + |
| *Portulaca* purslane | | | | | | ++ | ++ | ++ |
| Perennials: | | | | | | | | |
| *Pinus* pine | | | | | | | | n+ |

Table 5.22 (continued). LA 45507, LA 45508, and LA 45510 Flotation Scan Results

| | LA 45507 | | | | | | LA 45508 | LA 45510 |
|---|---|---|---|---|---|---|---|---|
| | Pit Structure 12 | | | | | Extramural Trash Pit | Pit Structure 1 | hearth |
| | FS 1347 roof fall | FS 1455 general fill 40-60 cm | FS 1472 general fill 60 cm | FS 1715 general fill 70-80 cm | FS 1716 general fill 70-80 cm | FS 1179 fill | FS 523 floor | FS 300 fill |
| Other: | | | | | | | | |
| *Descurainia*<br>tansy mustard | | | | | | | + | |
| *Euphorbia*<br>spurge | | | | | | | + | |
| *Phacelia*<br>scorpionweed | | | | | | | | + |
| Polygonaceae<br>buckwheat family | | | | | | | | + |

Key: c = cupule; e = embryo; k = kernel; n = needle; s = scutella; * = charred; + = 1-10/liter; ++ = 11-25/liter; +++ = 25-100/liter.

## Table 5.23. LA 70185 Flotation Scan Results

| | Outside of Rooms | Roomblock 1, Room 1 | | | | | | | | | | Roomblock 1, Room 2 | Roomblock 1, Room 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 243 general fill 80-92 cm | FS 1221 ventilator shaft | FS 1223 mealing area | FS 1232 south ½ hearth | FS 1233 hearth fill | FS 1234 fill in metate | FS 1235 Pit 10 fill (possible posthole) | FS 1238 fill above metates 1-2 | FS 1242 Pit 2 fill | FS 1243 hearth lower fill | FS 1244 hearth upper fill | FS 1228 Pit 5 fill | FS 626 posthole |
| CULTURAL | | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | +* | | | | +* | | |
| *Chenopodium* goosefoot | | | | e+*; +* | +* | | | | | +* | | | +* |
| *Portulaca* purslane | | | | | | | | | | | | | +++* |
| Cultigens: | | | | | | | | | | | | | |
| *Zea mays* maize | | c+* | | | c+* | | c+* | | c+* | | | | |
| Other: Unidentifiable | | | | | e+* | | | | | | | | |
| NONCULTURAL | | | | | | | | | | | | | |
| Annuals: | | | | | | | | | | | | | |
| *Amaranthus* pigweed | | | | | | | | | | + | | | |
| *Chenopodium* goosefoot | + | | | | | + | | | | | | + | + |
| *Portulaca* purslane | | | + | | | | | | | | | | |
| Perennials: | | | | | | | | | | | | | |
| *Juniperus* juniper | | | | | | | | l+ | | | | | |
| Other: | | | | | | | | | | | | | |
| Compositae composite family | | | | | | | | + | | | | | |
| Papaveraceae poppy family | | | | | | | | | | | | | + |
| *Polygonum* knotweed | | | | | | | | + | | | | | + |

Key: c = cupule; l = leaf; * = charred; + = 1-10/liter; ++ = 11-25/liter; +++ = 25-100/liter.

Table 5.24. LA 70188, LA 75791, LA 78439, and LA 89846 Flotation Scan Results

| | LA 70188 | | LA 75791 | LA 78439 | | LA 89846 |
|---|---|---|---|---|---|---|
| | Pit 3 FS 1392 fill | Pit Structure FS 1534 fill from on top of the wall | Burned Stain FS 51 fill | Hearth 4 FS 145 fill | Roasting Pit FS 164 fill | Roasting Pit FS 211 fill |
| CULTURAL | | | | | | |
| Annuals: | | | | | | |
| *Amaranthus* | +* | | | | | |
| pigweed | | | | | | |
| *Chenopodium* | | | +* | | | +* |
| goosefoot | | | | | | |
| *Portulaca* | | | ++* | | | |
| purslane | | | | | | |
| Cultigens: | | | | | | |
| *Zea mays* | | | k+* | | | |
| maize | | | | | | |
| Perennials: | | | | | | |
| *Pinus* | | | | | | b+* |
| pine | | | | | | |
| *Sphaeralcea* | | | +* | | | |
| globemallow | | | | | | |
| Other: | | | | | | |
| *Suaeda* | 0 | | | | | |
| seepweed | | | | | | |
| Unidentifiable | | +* | | | | pp+* |
| Unknown 9138 | +* | | | | | |
| NONCULTURAL | | | | | | |
| Perennials: | | | l+ | l+++ | l+ | |
| *Juniperus* | | | | | | |
| juniper | | | | | | |
| Other: | | | + | | | |
| Polygonaceae | | | | | | |
| buckwheat family | | | | | | |
| Unidentifiable | | | | | | |
| Unknown | | | | + | | |

Key:* = charred, + = 1-10/liter; ++ = 11-25/liter; +++ = 25-100/liter b = bark, c = cupule, k = kernel,  = leaf, pp = plant part.

Table 5.25. Species Composition (by weight in grams) of Flotation Wood, LA 3279

| | Room 2 | Room 5 | Room 6 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 175 Hearth | FS 168 SW Corner | FS 229 Vessel 2 | FS 269 Upper Hearth | FS 283 Ash Pit | FS 289 Ash Pit, North ½ | FS 289 Ash Pit, South ½ | FS 300 Posthole Fill | FS 302 Roasting Pit | FS 303 Pit | FS 308 Pit 8 |
| CONIFERS: | | | | | | | | | .73 | | |
| *Pinus edulis* piñon | | | | | | | | | | | |
| *Pinus ponderosa* ponderosa pine | | | | | | | | | | .07 | |
| Undetermined conifer | .12 | .15 | .04 | .01 | .13 | .11 | .10 | .19 | 1.16 | .13 | .34 |
| NONCONIFERS: | | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | .04 | | | | | | | | | |
| *Quercus* oak | .02 | .02 | .02 | <.01 | .04 | | | <.01 | | .02 | 0.0 |
| Rosaceae rose family | .02 | | | | | | | | | | |
| Undetermined nonconifer | | | .01 | | .16 | .02 | .03 | .01 | | | |
| OTHER: | | | | | | | | | | | |
| Unknown wood | | | | | | | | .16 | | | |
| TOTAL weight | .16 | .21 | .07 | .01 | .33 | .13 | .13 | .36 | 1.89 | .22 | .34 |
| TOTAL taxa | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 1 | 2 | 2 |

Table 5.26. Species Composition (by weight in grams) of Flotation Wood, LA 3279

| | Room 6 | | | | | | | | | Rooms 2 and 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 314 Pit 9 from above Vessel 7 | FS 317 Pit 11 | FS 328 Firepit 14 | FS 332 Posthole 14 | FS 339 Pit 15 | FS 342 Posthole 16 | FS 344 Posthole 17 | FS 345 Pit 12 | FS 349 pit | FS 348 storage bin, Vessel 4 | FS 747 storage bin |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus* juniper | .26 | | | | | | | | | .11 | |
| *Pinus edulis* piñon | | .32 | | | | | | | .03 | | |
| *Pinus ponderosa* ponderosa pine | | | .26 | | | <.01 | | .01 | | .02 | |
| Undetermined conifer | .58 | .21 | .29 | .18 | 1.09 | .05 | .12 | .18 | .10 | .20 | .36 |
| NONCONIFERS: | | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | | | | | | | | | | .10 |
| *Populus/Salix* cottonwood/willow | | .03 | .01 | | | | | | | .21 | |
| *Quercus* oak | .11 | .06 | .11 | .01 | .07 | .01 | .06 | .09 | | .03 | .01 |
| Rosaceae rose family | | | | | | | | | .01 | | |
| Undetermined nonconifer | | | | | | | | .16 | | .57 | .44 |
| TOTAL weight | .95 | .62 | .67 | .19 | 1.16 | .06 | .18 | .44 | .14 | 1.14 | .91 |
| TOTAL taxa | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 5 | 4 |

Table 5.27. Species Composition (by weight in grams) of Flotation Wood, LA 3279

| | Room 7 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 347 stone bowl | FS 357 Storage Pit 1 | FS 358 small pit | FS 365 ash pit | FS 366 storage pit | FS 369 Ash Pit 2 | FS 370 posthole | FS 371 Posthole 1 | FS 372 pit | FS 373 posthole | FS 374 Vessel 9 |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus* juniper | | | .10 | .21 | .30 | .16 | .13 | .05 | .25 | .07 | .02 |
| *Pinus edulis* piñon | | | | | | .02 | .07 | | .22 | | |
| *Pinus ponderosa* ponderosa pine | .26 | | | | | | | .05 | .03 | .03 | |
| Undetermined conifer | .21 | .46 | .14 | .14 | .23 | .22 | .43 | .40 | .16 | .14 | .20 |
| NONCONIFERS: | | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | | .01 | .01 | | | | | .08 | .04 | .01 |
| *Populus/Salix* cottonwood/willow | | .02 | | | | | | .01 | | | .01 |
| *Quercus* oak | .02 | .22 | .07 | .01 | | | | .01 | .04 | .01 | .06 |
| Rosaceae rose family | | | | | | | | | | | |
| Undetermined nonconifer | | | .01 | | .01 | | | | | | .01 |
| TOTAL weight | .49 | .68 | .33 | .37 | .54 | .40 | .63 | .52 | .78 | .29 | .31 |
| TOTAL taxa | 2 | 3 | 4 | 3 | 2 | 2 | 2 | 4 | 5 | 4 | 5 |

Table 5.28. Species Composition (by weight in grams) of Flotation Wood, LA 3279

| | Room 7 | | | | | | | | | Room 8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 375 Pit 2 | FS 376 hearth in fill above floor | FS 377 hearth N ½ | FS 378 pit | FS 379 Pot Rest 3 | FS 385 Ash Pit 1 | FS 386 Pit 3 | FS 387 Posthole 2 | FS 492 metate on floor | FS 382 Hearth 2 | FS 383 pit |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus* juniper | .21 | | .03 | .06 | .05 | | | | .03 | .02 | .02 |
| *Pinus edulis* piñon | | | | .05 | .38 | | | .02 | | | |
| *Pinus ponderosa* ponderosa pine | .12 | 1.63 | | .10 | | | | .01 | .18 | | .09 |
| Undetermined conifer | .03 | .18 | .30 | .11 | .16 | .19 | .22 | .11 | .21 | .25 | .30 |
| NONCONIFERS: | | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | | .02 | .10 | .01 | | | | | | |
| *Populus/Salix* cottonwood/willow | | | | | | | | .01 | | | |
| *Quercus* oak | .72 | .04 | .14 | .36 | .01 | .05 | | | .01 | .01 | .01 |
| Undetermined nonconifer | | | | | | | .01 | .04 | .02 | | .03 |
| TOTAL weight | 1.08 | 1.85 | .49 | .78 | .61 | .24 | .23 | .19 | .45 | .28 | .45 |
| TOTAL taxa | 3 | 2 | 3 | 5 | 4 | 2 | 2 | 4 | 4 | 2 | 3 |

Table 5.29. Species Composition (by weight in grams) of Flotation Wood, LA 3279

| | Room 8 | | Room 9 | | | | | | | | Room 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 384 posthole | FS 388 posthole | FS 506 hearth, south ½ | FS 508 ceramic vessel on floor | FS 509 NW ¼ floor | FS 522 Pit 2 | FS 524 Pit 1 | FS 556 subwall hearth | FS 562 Vent 2 | FS 563 center posthole | FS 565 hearth lower fill |
| CONIFERS: | | | | | | | | | | | .42 |
| *Juniperus* juniper | .07 | .05 | .05 | | .13 | | .06 | .02 | | | |
| *Pinus edulis* piñon | .03 | | | | | | | | .01 | | |
| *Pinus ponderosa* ponderosa pine | | | .08 | | .09 | | | .28 | | .56 | .01 |
| Undetermined conifer | .08 | .08 | .24 | .11 | .18 | .18 | .09 | .14 | .24 | .14 | .09 |
| NONCONIFERS: | | | | | | | | | | .01 | |
| *Populus/Salix* cottonwood/willow | | | | | | | | | | | |
| *Quercus* oak | .02 | .01 | .02 | .03 | .01 | .02 | .10 | | | .01 | .04 |
| Undetermined nonconifer | | | | | .02 | | .21 | | | | |
| TOTAL weight | .20 | .14 | .39 | .14 | .43 | .20 | .46 | .44 | .25 | .72 | .56 |
| TOTAL taxa | 3 | 2 | 3 | 2 | 4 | 2 | 3 | 2 | 1 | 3 | 3 |

Table 5.30. Species Composition (by weight in grams) of Flotation Wood, LA 3279

| | Room 10 | | Room 11 | | | Room 13 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 613<br>pit | FS 626<br>ash from ash pit | FS 628<br>pit fill | FS 560<br>Vessel 1 | FS 631<br>hearth | FS 564<br>Vessel 1 | FS 646<br>Pit 2 | FS 648<br>Pit 1 | FS 649<br>slab-lined hearth | FS 651<br>ash pit | FS 670<br>hearth |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus*<br>juniper | .04 | .29 | | | | | | | | | |
| *Pinus edulis*<br>piñon | .03 | .05 | | | | | | | | .08 | .01 |
| *Pinus ponderosa*<br>ponderosa pine | .30 | | | | | | | | | | |
| Undetermined conifer | .11 | .06 | .15 | <.01 | .12 | .15 | .10 | .58 | .24 | .28 | .07 |
| NONCONIFERS: | | | | | | | | | | | |
| *Quercus*<br>oak | .01 | .65 | .02 | | 29 | .01 | .05 | .10 | <.01 | .10 | .15 |
| Undetermined nonconifer | | | .02 | | | | .02 | .02 | | | .02 |
| TOTAL weight | .49 | 1.05 | .19 | <.01 | .41 | .16 | .17 | .70 | .24 | .46 | .25 |
| TOTAL taxa | 4 | 3 | 3 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 3 |

Table 5.31. Species Composition (by weight in grams) of Flotation Wood, LA 3279

| | Kiva | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | FS 675 possible posthole | FS 678 Pit 5 | FS 704 possible sipapu | FS 705 Pit 3 | FS 708 hearth | FS 709 posthole | FS 712 west footdrum | FS 713 lower hearth | FS 714 Burial 1, Vessel 3 |
| CONIFERS: | | | | | | | | | |
| *Juniperus* juniper | .32 | | .11 | <.01 | | .03 | .06 | | |
| *Pinus edulis* piñon | | .42 | | | | | .15 | | |
| *Pinus ponderosa* ponderosa pine | | | | .22 | | | .10 | | |
| Undetermined conifer | .21 | .41 | .74 | .72 | .06 | .32 | .52 | .21 | .04 |
| NONCONIFERS: | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | | .52 | | | | | | |
| *Populus/Salix* cottonwood/willow | | | | | | | | | <.01 |
| *Quercus* oak | .05 | 0.0 | .92 | .02 | .01 | .03 | .03 | .03 | <.01 |
| Undetermined nonconifer | .01 | | | <.01 | <.01 | | | | |
| TOTAL weight | .59 | .83 | 2.29 | .96 | .07 | .38 | .86 | .24 | .04 |
| TOTAL taxa | 3 | 2 | 3 | 4 | 3 | 2 | 4 | 2 | 3 |

Table 5.32. Species Composition (by weight in grams) of Flotation Wood, LA 3279

| | Kiva | | | | Site Totals | |
|---|---|---|---|---|---|---|
| | FS 716 Posthole 3 | FS 726 Posthole 4 | FS 719 Posthole 5 | FS 730 Subfloor Ashpit | Total Weight | % Weight |
| CONIFERS: | | | | | | |
| *Juniperus* juniper | .01 | .12 | .18 | .43 | 4.47 | 11% |
| *Pinus edulis* piñon | .08 | | | .12 | 2.82 | 7% |
| *Pinus ponderosa* ponderosa pine | .06 | .15 | .11 | .14 | 4.96 | 12% |
| Undetermined conifer | .38 | .71 | .41 | .69 | 19.34 | 48% |
| NONCONIFERS: | | | | | | |
| *Cercocarpus* mountain mahogany | | | | | .94 | 2% |
| *Populus/Salix* cottonwood/willow | .04 | .01 | .04 | | .19 | <1% |
| *Quercus* oak | .05 | .09 | .15 | .25 | 5.92 | 15% |
| Rosacaeae rose family | | .02 | | | .08 | <1% |
| Undetermined nonconifer | .02 | | | | 1.3 | 3% |
| Other: Unknown wood | | | | | .16 | <1% |
| TOTAL weight | .64 | 1.1 | .89 | 1.63 | 40.18 | 98% |
| TOTAL taxa | 6 | 5 | 4 | 4 | 9 | |

Table 5.33. Species Composition (by weight in grams) of Flotation Wood, LA 37917, LA 39968, LA 39969, LA 39975, and LA 43766

| | LA 37917 | LA 39968 | | | | | | | LA 39969 | LA 39975 | LA 43766 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hearth 1 FS 36 fill | Pit Structure, Floor 1 | | Pit Structure, Floor 2 | | | Site Totals | | Room 2 FS 501 possible posthole fill | Roasting Pit, NW of Pit Structure 1 FS 473 Level 2a | Upper Hearth FS 108 fill |
| | | FS 2125 Hearth 1 fill | FS 2177 Pit 2 fill | FS 2175 Hearth 2 fill, west ½ | FS 2176 Hearth 2 fill, east ½ | FS 2428 Hearth 2 fill | Total Weight | % Weight | | | |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus* juniper | | .12 | | .03 | | .03 | .18 | 7% | | .08 | .03 |
| *Pinus edulis* piñon | | .04 | | .04 | .01 | .06 | .15 | 6% | .21 | | |
| *Pinus ponderosa* ponderosa pine | | | | .02 | | | .02 | <1% | | | |
| Undetermined conifer | .38 | .09 | .10 | .09 | 1.12 | .32 | 1.72 | 64% | 1.88 | .40 | .27 |
| NONCONIFERS: | | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | | | | | .04 | .04 | 1% | | | |
| *Populus/Salix* cottonwood/willow | | | | .04 | | | .04 | 1% | | | |
| *Quercus* oak | | .07 | .10 | .13 | | .11 | .41 | 15% | | .04 | .04 |
| Rosacaeae rose family | | | | | | .10 | .10 | 4% | | | |
| Undetermined nonconifer | .03 | | .02 | | | | .02 | <1% | | .08 | |
| TOTAL weight | .41 | .32 | .22 | .35 | 1.13 | .66 | 2.68 | 98% | 2.09 | .60 | .34 |
| TOTAL taxa | 2 | 3 | 3 | 5 | 2 | 5 | 8 | | 1 | 3 | 2 |

Table 5.34. Species Composition (by weight in grams) of Flotation Wood, LA 45507, LA 70188, and LA 70189

| | LA 45507 | | | | | | LA 70188 | | LA 70189 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure 1 | Pit Structure 3 | | Pit Structure 12 | Site Totals | | Burned Area in Pit Structure | Rock Pile | Roasting Pit | | |
| | FS 93 hearth | FS 674 hearth | FS 891 subfloor pit | FS 2306 roasting pit fill | Total Weight | % Weight | FS 1341 fill | FS 1608 fill | FS 200 fill | FS 201 fill | FS 202 fill |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus* juniper | | | | | | | .39 | .04 | | | |
| *Pinus edulis* piñon | | | | | | | .28 | | | | |
| *Pinus ponderosa* ponderosa pine | .03 | .17 | .06 | .09 | .35 | 36% | | | | .01 | |
| Undetermined conifer | .23 | .14 | .12 | .12 | .61 | 63% | .42 | .01 | .25 | .23 | .44 |
| NONCONIFERS: | | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | | <.01 | | <.01 | <1% | | .23 | | .04 | <.01 |
| *Populus/Salix* cottonwood/willow | | | | | | | | | | | |
| *Quercus* oak | | | .01 | | .01 | 1% | | .04 | | | |
| Rosacaeae rose family | | | | | | | | | | | |
| Undetermined nonconifer | | | | | | | | .08 | | | |
| TOTAL weight | .26 | .31 | .19 | .21 | .97 | 100% | .91 | .40 | .25 | .28 | .44 |
| TOTAL taxa | 1 | 1 | 3 | 1 | 3 | | 2 | 4 | 1 | 2 | 2 |

Table 5.35. Species Composition (by weight in grams) of Flotation Wood, LA 70189 and LA 70196

| | LA 70189 | LA 70189 | | LA 70196 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure FS 203 fill | Site Totals | | Pit Structure FS 75 Level 2 | Pit Structure Roof Fall FS 150 fill | Pit Structure Lower Floor FS 182 hearth fill | Pit Structure Lower Floor FS 348 hearth fill | Pit Structure Lower Floor FS 350 hearth fill | Site Totals | |
| | | Total Weight | % Weight | | | | | | Total Weight | % Weight |
| CONIFERS: | | | | | | | | | | |
| *Juniperus* juniper | .01 | .01 | <1% | .04 | .30 | .07 | .09 | .32 | .82 | 33% |
| *Pinus edulis* piñon | .01 | .01 | <1% | | | | .30 | | .30 | 12% |
| *Pinus ponderosa* ponderosa pine | | .01 | <1% | | | | | | | |
| Undetermined conifer | .16 | 1.08 | 94% | .56 | .22 | .15 | .14 | .32 | 1.39 | 55% |
| NONCONIFERS: | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | .04 | 3% | | | | | | | |
| *Quercus* oak | <.01 | <.01 | | | | | | | | |
| TOTAL weight | .18 | 1.15 | 97% | .60 | .52 | .22 | .53 | .64 | 2.51 | 100% |
| TOTAL taxa | 3 | 5 | | 1 | 1 | 1 | 2 | 1 | 2 | |

Table 5.36. Species Composition (by weight in grams) of Flotation Wood, LA 75791 and LA 89846

| | LA 75791 | LA 89846 | |
|---|---|---|---|
| | Extramural Roasting Pit 2 | Hearth | Roasting Pit |
| | FS 158 fill | FS 189 | FS 211 |
| CONIFERS: | | | |
| *Juniperus* juniper | | .23 | |
| *Pinus ponderosa* ponderosa pine | .02 | | |
| Undetermined conifer | .34 | .12 | .12 |
| NONCONIFERS: | | | |
| *Quercus* oak | | | <.01 |
| Undetermined nonconifer | | | |
| TOTAL weight | .36 | .45 | .12 |
| TOTAL taxa | 1 | 1 | 1 |

Table 5.37. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 3279

| | Room 2 | Room 5 | Room 6 | | | | | Between Rooms 2 and 6 | Room 6 | Room 7 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 56 fill | FS 114 fill | FS 293 ash pit | FS 305 roasting pit | FS 312 pit | FS 327 fire pit | FS 346 near ash pit | FS 348 storage bin | FS 349 storage pit | FS 347 stone bowl | FS 357 Vessel 8 | FS 370 southwest quad, posthole | FS 375 Pit 2 |
| CONIFERS: | | | | | | | | | | | | | |
| *Juniperus* juniper | | | | 2.6 | .5 | 3.2 | | | | | .9 | .3 | |
| *Pinus* pine | 3.5 | 7.7 | 1.6 | 11.1 | 17.2 | 5.8 | 2.1 | .5 | 2.5 | 1.6 | 3.0 | 3.8 | 8.9 |
| *Pinus edulis* piñon | 1.1 | 4.0 | <.01 | 6.6 | .2 | .5 | | 1.6 | | | 2.3 | .9 | .8 |
| *Pinus ponderosa* ponderosa pine | | | | | | | | | 5.5 | | | 1.6 | |
| Undetermined conifer | 1.5 | | .3 | 6.5 | 2.7 | 1.6 | .8 | .1 | .4 | .8 | 1.9 | .2 | .8 |
| NONCONIFERS: | | | | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | | | | | | | 15.4 | | | .1 | | |
| *Quercus* oak | .3 | .2 | | .5 | | 1.6 | | | .5 | | .8 | | 1.2 |
| Undetermined nonconifer | | | | | | | | | | | | .2 | |
| TOTAL weight | 6.4 | 11.9 | 1.9 | 27.3 | 20.6 | 12.7 | 2.9 | 17.6 | 8.9 | 2.4 | 9.0 | 7.0 | 11.7 |
| TOTAL taxa | 3 | 3 | 2 | 4 | 3 | 4 | 1 | 3 | 3 | 1 | 5 | 5 | 3 |

Table 5.38. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 3279

| | Room 8 | | | Room 9 | | | Room 10 | | | | Room 11 | | Room 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 367 Ash Pit | FS 372 Ash Pit 2 | FS 376 Hearth | FS 382 Hearth 2 | FS 505 South ½ Floor | FS 563 North ½ Posthole | FS 601 Hearth | FS 612 Pit | FS 623 Feature 9 | FS 628 pit | FS 560 Northeast Quad Fill | FS 633 Northeast Quad Fill | FS 672 Southeast Quad Floor |
| CONIFERS: | | | | | | | | | | | | | |
| *Juniperus* juniper | | .3 | | | .2 | | .1 | | | | | | |
| *Pinus* pine | 3.0 | 1.4 | 2.6 | | .2 | | .2 | 2.2 | 2.9 | 1.7 | 3.3 | 3.2 | 3.2 |
| *Pinus edulis* piñon | | | | .3 | | | 0 | | | | | .6 | |
| *Pinus ponderosa* ponderosa pine | 1.5 | | | | .3 | 4.2 | .3 | .7 | | | 1.3 | | |
| Undetermined conifer | .6 | .2 | | .5 | .2 | | .3 | .1 | .1 | | .3 | 1.9 | |
| NONCONIFERS: | | | | | | | | | | | | | |
| *Quercus* oak | | | | .6 | .6 | | .3 | .1 | | | | | |
| Rosaceae rose family | | | | | .3 | | | | | | | | |
| OTHER: | | | | | | | | | | | | | |
| *Phragmites* reed | | | .2 | | | | | | | | | | |
| TOTAL weight | 5.1 | 1.9 | 2.8 | 1.4 | 1.8 | 4.2 | 1.2 | 3.1 | 3.0 | 1.7 | 4.9 | 5.7 | 3.2 |
| TOTAL taxa | 2 | 2 | 2 | 2 | 5 | 1 | 5 | 3 | 1 | 1 | 2 | 2 | 1 |

Table 5.39. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 3279

| | Room 12 | Room 13 | | | Kiva | | | | | | | Site Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 673 floor | FS 647 posthole | FS 651 Pit 3 | FS 670 hearth | FS 675 small pit | FS 704 small slab pit | FS 709 posthole | FS 719 NE quad posthole | FS 712 SW quad, foot drum | FS 715 SE quad, foot drum | FS 730 SW quad, foot drum | Weight | % Weight |
| CONIFERS: | | | | | | | | | | | | | |
| *Juniperus* juniper | | | | | 2.9 | 2.4 | | .8 | | 5.0 | .1 | 19.3 | 5% |
| *Pinus* pine | 5.5 | 1.7 | 1.3 | 1.2 | 1.3 | 9.8 | 3.9 | 1.9 | 9.3 | 28.4 | 40.6 | 198.1 | 51% |
| *Pinus edulis* piñon | | | .5 | | | 3.2 | .5 | | | 3.8 | | 26.9 | 7% |
| *Pinus ponderosa* ponderosa pine | | | | | | | | | | | | 15.4 | 4% |
| Undetermined conifer | | .2 | .6 | .1 | 16.2 | 16.2 | .2 | 1.3 | .7 | 23.3 | | 80.6 | 21% |
| NONCONIFERS: | | | | | | | | | | | | | |
| *Cercocarpus* mountain mahogany | | | .3 | | | 7.6 | | .3 | | 1.5 | | 25.2 | 6% |
| *Populus/Salix* cottonwood/willow | | | | | | .4 | | | | | | .4 | <1% |
| *Quercus* oak | | | .2 | .1 | | 16.2 | | .3 | | .7 | | 24.2 | 6% |
| Rosaceae rose family | | | | | | | | | | | | .3 | <1% |
| Undetermined nonconifer | | | | | | | | | | | | .2 | <1% |
| OTHER: | | | | | | | | | | | | | |
| *Phragmites* reed | | | | | | | | | | .1 | | .1 | <1% |
| Unknown bark | | | | | | 6.7 | | | | | | | |
| TOTAL weight | 5.5 | 1.9 | 2.9 | 1.4 | 20.4 | 62.5 | 4.6 | 4.6 | 10.0 | 62.7 | 40.7 | 390.6 | 100% |
| TOTAL taxa | 1 | 1 | 4 | 2 | 2 | 6 | 2 | 4 | 1 | 6 | 2 | 9 | |

Table 5.40. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 3563, LA 37917, and LA 37919

| | LA 3563 | LA 37917 | | | | Site Totals | | LA 37919 | | Site Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | outside of pit structure | Area A | Area F | Area D | Area G | Weight | % Weight | charcoal deposit | | Weight | % Weight |
| | FS 551 general fill | FS 170 hearth | FS 249 charcoal stain | FS 254 general fill | FS 344 hearth area | | | FS 17 general fill | FS 21 general fill | | |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus* juniper | 1.7 | 2.4 | 4.81 | 6.1 | .01 | 13.32 | 89% | | | | |
| *Pinus edulis* piñon | | | | | .64 | .64 | 4% | .75 | | .75 | 13% |
| *Pinus ponderosa* ponderosa | | | | | | | | | 3.5 | 3.5 | 62% |
| Undetermined conifer | | | 1.04 | | | 1.04 | 7% | 1.38 | | 1.38 | 25% |
| TOTAL weight | 1.7 | 2.4 | 5.85 | 6.1 | .65 | 15.0 | 100% | 2.13 | 3.5 | 5.63 | 100% |
| TOTAL taxa | 1 | 1 | 1 | 1 | 2 | 2 | | 2 | 1 | 2 | |

Table 5.41. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 39968

| | Burial 2 | | Pit Structure | | | Catchment Basin | Pit 6 | Extramural Hearth | Pit Structure | | Pit 10 | Pit Structure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 439 fill near burial | FS 589 general fill | FS 1247 fill | FS 1371 roof fall | FS 1372 roof fall | FS 1544 fill | FS 1562 floor | FS 1608 fill | FS 1820 fill | FS 1879 fill | FS 1927 fill | FS 1949 fill |
| CONIFERS: | | | | | | | | | | | | |
| *Juniperus* juniper | .02 | .07 | | | | | | .66 | | .32 | | .51 |
| *Pinus* pine | | | | | | | | .24 | | | | |
| *Pinus ponderosa* ponderosa | | | | 12.38 | 1.02 | 2.8 | | .38 | | | 1.30 | |
| Undetermined conifer | .01 | .12 | 8.78 | 2.88 | 6.77 | 1.26 | .65 | 1.37 | .10 | .35 | .77 | .78 |
| NONCONIFERS: | | | | | | | | | | | | |
| *Larrea* creosotebush | | | | | | | | .31 | | .09 | | |
| *Quercus* oak | | .03 | | | | | | 1.46 | .62 | .15 | 2.81 | |
| TOTAL weight | .03 | .22 | 8.78 | 15.26 | 7.79 | 4.06 | .65 | 4.42 | .72 | .91 | 4.88 | 1.29 |
| TOTAL taxa | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 5 | 2 | 3 | 2 | 1 |

Table 5.42. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 39968

| | Jacal Structure | Pit Structure | | Hearth 1 | Pit Structure | | | | | Site Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 1971 fill | FS 2049 entryway | FS 2088 general fill | FS 2164 west 1/2 | FS 2168 upper hearth | FS 2169 ash pit | FS 2251 metate on floor | FS 2367 lower floor | FS 2433 Hearth 2 | Weight | % Weight |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus*<br>juniper | | | | 1.34 | 5.4 | .29 | | | | 8.61 | 11% |
| *Pinus*<br>pine | | | | | | | | | | .24 | <1% |
| *Pinus edulis*<br>piñon | | | | .27 | | .61 | | | .01 | .89 | 1% |
| *Pinus ponderosa*<br>ponderosa | 10.96 | 1.94 | .94 | | | .36 | | .01 | | 32.09 | 39% |
| Undetermined conifer | | | 3.40 | 1.28 | | 1.40 | .02 | | .35 | 30.29 | 37% |
| NONCONIFERS: | | | | | | | | | | .40 | <1% |
| *Larrea*<br>creosotebush | | | | | | | | | | | |
| *Quercus*<br>oak | | | | .79 | | 1.64 | 1.02 | .60 | .04 | 9.16 | 11% |
| Undetermined nonconifer | | | | | | .08 | .07* | | | .15 | <1% |
| TOTAL weight | 10.96 | 1.94 | 4.34 | 3.68 | 5.4 | 4.38 | 1.11 | .61 | .40 | 81.83 | 99% |
| TOTAL taxa | 1 | 1 | 1 | 3 | 1 | 5 | 3 | 2 | 2 | 7 | |

* = partially charred

Table 5.43. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 39969

| | Room 1 | | | | Trash Midden | Room 2 | | | Room 3 | Extramural Firepit | Outside of Room 1 | Burial 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 315 fill | FS 325 fill | FS 362 fill | FS 1002 fill | FS 1025 fill | FS 412 fill | FS 502 posthole | FS 710 fill | FS 787 fill | FS 831 fill | FS 844 general fill | FS 1050 fill |
| CONIFERS: | | | | | | | | | | | | |
| *Pinus edulis* piñon | .84 | 3.03 | | 1.10 | | 1.01 | | .54 | | .86 | .03 | .10 |
| *Pinus ponderosa* ponderosa | .59 | 2.21 | 15.68 | | 1.36 | .35 | 7.04 | .68 | | .96 | .42 | .05 |
| Undetermined conifer | .19 | | | | | LA 39975 | | | | | 1.04 | .22 |
| NONCONIFERS: | | | | | | | | | | | | |
| *Larrea* creosotebush | | | | | | | | .08 | | | .04 | |
| *Quercus* oak | | | | .18 | | | | .41 | 1.0 | .55 | .08 | .01 |
| Undetermined nonconifer | | | | | | .02 | | | | | .15 | |
| TOTAL weight | 1.62 | 5.24 | 15.68 | 1.28 | 1.5 | 1.38 | 7.51 | 2.14 | 1.16 | 2.97 | 1.76 | .38 |
| TOTAL taxa | 2 | 2 | 1 | 2 | 1 | 3 | 1 | 4 | 2 | 3 | 5 | 3 |

Table 5.44. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 39969

| | Extramural Pit | Room 2 | Under Paving | Room 3 | Room 2 | Room 3 | Site Totals | |
|---|---|---|---|---|---|---|---|---|
| | FS 1075 | FS 1134 Subfloor | FS 1147 | FS 1163 Posthole | FS 1187 Subfloor | FS 1200 Pit 12 | Weight | % Weight |
| CONIFERS: | | | | | | | | |
| *Juniperus* juniper | | 88.64 | | | | 2.16 | 90.80 | 59% |
| *Pinus edulis* piñon | | | .34 | | 2.86 | | 10.71 | 7% |
| *Pinus ponderosa* ponderosa | | | | | 6.84 | | 36.18 | 24% |
| Undetermined conifer | 1.04 | | 2.83 | .17 | 3.10 | 2.18 | 12.57 | 8% |
| NONCONIFERS: | | | | | | | | |
| *Larrea* creosotebush | | | | .26 | | | .38 | <1% |
| *Quercus* oak | | | | .10 | | .09 | 2.42 | 2% |
| Undetermined nonconifer | | | | .12 | | | .29 | <1% |
| TOTAL weight | 1.04 | 88.64 | 3.17 | .65 | 12.8 | 4.43 | 153.35 | 100% |
| TOTAL taxa | 1 | 1 | 1 | 4 | 2 | 2 | 6 | |

Table 5.45. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 39972 and LA 39975

| | LA 39972 | | LA 39975 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Possible Use Surface | | Pit Structure 1 | | | | Roasting Pit | Pit Structure 3 | Site Totals | |
| | FS 494 general fill, 0-10 cm | FS 525 general fill, 30-40 cm | FS 225 fill | FS 267 fill | FS 487 fill | FS 565 fill | FS 566 fill | FS 623 | Weight | % Weight |
| CONIFERS: | | | | | | | | | | |
| *Juniperus*<br>juniper | | .29 | 5.6 | | 1.91 | 1.53 | 3.5 | 1.1 | 13.64 | 55% |
| *Pinus edulis*<br>piñon | .60 | | | | 2.9 | .04 | | | 2.94 | 12% |
| *Pinus ponderosa*<br>ponderosa | .86 | | | 3.61 | | | .3 | | 3.91 | 16% |
| Undetermined conifer | 1.15 | .27 | | | .50 | .58 | .6 | | 1.68 | 7% |
| NONCONIFERS: | | | | | | | | | | |
| *Larrea*<br>creosotebush | | | | | | .04 | | | .04 | <1% |
| *Quercus*<br>oak | .06 | 2.47 | | | .65 | .22 | .4 | .2 | 1.47 | 6% |
| *Acer negundo*<br>box elder | | | | | | | 1.3 | | 1.3 | 5% |
| TOTAL weight | 2.67 | 3.03 | 5.6 | 3.61 | 5.96 | 2.41 | 6.1 | 1.3 | 24.98 | 101% |
| TOTAL taxa | 3 | 2 | 1 | 1 | 3 | 4 | 4 | 2 | 6 | |

Table 5.46. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 43766

| | | Hearth | Hearth | Roasting Pit | | Roasting Pit | Hearth | Charcoal Stain | Roasting Pit | | Site Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 89 silt layer between 1st and 2nd occupations | FS 128 upper level | FS 269 upper level | FS 323 lower level | FS 481 silt layer between 1st and 2nd occupations | FS 511 lower level | FS 537 lower level | FS 566 lower level | FS 647 lower level | FS 685 general fill | Total Weight | % Weight |
| CONIFERS: | | | | | | | | | | | | |
| *Juniperus*<br>juniper | | | | | | 1.11 | .73 | .34 | | | 2.18 | 8% |
| *Pinus edulis*<br>piñon | .11 | .17 | | 1.13 | | | | .64 | 3.96 | | 6.01 | 23% |
| *Pinus ponderosa*<br>ponderosa | | .07 | .17 | | 1.60 | .18 | .14 | .18 | .05 | 1.12 | 4.45 | 17% |
| Undetermined conifer | .07 | | 1.14 | | .05 | | 1.47 | .02 | .96 | | 3.83 | 15% |
| NONCONIFERS: | | | | | | | | | | | | |
| *Larrea*<br>creosotebush | | | | | | | .54 | | | | .54 | 2% |
| *Quercus*<br>oak | .23 | 1.12 | | .41 | | 2.29 | 1.77 | .44 | 2.28 | | 8.77 | 34% |
| Undetermined nonconifer | | 0.0 | | | | | .24 | | | | .24 | <1% |
| TOTAL weight | .41 | 1.36 | 1.31 | 1.54 | 1.65 | 3.58 | 4.89 | 1.62 | 7.25 | 1.12 | 26.02 | 99% |
| TOTAL taxa | 2 | 4 | 1 | 2 | 1 | 2 | 5 | 4 | 3 | 1 | 6 | |

## Table 5.47. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 45507

| | Pit Structure 1 | | | | | | | | Pit Structure 3 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 2 above floor | FS 11 roof fall | FS 21 roof fall | FS 41 posthole | FS 63 posthole | FS 101 posthole | FS 102 posthole | FS 631 floor | FS 429 Posthole 1 | FS 655 pit | FS 659 floor | FS 660 Posthole 2 | FS 673 floor | FS 901 posthole | FS 1139 roasting pit |
| CONIFERS: | | | | | | | | | | | | | | | |
| *Juniperus* juniper | | | 1.83 | .63 | 4.47 | | | | 3.18 | | | 13.01 | | 28.23 | |
| *Pinus edulis* piñon | | .08 | | 2.06 | | | | | | | | | | | |
| *Pinus ponderosa* ponderosa | 4.42 | .95 | | | | 10.91 | 9.94 | | .20 | 2.92 | | | 3.49 | | |
| Undetermined conifer | 2.33 | 1.36 | 4.10 | 1.75 | | 1.16 | | 4.57 | | | 3.43 | | | | 1.34 |
| NONCONIFERS: | | | .43 | | | | | | | | | | | | |
| *Quercus* oak | | | | | | | | | | | | | | | |
| TOTAL weight | 6.75 | 2.39 | 6.36 | 4.46 | 4.47 | 12.07 | 9.94 | 4.57 | 3.38 | 2.92 | 3.43 | 13.01 | 3.49 | 28.23 | 1.34 |
| TOTAL taxa | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Table 5.48. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 45507

| | Pit Structure 9 | | | | Pit Structure 12 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 1136 fill | FS 1340 fill | FS 1344 floor | FS 1432 possible posthole | FS 1353 upper fill | FS 1461 upper fill | FS 1463 roasting pit | FS 1700 burial pit fill | FS 1839 posthole | FS 1840 hearth | FS 1846 floor | FS 1856 fill | FS 1925 Pit 2 | FS 2100 upper hearth |
| *Juniperus* juniper | | | | | | | 2.68 | .24 | | 5.49 | | | .65 | .46 |
| *Pinus edulis* piñon | | | | | | | | .31 | .15 | | | 2.90 | | |
| *Pinus ponderosa* ponderosa | 9.56 | .38 | 18.68 | .75 | 1.73 | 1.82 | | | | | | 1.08 | .25 | |
| Undetermined conifer | 1.43 | .33 | | 1.34 | .17 | | .65 | .78 | .08 | 1.16 | .59 | 3.47 | .01 | 1.98 |
| NONCONIFERS: | | | | | | | | | | | | | | |
| *Fraxinus* ash | | | | | | | | | .20 | | | | | |
| *Larrea* creosotebush | | | | | | | | | | | .17 | | | |
| *Quercus* oak | | | | | .36 | | | | | .51 | .09 | | | .11 |
| TOTAL weight | 10.99 | .71 | 18.68 | 2.09 | 2.26 | 1.82 | 3.33 | 1.33 | .43 | 7.16 | .85 | 7.45 | .91 | 2.55 |
| TOTAL taxa | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 2 |

Table 5.49. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 45507

| | Pit Structure 12 | | | | | | Pit Structure 13 | | | | | Site Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 2116 Posthole 3 | FS 2117 fill | FS 2121 fill | FS 2144 firepit fill | FS 2223 upper fill | FS 2300 upper fill | FS 1471 fill | FS 1866 hearth | FS 1920 Posthole 1 | FS 2080 pit | FS 2287 roof fall | Weight | % Weight |
| CONIFERS: | | | | | | | | | | | | | |
| *Juniperus*<br>juniper | .25 | | | | .52 | | | | .22 | 2.95 | | 64.81 | 28% |
| *Pinus edulis*<br>piñon | | | | | | | | | | 18.03 | .15 | 23.68 | 10% |
| *Pinus ponderosa*<br>ponderosa | | | 2.47 | | .15 | | 2.91 | .07 | | .54 | | 73.22 | 32% |
| Undetermined conifer | .34 | | | | .29 | 5.30 | .93 | 4.34<br>[bark] | .40 | 4.07 | | 55.14 | 24% |
| NONCONIFERS: | | | | | | | | | | | | .20 | <1% |
| *Fraxinus*<br>ash | | | | | | | | | | | | | |
| *Larrea*<br>creosotebush | | | | | | | | | | | | .17 | <1% |
| *Quercus*<br>oak | | 5.34 | | 3.41 | .22 | | | | .10 | | .61 | 11.18 | 5% |
| Undetermined nonconifer | | | | | | | | .02 | | | | .02 | <1% |
| TOTAL weight | .59 | 5.34 | 2.47 | 3.41 | 1.18 | 5.30 | 3.84 | 4.43 | .72 | 25.59 | .76 | 228.42 | 99 % |
| TOTAL taxa | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 2 | 2 | 3 | 2 | 7 | |

Table 5.50. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 45508 and LA 45510

| | LA 45508 | | | | Site Totals | | LA 45510 | | | Site Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure 1 | | Pit Structure 2 | outside of PS 2 | | | | | | | |
| | FS 225 fill | FS 268 fill | FS 564 | FS 598 fill | Weight | % Weight | FS 279 general fill | FS 305 general fill | FS 306 general fill | Weight | % Weight |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus* juniper | .28 | .69 | | | .97 | 3% | .58 | | | .58 | 2% |
| *Pinus edulis* piñon | .06 | | | | .06 | <1% | | | | | |
| *Pinus ponderosa* ponderosa | | | | 28.16 | 28.16 | 90% | .44 | 4.61 | | 5.05 | 14% |
| Undetermined conifer | .31 | | 1.25 | .28 | 1.80 | 6% | 1.37 | .63 | 28.38 | 30.38 | 84% |
| NONCONIFERS: | | | | | | | | | | | |
| *Artemisia* sage | | | | .28 | .28 | <1% | | | | | |
| TOTAL Weight | .65 | .69 | 1.25 | 28.72 | 31.31 | 99% | 2.36 | 5.24 | 28.38 | 35.98 | 100% |
| TOTAL Taxa | 2 | 1 | 1 | 2 | 5 | | 2 | 1 | 1 | 2 | |

Table 5.51. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 70185

| | Room 1 | | | | | | | Room 2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FS 664 fill | FS 737 fill | FS 1325 floor near south wall | FS 1390 floor | FS 1391 fill | FS 1392 hearth | FS 1397 floor | FS 1246 hearth | FS 1248 vent | FS 1381 fill | FS 1395 Pit 3 |
| CONIFERS: | | | | | | | | | | | |
| *Juniperus* juniper | | | <.01 | | | 74 | .84 | .21 | | | 1.93 |
| *Pinus edulis* piñon | .62 | .11 | .16 | | | | .03 | | .16 | | .72 |
| *Pinus ponderosa* ponderosa | | 2.69 | | 5.93 | 2.69 | 1.22 | | | | 6.83 | |
| Undetermined conifer | | .91 | | | | .29 | | | 1.83 | | 8.87 |
| NONCONIFERS: | | | | | | | | .18 | | | |
| *Quercus* oak | | | | | | | | | | | |
| TOTAL weight | .62 | 3.71 | .16 | 5.93 | 2.69 | 2.25 | .87 | .39 | 1.99 | 6.83 | 11.52 |
| TOTAL taxa | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 |

Table 5.52. Species Composition (by weight in grams) Charcoal Samples for C-14 Dating, LA 70185 (continued)

| | Room 2 | | Room 4 | Site Totals | |
|---|---|---|---|---|---|
| | FS 1396 Pit 5 | FS 1416 Hearth | FS 1453 Pit 1 | Weight | % Weight |
| CONIFERS: | | | | | |
| *Juniperus* juniper | .23 | | .70 | 3.81 | 7% |
| *Pinus edulis* piñon | | | | 1.77 | 3% |
| *Pinus ponderosa* ponderosa | | 8.48 | | 28.01 | 48% |
| Undetermined conifer | 2.48 | 8.66 | .04 | 24.22 | 42% |
| NONCONIFERS: | | | | | |
| *Quercus* oak | | | | .18 | <1% |
| TOTAL weight | 2.71 | 17.14 | .74 | 57.99 | 100% |
| TOTAL taxa | 1 | 1 | 1 | 4 | |

Table 5.53. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 70188

| | Pit Structure | | Stone Ring | Pit 3 | Athabascan Charcoal Stain | Rock Pile | Site Totals | |
|---|---|---|---|---|---|---|---|---|
| | FS 1443 fill | FS 1451 fill | FS 1454 | FS 1523 | FS 1543 general fill | FS 1603 | Weight | % Weight |
| CONIFERS: | | | | | | | | |
| *Juniperus*<br>juniper | 1.45 | 8.2 | 6.3 | | 4.8 | | 20.75 | 27% |
| *Pinus edulis*<br>piñon | 2.12 | | | | 2.0 | | 4.12 | 5% |
| *Pinus ponderosa*<br>ponderosa | | | | 42.03 | 1.7 | | 43.73 | 56% |
| Undetermined conifer | .75 | | | | | | .75 | <1% |
| NONCONIFERS: | | | | | | | | |
| *Quercus*<br>oak | | | | | 1.1 | 4.8 | 5.9 | 8% |
| *Acer negundo*<br>box elder | | | 1.2 | | | 1.7 | 2.9 | 4% |
| TOTAL weight | 4.32 | 8.2 | 7.5 | 42.03 | 9.6 | 6.5 | 78.15 | 100% |
| TOTAL taxa | 2 | 1 | 2 | 1 | 4 | 2 | 5 | |

Table 5.54. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 70189 and LA 70196

| | LA 70189 | | | | | LA 70196 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure | | Roasting Pit | Site Totals | | Extramural Pit | Pit Structure | | | | | | | Site Totals | |
| | FS 187 general fill 15-34 cm | FS 192 general fill 2-4 cm | FS 191 fill | Weight | % Weight | FS 81 fill | FS 62 fill | FS 152 roof fall | FS 204 fill (inside of pot) | FS 226 floor | FS 267 floor | FS 306 floor | FS 354 lower floor | Weight | % Weight |
| CONIFERS: | | | | | | | | | | | | | | | |
| *Juniperus*<br>juniper | 1.58 | 4.2 | 7.1 | 12.88 | 75% | 1.8 | 2.05 | 23.0 | 3.5 | 9.54 | 5.3 | | | 45.19 | 60% |
| *Pinus edulis*<br>piñon | .13 | | | .13 | <1% | | | | | | | | | | |
| *Pinus ponderosa*<br>ponderosa | | .4 | 1.7 | 2.1 | 12% | .7 | | | | | | | | 0.7 | <1% |
| Undetermined conifer | .47 | | | .47 | 3% | 3.2 | | | | | | 18.03 | 7.59 | 28.82 | 39% |
| NONCONIFERS: | | | | | | | | | | | | | | | |
| *Quercus*<br>oak | .06 | .8 | | .86 | 5% | | | | | | | | | | |
| Undetermined nonconifer | .83 | | | .83 | 5% | | | | | | | | | | |
| TOTAL weight | 3.07 | 5.4 | 8.8 | 17.27 | 100% | 5.7 | 2.05 | 23.0 | 3.5 | 9.54 | 5.3 | 18.03 | 7.59 | 74.71 | 99% |
| TOTAL taxa | 4 | 3 | 2 | 5 | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | |

Table 5.55. Species Composition (by weight in grams) of Charcoal Samples for C-14 Dating, LA 75791 and LA 78439

| | LA 75791 | | | | Site Totals | | LA 78439 | | | | | | Site Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pit Structure 1 | Pit Structure 3 | Roasting Pit 1 | Roasting Pit 2 | | | Burn Area | Roasting Pit | | | Hearth 1 | | | |
| | FS 103 general fill | FS 24 general fill | FS 52 | FS 148 | Weight | % Weight | FS 33 general fill 23-27 cm | FS 208 general fill | FS 229 bottom | FS 579 fill | FS 567 | FS 570 | Weight | % Weight |
| CONIFERS: | | | | | | | | | | | | | | |
| *Juniperus* | | | | 5.90 | 5.90 | 24% | 0.30 | 0.70 | 0.70 | 0.20 | 2.40 | 2.41 | 6.71 | 90% |
| juniper | | | | | | | | | | | | | | |
| *Pinus edulis* | 4.20 | | | | 4.20 | 17% | | | | | | | | |
| piñon | | | | | | | | | | | | | | |
| Undetermined conifer | 3.20 | 1.04 | 7.90 | 2.10 | 14.24 | 59% | 0.05 | | 0.20 | | | 0.29 | 0.54 | 7% |
| NONCONIFERS: | | | | | | | | | 0.20 | | | | 0.20 | 3% |
| *Acer negundo* | | | | | | | | | | | | | | |
| box elder | | | | | | | | | | | | | | |
| TOTAL weight | 7.4 | 1.04 | 7.9 | 8.0 | 24.34 | 100% | .35 | .7 | 3.8 | .2 | 2.4 | 2.70 | 7.45 | 100% |
| TOTAL taxa | 1 | 1 | 1 | 1 | 2 | | 1 | 1 | 2 | 1 | 1 | 1 | 3 | |

Table 5.56. Species Composition (by weight in grams) of Charcoal Samples, LA 89846

| | Roasting Pit | Hearth | Roasting Pit | Site Totals | |
|---|---|---|---|---|---|
| | FS 191 General Fill | FS 189 | FS 211 | Total Weight | % Weight |
| CONIFERS: | | | | | |
| *Juniperus* | | 2.1 | | 2.1 | 8% |
| juniper | | | | | |
| *Pinus* | .60 | 8.0 | 2.7 | 11.3 | 44% |
| pine | | | | | |
| *Pinus edulis* | .20 | 2.5 | .8 | 3.5 | 16% |
| piñon | | | | | |
| Undetermined | <.01 | 3.6 | 3.0 | 6.6 | 28% |
| conifer | | | | | |
| NONCONIFERS: | | | | | |
| *Populus/Salix* | .10 | | | .1 | <1% |
| cottonwood/willow | | | | | |
| *Quercus* | <.01 | | .3 | .3 | 1% |
| oak | | | | | |
| Undetermined | | | .8 | .8 | 3% |
| nonconifer | | | | | |
| TOTAL weight | .90 | 16.2 | 7.6 | 24.7 | 100% |
| TOTAL taxa | 4 | 3 | 4 | 6 | |

Table 5.57. Species Composition (by weight in grams) of Unburned and Partially Burned Wood, LA 39968

| | Pit Structure | | | | | | Site Totals | |
|---|---|---|---|---|---|---|---|---|
| | FS 936 | FS 1267 | FS 1359 | FS 1449 | FS 1450 | FS 1606 | Total Weight | % Weight |
| CONIFERS: | | | | | | | | |
| *Juniperus* juniper | .41pc | 2.2*; 15.53u | 10.95pc | | | Beam 1 32.30u; Beam 2 44.09u | 105.48 | 37% |
| *Pinus ponderosa* ponderosa pine | | | | | 104.01u | | 104.01 | 37% |
| Undetermined conifer | | | | 58.98u | | Beam 3 15.49u | 74.47 | 26% |
| TOTAL weight | .41 | 17.73 | 10.95 | 58.98 | 104.01 | 91.88 | 283.96 | 100% |
| TOTAL taxa | 1 | 1 | 1 | 1 | 1 | 1 | 2 | |

U = unburned; PC = partially charred

Table 5.58. Species Composition (by weight in grams) of Wood Identification Samples, LA 39969

| | Room 1 | | | | | | Site Totals | |
|---|---|---|---|---|---|---|---|---|
| | FS 220 | FS 259 | FS 277 | FS 316 | FS 342 | FS 408 | Total Weight | % Weight |
| CONIFERS: | | | | | | | | |
| *Juniperus* juniper | | 3.61u | 37.49u | | | | 41.1 | 41% |
| Undetermined conifer | 1.77u | | | 1.08u | .33u | 54.86pc | 58.04 | 59% |
| TOTAL weight | 1.77 | 3.61 | 37.49 | 1.08 | .33 | 54.86 | 99.14 | 100% |
| TOTAL taxa | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |

U = unburned; PC = partially charred

Table 5.59. Sample Distribution and Taxonomic Diversity by Provenience Category

| Provenience Category | Number of Samples | Number of Taxa | Diversity ( taxa/ of samples) |
|---|---|---|---|
| Ashpits | 10 | 13 | 1.3 |
| Burial pits | 1 | 1 | 1 |
| Burned stains | 4 | 6 | 1.5 |
| Extramural cultural surfaces | 4 | 4 | 1 |
| Extramural pits | 10 | 5 | .5 |
| Extramural thermal features | 24 | 8 | .3 |
| Floor | 7 | 8 | 1.1 |
| Footdrum | 1 | 6 | 6 |
| General fill outside structures | 2 | 0 | 0 |
| General fill | 12 | 6 | .5 |
| Under hatch cover | 1 | 2 | 2 |
| Metate fill | 10 | 4 | .4 |
| Postholes | 28 | 18 | .6 |
| Pot rest | 1 | 3 | 3 |
| Roof fall | 6 | 6 | 1 |
| possible Sipapu | 1 | 9 | 9 |
| Storage pits/bins | 3 | 7 | 2.3 |
| Thermal features | 40 | 18 | .45 |
| Trash pits | 2 | 1 | .5 |
| Undetermined pits | 31 | 25 | .8 |
| Ventilator shafts | 2 | 7 | 3.5 |
| Vessels | 19 | 9 | .47 |
| Total | 211 | 166 | 37.22 |

Table 5.60. Luna/Reserve Wood Use in Luna Valley vs. Pinelawn Valley Sites: Taxonomic Composition by Percent Weight

| | Luna Valley | | | | | Pine Lawn Valley | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Archaic<br>1 site<br>8.5 g | Pithouse<br>3 sites<br>296.68 g | Pueblo<br>2 sites<br>488.37 g | Athabaskan<br>1 site<br>16.65 g | All Periods<br>7 sites<br>810.20 g | Archaic<br>3 sites<br>83.23 g | Pithouse<br>3 sites<br>108.50 g | Pueblo<br>4 sites<br>248.60 g | Athabaskan<br>5 sites<br>79.9 g | All Periods<br>15 sites<br>520.23 g |
| **Dicot Shrubs:**<br>*Artemisia* (sage) | | <1% | | | <1% | | | | | |
| *Cercocarpus* (mountain mahogany) | | <1% | 5% | | 3% | | | <1% | <1% | <1% |
| *Larrea* (creosotebush) | | <1% | | | <1% | 1% | <1% | <1% | | <1% |
| *Quercus* (oak) | 4% | 4% | 6% | | 5% | 10% | 1.5% | 5% | 8% | 6% |
| Rosaceae (rose family) | | | <1% | | <1% | | | <1% | | <1% |
| Undetermined nonconifer | 9% | <1% | <1% | | <1% | 1% | <1% | 1% | <1% | 1% |
| **TOTAL nonconifer** | **13%** | **4%** | **12%** | | **9%** | **12%** | **1.5%** | **6%** | **8%** | **1%** |
| **Riparian:**<br>*Acer negundo* (box elder) | | | | | | | 1.5% | | 2% | 1% |
| *Fraxinus* (ash) | | <1% | | | <1% | | | | | |
| *Phragmites* (reed grass) | | | <1% | | <1% | | | | | |
| *Populus/ Salix* (cottonwood/ willow) | 1% | | <1% | | <1% | | | <1% | | <1% |
| **TOTAL riparian** | **1%** | **<1%** | **<1%** | | **<1%** | | **1.5%** | **<1%** | **2%** | **1%** |
| **Conifers:**<br>*Juniperus* (juniper) | | 22% | 6% | 14% | 12% | 17% | 71% | 42% | 48% | **42%** |
| *Pinus edulis* (piñon) | 12% | 8% | 6% | 15% | 7% | 10% | 4% | 5% | 10% | **6%** |
| *Pinus ponderosa* (ponderosa pine) | | 36% | 10% | | 19% | 55% | 1% | 28% | 9% | **24%** |
| Undetermined conifer | 74% | 30% | 66% | 71% | 53% | 6% | 21% | 19% | 23% | **20%** |
| **TOTAL conifer** | **86%** | **96%** | **88%** | **100%** | **91%** | **88%** | **97%** | **94%** | **90%** | **92%** |

Table 5.61. Luna/Reserve Flotation Results by Chronological Period (percent sites/samples taxa were found in)

| | Wild Plants | | | | Domesticates | | Preservation/ Contamination |
|---|---|---|---|---|---|---|---|
| | Goosefoot | Pigweed | Purslane | Other Taxa | Corn | Squash | |
| **ARCHAIC** | | | | seepweed [25/6] | | | poor/low |
| sites (n=4) | 50 | 50 | 25 | groundcherry [25/6] | - | - | |
| samples (n=17) | 41 | 6 | 35 | juniper [25/12] | - | - | [small shallow sites] |
| | | | | pine bark [50/12] | | | |
| **PITHOUSE** | | | | bugseed [17/4] | | | poor-moderate/low-medium |
| sites (n=6) | 67 | 33 | 33 | globemallow [17/2] | 50 | - | |
| samples (n=57) | 56 | 32 | 7 | winged pigweed [17/2] | 28 | - | |
| | | | | patata [17/2] | | | [bulk of samples are from PH villages] |
| | | | | prickly pear [17/2] | | | |
| | | | | pine bark [33/12] | | | |
| **PUEBLO** | | | | globemallow [13/2] | | | moderate/moderate-high |
| sites (n=8) | 50 | 38 | 50 | winged pigweed [25/2] | 57 | 14 | |
| samples (n=181) | 45 | 17 | 28 | patata [13/1] | 48 | 4 | [bulk of samples are from roomblocks] |
| | | | | sunflower [13/3] | | | |
| | | | | groundcherry [13/2] | | | |
| | | | | stickleaf [13/4] | | | |
| | | | | tobacco [13/3] | | | |
| | | | | scorpionweed [25/7] | | | |
| | | | | sage [13/3] | | | |
| | | | | grass family [13/4] | | | |
| | | | | dropseed grass [13/2] | | | |
| | | | | Indian ricegrass [13/1] | | | |
| | | | | sedge [13/1] | | | |
| | | | | mint family [13/1] | | | |
| | | | | buckwheat family [13/1] | | | |
| | | | | evening primrose [13/1] | | | |
| | | | | verbena [25/1] | | | |
| | | | | beeweed [13/1] | | | |
| | | | | spurge [13/1] | | | |
| | | | | yucca [25/1] | | | |
| | | | | juniper [25/10] | | | |
| | | | | pine bark, needles [38/34] | | | |
| **ATHABASKAN** | | | | globemallow [17/6] | | | poor/high |
| sites (n=6) | 17 | - | 17 | pine bark [50/24] | 17 | - | |
| samples (n=17) | 6 | - | 6 | | 12 | - | [small shallow sites] |

Table 5.62. Luna/Reserve Wood by Chronological Period: Taxonomic Composition by Percent Weight

| | Archaic<br>4 sites<br>91.73 g | Pithouse<br>6 sites<br>405.18 g | Pueblo<br>6 sites<br>736.97 g | Athabaskan<br>6 sites<br>96.55 g | ALL TIME PERIODS<br><br>1330.43 g |
|---|---|---|---|---|---|
| **Dicot Shrubs:** | | | | | |
| *Artemisia* (sage) | | <1% | | | <1% |
| *Cercocarpus* (mt. mahogany) | | <1% | 4% | <1% | 2% |
| *Larrea* (creosote bush) | 1% | <1% | <1% | | <1% |
| *Quercus* (oak) | 10% | 4% | 6% | 5% | 5% |
| Rosaceae (rose family) | | | <1% | | <1% |
| Undetermined nonconifer | 1% | <1% | <1% | 2% | 1% |
| **TOTAL nonconifer shrubs** | **12%** | **4%** | **10%** | **7%** | **8%** |
| **Riparian:** | | | | | |
| *Acer negundo* (box elder) | | | | 3% | <1% |
| *Fraxinus* (ash) | | <1% | | | <1% |
| *Phragmites* (reed grass) | | | <1% | | <1% |
| *Populus/ Salix* (cottonwood/ willow) | <1% | | <1% | | <1% |
| **TOTAL riparian** | **<1%** | **<1%** | **<1%** | **3%** | **<1%** |
| **Conifers:** | | | | | |
| *Juniperus* (juniper) | 15% | 31% | 18% | 42% | 24% |
| *Pinus edulis* (piñon) | 10% | 7% | 6% | 10% | 7% |
| *Pinus ponderosa* (ponderosa pine) | 50% | 28% | 16% | 7% | 21% |
| Undetermined conifer | 13% | 30% | 50% | 31% | 40% |
| **TOTAL conifer** | **88%** | **96%** | **90%** | **90%** | **92%** |

Table 5.63. Luna/Reserve Botanical Remains in a Regional Context: Taxonomic Occurrences by Site

| Time Period | Archaic-Early Pithouse | Early Pithouse-Early Pueblo | Archaic-Late Pueblo | | | Archaic-Athabascan | Early-Late Pueblo | Late Pueblo |
|---|---|---|---|---|---|---|---|---|
| Site | Bat Cave[1] | Gallo[2] | Cordova Cave[3] | Tularosa Cave[4] | Kelly Ranch[5] | Luna/Reserve[6] | Carter Ranch[7] | Higgins Flat[8] |
| Annuals | *Amaranthus*<br>*Chenopodium*<br>*Helianthus*<br>*Suaeda* | *Amaranthus*<br>*Chenopodium*<br>*Cleome*<br>Compositae<br>*Cycloloma*<br>*Helianthus*<br>*Nicotiana*<br>*Physalis*<br>*Portulaca* | *Chenopodium*<br>*Helianthus*<br>*Mentzelia*<br>Proboscidea | | | *Amaranthus*<br>*Chenopodium*<br>*Cleome*<br>*Corispermum*<br>*Cycloloma*<br>*Helianthus*<br>*Monolepis Nicotiana*<br>*Portulaca Suaeda* | *Helianthus* | *Chenopodium*<br>*Datura*<br>*Mentzelia*<br>*Suaeda* |
| Cacti | *Opuntia* | *Opuntia* | *Echinocereus* | *Echinocereus* | | *Opuntia* | *Opuntia* | *Opuntia* |
| *Gossypium*<br>Cotton | | | | | | | | seeds |
| Grass | seeds | seeds | spikes, seeds | stem wads | | seeds | seeds | |
| Perennials | *Juglans*<br>*Juniperus Pinus*<br>*edulis Quercus*<br>*Scirpus* | *Juglans*<br>*Juniperus Pinus*<br>*edulis*<br>*Rhus* | *Agave*<br>*Cirsium*<br>*Dasylirion Pinus*<br>*edulis Quercus*<br>*Juniperus*<br>*Juglans*<br>*Cercocarpus* | *Agave* | *Nolina*<br>(matting) | *Juniperus Pinus*<br>*edulis Pinus*<br>*ponderosa*<br>*Sphaeralcea* | *Juglans*<br>*Juniperus*<br>*Pinus edulis* | *Atriplex*<br>*Juglans*<br>*Juniperus*<br>*Dasylirion* |
| *Cucurbita foetidissima*<br>wild gourd | + | | seeds, pulp, rind | pulp, rind, roots | | | | rind, seeds |
| *Cucurbita pepo*<br>squash | vessel, seeds, rind, peduncles | rind, seeds | | peduncles, seeds | peduncles, rind | rind | seeds | seeds |
| *Lagenaria*<br>gourd | | rind | rind | | rind | | | seeds |
| *Phragmites*<br>reed grass | cigarettes | + | + | | | | | + |

Table 5.63 (continued)

| Time Period | Archaic-Early Pithouse | Early Pithouse-Early Pueblo | Archaic- Early Pueblo | Archaic-Late Pueblo | Archaic-Pueblo | Archaic-Athabascan | Early-Late Pueblo | Late Pueblo |
|---|---|---|---|---|---|---|---|---|
| Site | Bat Cave[1] | Gallo[2] | Cordova Cave[3] | Tularosa Cave[4] | Kelly Ranch[5] | Luna/Reserve[6] | Carter Ranch[7] | Higgins Flat[8] |
| *Phaseolus vulgaris* common bean | + | + | pod | pods, beans | basket w/ 92 lbs. of beans | | + | + |
| *Yucca* | cordage, leaf bundle, netting, quids | seeds, pod, sandals, cordage | cordage, fiber wads, fruits, leaf fragments | fiber wads, fruit | fiber, headband, netting | seeds | fiber, pods, seeds | seed |
| *Zea mays* maize | husks, tassels, leaf sheaths, cobs, kernels | cobs, cupules, kernels | cobs, husks, kernels, stalks | cobs, husk wads | cobs, kernels, stalks | cupules, kernels | cobs | cobs, kernels |

[1]Dick 1965; [2]Toll and McBride 1996; [3]Kaplan 1963; [4]Cutler 1952; [5]Cosgrove 1947:26 ; [6]this study; [7]Cutler 1964 ; [8]Cutler 1956

# POLLEN ANALYSIS FROM SITES IN THE MOGOLLON HIGHLANDS

Richard G. Holloway[1]

This project consisted of four excavation phases, which produced a total of 171 archaeological soil pollen samples and 89 pollen wash samples. Phase 1 sites were along the southern portion of U.S. 180 within the project area. A total of eight sites were sampled. The Phase 2 section of the project was from the San Francisco Mountains north to the southern limit of the town of Luna. Four sites were sampled from this phase. Phase 3 of the project was the section along NM 12 from its junction with U.S. Highway 180 east. Four archaeological sites were sampled from this phase. Phase 4 of the project included the section from the town of Luna north and west to the Arizona state line. Only two sites were sampled for pollen, and both were just west of Luna.

Figure 5.2 shows the distribution of the archaeological sites along U.S. 180 plotted against elevation. Figure 5.3 shows the distribution of sites along NM 12, also plotted against elevation.

A vegetational analysis of the present distribution of plant communities was also conducted in conjunction with this project. A total of 24 plots were examined along U.S. 180 from M[redacted]e[redacted] o the Arizona state line. These plots were examined using the releve method, and surface pollen samples were collected from each stand to assess the modern pollen rain.

The vegetation communities from Phase 1 contain moderate to higher elevation forest with some grassland meadow communities interspersed. The lower elevations are primarily piñon-juniper communities which grade into the oak-ponderosa community type at higher elevations. Piñon is present only on the south side of the San Francisco Mountains, a distribution which may or may not have been present prehistorically.

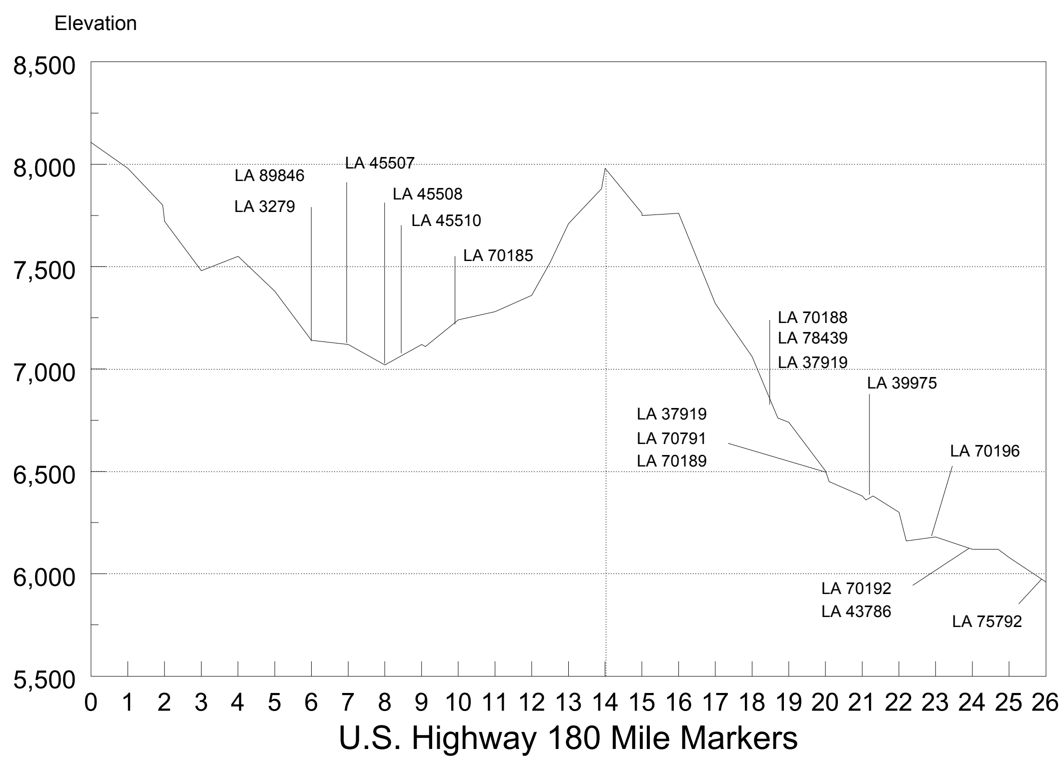



*Figure 5.2. Site locations along U.S. 180.*

[1]Quaternary Services Technical Report Series Report 97-004

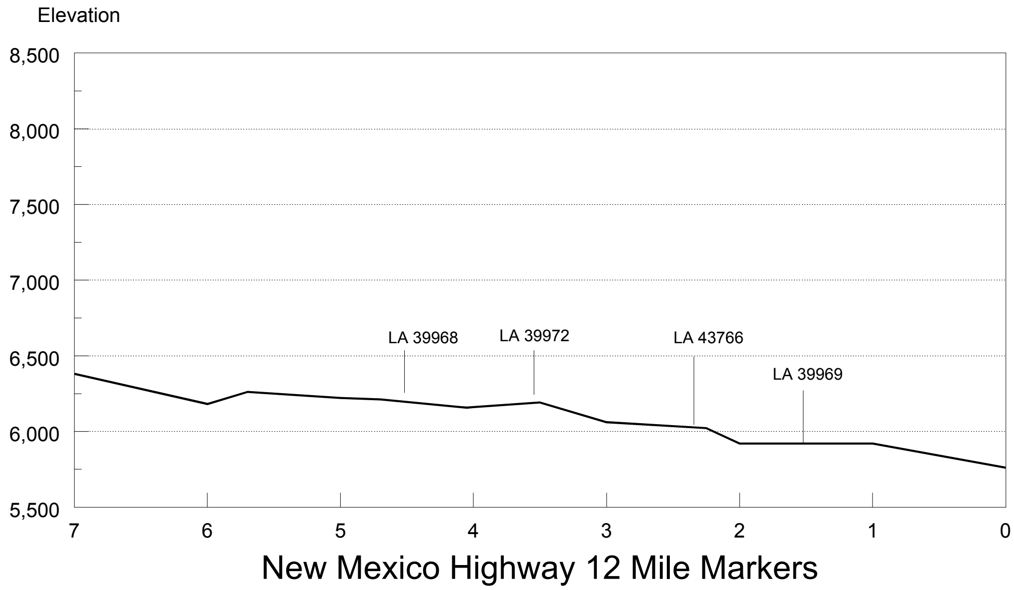



*Figure 5.3. Site locations, NM 12.*

The highway north of the San Francisco Mountains (Phase 2) is again primarily forest with interspersed grassland communities. The Phase 3 area is a moderate elevation mixed forest and grassland environment ranging from 6,020 to 6,380 elevation and forms a transect from Reserve to the junction of NM 180. The vegetation is primarily grassland and desert scrub with interspersed stands of piñon-juniper woodland. The Phase 4 area is characterized by high density pine forests with very little interspersed grassland areas. If these are present, they are generally associated with highway roadcuts as a function of earlier highway construction.

## Methods and Materials

Chemical extraction of pollen samples was conducted at the Palynology Laboratory at the Castetter Laboratory for Ethnobotanical Studies (CLES) at the University of New Mexico (UNM) using a procedure designed for semiarid southwestern sediments. The method, detailed below, specifically avoids use of such reagents as nitric acid, bleach, and potassium hydroxide, which have been demonstrated experimentally to be destructive to pollen grains (Holloway 1981).

From each pollen sample submitted, 25 g of soil were subsampled. Prior to chemical extraction, three tablets of concentrated *Lycopodium* spores (Batch 124961, Department of Quaternary Geology, Lund, Sweden; 12,542 marker grains per tablet) were added to each subsample. The addition of marker grains permits calculation of pollen concentration values and provides an indicator for accidental destruction of pollen during the laboratory procedure.

The pollen wash samples were sampled by Glenna Dean at the Office of Archaeological Studies, Museum of New Mexico, in Santa Fe. The loose soil was lightly brushed off and the area rinsed with distilled water. The area was rinsed with a 10 percent solution of HCl and repeatedly rinsed with distilled water. The liquid runoff of all three washes was collected together in a glass jar, sealed, and transported to CLES for analysis. Each artifact was described and the area washed measured. These data were provided to CLES. The pollen wash samples were extracted according to the protocol described below for the soil samples. The entire liquid portion was processed.

The samples were treated with 35 percent hydrochloric acid (HCl) overnight to remove carbonates and release the *Lycopodium* spores from their matrix. After neutralizing the acid with distilled water, the samples were allowed to settle for a period of at least three hours before the supernatant liquid was removed. Additional distilled water was added to the supernatant, and the mixture was swirled and then allowed to settle for five seconds. The suspended fine fraction was decanted through 250-micron mesh screen into a second beaker. This procedure, repeated at least three times, removed lighter materials, including pollen grains, from the heavier fractions. The fine material was concentrated by centrifugation at 2,000 revolutions per minute (RPM).

The fine fraction was treated overnight in cold 48 percent hydrofluoric acid (HF) overnight to remove silicates. After completely neutralizing the acid with distilled water, the samples were treated with a 1 percent solution of tri-sodium phosphate ($Na_3PO_4$) and repeatedly washed with distilled water and centrifuged (2,000 RPM) until the supernatant liquid was clear and neutral. This procedure removed fine charcoal and other associated organic matter and effectively deflocculated the sample.

Heavy density separation ensued using zinc chloride ($ZnCl_2$), with a specific gravity of 1.99-2.00, to remove much of the remaining detritus from the pollen. The light fraction was diluted with distilled water (10:1) and concentrated by centrifugation. The samples were washed repeatedly in distilled water until neutral and treated with glacial acetic acid to remove any remaining water.

Acetolysis solution (acetic anhydride: concentrated sulfuric acid in 8:1 ratio; Erdtman 1960) was added to each sample. Centrifuge tubes containing the solution were heated in a boiling water bath for approximately eight minutes and then cooled for an additional eight minutes before centrifugation and removal of the acetolysis solution with glacial acetic acid followed by distilled water. Centrifugation at 2,000 RPM for 90 seconds dramatically reduced the size of the sample but, as periodic examination of the residue showed, did not remove fossil palynomorphs.

The material was rinsed in methanol stained with safranin, rinsed twice with methanol, and transferred to 1-dram vials with tertiary butyl alcohol (TBA). The samples were mixed with a small quantity of silicone oil (1,000 cks) and allowed to stand overnight for evaporation of the TBA. The storage vials were capped and permanently stored at CLES. The excess soil was returned to the Office of Archaeological Studies at the Museum of New Mexico.

A drop of the polliniferous residue was mounted on a microscope slide for examination under an 18 by 18 mm cover slip sealed with fingernail polish. The slide was examined using 200x or 100x magnification under an aus-Jena Laboval 4 compound microscope. Occasionally, pollen grains were examined using 400x or 1,000x oil immersion to obtain a positive identification to the family or genus level.

Abbreviated microscopy was performed on each sample in which 20 percent of the slide (approximately four transects at 200x magnification) or a minimum of 50 marker grains were counted. If warranted, full counts were conducted by counting to a minimum of 200 fossil grains. Regardless of which method was used, the uncounted portion of each slide was completely scanned at a magnification of 100x for larger grains of cultivated plants such as *Zea mays* and *Cucurbita,* two types of cactus (*Platyopuntia* and *Cylindropuntia*), and other large pollen types such as members of the Malvaceae or Nyctaginaceae families.

For those samples warranting full microscopy, a minimum of 200 pollen grains per sample were counted (Barkley 1934), which allows the analyst to inventory the most common taxa present in the sample. All transects were counted completely, resulting in various numbers of grains counted beyond 200. Pollen taxa encountered on the uncounted portion of the slide during the low-magnification scan are tabulated separately.

The pollen concentration values of taxa identified during the low-magnification scans were adjusted to reflect the true concentration values of these taxa. If, for example, a single *Cucurbita* grain was encountered during the scan of a slide, an estimate of its concentration was made based on the number of marker grains present on that slide. This was done by averaging the number of marker grains per transect counted during the actual count and multiplying by the number of transects examined. The resultant number was substituted into the formula for computing pollen concentration values for all taxa encountered during the scan, but these data are presented in a separate table. Lowered pollen concentration values for the target taxa are the outcome, but it is believed that a more accurate assessment of the true pollen concentration values are achieved. However, because of the effect of nonrandom distribution of pollen grains on the slide (Brookes and Thomas 1967), the result sometimes is an increase of pollen concentration values for these target taxa.

Total pollen concentration values were computed for all taxa. In addition, the percentage of indeterminate pollen was also computed. Statistically, pollen concentration values provide a more reliable estimate of species composition within the assemblage. Traditionally, results have been presented by relative frequencies (percentages) where the abundance of each taxon is expressed in relation to the total pollen sum (200+ grains) per sample. With this method, rare pollen types tend to constitute less than 1 percent of the total assemblage. Pollen concentration values provide a more precise measurement of the abundance of even these rare types. The pollen data are reported here as pollen concentration values using the following formula:

$$PC = \frac{K * \Sigma_p}{\Sigma_L * S}$$

where: PC = pollen concentration
K = *Lycopodium* spores added
$\Sigma_p$ = fossil pollen counted
$\Sigma_L$ = *Lycopodium* spores counted
S = sediment weight

The following example should clarify this approach. Taxon X may be represented by a total of 10 grains (1 percent) in a sample consisting of 1,000 grains, and by 100 grains (1 percent) in a second sample consisting of 10,000 grains. Taxon X is 1 percent of each sample, but the difference in actual occurrence of the taxon is obscured when pollen frequencies are used. The use of "pollen concentration values" is preferred because it accentuates the variability between samples in the occurrence of the taxon. The variability, therefore, is more readily interpretable when comparing cultural activity to noncultural distribution of the pollen rain.

The pollen concentration values for pollen wash samples, when present, were calculated using a modification of the above formula. This modification involved the substitution of the sediment weight (S) by the area washed in the equation because the sample was in liquid form. The resulting concentration value is thus expressed as estimated grains per square centimeter. The resulting pollen concentration values from pollen wash samples are treated independently from soil samples in the discussion sections. This procedure permits comparisons between similar artifacts based on a standard area. The use of pollen concentration values from these particular samples are preferred, as explained above, to accentuate the variability between pollen wash samples.

Variability in pollen concentration values can also be attributed to deterioration of the grains through natural processes. In his study of sediment samples collected from a rockshelter, Hall (1981) developed the "1000 grains/g" rule to assess the degree of pollen destruction. This approach has been used by many palynologists working in other contexts as a guide to determine the degree of preservation of a pollen assemblage and, ultimately, to aid in the selection of samples to be examined in greater detail. According to Hall, a pollen concentration value below 1,000 grains/g indicates that forces of degradation may have severely altered the original assemblage. However, a pollen concentration value of fewer than 1,000 grains/g can indicate the restriction of the natural pollen rain. Samples from pit structures or floors within enclosed rooms, for example, often yield pollen concentration values below 1,000 grains/g.

Pollen degradation also modifies the pollen assemblage because pollen grains of different taxa degrade at variable rates (Holloway 1981, 1989). Some taxa are more resistant to deterioration than others and remain in assemblages after other types have deteriorated completely. Many commonly occurring taxa degrade beyond recognition in only a short time. For example, most (about 70 percent) angiosperm pollen has tricolpate (three furrows) or tricolporate (three furrows each with pores) morphology. Because surfaces erode rather easily, once deteriorated, these grains tend to resemble each other and are not readily distinguishable. Other pollen types (e.g., cheno-am) are so distinctive that they remain identifiable even when almost completely degraded.

Pollen grains were identified to the lowest taxonomic level whenever possible. The majority of these identifications conformed to existing levels of taxonomy with a few exceptions. For example, cheno-am is an artificial, pollen morphological category that includes pollen of the family Chenopodiaceae (goosefoot) and the genus *Amaranthus* (pigweed), which are indistinguishable from each other (Martin 1963). All members are wind pollinated (anemophilous) and produce very large quantities of pollen. In many sediment samples from the American Southwest, this taxon often dominates the assemblage.

Pollen of the Asteraceae (sunflower) family was divided into four groups. The high spine and low spine groups were identified on the basis of spine length. High spine Asteraceae contains grains with spine length equal to or greater than or 2.5 microns, while the low spine group have spines less than 2.5 microns long (Bryant 1969; Martin 1963). *Artemisia* pollen is identifiable to the genus level because of its unique morphology of a double tectum in the mesocopial (between furrows) region of the pollen grain. Pollen grains of the Liguliflorae are also distinguished by their fenestrate morphology. Grains of this type are restricted to the tribe Cichoreae, which includes such genera as *Taraxacum* (dandelion) and *Lactuca* (lettuce).

Pollen of the Poaceae (grass) family are generally indistinguishable below the family level, with the single exception of *Zea mays*, identifiable by its large size (about 80 microns), relatively large pore annulus, and the internal morphology of the exine. All members of the family contain a single pore, are spherical, and have simple wall architecture. Identification of noncorn pollen is dependent on the presence of the single pore. Only complete or fragmented grains containing this pore were tabulated as members of the Poaceae.

Clumps of four or more pollen grains (anther fragments) were tabulated as single grains to avoid skewing the counts. Clumps of pollen grains (anther fragments) from archaeological contexts are interpreted as evidence for the presence of flowers at the sampling locale (Bohrer 1981). This enables the analyst to infer possible human behavior.

Finally, pollen grains in the final stages of disintegration but retaining identifiable features, such as furrows, pores, complex wall architecture, or a combination of these attributes, were assigned to the indeterminate category. The potential exists to miss counting pollen grains without identifiable characteristics. For example, a grain that is so severely deteriorated that no distinguishing features exist, closely resembles many spores. Pollen grains and spores are similar in size and composed of the same material (Sporopollenin). So that spores are not counted as deteriorated pollen, only those grains containing identifiable pollen characteristics are assigned to the indeterminate category. Thus, the indeterminate category contains a minimum estimate of degradation for any assemblage. If the percentage of indeterminate pollen is between 10 and 20 percent, relatively poor preservation of the assemblage is indicated, whereas indeterminate pollen in excess of 20 percent indicates severe deterioration to the assemblage.

In samples where the total pollen concentration values are approximately at or below 1,000 grains/g and the percentage of indeterminate pollen 20 percent or greater, counting was terminated at the completion of the abbreviated microscopy phase. In some cases, the assemblage was so deteriorated that only a small number of taxa remained. Statistically, the concentration values may have exceeded 1,000 grains/g. If the species diversity was low (generally these samples contained only pine, cheno-am, members of the Asteraceae family, and indeterminate), counting was also terminated after abbreviated microscopy even if the pollen concentration values slightly exceeded 1,000 grains/g.

## Releve Stands

The description of the modern vegetation stands was determined using the releve method of Mueller-Dombois and Ellenberg (1974). This relatively simple technique employs percent cover estimates to quantify the vegetation assessments. Granted, the degree of quantification is not as precise (due to use of cover estimates) as a method involving measurement or counting of species, but the releve method can survey larger areas within a restricted time frame.

The method is also flexible enough to incorporate changes necessitated by field conditions. Each stand was sampled twice, once during the late spring-early summer (June) and again in late summer-early fall (September). This was done to incorporate the full range of potential taxa within these stands. Sampling at only one time period during the year will, of necessity, miss many of the taxa commonly found within these stands.

Regardless of the vegetational sampling methodology employed, certain criteria are inherent in vegetation sampling and must be met. As Mueller-Dombois and Ellenberg (1974:48) have observed: "The requirement of relative homogeneity throughout the sample stand rests on the premise that the vegetation parameters . . . should result in a meaningful average." Generally, this means that a sample area extending into an open area is an artifact, whereas if open areas are characteristic of certain communities, they must be sampled as well.

Establishing the size area of the sample plot is critical and depends to a large degree on the structure of the community. A forested area will require substantially greater plot sizes than a moss or lichen community. It has been suggested that a series of nested plots be utilized for establishing the minimal area necessary for conducting releves (Mueller-Dombois and Ellenberg 1974). Since I have used this technique in the past, and to make the plots consistent, I chose 400 sq m (20 m square) as the basic sampling unit. While this was probably larger than necessary for grassland stands, I have found it more than adequate for woodland and forest communities.

The structure of each community was broken into a maximum of five vertical layers: canopy, tall shrub, low shrub, herb, and grass. Obviously, not all layers were present in all communities, but this effectively permitted differentiation of the community structure. A species list for all species present in each layer was constructed and cover percentages estimated for each species contribution within each layer. Additionally, characteristics such as aspect, slope, longitude, latitude, elevation, surface soil characteristics, and moisture type were recorded for each stand. Finally, a surface pollen sample was collected from each releve. These pollen samples were "pinch samples" (Adams and Mehringer 1977). Approximately 25-50 pinch samples from across the surface of the releve were combined together to form the pollen sample. This serves to alleviate particular over-representation of certain pollen types because of their distribution within the sampling plot.

## Modern Vegetation and Surface Pollen of Releve Stands

A total of 24 vegetational stands were investigated for this project. The stands were investigated during the months of June and late September-October to obtain a more accurate estimation of the cover percentages of various taxa. For convenience, Table 5.64 lists the taxa used in this report by scientific and common name where available. Tables 5.65-5.69 provide the longitude and latitude of each of the 24 stands. Tables 5.66 and 5.67 contain the percentage cover estimates by taxon for each of the stands. These are reported separately for stands along U.S. 180 and NM 12. Tables 5.68 and 5.69 contain the raw pollen counts and the calculated pollen concentration values for surface pollen samples from each of the stands. The results of the vegetation and pollen analysis for the stands are reported below by highway transect and mileage locator.

*U.S. 180*

*Stand L-01.* Plot L-01 was at Mile 26.0 on the east side of the highway at an elevation of 5,960 ft. This stand was described as a piñon-juniper woodland with an oak understory. *Juniperus depeanna* and *Juniperus monosperma* covered 0.6 percent of the plot, with *Juniperus* sp. regenerating. *Pinus edulis* (12 percent) and *Pinus ponderosa* (15 percent) were present along with *Robinia neomexicana* (3 percent). *Quercus gambelii* (1 percent) was present in the understory. *Hilaria* sp. and *Muhlenbergia* sp. were the only two grass species present. *Actostaphylos* sp. dominated the nonarboreal understory (99 percent). Traces of *Astragalus* sp., *Castilleja* sp., *Melilotus* sp., *Penstemon barbatus*, and *Opuntia phaecantha* were also present.

The pollen assemblage contained 11,636 grains/g. *Pinus* (5,892 grains/g) was high, and there were high amounts of *Quercus* (2,062 grains/g). Small amounts of *Juniperus* (49 grains/g) and *Juglans* (196 grains/g) were also present. Cheno-am (1,277 grains/g) and Poaceae (344 grains/g) pollen were high, as were both high and low spine Asteraceae and *Artemisia.* A small amount of Malvaceae pollen was also present.

*Stand L-02.* Plot L-02 was at Mile 25.0 on the west side of the highway at an elevation of 6,080 ft. This stand was described as a piñon-juniper woodland with an oak understory. *Juniperus depeanna* (5.25 percent) dominated, with a smaller cover of *Juniperus monosperma* (0.3 percent) and *Juniperus* sp. regenerating. *Pinus edulis* (4.5 percent) and *Pinus ponderosa* (8.75 percent) were present along with *Quercus* (15 percent). The grass cover comprised 30 percent and was dominated by *Muhlenbergia* sp., with smaller amounts of *Aristata* sp. and an unknown grass taxon. The herbaceous cover comprised only 10 percent of the area.

The pollen assemblage contained 11,039 grains/g. *Pinus* (7916 grains/g) was high, with moderate amounts of *Juniperus* (269 grains/g) and high amounts of *Quercus* (431 grains/g). Cheno-am, Poaceae, and the Asteraceae were quite high, and a moderate amount of Solanaceae pollen was present.

*Stand L-03.* Plot L-03 was a meadow at Mile 24.7 at an elevation of 6,120 ft. No canopy was present, although isolated *Pinus* trees were present within visual range. The community was dominated by the grass cover (65 percent). This level was dominated by *Aristata* sp. and *Muhlenbergia* sp. (19.5 percent each). *Hordeum* sp. and Unknown Type 2 were also present (13 percent each).

This assemblage contained 7,338 grains/g. *Pinus* (5,669 grains/g) was high, with a trace of *Juniperus* pollen. Cheno-am, Poaceae, and the Asteraceae were all high, and a small amount of Fabaceae pollen was also present.

*Stand L-04.* Plot L-04 was at Mile 22.2 at an elevation of 6,160 ft on the east side of the highway. This stand was a piñon-juniper woodland with an oak understory. *Juniperus* sp. (2.5 percent) was present, but *Pinus edulis* (0.5 percent) and *Pinus ponderosa* (25 percent) were dominant. *Quercus gambelii* (22.5 percent) was codominant. The grass cover comprised only 30 percent of the plot and was dominated by *Sporobolus* sp. (15 percent) and secondarily by *Artistata* and Unknown Type 2 (7.5 percent each). The herbaceous cover (5 percent) contained *Astragalus* sp., *Castilleja* sp., *Dalea* sp., *Melilotus* sp., *and Senecio* sp.

This assemblage contained 6,879 grains/g. *Pinus* (5,670 grains/g) was high, with a moderate amount (58 grains/g) of *Quercus* pollen. Poaceae and *Artemisia* were low, with low amounts of cheno-am and high amounts of the Asteraceae and Cylindropuntia pollen.

*Stand L-18*. Plot L-18 was at Mile 21.3 at an elevation of 6,380 ft on the northeast corner of the intersection of U.S. 180 and NM 12. Because of its position, the data for Stand L-18 is repeated in the tables for each transect. This stand was predominantly a pine community with both *Juniperus* and *Quercus* in the understory. Grasses constituted only 1 percent of the cover and both *Aristata* sp. and *Muhlenbergia* sp. were present. The shrub and herb levels together covered 30 percent of the plot, and these levels were dominated by *Gaura* sp. and *Opuntia phaecantha*.

The pollen assemblage contained 14,282 grains/g. *Pinus* (11,747 grains/g) was very high, with high amounts of *Juniperus* (124 grains/g) and *Quercus* (618 grains/g). A trace of *Picea* and *Pseudotsuga* (62 grains/g each) pollen was also present. Cheno-am pollen was low, with moderate amounts of Poaceae and high spine Asteraceae. Low spine Asteraceae (433 grains/g) was high, along with *Artemisia* and Cylindropuntia pollen. A small amount of *Sphaeralcea* pollen was also present.

*Stand L-05.* Plot L-05 was at Mile 21.1 at an elevation of 6,360 ft on the east side of the highway. This stand was dense piñon pine (98 percent). A small amount of *Juniperus depeanna* was also present, but these were generally smaller and formed a subcanopy.

*Muhlenbergia* sp. (24 percent) and *Sporobolus* sp. (14 percent) dominated the grass layer, with a small amount (2 percent) of *Aristata* sp. The herbaceous cover consisted of small amounts of *Aster* sp., *Astragalus* sp., *Castilleja* sp., *Gaura* sp., *Heliotropium* sp., *Opuntia phaecantha, Senecio* sp., and *Shrankia* sp.

This assemblage contained 7,937 grains/g. *Pinus* (5,594 grains/g) was high, with high amounts of *Juniperus* and *Quercus. Picea, Pseudotsuga,* and *Juglans* pollen were also present. Cheno-am pollen is low, with moderate amounts of high spine Asteraceae and high concentration values of Poaceae, low spine Asteraceae, and *Artemisia* pollen. Cylindropuntia pollen is moderate to high.

*Stand L-06.* Plot L-06 was at Mile 20.1 at elevation 6,450 ft on the east side of the highway. This stand was described as a ponderosa pine/juniper forest. The canopy comprised 50 percent of the cover and was dominated by *Pinus ponderosa* (40 percent). *Juniperus depeanna, Juniperus* sp., and *Quercus gambelii* were also present but in lower percentages. Grasses covered only 10 percent of the plot and were equally represented (3.3 percent each) by *Aristata* sp., *Bromus* sp., and *Hordeum sp.*

This assemblage contained 12,781 grains/g. *Pinus* (11,111 grains/g) was extremely high, with high amounts of *Quercus* and moderate *Juniperus.* Poaceae pollen was high (209 grains/g), with high amounts of Asteraceae and *Artemisia* pollen. *Cylindropuntia* pollen was moderate.

*Stand L-07*. Plot L-07 was at Mile 18.7 at an elevation of 6,760 ft on the west side of the highway. This stand was a piñon-juniper woodland with an understory of oak. *Pinus edulis* (12.7 percent) and *Pinus ponderosa* (11 percent) were codominant, with *Juniperus depeanna* (11 percent) and a large amount of *Quercus gambelii* (15 percent), which formed the understory. No grasses were present within this stand, which may be due to the dense canopy cover (55 percent). *Arctostaphylos* sp. (26 percent) was also present in the shrub level. The small shrub and herb components consisted of *Artemisia* sp., *Aster* sp., *Astragalus* sp., *Chenopodium* sp., *Erigeron* sp., *Gaura* sp., *Melilotus* sp., *and Opuntia phaecantha*.

The pollen assemblage contained 13,871 grains/g. *Pinus* (12,003 grains/g) was high with high *Quercus* and *Juniperus.* Cheno-am pollen was low, with high amounts of Poaceae and low spine Asteraceae and moderate to low amounts of *Artemisia* and high spine Asteraceae. A moderate amount of *Eriogonum* pollen was also present.

*Stand L-08.* Plot L-08 was at Mile 15.0 at an elevation of 7,760 ft on the east side of the highway. This stand was immediately next to Plot L-09 but was more of an open piñon-juniper stand. *Juniperus* sp. (26 percent) and *Juniperus depeanna* (3.75 percent) were present along with *Pinus edulis* (18.75 percent) and *Pinus ponderosa* (7.5 percent). *Quercus gambelii* (26 percent) formed a fairly thick understory. *Arctostaphylos* sp. and *Opuntia phaecantha* (26 percent each) were codominant in the understory. The grass layer covered 25 percent of the plot and was dominated by *Oryzopsis* sp. (12.5 percent), with lesser amounts of *Aristata* sp., *Bouteloua* sp., *Muhlenbergia* sp., *and Sporobolus* sp. Small cover percentages were provided by *Castilleja* sp., *Erigeron* sp., *Gaura* sp., *Penstemon barbatus, and Sedum* sp.

This assemblage contained 23,298 grains/g. *Pinus* (19,742 grains/g) was very high, with high amounts of *Quercus* and *Juniperus* pollen. *Pseudotsuga* pollen was also high (218 grains/g). Cheno-am pollen was very low, with low amounts of high spine Asteraceae pollen. Poaceae (1089 grains/g) was very high with high amounts of low spine Asteraceae and *Artemisia.* Moderate quantities of cf. *Shepherdia,* Fabaceae, and *Eriogonum* pollen were also present.

*Stand L-09.* Plot L-09 was in the same area and in the same elevation as Plot L-08 but more heavily forested. It was on a rather steep slope. The canopy cover was 30 percent and was dominated by *Pinus ponderosa* (49.5 percent). *Pseudotsuga mensiezii* and *Quercus gambelii* (13.5 percent each) were also present. *Aristata* sp., *Sporobolus* sp., and Unknown Type 2 were the only grasses present. Only traces of *Castilleja* sp. and *Gaura* sp. were present.

This assemblage contained 11,096 grains/g. *Pinus* (10,148 grains/g) dominated the assemblage, but *Quercus* and *Pseudotsuga* pollen were also present. Cheno-am, Poaceae, and high spine Asteraceae pollen were low to moderate, with high amounts of low spine Asteraceae. A moderate amount of *Cylindropuntia* was also present.

*Stand L-17*. Plot L-17 was at Mile 13.9 at an elevation of 7,880 ft. This stand was on the northwest side of the San Francisco Mountains. This stand contained 55 percent cover by the canopy. The canopy was dominated by *Pinus ponderosa* (60.5 percent), with a small amount of *Juniperus monosperma* (5 percent). *Pseudotsuga mensiezii* (17.75 percent) was present, but *Quercus gambelii* (81.25 percent) dominated the arboreal taxa, although most of this was present in a subcanopy or tall shrub zonation. Only small amounts of *Hilaria* sp. and *Muhlenbergia* sp. were present in addition to trace amounts of the herbaceous taxa.

This assemblage contained 9,092 grains/g. *Pinus* (7,175 grains/g) was high, with high amounts of *Juniperus* and *Quercus* pollen. Cheno-am, *Artemisia,* and high spine Asteraceae pollen were low to moderate, with high amounts of Poaceae and low spine Asteraceae. Small amounts of Fabaceae and *Eriogonum* pollen were also present.

*Stand L-12*. Plot L-12 was at Mile 12.5 on the west side of the highway at an elevation of 7,520 ft. The canopy covered 55 percent of the stand and the dominant arboreal vegetation was *Pinus ponderosa*. One or two *Picea engelmanii* trees were present (13.75 percent) and a small amount of *Pseudotsuga mensiezi*i was observed. *Quercus gambelii* (2.75 percent) formed the bulk of the understory. The grass cover was only 3 percent total which was composed entirely of *Hilaria* sp.

This assemblage contained 11,078 grains/g. Pinus (9510 grains/g) was high with high amounts of *Abies* (101 grains/g) and moderate amounts of *Quercus* (101 grains/g). Cheno-am, Poaceae, and the Asteraceae were either low or moderate.

*Stand L-11*. Plot L-11 was at Mile 9.1 just south of the town of Luna at an elevation of 7,110 ft. *Pinus ponderosa* (11 percent) was the only arboreal taxon present. The grass cover was 60 percent and was dominated by *Artistata* sp. (30 percent). *Hilaria* sp. *and Muhlenbergia* sp. were covered at 12 percent each, while *Bromus* sp. and Unknown Type 2 covered 3 percent each. The nonarboreal taxa consisting of *Argemone* sp*., Aster* sp. (2), *Castilleja* sp., *Cirsium* sp., *Coreopsis* sp*., Gaura* sp*., Hedyotis* sp., *Lupinus* sp., *Polygonum* sp., *Ranunculus* sp., *Ratiba sp., Senecio sp., Tragopogon sp., and Verbascum thalpsi* were present below 3 percent cover.

This assemblage contained 8,541 grains/g. *Pinus* (7,104 grains/g) was high, with high amounts of *Quercus* and moderate amounts of *Picea.* A trace (39 grains/g) of *Pseudotsuga* pollen was also present. Low spine Asteraceae pollen was high, with moderate to low amounts of Poaceae, cheno-am high spine Asteraceae and *Artemisia.*

*Stand L-10.* Plot L-10 was on the north side of Luna on the west side of the highway at an elevation of 7,120 ft. It was dominated by *Pinus ponderosa* (40 percent), with an understory of *Quercus gambeli*i (1 percent). Grasses covered 50 percent of the plot and were dominated by *Aristata* sp. (45 percent), with a small amount of *Muhlenbergia* sp. (5 percent). The herbaceous taxa covered less than 1 percent of the area for each taxon.

This assemblage contained 17,983 grains/g. Pinus (16,456 grains/g) was high, with high *Quercus* and moderate *Picea*. Cheno-am pollen was low, with high amounts of Poaceae and the Asteraceae. Solanaceae pollen was also present.

*Stand L-16.* Plot L-16 was at Mile 5.0 at an elevation of 7,380 ft. *Pinus ponderosa* (45 percent) was dominant, with *Juniperus depeanna* (5 percent), *Juniperus* sp. (0.75 percent) and *Quercus gambelii* (13.5 percent) forming the understory. The grass layer covered only 5 percent of the stand and consisted entirely of *Hilaria* sp. The herbaceous component covered 50 percent of the stand and contained *Artemisia* sp., *Aster* sp., *Cirsium* sp., *Gaura* sp., *Melilotus* sp., and *Penstemon barbatus*.

This assemblage contained 13,988 grains/g. *Pinus* (12,606 grains/g) was high, with high amounts of *Quercus.* High spine Asteraceae and cheno-am were low, with high amounts of Poaceae, low spine Asteraceae, *Artemisia,* and *Eriogonum. Cylindropuntia* and Nyctaginaceae pollen were also present.

*Stand L-15.* Plot L-15 was at Mile 3.0 at 7,480 ft elevation. *Pinus ponderosa* (40 percent) dominated the stand, with *Quercus gambelii* (1 percent) forming an understory. *Hilaria* sp. covered 30 percent of the stand and was the only grass taxon present. The herbaceous cover was 50 percent and consisted almost entirely (48.5 percent) of *Aster* sp.

This assemblage contained 7,442 grains/g. *Pinus* (6,503 grains/g) was high, with high amounts of *Quercus.* Cheno-am was low, with low amounts of Poaceae and high spine Asteraceae with high amounts of low spine Asteraceae.

*Stand L-14.* Plot L-14 was at Mile 1.95 at 7,800 ft elevation. *Pinus ponderosa* (27 percent) dominated the canopy. *Quercus gambelii* (18 percent) and *Robinia neomexicana* (15 percent) dominated the understory. *Hordeum* (0.25 percent) was the only grass taxon noted.

This assemblage contained 6,965 grains/g. *Pinus (*5,066 grains/g) was high, with high amounts of *Quercus* and a moderate amount of *Pseudotsuga.* Cheno-am pollen was low, with high amounts of Asteraceae and moderate *Artemisia.* Solanaceae pollen was also present.

*Stand L-13.* Plot L-13 was at the New Mexico-Arizona state line at Mile 0.0 and at an elevation of 8,106 ft. *Pinus ponderosa* (50 percent) dominated the canopy, with *Quercus gambelii* forming an understory (5 percent). *Hilaria* sp. covered 5 percent of the plot and was the only grass taxon. The herbaceous taxa covered 25 percent of the plot and consisted of *Aster* sp., *Castilleja* sp., *Gaura* sp., *Lupinus* sp., *Potentilla* sp., and *Senecio* sp.

This assemblage contained 14,245 grains/g. *Pinus* (12,687 grains/g) was high, with high amounts of *Quercus.* Poaceae and low spine Asteraceae pollen were moderate, with low cheno-am and high, high spine Asteraceae pollen.

*NM 12*

*Stand L-19.* Plot L-19 was at Mile 2.25 at an elevation of 6,020 ft. *Pinus ponderosa* (13.5 percent) and *Pinus edulis* (6 percent) dominated the canopy, but *Juniperus monosperma* (10.5 percent and *Juniperus* sp. (0.5 percent) were also present. *Quercus* sp. (4.5 percent) formed the understory. *Sporobolus* sp. covered

24 percent, while *Bouteloua* sp. covered 4.5 percent of the stand. The nonarboreal components consisted of *Artemisia* sp., *Aster* sp., *Chrysothamnus* sp., *Cirsium* sp., *Gaura* sp., and *Verbascum thalps*i.

This assemblage contained 14,282 grains/g. *Pinus* (11,747 grains/g) was high, with high *Juniperus* and moderate *Picea* pollen. *Quercus* pollen was high, with a moderate amount of *Pseudotsuga.* Cheno-am was low, with moderate amounts of Poaceae and high spine Asteraceae, and high amounts of low spine Asteraceae and *Artemisia. Cylindropuntia* was also high, with a moderate amount of *Sphaeralcea.*

*Stand L-20.* Plot L-20 was at Mile 3.5 at 6,190 ft elevation. *Pinus edulis* and *Juniperus depeanna* (20 percent each) dominated the canopy, while *Quercus gambelii* formed the understory. The grass cover reached 45 percent and was dominated by *Muhlenbergia* sp. and secondarily by *Aristata* sp. and *Bouteloua* sp. *Opuntia phaecantha* (1 percent) and *Opuntia imbricata* (1 percent) were present along with a few other taxa.

This assemblage contained 11,169 grains/g. *Pinus* (9,221 grains/g) was high, with high *Juniperus* (278 grains/g) and *Quercus* (556 grains/g). Cheno-am was low, with moderate high spine Asteraceae, and high amounts of Poaceae and low spine Asteraceae. *Sphaeralcea* was also moderate.

*Stand L-21.* Plot L-21 was at Mile 4.05 along the south side of the highway at an elevation of 6,165 ft. A single *Juniperus monosperma* (1 percent) was present to form the canopy. *Fallugia paradoxa* and *Artemisia* sp. (15 percent each) was present, along with small cover percentages of *Aster* sp., *Cirsium* sp., *Gaillardia* sp., *Senecio* sp., *and Verbascum thalpsi*. *Aristata* sp. and *Bouteloua* sp. were the only grass taxa present.

This assemblage contained 10,395 grains/g. *Pinus* (9,181 grains/g) was high, with moderate *Juniperus* and *Picea* (38 grains/g each) and high *Quercus* (455 grains/g). Cheno-am was low, with high amounts of Poaceae and *Cylindropuntia*. A small amount of Rosaceae was also present.

*Stand L-22*. Plot L-22 was at Mile 4.1 on the south side of the highway at an elevation of 6,160 ft. This stand contained no canopy, although *Pinus* was no closer than 1,000-2,000 m to the west. *Aristata* sp. (37 percent) and *Hordeum* sp. (22 percent) dominated the grass level, with 15 percent *Bouteloua* sp. The herbaceous component was rather restricted, covering only 10 percent of the area.

This assemblage contained 11,581 grains/g. *Pinus* (9599 grains/g) was high, with moderate *Juniperus* and *Abies* and high amounts of *Quercus.* Cheno-am pollen was low, with high amounts of Poaceae and low spine Asteraceae pollen. Cylindropuntia pollen was high, with moderate to high amounts of Rosaceae pollen.

*Stand L-23.* Plot L-23 was at Mile 4.7 at an elevation of 6,210 ft. *Pinus edulis* (22 percent) and *Pinus ponderosa* (2.25 percent) were present, while *Juniperus depeanna* (22.5 percent) dominated the canopy. The grass component covered 66 percent of the stand and was dominated by *Muhlenbergia* sp (33 percent) and *Aristata* sp. (19.8 percent). *Bouteloua* sp. (9.9 percent) and *Hilaria* sp. (3.3 percent) were also present. *Opuntia phaecantha* and *Opuntia imbricata* were both present along with small cover percentages of several other taxa.

This assemblage contained 10,868 grains/g. *Pinus* (9,403 grains/g was high, with high *Quercus* and moderate *Juniperus.* Cheno-am was low, with high amounts of Poaceae and low spine Asteraceae. *Cylindropuntia* and Fabaceae pollen were moderate.

*Stand L-24.* Plot L-24 was at Mile 5.7 at an elevation of 6,260 ft. *Pinus edulis* (22 percent) dominated the assemblage, with *Juniperus* and *Pinus ponderosa* also present. *Muhlenbergia* sp. (3 percent) comprised the grass component. *Castilleja* sp. was also observed.

This assemblage contained 13,146 grains/g. *Pinus* (12,103 grains/g) was high, with high *Quercus.* Cheno-am was low, with high amounts of Poaceae and high spine Asteraceae. *Platyopuntia* and *Cylindropuntia* were both present.

## Soil Pollen Samples

The provenience data and raw pollen counts are found in the Tables 5.64 and 5.65. The calculated pollen concentration values for all soil pollen samples are presented in Table 5.66. The results are presented below by site.

### *Phase 1*

*LA 39975*. A total of eight (8) pollen samples were submitted from this site, which dated to A.D. 330-420.

FS 234 (CLES 93233) was taken from Level 2A in Pit Structure 1 and contained 1,224 grains/g. *Pinus* (83 grains/g) was low, with higher amounts of Poaceae (83 grains/g), cheno-am (445 grains/g), and low spine Asteraceae (195 grains/g). High spine Asteraceae (56 grains/g) was moderate, with a small amount of *Polygala. Zea mays* pollen (28 grains/g) was present, and *Sphaeralcea* was present in the low-magnification scan.

FS 269 (CLES 93227) was taken from the fill 5 cm above the floor and contained only 147 grains/g. This concentration value was based on only 6 grains in the pollen sum. A single grain each of *Pinus,* Poaceae, cheno-am, Platyopuntia, indeterminate, and *Zea mays* were present.

FS 271 (CLES 93226) was taken from the floor under a sherd and contained 925 grains/g. *Pinus* (200 grains/g) was low, with low amounts of cheno-am (401 grains/g), low spine Asteraceae (33 grains/g), and *Juniperus* (67 grains/g).

FS 272 (CLES 93230) was taken from the floor from within a sherd and contained 772 grains/g. *Pinus* (199 grains/g) was low, with low amounts of cheno-am (224 grains/g), Poaceae and high spine Asteraceae (25 grains/g each), low spine Asteraceae (50 grains/g), and *Zea mays* (25 grains/g). A single grain of *Platyopuntia* was noted in the low-magnification scan.

FS 360 (CLES 93229) was taken from the floor and contained 702 grains/g. *Pinus* (121 grains/g) was very low, with low amounts of cheno-am (339 grains/g), high (48 grains/g) and low spine (24 grains/g) Asteraceae, and moderate amounts of Poaceae (73 grains/g). A single corn grain was present in the low-magnification scan.

FS 367 (CLES 93228) was taken from the 25 cm level within Pit Structure 1 and contained 979 grains/g. *Pinus* (144 grains/g) was low, with low amounts of cheno-am (317 grains/g) and slightly higher amounts of Poaceae and high spine Asteraceae (83 grains/g each) and low spine Asteraceae (58 grains/g). A single grain of Platyopuntia was observed in the low-magnification scan.

FS 665 (CLES 93231) was taken under a vessel and contained 820 grains/g. *Pinus* (146 grains/g), Poaceae (63 grains/g), cheno-am (176 grains/g) and low spine Asteraceae (59 grains/g) were present in low amounts. Both *Sphaeralcea* and *Zea mays* pollen (29 grains/g each) were present.

FS 682 (CLES 93232) contained 1,449 grains/g. *Pinus* (252 grains/g) and *Juniperus* (31 grains/g) were low, with moderate cheno-am (504 grains/g), Poaceae (63 grains/g), and low spine Asteraceae (126 grains/g).

*LA 43786*. A single pollen sample was submitted from this site, which dated to ca. A.D. 900.

FS 18 (CLES 93242) contained 1,731 grains/g. *Pinus* (340 grains/g) and *Juniperus* (31 grains/g) pollen were low, with moderate to high amounts of cheno-am (464 grains/g), Poaceae (93 grains/g), high (62 grains/g) and low spine (185 grains/g) Asteraceae, *Artemisia* (62 grains/g), and Platyopuntia (31 grains/g). A small amount of *Zea mays* (62 grains/g) was also present.

*LA 70188.* A total of three samples were submitted from this site, which dated to 70 B.C.–A.D. 90.

FS 1478 (CLES 93234) was taken from 85 cm depth in Pit Structure 1 and contained 337 grains/g. Small amounts of *Pinus,* cheno-am, and indeterminate pollen were present.

FS 1482 (CLES 93235) was taken from floor fill of Pit Structure 1 from the 73-94 cm level and contained only 169 grains/g. This value was based on a total of only nine grains. *Pinus,* cheno-am, and indeterminate pollen were present. A single corn and *Platyopuntia* grain were observed during the low-magnification scan.

FS 1516 (CLES 93236) was taken from the floor and contained 880 grains/g. *Pinus* and cheno-am (91 grains/g each) were very low, with a moderate amount of high (30 grains/g) and low spine (121 grains/g) Asteraceae and *Artemisia* (30 grains/g). Indeterminate (516 grains/g) pollen was quite high, and three corn grains were observed in the low-magnification scan.

*LA 70189*. A total of five samples were submitted from this site, which dated to A.D. 1010-1020, with a later occupation at ca. A.D. 1400.

FS 195 (CLES 93237) was taken from under a sherd in the shallow pit structure at the 24 cm level and contained only 243 grains/g. This value was based on a pollen sum of only 8 grains. Cheno-am and indeterminate pollen were the only taxa present.

FS 196 (CLES 93238) was also taken from under a sherd in the roasting pit and contained 4,302 grains/g. *Pinus* (3,467 grains/g) was high, with traces of *Juniperus* and *Quercus* (64 grains/g each). Cheno-am (257 grains/g) was low, with moderate amounts of low spine Asteraceae (97 grains/g). *Ephedra* (32 grains/g) and *Zea mays* (64 grains/g) pollen were present in addition to indeterminate (257 grains/g). A single corn grain and two grains of Platyopuntia were observed in the low-magnification scan.

FS 197 (CLES 93239) was taken from the pit structure floor and contained 742 grains/g. *Pinus* (278 grains/g) was low, with low amounts of cheno-am (155 grains/g) and high (31 grains/g) and low spine (62 grains/g) Asteraceae. A single corn grain was observed in the low-magnification scan.

FS 198 (CLES 93240) was also taken from the pit structure floor and contained 195 grains/g. This value was based on a pollen sum of only seven grains. *Pinus,* cheno-am, and indeterminate pollen were the only taxa recovered.

FS 199 (CLES 93241) was a control sample taken from within the upper 5 cm of soil and contained 32,969 grains/g. *Pinus* (28,378 grains/g) clearly dominated the assemblage, with *Juniperus* (139 grains/g) and *Quercus* (417 grains/g) present. Poaceae (1,113 grains/g) was high, along with cheno-am (696 grains/g), high (278 grains/g) and low spine (974 grains/g) Asteraceae, and *Artemisia* (278 grains/g) pollen. An unknown type (139 grains/g) was also present.

*LA 70196*. A total of five pollen samples were submitted from this site, which dated to ca. A.D. 800. FS 209 (CLES 93246) was taken from the interior of a vessel and contained 775 grains/g. *Pinus* (149 grains/g) and cheno-am (179 grains/g) were low, with smaller amounts of high (30 grains/g) and low spine (89 grains/g) Asteraceae.

FS 216 (CLES 93245) was taken from roof fall under the hatch within the pit structure and contained 412 grains/g. *Pinus* (137 grains/g) was low, with indeterminate (252 grains/g). A trace of Onagraceae (23 grains/g) pollen was also present.

FS 229 (CLES 93247) was taken from the floor of the pit structure under a mano/metate and contained 315 grains/g. *Pinus,* cheno-am, low spine Asteraceae, and indeterminate pollen were present.

FS 241 (CLES 93248) was taken from the floor of the structure under a mano and contained 738 grains/g. *Pinus* (193 grains/g) was low, with low amounts of Poaceae (32 grains/g), cheno-am (257 grains/g), and high and low spine Asteraceae (32 grains/g each). *Zea mays* pollen was also present (64 grains/g).

FS 304 (CLES 93249) was taken from the floor under a mano and contained 462 grains/g. *Pinus* (180 grains/g) was low, with low amounts of cheno-am (77 grains/g), low spine Asteraceae and *Ephedra* (26 grains/g each). A single corn grain was observed in the low-magnification scan.

*LA 75791*. Two pollen samples were submitted from this portion of the site, which dated to ca. A.D. 1650.

FS 54 (CLES 93256) was taken from the fill of Pit Structure 1 and contained 403 grains/g. *Pinus,* Poaceae, cheno-am, and both high and low spine Asteraceae pollen were present in low amounts. *Platyopuntia* was present in quantities of 58 grains/g.

FS 104 (CLES 93257) was taken from under a metate at the 35 cm level in Pit 3 and contained 612 grains/g. *Pinus,* cheno-am, Poaceae, and *Platyopuntia* pollen were present in low amounts. An additional two grains of *Platyopuntia* were observed in the low-magnification scan.

*LA 75792*. Two samples were submitted from this site, which dated to ca. A.D. 1000.

FS 450 (CLES 93244) was from under a metate and contained 541 grains/g. *Pinus* (235 grains/g) and cheno-am (141 grains/g) were very low but dominated the assemblage. Poaceae and low spine Asteraceae (24 grains/g each) were low, and a small amount of *Ephedra* (47 grains/g) was present. *Zea mays* (24 grains/g) pollen was also present.

FS 455 (CLES 93243) was taken from under a large sherd and contained 523 grains/g. Cheno-am (125 grains/g) was low but dominated the assemblage. *Pinus,* Poaceae, high and low spine Asteraceae, and *Artemisia* were also present.

*Phase 2*

The provenience and raw pollen counts for all soil pollen samples are found in Tables 5.64 and 5.65. Table 5.66 presents the provenience and calculated pollen concentration values for all soil pollen samples. The results are presented below by site.

*LA 45507*. A total of 18 samples were submitted from this site, which dated to A.D. 885-970.

Three samples were taken from Feature 1, a pit structure.

FS 3 (CLES 94200) was taken from the floor contact. This sample contained 331 grains/g. *Pinus,* cheno-am, low spine Asteraceae, and indeterminate pollen were present in low amounts.

FS 883 (CLES 93366) was taken from under Metate 1 and contained 565 grains/g. *Pinus* (135 grains/g) was low, along with low amounts of Poaceae, cheno-am, high and low spine Asteraceae, and *Artemisia. Zea mays* pollen (27 grains/g) was also present.

FS 884 (CLES 94020) was taken from under Metate 2 and contained 432 grains/g. *Pinus* (259 grains/g) was low, with low amounts (115 grains/g) of cheno-am. *Sphaeralcea* (29 grains/g) was also present.

Four samples were taken from Feature 3, a pit structure.

FS 641 (CLES 94017) was taken from under the comal on the floor and contained only 304 grains/g. *Pinus*, cheno-am, and low spine Asteraceae were present in small amounts. Onagraceae pollen (30 grain/g) was present.

FS 664 (CLES 94013) was taken from under a broken pot on the floor. This sample contained 445 grains/g. *Pinus* (111 grains/g) and cheno-am (83 grains/g) were extremely low, with traces of low spine Asteraceae(28 grains/g) and *Ephedra* (56 grains/g).

FS 683 (CLES 93372) was taken from under a mano/metate and contained 646 grains/g. *Pinus* (269 grains/g) was low in addition to low amounts of Poaceae, cheno-am, high and low spine Asteraceae and *Artemisia. Ephedra* and *Platyopuntia* (54 grains/g) were present.

FS 893 (CLES 94199) was taken from under a sherd in the fill and contained 326 grains/g. Cheno-am (173 grains/g) was low but dominated the assemblage, with low amounts of *Pinus* and low spine Asteraceae. A single grain of Rosaceae was observed in the low-magnification scan.

FS 1608 (CLES 94015) was taken from under a mano sitting on a metate in Feature 9, a pit structure. This sample contained 526 grains/g. *Pinus* (155 grains/g) and cheno-am (278 grains/g) were both low, with small amounts of Poaceae and *Platyopuntia* (31 grains/g each). *Zea mays* (31 grains/g) pollen was present.

A total of seven samples were taken from Feature 12, a large pit structure.

FS 1985 (CLES 94016) was taken from under Metate 2 and contained 344 grains/g. *Pinus,* Poaceae, and cheno-am pollen were very low and were the only taxa present in addition to indeterminate pollen.

FS 1986 (CLES 93368) was taken from Metate 3 and contained 477 grains/g. *Pinus* (119 grains/g), Poaceae (51 grains/g), cheno-am (172 grains/g), and high (34 grains/g) and low spine Asteraceae (17 grains/g) pollen were present in low amounts.

FS 1987 (CLES 93370) was taken from the top of the comal and contained 399 grains/g. *Pinus, Juniperus, Quercus*, Poaceae, cheno-am, and both high and low spine Asteraceae were present in very small amounts.

FS 1989 (CLES 94014) was taken under a ground stone and contained 445 grains/g. *Pinus* and cheno-am pollen were both very low, with a trace of low spine Asteraceae pollen.

FS 1990 (CLES 93371) was taken from the interior of a jar and contained 396 grains/g. *Pinus* and *Quercus* were low, in addition to low amounts of Poaceae and cheno-am pollen.

FS 1993 (CLES 93367) was taken from under a floor sherd from Feature 12 and contained only 106 grains/g. This value was based on a pollen sum of only four grains. A single grain each of *Pinus* and cheno-am were recovered.

FS 1999 (CLES 93369) was taken from sherds under a metate in the pit structure fill and contained 612 grains/g. Poaceae, cheno-am, and high spine Asteraceae pollen were present, but in low amounts.

FS 1900 (CLES 94019) was taken from the floor under the comal in Feature 13, a pit structure. This sample contained 495 grains/g. *Pinus* and cheno-am were low, with high amounts (185 grains/g) of Poaceae. High spine Asteraceae and *Platyopuntia* pollen were present.

FS 1610 (CLES 93365) was taken from the skull cavity of Feature 14, a burial postdating A.D. 900, and contained 556 grains/g. *Pinus* and cheno-am pollen were low, with small amounts of Poaceae and high spine Asteraceae. FS 1609 (CLES 94018) was taken from the pelvic cavity of this burial and contained 884 grains/g. *Pinus* and cheno-am pollen were low, with high amounts of Poaceae (98 grains/g). Low spine (33 grains/g) Asteraceae was low.

*LA 45508*. FS 1926 (CLES 94198) was from under a sherd at 153 cm depth in the fill. The sample contained 238 grains/g. *Pinus,* Poceae, cheno-am, and low spine Asteraceae pollen were present in trace amounts. A single grain of corn and *Ephedra* were observed in the low-magnification scan.

*LA 45510*. FS 302 (CLES 94201) was taken from inside a bowl recovered from this, site which dated to the Late Pithouse period. A pollen concentration value of 327 grains/g was recovered. *Pinus* (164 grains/g) was low, with small amounts of Poaceae, cheno-am, and both high and low spine Asteraceae. A single grain of *Platyopuntia* was recovered from the low-magnification scan.

*LA 70185*. This site consisted of a roomblock with at least two rooms dating between A.D. 1020 and 1060. A total of 20 samples were collected. An additional five samples were collected from outside these two rooms.

FS 537 (CLES 94180) was taken from the floor of Room 1 and contained 401 grains/g. *Pinus* and cheno-am were low and were the only taxa present in addition of indeterminate.

FS 665 (CLES 94293) was Sample 1 from the floor of Room 1 and contained 1,032 grains/g. *Pinus*, Poaceae, and cheno-am were low.

FS 666 (CLES 93294) was Sample 2 taken from the floor of Room 1 and contained 913 grains/g. *Pinus* (504 grains/g) pollen was low, with low amounts of cheno-am (252 grains/g) and high spine Asteraceae (31 grains/g). Poaceae (126 grains/g) pollen was high.

FS 667 (CLES 93295) was Sample 3 from the floor of Room 1 and contained 424 grains/g. *Pinus*, Poaceae, and cheno-am were low.

FS 1389 (CLES 94197) was taken from the surface of Metate 3 in Room 1 and contained 283 grains/g, but this was based on only nine pollen grains. *Pinus* and cheno-am pollen were very low. *Zea mays* (31 grains/g) pollen was also present.

FS 1405 (CLES 94196) was taken from Pit 5 from inside a sherd, Room 1, and contained 212 grains/g. This value was based on a pollen sum of only eight grains. *Pinus* and cheno-am were the only taxa recovered.

FS 1407 (CLES 94192) was taken from under a sherd, Vessel 4, Room 1, and contained 446 grains/g. *Pinus* (330 grains/g) pollen was low, with a trace (19 grains/g) of Onagraceae pollen. Cheno-am and low spine Asteraceae pollen was very low.

FS 1425 (CLES 94194) was taken from under the floor of Room 1 and contained only 154 grains/g concentration, but this was based on a pollen sum of only six grains. Only a single cheno-am grain was recovered.

FS 420 (CLES 94178) was taken from a metate surface in Room 2 and contained 503 grains/g. *Pinus*, cheno-am, low spine Asteraceae, and indeterminate pollen were present.

FS 519 (CLES 93392) was from the fill of Room 2 and contained 439 grains/g. *Pinus*, cheno-am, low spine Asteraceae, and indeterminate were the only taxa present.

FS 520 (CLES 94182) was from Room 2 fill and contained only 247 grains/g total pollen. *Pinus, Quercus,* cheno-am, and indeterminate type pollen were the only taxa present.

FS 521 (CLES 94181), from Room 2, contained 518 grains/g. *Pinus* (230 grains/g) was very low, with low amounts of cheno-am (173 grains/g), high and low spine Asteraceae (29 grains/g each), and indeterminate pollen (58 grains/g).

FS 690 (CLES 93296) was taken from the grinding surface of a metate in the fill of Room 2 and contained 739 grains/g. *Pinus* and cheno-am pollen were low, with a trace of low spine Asteraceae pollen. Poaceae pollen (109 grains/g) was high.

FS 761 (CLES 93297) was taken from the fill of Room 2 and contained 306 grains/g. *Pinus,* cheno-am, *Ephedra*, and indeterminate were the only taxa present.

FS 1421 (CLES 94121) was taken from a comal in the ash pit and contained 278 grains/g. *Pinus* and cheno-am were present.

*LA 45510, Outside of Rooms*. FS 238 (CLES 94184) was taken from the top of Metate 1 in the general fill and contained 365 grains/g. *Pinus*, cheno-am, and indeterminate were the only taxa present.

FS 240 (CLES 941184) contained 1,091 grains/g. *Pinus* and cheno-am were both low, with small amounts of low spine Asteraceae and *Artemisia.*

FS 360 (CLES 94125) contained 402 grains/g. *Pinus*, cheno-am, and low spine Asteraceae were present in low amounts.

FS 762 (CLES 94183) was designated Sample 1 from general fill and contained 599 grains/g. *Pinus,* Poaceae, cheno-am, and *Ephedra* were very low. A trace of cheno-am anther fragments (18/g) were present, and a single corn grain was observed in the low-magnification scan.

FS 763 (CLES 94193) was designated Sample 2 and contained 465 grains/g. *Pinus* and cheno-am pollen were very low, with a trace of low spine Asteraceae pollen. *Zea mays* (21 grains/g) pollen was also present.

*Phase 3*

The provenience and raw pollen counts for all soil pollen samples are found in Tables 5.64 and 5.65. Table 5.66 presents the provenience and calculated pollen concentration values for all soil pollen samples. The results are presented below by site.

*LA 39968*. A total of 30 pollen samples were taken from this site, which dated to A.D. 1185 ± 30. The site is at 6,190 ft elevation. It is a Tularosa phase roomblock with a possible kiva.

FS 915 was a surface control sample taken from Level 1 off site. This assemblage contained a total of 3,797 grains/g, with 4.3 percent indeterminate pollen. *Pinus* (1964 grains/g) pollen was moderate, with a small amount of *Quercus* pollen (65 grains/g). Cheno-am (818 grains/g) pollen was low, with high amounts of Poaceae (360 grains/g), high (196 grains/g) and low spine (131 grains/g) Asteraceae, and a small amount of *Artemisia* (33 grains/g). *Zea mays* (65 grains/g) pollen was moderate.

Two samples (both FS 449) were taken in association with Burials 1 and 2, and both were associated with ceramics. Sample CLES 95288 was associated with Vessel 6 from Burial 1 and contained only 519 grains/g total concentration, with 7.3 percent indeterminate pollen. *Pinus,* cheno-am, and high spine Asteraceae pollen were low, with high amounts of Poaceae pollen. Small amounts of both *Zea mays* and *Polygonum* pollen were also present.

CLES 95250 was associated with a broken vessel from Burial 2 and contained 622 grains/g total concentration, with 11.4 percent indeterminate pollen. *Pinus, Quercus*, and cheno-am pollen were very low, with high amounts of Poaceae pollen. A small amount of *Zea mays* pollen was also present.

A total of 11 samples were taken from either the floor or the fill of the pit structure.

FS 1847 was taken from the floor and contained 764 grains/g. *Pinus* (340 grains/g) was very low. Cheno-am and high spine Asteraceae pollen were both low, with a moderate amount of Poaceae pollen. An unknown type of grain was present in fairly high amounts (113 grains/g), but no corn pollen was present.

FS 1848 (CLES 94091) was from the inside of Vessel 1 and contained 393 grains/g. *Pinus* (164 grains/g) and cheno-am (131 grains/g) were very low but dominated the assemblage. Poaceae, high spine Asteraceae, and indeterminate pollen were all quite low (33 grains/g) each.

FS 1849 was also from the floor from under a group of sherds and contained 556 grains/g. *Pinus* was very low, with low amounts of cheno-am pollen. Poaceae, low spine Asteraceae, and *Artemisia* were present in moderate amounts. No corn pollen was present.

FS 1850 was taken from inside a large sherd in the fill of the pit structure and contained 495 grains/g. *Pinus* was very low, with low cheno-am, low to moderate amounts of high spine Asteraceae and *Artemisia*, and fairly high amounts of Poaceae pollen. No corn pollen was present.

FS 1851 was taken from the surface of a metate from the fill of the pit structure and contained 632 grains/g. *Pinus* was very low, with a trace of Solanaceae pollen. Cheno-am, Poaceae, and both high and low spine Asteraceae pollen were low and no corn pollen was present.

FS 1852 was taken from under a ceramic bowl from the fill of this pit structure and contained only 360 grains/g total concentration and was based on a pollen sum of only 11 grains. *Pinus* was very low, with a small amount of *Quercus* pollen. Poaceae, cheno-am, and low spine Asteraceae pollen were low, with no corn pollen.

FS 1952 was from inside Metate 2, also from the fill and contained 788 grains/g. *Pinus* was very low, with low amounts of cheno-am and low spine Asteraceae. Poaceae, high spine Asteraceae, and *Artemisia* pollen were high. *Zea mays* pollen was also present (23 grains/g).

FS 2082 was taken from reconstructed Vessel 2, which was located on the floor of this pit structure and contained 477 grains/g. *Pinus* was very low, with low amounts of cheno-am, moderate amounts of high spine Asteraceae, and high Poaceae pollen. No corn pollen was present.

FS 2083 was taken from a metate on the floor surface and contained 668 grains/g. *Pinus* pollen was very low, with a trace of *Juniperus* pollen. Cheno-am was low, with moderate amounts of high spine Asteraceae and Poaceae pollen. Cylindropuntia pollen was moderate (24 grains/g), with no corn pollen.

FS 2085 was a second pollen sample from the metate and contained 916 grains/g. *Pinus* was very low, with low amounts of cheno-am and moderate Poaceae. A small amount of *Zea mays* pollen (33 grains/g) was also present.

FS 2188 was taken from below Metate 4 from the floor of the pit structure and contained 468 grains/g. *Pinus* was very low, with low amounts of cheno-am. A large amount of *Cylindropuntia* pollen was present, but no corn pollen.

FS 2189 was taken from Pit 4 and contained 630 grains/g. *Pinus* was very low, with low amounts of cheno-am and *Artemisia* and high amounts of Poaceae. No corn pollen was present.

FS 2190 was taken from Posthole 2 and contained 941 grains/g. *Pinus* was low, with low amounts of cheno-am and moderate amounts of low spine Asteraceae and *Artemisia.* No corn pollen was present.

FS 2191 was from Posthole 8 and contained 674 grains/g. *Pinus* was low, with low cheno-am and high spine Asteraceae. *Sphaeralcea* and *Zea mays* were both present.

FS 2192 was taken from Metate 2 from the floor of the pit structure and contained 1,258 grains/g. *Pinus* pollen was very low, with low amounts of cheno-am (605 grains/g) and high spine Asteraceae, and high amounts of Poaceae. *Zea mays* (96 grains/g) pollen was also present.

FS 2193 was from the fill of Pot Rest 5 and contained 1,012 grains/g. *Pinus* was low, with low amounts of cheno-am, high spine Asteraceae, and *Artemisia*, with moderate amounts of Poceae. No corn pollen was present.

FS 2194 was also from the fill of this suspected posthole and contained 607 grains/g. *Pinus* was low, with low amounts of Poaceae and cheno-am and very high amounts of low spine Asteraceae (101 grains/g). A trace of *Zea mays* pollen (25 grains/g) was also present.

FS 2244 was taken from the fill of Pit 2 and contained only 377 grains/g. *Pinus* was very low, with low amounts of cheno-am and *Artemisia*. No corn pollen was present, but this sample contained a pollen sum of only 14 grains.

FS 2245 was taken from the floor below Metate 3 and contained 985 grains/g. *Pinus* was low, with low amounts of Poaceae and cheno-am and moderate amounts of high spine Asteraceae and *Artemisia.* No corn pollen was present.

FS 2322 was taken from Floor 2 and contained 547 grains/g. *Pinus* and *Juniperus* were very low, with low cheno-am and low spine Asteraceae, and high Poaceae pollen. No corn pollen was present.

FS 2326 was taken from Pot Rest 21 from Floor 2 and contained only 152 grains/g total concentration, which was based on only five grains.

FS 2327 was from Pot Rest 20 from Floor 2 and contained 992 grains/g. *Pinus* was low, with low cheno-am, moderate low spine Asteraceae, and high Poaceae values. No corn pollen was present.

FS 2374 was also from Floor 2 and contained 1,751 grains/g. *Pinus* was low, with moderate cheno-am (1013 grains/g), high Poaceae (164 grains/g), and low amounts of high and low spine Asteraceae and *Artemisia* (27 grains/g each). No corn pollen was present.

FS 2375 was from the fill of Pot Rest 22 and contained 327 grains/g. *Pinus* was low, with low cheno-am and high Poaceae values. No corn pollen was present.

FS 2381 was from the upper fill of the pit structure from under a stone slab and contained 257 grains/g. *Pinus* was very low, with low cheno-am and no corn pollen.

FS 2520 was taken from under Metate 1 from the floor fill of the pit structure and contained 564 grains/g. *Pinus* was low, with low cheno-am and high spine Asteraceae, and moderate low spine Asteraceae and Poaceae values. No corn pollen was present.

FS 2521 was also from under Metate 1 from the floor fill of the pit structure and contained 520 grains/g. *Pinus* was very low, with low cheno-am and both high and low Asteraceae, and moderate values of Poaceae pollen. No corn pollen was present.

*LA 39969*. A total of 30 pollen samples were taken from LA 39969, which dated to A.D. 1043 ± 30. The site is at an elevation of 5,920 ft.

FS 1174 and FS 1175 were off-site surface control samples. FS 1174 contained 2,576 grains/g. *Pinus* (1,717 grains/g) pollen was moderate, with a small amount of Quercus (46 grains/g). A number of herbaceous taxa were present in small amounts, including Rosaceae, Solanaceae, *Polygonum,* and Fabaceae. Cheno-am pollen was low, with small amounts of high spine Asteraceae and *Artemisia* pollen. Poaceae and low spine Asteraceae were quite high.

FS 1175 contained 6,368 grains/g. *Pinus* pollen (4513 grains/g) was very high, with high amounts of *Juniperus* (278 grains/g), *Quercus* (124 grains/g), and a fair amount of *Pseudotsuga* (31 grains/g). *Pseudotsuga* is fairly common in the higher elevations of the San Francisco Mountains. Cheno-am pollen (556 grains/g) was low, with high amounts of Poaceae (309 grains/g) and low spine Asteraceae (155 grains/g) and a small amount of high spine Asteraceae (31 grains/g).

FS 343 was taken from Pit 3 from Room 1 and contained 556 grains/g. *Pinus* pollen was low, with low amounts of cheno-am pollen. A small amount of *Zea mays* (25 grains/g) pollen was also present.

FS 364 was taken from under a mano from Room 1 fill and contained 454 grains/g. *Pinus* was low, with traces of Poaceae, cheno-am, and high spine Asteraceae pollen. An unknown type was present (16 grains/g) in addition to *Zea mays* (32 grains/g).

FS 365 was taken from under a metate in Room 1 fill and contained 1,007 grains/g. *Pinus* was low, with low amounts of cheno-am, high spine Asteraceae, and *Artemisia,* and high amounts of Poaceae and low spine Asteraceae. No corn pollen was present.

FS 397 was taken from the fill of a large pit (Feature 2) and contained 730 grains/g. *Pinus* was low, with low amounts of cheno-am and moderate Poaceae values. No corn was present.

FS 722 was taken from under the south wall within Room 1 and contained 945 grains/g. *Pinus* was low, with low cheno-am and high spine Asteraceae. *Cylindropuntia* (31 grains/g) was present but no corn pollen.

FS 956 (94420) was taken from Burial 1 (Feature 10) and contained only 385 grains/g. *Pinus* was very low, with low cheno-am and moderate values of Poaceae and high spine Asteraceae pollen. No corn pollen was present. Two additional samples were taken from the same FS number, also in association with Burial 1. CLES 94419 (PP 2) was taken from the burial area and contained 368 grains/g. *Pinus* was very low, and cheno-am anther fragments was the only other taxon present. CLES 94424 (PP 2) was taken from the fill of a complete bowl and contained 706 grains/g. *Pinus* was low, with low cheno-am and high spine Asteraceae. Poaceae was moderate, with a significant amount of *Cylindropuntia* pollen. No corn pollen was present.

Several samples were taken from FS 1050 from Burial 2 (Feature 14). CLES 94426 contained 455 grains/g. *Pinus* was low, with low cheno-am pollen. No corn pollen was present. CLES 94422 contained 618 grains/g. *Pinus* was very low, with low cheno-am, low spine Asteraceae, and Poaceae. No corn pollen was present. CLES 94418 contained 674 grains/g. *Pinus* was very low, with low cheno-am and no corn pollen. CLES 94427 contained 346 grains/g. *Pinus,* Poaceae, cheno-am, and indeterminate pollen were present. CLES 94425 was taken from the fill of Vessel 2 from Burial 2 and contained 753 grains/g. *Pinus, Quercus*, cheno-am, and *Cylindropuntia* were present in addition to indeterminate pollen.

FS 832 was from the fill of an outside hearth (Feature 9) and contained 547 grains/g. *Pinus* was low, with low amounts of cheno-am, high spine Asteraceae, and *Ephedra.* A trace of Rosaceae pollen (27 grains/g) was also present.

FS 970 was taken from Pit 15 and contained only 507 grains/g. *Pinus* pollen was low, with low amounts of cheno-am and Poaceae and high values for low spine Asteraceae pollen. No corn pollen was present.

FS 1046 was taken from the base of Pit 17 and contained only 252 grains/g. *Pinus* and cheno-am pollen were low and were the only taxa present. The concentration values were based on a pollen sum of only eight grains.

Several samples were taken from a large pit feature from the same FS area as Burial#2. CLES 94090 was associated with a vessel and contained 1,440 grains/g. *Pinus* (687 grains/g) was low, with low amounts of cheno-am (360 grains/g), high spine Asteraceae, and *Ephedra* (33 grains/g each). Poaceae (131 grains/g) and low spine Asteraceae (65 grains/g) were both high. No corn pollen was present. CLES 94423 contained 756 grains/g. *Pinus* was low, with low cheno-am and low spine Asteraceae. Poaceae and *Artemisia* (52 grains/g each) pollen was moderate. No corn pollen was present.

FS 1050 was taken from the 96 cm level from below Vessel 1. This assemblage contained 989 grains/g. *Pinus* was low, with low cheno-am and high spine Asteraceae, and high amounts of Poaceae. A small amount of *Zea mays* pollen (31 grains/g) was present. Another was taken from the 99 cm level from below Vessel 1 and contained 1060 grains/g. *Pinus* was low, with low amounts of cheno-am, high spine Asteraceae, *Artemisia,* and *Cylindropuntia*. *Zea mays* pollen was present in amounts of 26 grains/g.

FS 1096 was taken from the bottom of Pit 19 within Room 3 and contained 635 grains/g. *Pinus* was low, with low cheno-am. High spine Asteraceae and *Artemisia* pollen were low (24 grains/g), with high amounts of Poaceae. No corn pollen was present.

FS 1097 was also taken from Pit 19, Room 3, from an upright stone slab located against the west wall. This assemblage contained 489 grains/g. *Pinus* and cheno-am pollen were both low, with a trace of high spine Asteraceae.

FS 1123 was taken from a pit within Room 3 (Feature 21) and contained 706 grains/g. *Pinus* pollen was low, with low cheno-am. These were the only taxa present in addition to indeterminate pollen.

FS 1141 was taken from a subfloor pit (Feature 22) within Room 3 and contained 602 grains/g. *Pinus* and cheno-am pollen were both low and were the only taxa present in addition to indeterminate.

FS 1143 was taken from Pit 23 from Room 3 and contained 732 grains/g. *Pinus* and cheno-am pollen, both low, and were the only taxa present in addition to indeterminate pollen.

FS 1154 was taken from the subfloor Pit 25 in Room 3 and contained 610 grains/g. *Pinus* was low, with a trace of *Quercus* pollen. Cheno-am, high and low spine Asteraceae, and *Artemisia* pollen were low, with moderate values for Poaceae. No corn pollen was present.

Two samples were associated with a partial vessel from Unit 101N/104E in the general fill. FS 694 contained 775 grains/g. *Pinus* was low, with a trace of *Juniperus* pollen. Cheno-am (219 grains/g) pollen was low, with small amounts of Poaceae, high and low spine Asteraceae, *Artemisia,* and *Cylindropuntia* (20 grains/g each). A small amount of *Zea mays* pollen (20 grains/g) was also present.

FS 697 was taken from the fill of this partial vessel and contained 776 grains/g. *Pinus* and cheno-am pollen were both low. Poaceae (141 grains/g) pollen was high, with low to moderate amounts of low spine Asteraceae and *Artemisia.* No corn pollen was present.

*LA 39972*. Only three samples were submitted from this site. LA 39972 appears to have had two periods of occupation. One was an Early Pithouse period occupation based on ceramic materials and a C-14 sample. This occupation dated to A.D. 380 ± 70, and a later one to A.D. 1000-1100. The site is at an elevation of 6,110 ft. The provenience data, raw pollen counts, and calculated pollen concentration values are reported in Table 5.67.

FS 281 was dated to the earlier pithouse occupation and contained 394 grains/g. *Pinus*, Poaceae, and cheno-am pollen were present in addition to indeterminate.

FS 495 was taken from the trash pit in the Reserve phase portion of the site, which dated to A.D. 1000-1100. This assemblage contained 754 grains/g. *Pinus* was low, with low amounts of cheno-am and Poaceae and moderate amounts of high spine Asteraceae.

FS 496 was also taken from this feature and contained 676 grains/g. *Pinus* was low, with low cheno-am and moderate Poaceae pollen.

*Phase 4*

The provenience and raw pollen counts for all soil pollen samples are found in Tables 5.64 and 5.65. Table 5.66 presents the provenience and calculated pollen concentration values for all soil pollen samples. The results are presented below by site.

*LA 3279*. All samples from this site dated to ca. A.D. 1275-1300. The site is only a short distance from LA 89846 and at the same approximate elevation.

FS 79, taken from reconstructible Vessel 1-4 in Feature 2 (trash midden), contained 622 grains/g. *Pinus* and cheno-am pollen were extremely low, but this sample did contain moderate amounts of *Zea mays* pollen (33 grains/g).

FS 114 was taken from soil within a bowl in the fill of Room 5 and contained 3,130 grains/g. *Pinus* pollen was moderate (1,904 grains/g, with a small amount of *Quercus* (52 grains/g) pollen. Cheno-am was very low, but Poaceae pollen was high (209 grains/g). High spine Asteraceae was moderate, with very high amounts of low spine Asteraceae. *Artemisia* was present in low amounts.

FS 168 was taken from the floor of Room 5 and contained 1,348 grains/g. *Pinus* was low, with small amounts of *Quercus* (32 grains/g). Cheno-am pollen was low, with high amounts of grass pollen (96 grains/g). Asteraceae pollen was moderate to high, with a moderate amount of Cylindropuntia pollen (32 grains/g). *Zea mays* pollen (26 grains/g) was also present.

FS 230 was taken in association with Vessel 2 from the floor of Room 6 and contained 360 grains/g. *Pinus* was very low, with only traces of cheno-am but moderate grass pollen.

FS 231 was taken from Vessel 1 on the floor of Room 6 and contained 848 grains/g. *Pinus* was low, with low amounts of cheno-am pollen. High spine Asteraceae pollen was low, with a low to moderate amount of *Zea mays* pollen (27 grains/g).

FS 256 was taken from a small pot on the floor of Room 6 and contained 2,229 grains/g. *Pinus* was low, along with low cheno-am pollen. Both low and high spine Asteraceae pollen were high, and a large amount of Onagraceae pollen was present (123 grains/g).

FS 306 was taken from Vessel 4 in Pit 7, Room 6, and contained 927 grains/g. *Pinus* and cheno-am were both very low, with moderate Poaceae pollen and high amounts of low spine Asteraceae pollen.

FS 307 was taken from Vessel 5, Pit 7, Room 6, and contained 491 grains/g. *Pinus* and cheno-am were both very low, with low to moderate Poaceae pollen. Low spine Asteraceae was present in moderate to low amounts

FS 678 was taken from Feature 18, a pit, and contained 1,511 grains/g. *Pinus* and cheno-am were both low, with high amounts of Poaceae (394 grains/g) pollen. Low spine Asteraceae and *Zea mays* (33 grains/g) were also present.

FS 347 was from a subfloor pit in Room 7 and contained 1,541 grains/g. *Pinus* was low, with very low amounts of cheno-am and moderate amounts of Poaceae pollen. Low spine Asteraceae was very high (289 grains/g). *Zea mays* (64 grains/g) and *Cylindropuntia* (32 grains/g) were both present.

FS 348 was taken from a stone bowl on the floor of Room 7 and contained 1,538 grains/g. Pinus was low, with very low amounts of cheno-am and high spine Asteraceae pollen. Low spine Asteraceae pollen was high (425 grains/g), but no corn pollen was present.

FS 357 was taken from Vessel 8 in a subfloor pit in Room 7 and contained 756 grains/g. *Pinus,* cheno-am, and indeterminate pollen were the only taxa present.

FS 362 was taken from the floor of Room 7 and contained 1,669 grains/g. *Pinus* was low, with low cheno-am. Low spine Asteraceae was high, with moderate amounts of high spine Asteraceae.

FS 363 was taken from below a mano on the floor of Room 7 and contained 1,010 grains/g. *Pinus* was low, but a small amount of Quercus pollen was present. Cheno-am was low, but Poaceae pollen was high. Low spine Asteraceae was high, with moderate high spine Asteraceae and *Artemisia.*

FS 370 was taken from Feature 8, a posthole in Room 7, and contained 684 grains/g. *Pinus* was low, with very low cheno-am and moderate Asteraceae. *Platyopuntia* was present (27 grains/g), along with *Zea mays* (27 grains/g).

FS 374 was taken from Feature 10, a pit in Room 7, and contained only 619 grains/g. *Pinus* and cheno-am pollen were low, with moderate amounts of Poaceae pollen. A small amount of *Zea mays* pollen (27 grains/g) was also present.

FS 387 was taken from Feature 15, a posthole in Room 7, and contained 1,188 grains/g. Pine, cheno-am, and Poaceae pollen were low, with moderate amounts of Asteraceae pollen.

FS 492 was taken from a metate on the floor of Room 7 and contained 1,898 grains/g. *Pinus* and cheno-am were low, with high amounts of Poaceae. Low spine Asteraceae was very high (524 grains/g), with moderate amounts of *Zea mays* (33 grains/g) pollen.

FS 493 was taken from Feature 16, a pot rest in Room 7, and contained 1,833 grains/g. *Pinus* and cheno-am were low, with very high Poaceae (262 grains/g) and low spine Asteraceae (524 grains/g) pollen. *Artemisia* was present, along with *Zea mays* (33 grains/g).

FS 735 was taken from a ground stone on the floor of Room 7 and contained 1,266 grains/g. *Pinus* and cheno-am were both low, with low amounts of Poaceae. Low spine Asteraceae pollen was high (201 grains/g).

FS 372 was taken from Feature 6, a pit in Room 8, and contained 753 grains/g. *Pinus* was low, with low cheno-am and moderate Poaceae. A small amount of *Cylindropuntia* was present (32 grains/g).

FS 373 was taken from Feature 5, a posthole in Room 8, and contained 777 grains/g. *Pinus* and cheno-am were both low, with moderate to high Asteraceae and *Artemisia.*

FS 353 was taken from a reconstructible vessel below roof fall in Room 9 and contained 820 grains/g. *Pinus,* cheno-am, low spine Asteraceae, *Artemisia*, and *Ephedra* were present in addition to indeterminate pollen.

FS 358 was taken from the same vessel and contained 1,266 grains/g. *Pinus* and cheno-am were both low, with low to moderate amounts of Poaceae. High spine Asteraceae was low to moderate, with high amounts of low spine Asteraceae.

FS 360 was taken from reconstructible Vessel 3 on the floor of Room 9 and contained 942 grains/g. *Pinus,* Poaceae, and cheno-am pollen were low, with moderate amounts of Asteraceae.

FS 361 was taken from inside a stone bowl on the floor of Room 9 and contained 370 grains/g. *Pinus* pollen was low, along with low cheno-am. High spine Asteraceae pollen was high, with low amounts of low spine Asteraceae pollen and *Artemisia.*

FS 505 was from beneath Vessel 10 on the floor of Room 9 and contained 1,541 grains/g. *Pinus* and cheno-am was low, with moderate high spine and high low spine Asteraceae.

FS 522 was taken from Vessel 5 in Room 9 and contained 937 grains/g. *Pinus* was low, with a trace of *Quercus* pollen and low cheno-am. Asteraceae pollen was moderate, with moderate amounts of *Cylindropuntia* pollen.

FS 555 was taken from Feature 8, from a vessel in a pit in Room 9, and contained 688 grains/g. *Pinus* and cheno-am pollen were low, with moderate amounts of low spine Asteraceae. A small amount (32 grains/g) of *Zea mays* pollen was also present.

FS 475 was taken from a miniature bowl in Room 10 and contained 1,155 grains/g. *Pinus* and cheno-am were low, with high amounts of Poaceae and moderate high spine Asteraceae and *Artemisia.*

FS 610 was taken from Metate 1, Room 10, and contained 1,144 grains/g. Pine and cheno-am were both low, with moderate amounts (62 grains/g) of Asteraceae. *Zea mays* (31 grains/g) was also present.

FS 614 was taken from Feature 9, a pit in Room 10, and contained 684 grains/g. Pine, cheno-am, high spine Asteraceae, and *Artemisia* were present in low amounts in addition to indeterminate pollen.

FS 352 was taken from reconstructible Vessel 5 in the fill of Room 11 and contained only 821 grains/g. *Pinus,* cheno-am, and low spine Asteraceae were the only taxa present in addition to indeterminate pollen.

FS 632 was taken from the floor of Room 11 and contained 719 grains/g. Pine, Poaceae, and cheno-am were low, with low amounts of low spine Asteraceae.

FS 650 was taken from Feature 4, a platform in Room 11, and contained 496 grains/g. Pine and cheno-am pollen were low, with low Asteraceae.

FS 519 was taken from a small pot (CLES 95391) in Room 15 (great kiva) and contained 4,416 grains/g. *Pinus* was low, with moderate cheno-am (1,380 grains/g each).

Also from FS 519 (CLES 95392) was small pot in Room 15 containing 868 grains/g. *Pinus* and cheno-am were low.

And another sample from FS 519 (CLES 95393), Room 15, was taken from small pot and contained 527 grains/g. *Pinus* and cheno-am were low, with high amounts of low spine Asteraceae.

FS 674 was taken from a small pot in Room 15 and contained 337 grains/g. Pine and cheno-am pollen were the only taxa present.

FS 678 was also taken from a small pot in Room 15 and contained only 156 grains/g. Pine, cheno-am, and indeterminate pollen were the only taxa present.

FS 714 was taken from Burial Vessel 3, Feature 4, Room 15, and contained 556 grains/g. Pine and cheno-am were low, with a small amount of *Quercus* pollen. High spine Asteraceae and Artemisia were both present in small amounts.

*LA 89846*. A single pollen sample was taken from this site, which dated to ca. 540 B.C. FS 191 was from Feature 1 (pit) and contained 565 grains/g. *Pinus* (215 grains/g) pollen was very low. Cheno-am (162 grains/g) was very low, along with low amounts of Poaceae (27 grains/g) and high amounts of low spine Asteraceae (135 grains/g). *Zea mays* (27 grains/g) pollen was present.

## Pollen Wash Samples

The provenience data and raw pollen counts for all pollen wash samples are presented in Table 5.66, while Table 5.67 contains the calculated pollen concentration values for all pollen wash samples. The results are presented below by project phase and site.

### *Phase 1*

*LA 37919*. A single sample (FS 45, CLES 93069) was obtained from a tabular metate from this site, which dated to ca. A.D. 1570. A total of 1520.53 sq cm were washed, and the artifact contained 17.91 grains/sq cm. *Pinus* (6.26 grains/sq cm) was present in low amounts. High and low spine Asteraceae and Poaceae pollen were quite low in addition to indeterminate (5.39 grains/sq cm). Corn starch grains were present.

*LA 39975*. A total of six artifacts were submitted for analysis from this site, which dated to ca. A.D. 420.

FS 361 (CLES 93053) was a tabular two-handed mano. A total of 312 sq cm were washed, and the artifact contained 30.6 grains/sq cm. Cheno-am (15.3 grains/sq cm) dominated the assemblage, with traces of both high and low Asteraceae (2.19 grains/sq cm) and *Artemisia* (3.28 grains/sq cm).

FS 577 (CLES 93071) was a small ceramic dipper found in the general fill. A total of 21.99 sq cm were washed, and the artifact contained only 9.18 grains/sq cm, based on a pollen sum of only two grains. A single Poaceae and an unknown type pollen grain were the only grains encountered. Corn starch grains were present.

FS 587 (CLES 93065) was a tabular worked stone on the pithouse floor, and 315 sq cm were washed. The artifact contained 63.72 grains/sq cm. *Pinus* (5.49 grains/sq cm) was present in addition to Poaceae (6.59 grains/sq cm) and cheno-am (32.96 grains/sq cm), which dominated the assemblage. High and low spine Asteraceae were present in addition to a small amount of *Zea mays* (1.10 grains/sq cm), and corn starch grains were present.

FS 631 (CLES 93055) was a metate fragment in the fill of Pithouse 1, and 115 sq cm were washed. This artifact contained 32.77 grains/sq cm. *Pinus* (17.88 grains/sq cm) were present in addition to indeterminate (14.9 grains/sq cm).

FS 632 (CLES 93064) was a tabular metate fragment, also from the pithouse fill, and 195 sq cm were washed. This sample contained 41.33 grains/sq cm. *Pinus* (10.72 grains/sq cm) was present, along with a trace of *Quercus* (1.53 grains/sq cm). Cheno-am and high and low spine Asteraceae were present, along with *Ephedra.* Corn starch grains were also present.

FS 667 (CLES 93070) was a tabular mano taken from the general fill. A total of 426 sq cm were washed, and this sample contained 86.72 grains/sq cm. *Pinus* and *Juniperus* were present in small amounts. Cheno-am (21.87 grains/sq cm), Poaceae (9.37 grains/sq cm), and high (3.91 grains/sq cm) and low spine (21.87 grains/sq cm) were present. Cheno-am anther fragments were present in trace amounts (0.78/sq cm). *Artemisia* was present in addition to indeterminate pollen.

*LA 70188*. A total of nine pollen wash samples were submitted from this site, which dated to between A.D. 0 and 30. All but one of the samples were metate fragments.

FS 1206 (CLES 93067) was taken from Pit Structure 1 fill, and 32 sq cm were washed. This sample contained 243.77 grains/sq cm. *Pinus* (20.31 grains/sq cm) and Solanaceae (10.16 grains/sq cm) were present. Poaceae (20.31 grains/sq cm) and cheno-am (60.94 grains/sq cm) were both somewhat higher. Low spine Asteraceae) 50.79 was high, and 10.16 grains/sq cm of an unknown taxa was present. Corn starch grains were present.

FS 1273 (CLES 93051) was also taken from Pit Structure 1 fill, and 42.75 sq cm were washed. This sample contained only 44.78 grains/sq cm, based on a pollen sum of only six grains. Poaceae, low spine

Asteraceae, and indeterminate were the only taxa present.

FS 1276 (CLES 93066) was taken from general fill, and 40 sq cm were washed. This sample contained 272.45 grains/sq cm. *Pinus* (24.04 grains/sq cm) was present in addition to Poaceae and cheno-am pollen. High and low spine Asteraceae and *Artemisia* pollen were also present. *Ephedra* (8.01 grains/sq cm) was high, with high indeterminate pollen (136.23 grains/sq cm). *Zea mays* (8.01 grains/sq cm) was present, along with corn starch grains.

FS 1296 (CLES 93054) was taken from Pit Structure 1 fill, and 370 sq cm were washed, but only 11.91 grains/sq cm were present. *Pinus* was present in trace amounts, along with cheno-am anther fragments. *Artemisia* and indeterminate pollen were also present.

FS 1400 (CLES 93048) was taken from general fill, and 47.75 sq cm were washed. This sample contained 172.59 grains/sq cm. *Pinus* (55.23 grains/sq cm) and cheno-am (48.33 grains/sq cm) dominated the assemblage. Poaceae pollen and low spine Asteraceae pollen (13.81 grains/sq cm each) were also present.

FS 1426 (CLES 93074) was taken from the fill of Pit 3, and 1272.61 sq cm were washed. This sample contained only 3.32 grains/sq cm. *Pinus* and indeterminate pollen were the only taxa present.

FS 1438 (CLES 93075) was taken from general fill, and 315 sq cm were washed. This sample contained 40.06 grains/sq cm. *Pinus* (18.56 grains/sq cm) was present in addition to small amounts of Poaceae and cheno-am pollen. Traces of both high and low spine Asteraceae and *Artemisia* (0.98 grains/sq cm) were present.

FS 1462 (CLES 93049) was taken from Pit 3 fill, 231 sq cm were washed, and the sample contained 22.14 grains/sq cm. *Pinus,* cheno-am, and low spine Asteraceae were present in addition to indeterminate pollen.

FS 1469 (CLES 93050) was taken from general fill and was a mano. This sample contained 20.94 grains/sq cm, and 279.6 sq cm were washed. *Pinus,* cheno-am, high and low spine Asteraceae were present in addition to indeterminate pollen.

*LA 70196*. A total of five artifacts were submitted from this site, which dated to A.D. 790. All artifacts were recovered from the pithouse floor.

FS 261 (CLES 93076) contained 49.79 grains/sq cm, and 55 sq cm were washed. *Pinus* and *Quercus* were present in addition to cheno-am and high spine Asteraceae. *Zea mays* (19.92 grains/sq cm) was present, along with corn starch grains.

FS 263 (CLES 93052), from a two-hand mano, contained 52.52 grains/sq cm total concentration, and 180 sq cm were washed. *Pinus* and cheno-am pollen and low spine Asteraceae pollen were present.

FS 270 (CLES 93077), from a metate, contained only 10.23 grains/sq cm concentration, and 1170 sq cm were washed. *Pinus,* Poaceae, cheno-am, and *Artemisia* were present. *Zea mays* pollen and starch grains were also present.

FS 271 (CLES 93078), taken from a mano, contained 70.98 grains/sq cm concentration, and 154 sq cm were washed. *Pinus,* cheno-am, high and low spine Asteraceae and *Zea mays* (10.75 grains/sq cm) pollen were present. Corn starch grains were also present.

FS 272 (CLES 93068), from a mano, contained 19.67 grains/sq cm concentration, and 217.68 sq cm were washed. *Pinus,* cheno-am and corn pollen were present in addition to indeterminate pollen. Corn starch grains were also present.

*LA 75792*. A single artifact was submitted from this site, which dated to ca. A.D. 1000. FS 781 was a large trough metate east of the structure. A total of 1520.83 sq cm were washed, and the sample contained only 7.28 grains/sq cm. Pinus, cheno-am, and indeterminate pollen were the only taxa present. Corn starch grains were present, however.

*Phase 2*

*LA 45507.* A total of 12 artifacts were sampled from this site, which dated to A.D. 800-1000.

FS 682 (CLES 93122) was taken from a metate from Pit Structure 3 fill. This sample contained 18.4 grains/sq cm, and 684 sq cm were washed. *Pinus* (4.84 grains/sq cm) pollen was low, with small amounts of Poaceae, cheno-am, and *Artemisia* pollen.

FS 684 (CLES 93096) was taken from a metate fragment above the floor in Pit Structure 3. This sample contained 7.12 grains/sq cm, and 1146.25 sq cm were washed. *Pinus* was low (1.14 grains/sq cm), with traces of Poaceae, cheno-am, and *Artemisia* pollen. A trace of corn pollen (0.28 grains/sq cm) was also present.

FS 1193 (CLES 93097) was taken from a mano fragment recovered from an outside surface near Pit Structure 3. This sample contained 34.82 grains/sq cm, and 178 sq cm were washed. *Pinus* (5.8 grains/sq cm) was present, along with Poaceae, cheno-am, and *Artemisia.*

FS 1196 (CLES 93099) was taken from a metate fragment from a Pit Structure 3 subfloor pit at the base and contained 49.19 grains/sq cm, with 303 sq cm washed. *Pinus* was present, and the concentration values for Poaceae, cheno-am, and high spine Asteraceae were slightly higher. Corn starch grains were also present.

FS 1475 (CLES 93100) was taken from a mano recovered from Pit Structure 13 lower fill. This sample contained 51.18 grains/sq cm, and 105 sq cm were washed. *Pinus,* cheno-am, low spine Asteraceae, and *Artemisia* were present. Corn starch grains were also present.

FS 1578 (CLES 93094) was taken from a mano with a convex cross section from Pit Structure 13 floor. This sample contained 40.43 grains/sq cm, and 254 sq cm were washed. Poaceae, cheno-am, and high and low spine Asteraceae were present. Corn starch grains were also recovered.

FS 1604 (CLES 93095), taken from a mano fragment from Pit Structure 9 floor, contained 145.24 grains/sq cm concentration, and 64 sq cm were washed. *Pinus* (25.04 grains/sq cm) pollen was present, along with Poaceae (10.02 grains/sq cm), cheno-am (20.03 grains/sq cm), high spine Asteraceae (5.01 grains/sq cm), and *Artemisia* (10.02 grains/sq cm). *Zea mays* (5.01 grains/sq cm) pollen and corn starch grains were also present.

FS 1607 (CLES 93101) was taken from a mano fragment from Pit Structure 9 floor and contained 153.69 grains/sq cm; 48 sq cm were washed. *Pinus* (10.98 grains/sq cm) was present, with high amounts of Poaceae (54.89 grains/sq cm) and high spine Asteraceae (10.98 grains/sq cm). Corn starch grains were also present.

FS 1783 (CLES 93123) was taken from a metate on the floor in Pit Structure 12. This sample contained 38.04 grains/sq cm, and 771.75 sq cm were washed. *Pinus, Juniperus, Ulmus,* and *Quercus* pollen were present. Traces of Rosaceae, Solanaceae, *Polygala, Sarcobatus*, Ranunculaceae, and *Campanula* were also present. Poaceae, cheno-am, high and low spine Asteraceae and *Artemisia* were also present in small amounts. Traces of an unknown type and unknown diporate grain were also found. Corn starch grains were also present.

FS 1898 (CLES 93093) was taken from a mano fragment on the floor in Pit Structure 13 and contained 100.29 grains/sq cm; 52.5 sq cm were washed. *Pinus* (15.84 grains/sq cm) and *Juniperus* (5.28 grains/sq cm) were present. Poaceae (15.84 grains/sq cm) and cheno-am (26.39 grains/sq cm) pollen were higher, and high spine Asteraceae and *Artemisia* (10.56 grains/sq cm) were present. *Ephedra* pollen and corn starch grains were also present.

FS 1976 (CLES 93102) was taken from a mano/metate fragment from the fill of Pit Structure 12 and contained 70.54 grains/sq cm concentration; 58 sq cm were washed. This concentration value was based on a pollen sum of only two grains. A single grain each of Poaceae and low spine Asteraceae was recorded.

FS 1995 (CLES 93098) was taken from a mano/metate fragment on the floor in Pit Structure 12 and contained 94.85 grains/sq cm; 55 sq cm were washed. This concentration value was based on a pollen sum of only three grains. A single grain of *Ulmus* and two grains of cheno-am pollen were the only grains encountered. Corn starch grains were present.

*LA 45508*. A total of six artifacts were submitted for analysis from this site, which dated to ca. A.D. 200.

FS 228 (CLES 93072) was taken from a mano fragment in the fill of Pit Structure 1 and contained 68.97 grains/sq cm; 47.13 sq cm were washed. This concentration value was based on a pollen sum of only 10 grains. *Pinus* (27.59 grains/sq cm) was present. Poaceae (20.69 grains/sq cm) was high, with low amounts of cheno-am and *Artemisia* (6.9 grains/sq cm) pollen. Corn starch grains were also present.

FS 307 (CLES 93088) was from a tabular mano fragment in the fill of Pit Structure 1 and contained 36.66 grains/sq cm; 160 sq cm were washed. *Pinus* was present, along with small amounts of Poaceae, cheno-am, high and low spine Asteraceae, and *Artemisia* pollen.

FS 535 (CLES 93090) was from a small mano fragment from the fill of Pit Structure 2 and contained 54.13 grains/sq cm concentration; 30 sq cm were washed. This concentration value was based on a pollen sum of only six grains. *Pinus, Artemisia*, and indeterminate pollen were the only taxa present. Corn starch grains were also present.

FS 541 (CLES 93091) was from a tabular basalt stone from near Pit Structure 2 and contained 36.31 grains/sq cm; 226.5 sq cm were washed. Poaceae, cheno-am, and high spine Asteraceae pollen were present. Corn starch grains were also present.

FS 556 (CLES 93073) was a metate fragment from near Pit Structure 2 and contained 48.69 grains/sq cm; 575 sq cm were washed. *Pinus, Quercus*, and *Betula* pollen were present, along with a trace of Solanaceae pollen. *Eriogonum, Eleagnus*, Poaceae, cheno-am, high and low spine Asteraceae, and *Artemisia* were also present. Corn starch grains were present.

FS 593 (CLES 93092) was from a ground stone fragment from the fill of Pit Structure 2 and contained 106.45 grains/sq cm; 25.5 sq cm were washed. This concentration value was based on a pollen sum of only eight grains. Cheno-am and Platyopuntia pollen were present in addition to indeterminate. Corn starch grains were also present.

*LA 45510*. A single metate fragment from the general fill was analyzed from this site, which dated to post-A.D. 900. FS 489 (CLES 93089) contained 105.84 grains/sq cm; 89.75 sq cm were washed. *Pinus* (58.04 grains/sq cm) was somewhat higher, with cheno-am (20.48 grains/sq cm) and smaller amounts of cheno-am anther fragments and high and low spine Asteraceae pollen. *Zea mays* pollen (3.41 grains/sq cm) and starch grains were present.

*LA 70185*. A total of 12 samples were submitted from this site, which dated to A.D. 1020-1060.

FS 125 (CLES 93106) was taken from a trough boulder metate from the fill of Room 1 and contained 15.91 grains/sq cm; 1139.5 sq cm were washed. *Pinus* pollen was low, with small amounts of Poaceae, cheno-am, low spine Asteraceae, and *Artemisia* pollen. A trace of *Zea mays* pollen was also present.

FS 350 (CLES 93107) was taken from a trough metate from outside the roomblock and contained 38.88 grains/sq cm; 575 sq cm were washed. *Pinus,* Poaceae, cheno-am, and high spine Asteraceae were present.

FS 627 (CLES 93124) was taken from a metate fragment from the floor of Room 1 and contained 52.61 grains/sq cm; 175 sq cm were washed. *Pinus* and *Ulmus* pollen were present, in addition to Poaceae and cheno-am pollen. *Artemisia* pollen was also present.

FS 650 (CLES 93103) was taken from a ladle from the fill of Room 1 and contained 325.59 grains/sq cm; 12.57 sq cm were washed. This concentration value was based on a pollen sum of only nine grains. *Pinus* (36.18 grains/sq cm) and *Ulmus* (36.18 grains/sq cm) were present. Poaceae (108.53 grains/sq cm)and cheno-am (36.18 grains/sq cm) were present, and indeterminate pollen (108.53 grains/sq cm) was high. Corn starch grains were also present.

FS 766 (CLES 93108) was from a broken ceramic vessel from the floor of Room 1. It contained 34.24 grains/sq cm, and 115 sq cm were washed. *Pinus,* Poaceae, cheno-am, and indeterminate pollen were present. *Zea mays* (4.56 grains/sq cm) pollen was also present.

FS 767 (CLES 93109) was taken from a broken ceramic vessel associated with FS 125 from the floor of Room 1 and contained 44.59 grains/sq cm; 208 sq cm were washed. *Pinus,* Poaceae, cheno-am, and low spine Asteraceae pollen were present. A small amount (1.49 grains/sq cm) of *Zea mays* pollen and starch grains were also present.

FS 768 (CLES 93110) was taken from a small intact ceramic vessel from the floor of Room 1 and contained 41.65 grains/sq cm; 117.81 sq cm were washed. *Pinus,* Poaceae, cheno-am, and high spine Asteraceae were present. *Zea mays* pollen (4,90 grains/sq cm), and starch grains were present.

FS 1211 (CLES 93125) was taken from a trough metate from the floor of Room 1 and contained 11.91 grains/sq cm; 1178 sq cm were washed. *Pinus* pollen was present, along with cheno-am, Poaceae, high spine Asteraceae, and *Artemisia* pollen. A trace of corn pollen was also present.

FS 1212 (CLES 93111 was taken from a tabular mano from the fill from Room 1 and contained 111.03 grains/sq cm; 131.75 sq cm were washed. *Pinus* (29.33 grains/sq cm) pollen was present in addition to cheno-am (39.8 grains/sq cm), Poaceae (10.47 grains/sq cm), high (6.28 grains/sq cm) and low spine (8.38 grains/sq cm) Asteraceae, and *Artemisia* (2.09 grains/sq cm) pollen.

FS 1319 (CLES 93126) was taken from a mano, triangular in cross section, from the floor of Room 1. It contained 85.72 grains/sq cm, and 140.25 sq cm were washed. *Pinus* and *Juniperus* pollen were present, in addition to cheno-am (38.78 grains/sq cm), Poaceae, and high and low spine Asteraceae pollen A small amount of *Zea mays* pollen (2.04 grains/sq cm) was also present.

FS 1326 (CLES 93112) was taken from a suspected mortar from the floor fill of Room 2 and contained 15.46 grains/sq cm concentration; 12.57 sq cm were washed. This concentration value was based on only a single grain of *Pinus.* Corn starch grains were present.

FS 1511 (CLES 93113) was taken from a mano from the floor of Room 2 and contained 29.84 grains/sq cm; 262.5 sq cm were washed. *Pinus,* Poaceae, cheno-am, high and low spine Asteraceae, and *Artemisia* pollen were present. Corn starch grains were also present.

*Phase 3*

A total of 36 artifacts were washed for pollen following the procedure previously described. These 36 samples were obtained from the four sites investigated during this phase of the project. The provenience data, raw pollen counts, and estimated pollen concentration values for these pollen wash samples are presented in Table 5.66. Since measurements of the surface area actually washed were obtained, the estimated pollen concentration values are presented in grains/sq cm. The results are presented below by site and artifact type.

*LA 39968*. A total of 14 artifacts were sampled from this site, which dated to A.D. 1185 ± 30. LA 39968 is along NM 12 approximately 2.5 miles east of the junction with U.S. Highway 180. This site is located at an elevation of approximately 6,190 ft.

Five samples were taken from ceramic artifacts, three of which were from the 90N/100E unit. Vessel 5 (FS 552), identified as a jar, contained a total pollen concentration value of 53 grains/sq cm. This assemblage contained only *Pinus,* Poaceae, and indeterminate pollen and was based on a pollen sum of only five grains. Vessel 6 (FS 552) was a ceramic jar and contained a total pollen concentration value of only 17 grains/sq cm. Cheno-am pollen was the only taxon present, and only two grains were present in the counts. Vessel 3 (FS 552), another ceramic jar, contained 76 grains/sq cm. *Pinus,* Poaceae, cheno-am, and indeterminate pollen were present, but only nine grains were present in the counts.

FS 1871 was an olla vessel in the fill of the pit structure and contained 69 grains/sq cm. *Pinus,* Poaceae, high and low spine Asteraceae, and *Zea mays* pollen were present.

FS 2338 was a corrugated bowl in the fill of the pit structure, which contained 22 grains/sq cm. Poaceae and cheno-am pollen were the only taxa present.

A single mano and five metates were sampled from this site. The mano (FS 2080) was a stone bowl. The assemblage contained 40 grains/sq cm, based on only a single cheno-am pollen grain.

Two artifacts were identified as metates. FS 2379 was from the pit structure floor and contained 30 grains/sq cm. *Pinus,* Quercus, Poaceae, cheno-am, low spine Asteraceae, and indeterminate pollen were recovered.

FS 2562 from an outside surface contained only three grains/sq cm. *Pinus* and cheno-am pollen were the only taxa recovered.

Two other metates were identified as trough metates. FS 2378, a mano from the pit structure floor, contained no pollen. FS 2381 contained a concentration value of 11 grains/sq cm. *Pinus,* Poaceae, cheno-am, high spine Asteraceae, and indeterminate pollen was present.

FS 2380 was identified as a tabular metate and contained a concentration value of only four grains/sq cm. *Pinus,* cheno-am, and low spine Asteraceae pollen were the only taxa present.

FS 1105 was a large cobble mortar from the pit structure fill and contained a total concentration value of 125 grains/sq cm. *Pinus,* Poaceae, cheno-am, indeterminate, and a small amount of *Zea mays* pollen were present.

FS 1495 was a boulder and contained a pollen concentration value of 32 grains/sq cm. *Pinus, Quercus*, Poaceae, cheno-am, low spine Asteraceae, and indeterminate pollen were present.

FS 1947 was a small stone bowl from Pit 2. No pollen was recovered from this artifact.

*LA 39969*. A total of 11 pollen wash samples were recovered from this site. The date of the site is calibrated to ca. A.D. 1043 ± 30. The site is on NM 12, approximately 5.5 miles east of the junction with U.S. Highway 180 at an elevation of 5,920 ft.

FS 339 was a large, ceramic bowl fragment from the fill of Room 1. The assemblage contained a pollen concentration value of only 7 grains/sq cm, based on one indeterminate pollen grain.

Eight of the samples from LA 39969 were taken from either manos or metates.

FS 250 was a two-handed mano from Feature 2 (a large pit) and contained 37 grains/sq cm, but this was based on a pollen sum of only three grains. A single grain each (12 grains/sq cm) of Poaceae, indeterminate, and *Zea mays* were present.

FS 367, a metate from the fill of Room 1, contained 15 grains/sq cm. *Pinus*, Poaceae, cheno-am, and indeterminate pollen were present.

FS 709 was a metate fragment from the large pit (Feature 2). It contained 47 grains/sq cm. *Pinus, Quercus,* cheno-am, low spine Asteraceae, and indeterminate pollen were recovered.

FS 821 was a mano fragment from the fill of Room 3. It contained 107 grains/sq cm. *Pinus, Juniperus, Quercus*, Poaceae, cheno-am, high and low spine Asteraceae, and indeterminate pollen were present.

FS 1169 was a mano from the fill of Room 3 and contained 57 grains/sq cm. *Pinus,* Poaceae, cheno-am, low spine Asteraceae, and indeterminate pollen were present.

Another sample from FS 1169 was a tabular metate from the fill of Room 3, containing a pollen concentration value of 31 grains/sq cm. *Pinus,* Poaceae, cheno-am, low spine Asteraceae and indeterminate pollen were present.

FS 792 was an anvil from the fill of Room 3. It contained a pollen concentration value of 24 grains/sq cm based on a pollen sum of only six grains. *Pinus,* cheno-am, and indeterminate pollen were the only taxa present.

FS 827 was a stone palette from the fill of Room 3. The assemblage contained no pollen.

FS 1101 was a miscellaneous stone from Pit 19 Room 3 and contained 31 grains/sq cm, based on a pollen sum of only eight grains. *Pinus,* cheno-am, and high spine Asteraceae were the only taxa present.

FS 1185 was a tabular slab from a pit in Room 2. This assemblage contained 8 grains/cm based on a pollen sum of only three grains. *Pinus*, Poaceae, and indeterminate pollen were present.

*LA 39972*. A total of six pollen wash samples were collected from this site, which contained two temporal components, the earliest of which is an Early Pithouse period component based on ceramic materials and a C-14 date of A.D. 380. Another occupation was dated to approximately A.D. 320 ± 70. The latest occupation dates to A.D. 1000-1100. This site is on NM 12 approximately 3.5 miles east of the junction with U.S. Highway 180 at an elevation of 6,110 ft.

FS 88 was a mano fragment from a trash pit in the later pueblo occupation containing 63 grains/sq cm, but this was based on a pollen sum of only five grains. *Pinus,* cheno-am, and indeterminate pollen were the only taxa present.

FS 181 was a metate fragment, also from the trash pit in the pueblo occupation, containing 18 grains/sq cm. *Pinus, Quercus*, Poaceae, and cheno-am pollen were present in addition to a single grain of Solanaceae pollen.

FS 262 was a metate fragment from the Early Pithouse occupation containing only 9 grains/sq cm, with a pollen sum of only two grains. Poaceae and cheno-am pollen were the only taxa present.

FS 549 was also a metate fragment from the Early Pithouse period and contained 15 grains/sq cm, but this was based on a pollen sum of only five grains. Poaceae, cheno-am, and indeterminate pollen were the only taxa present.

FS 356 was a miscellaneous stone associated with the Early Pithouse occupation and contained 35 grains/sq cm. This was based on a pollen sum of only five grains. *Pinus,* and cheno-am pollen were the only taxa present.

FS 504 was a shaft straightener from the trash pit of the Pueblo period and contained 37 grains/sq cm, with a pollen sum of only seven grains. *Pinus,* Poaceae, and indeterminate pollen were the only taxa recovered.

*LA 43766*. A total of five pollen wash samples were recovered from this site. This site dated to 1055 B.C. from all proveniences. The site is along NM 12 approximately 4.6 miles east of the junction with U.S. Highway 180 at an elevation of 6,120 ft.

FS 478 was a mano from the later occupation surface and contained no pollen.

FS 650 was a metate fragment from general fill which contained 39 grains/sq cm, but this was based on a pollen sum of only seven grains. *Pinus,* Poaceae, cheno-am, low spine Asteraceae and indeterminate pollen were present.

FS 693 was a tabular metate from general fill and contained 17 grains/sq cm. *Pinus, Quercus*, Poaceae, cheno-am, and low spine Asteraceae pollen were present.

FS 689 was a suspected ground stone artifact containing only 9 grains/sq cm based on one indeterminate pollen grain.

FS 448 was a miscellaneous stone and contained no pollen.

### *Phase 4*

*LA 3279*. Four pollen wash samples were taken from this site, which dates in the late 1200s.

FS 337 was taken from a mano from Pit 15 in Room 6 and contained 23.4 grains/sq cm. Cheno-am and indeterminate pollen were the only types present.

FS 347 was taken from a stone bowl from Room 7 fill and contained 49.8 grains/sq cm. *Pinus,* cheno-am, and low spine Asteraceae pollen were the only taxa present.

FS 507 was a mano from Room 9 and contained 43 grains/sq cm. *Pinus*, cheno-am, and indeterminate pollen were the only taxa present.

FS 515 was a mano from the lower fill in Room 10 and contained 45 grains/sq cm. *Pinus* and cheno-am pollen were the only taxa present.

## Discussion

### *Releve Principal Components Analysis*

The vegetational data set was analyzed using Principal Components Analysis (Kovach 1990). The initial analysis also included mileage and elevation variables. The results of the Eigenvalue analysis (Table 5.70) revealed that 99.9859 percent of the observed variation was accounted for by the first factor, elevation. The second factor (miles) contributed an additional 1.4 percent. This second factor was essentially a north-south distribution. Thus, within this initial analysis, almost all of the variation could be accounted for by these two factors. These two components were plotted against each other and showed a fairly nice separation (Fig. 5.4). Surprisingly, *Arctostaphylos* sp. dominated the third component, while the variation of *Pinus edulis* constituted the fourth component. The surprising element is that *Arctostaphyos* sp. was present only in two stands.

Because of the strong influence of elevation on the data set, a second analysis was conducted which included only the percent cover estimates of the taxa. The Eigenvalue results are also presented in Table 5.70. Figure 5.5 shows the distribution of these first two components. In this second analysis, the distribution reflects more of the structure of the community and their elevational placement. The eigenvectors (component loadings) and the component scores are not provided but may be obtained by writing the author.

As shown in Figure 5.6, the higher elevation stands along U.S. 180 contain somewhat higher percentages of canopy cover, thus indicating a somewhat denser forested environment. The small shrub and grass cover tend to increase at the lower elevations. While several of the stands along NM 12 were considered piñon-juniper woodlands, the percentage of grass and herbaceous cover is higher, which is also consistent with the lowered elevations (Fig. 5.7).

Interestingly, *Pinus edulis* and *Juniperus depeanna* are restricted to those sites south of the highest elevations of the San Francisco Mountains (Fig. 5.8) along U.S. 180. *Juniperus monosperma* is present just on the north side of the divide but then disappears. The distribution of these *Juniperus* species are likely related to elevation as *Juniperus* begins to thin and disappear at elevations above 6,500 ft (Elmore 1976). The stands on the north side of this divide are exclusively dominated by *Pinus ponderosa*, which is a somewhat higher-elevation pine species. It would be interesting to

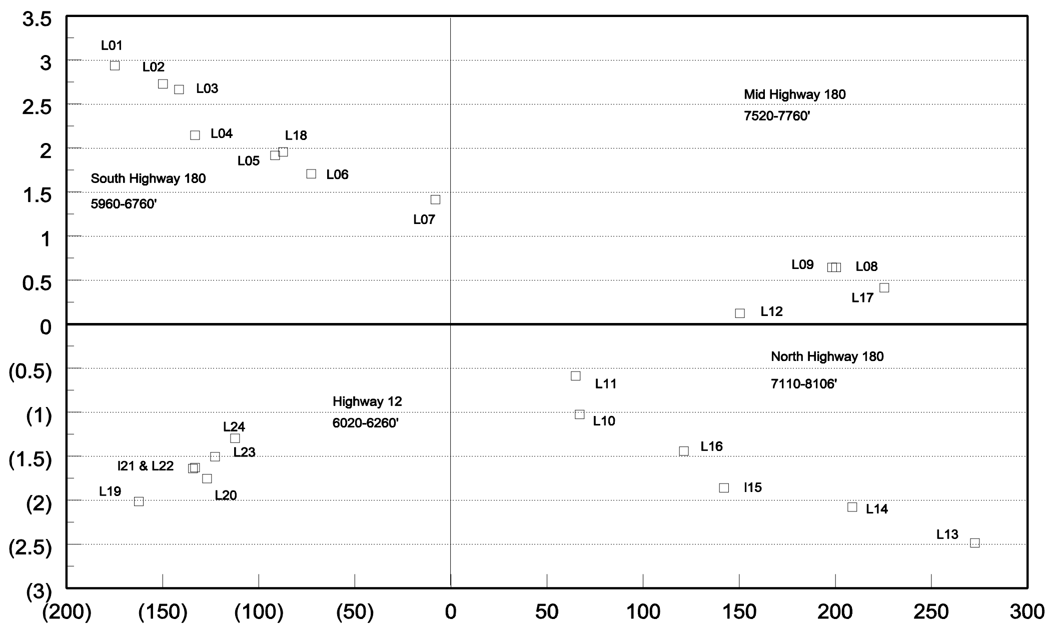



*Figure 5.4. Comparison of first and second principal components, vegetation data, including mile and elevation variables.*

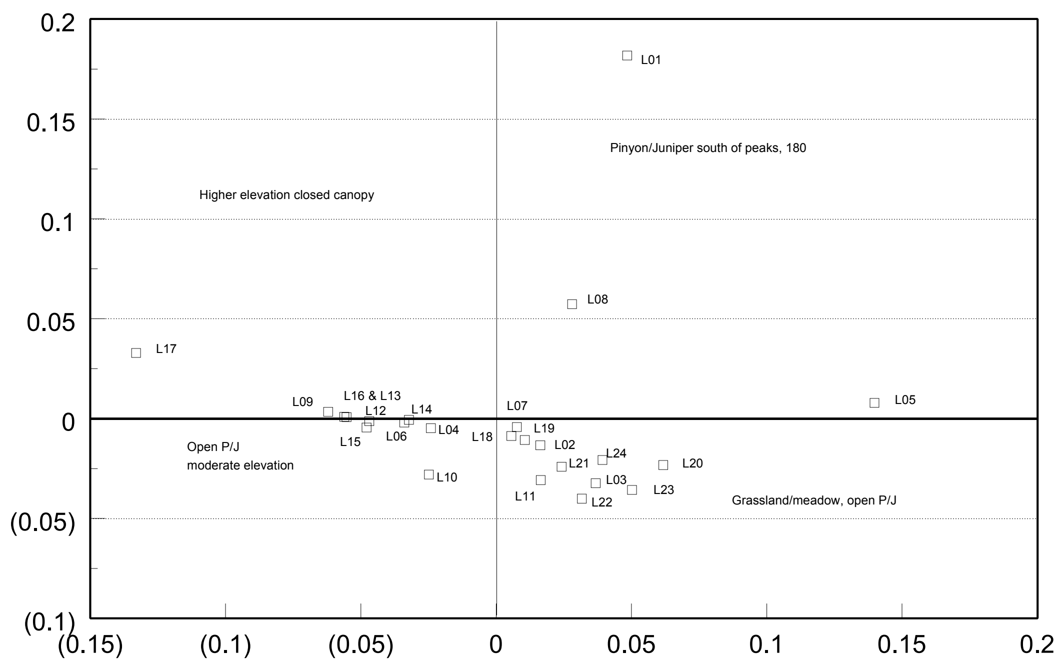



*Figure 5.5. Comparison of first and second principal components, vegetation data, excluding mile and elevation variables.*

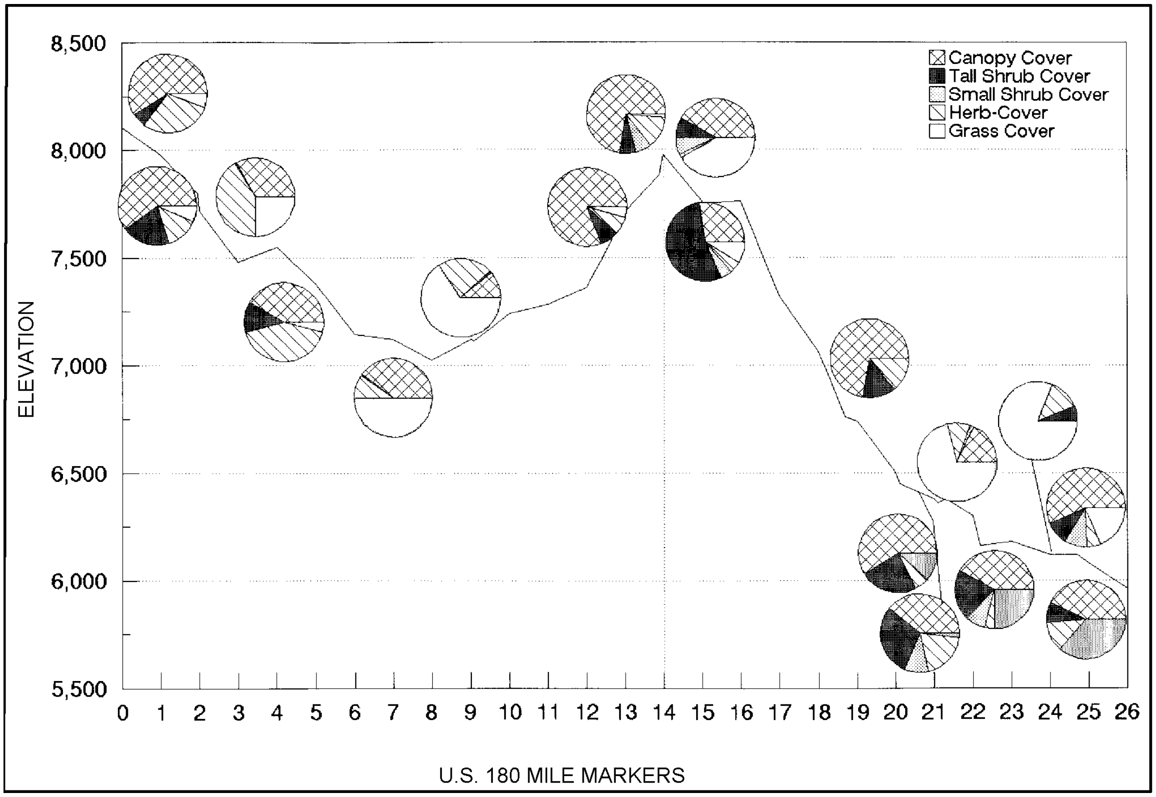



*Figure 5.6. Community stratification, releve stands, U.S. 180.*

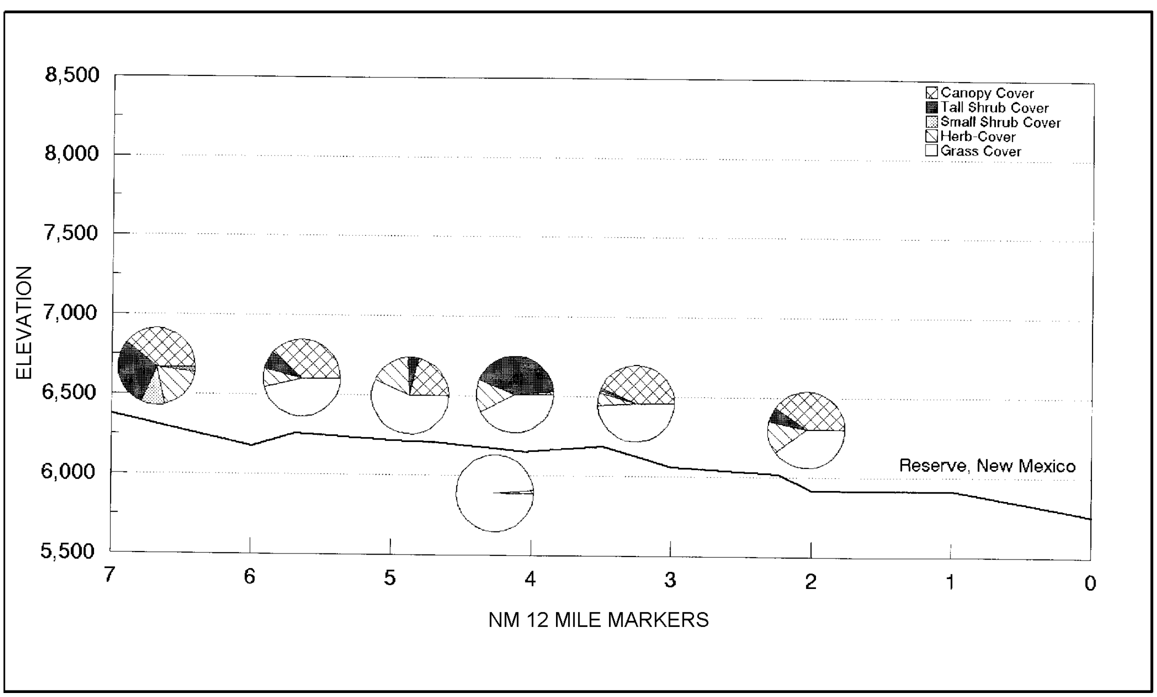



*Figure 5.7. Community stratification, releve stands, NM12.*

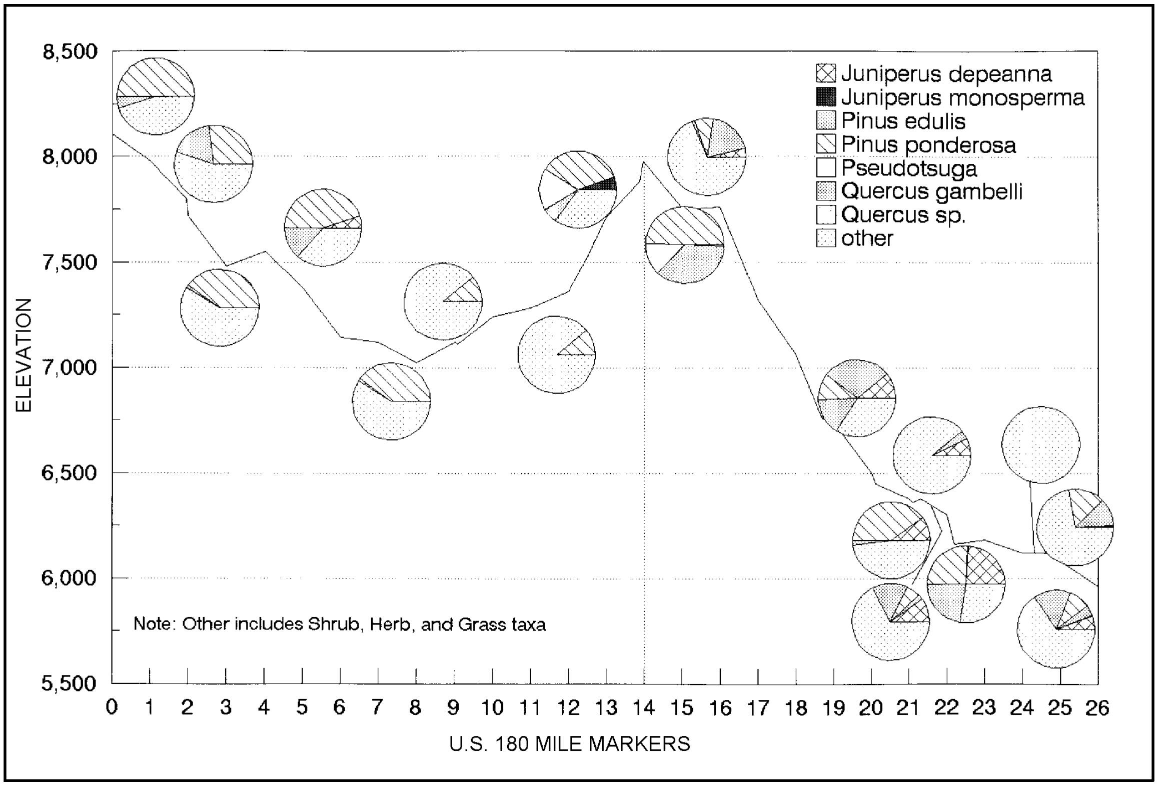



*Figure 5.8. Canopy species cover, releve stands, U.S. 180.*

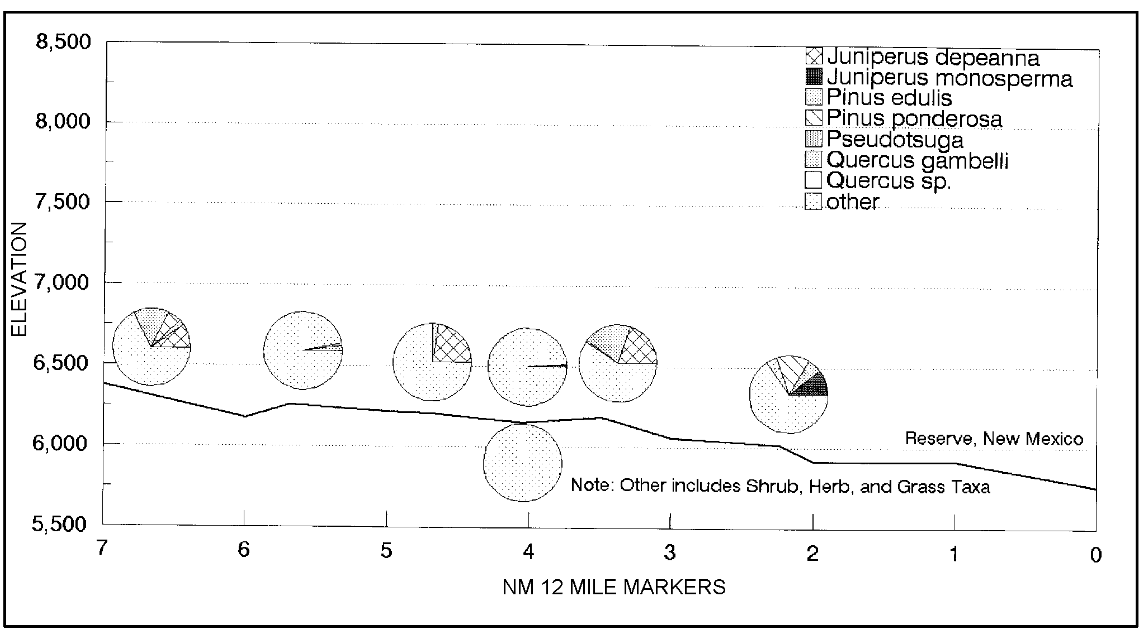



*Figure 5.9. Canopy species cover, releve stands, NM12.*

determine if this is a modern development or if the separation were present during the prehistoric period as well. Figure 5.9 shows the canopy species distribution along NM 12.

Table 5.71 shows the average cover percentages of the taxa grouped by 500 ft elevation, and ranges of these taxa are shown in Figures 5.10 and 5.11. The sites within the 6,000-6,500 ft interval contained the largest number of total taxa (49), although those within the 7,000-8,000 ft levels also had high numbers of taxa (32 and 36). *Juniperus* is present in sites up to the 7,500-8,000 ft elevation, but the cover percentages decline. *Pinus edulis* is present up to the 7,500-8,000 ft interval, but this taxon is restricted to the southern portion of the U.S. 180 transect. *Pinus ponderosa*, on the other hand, increases dramatically at higher elevations. *Quercus,* particularly *Quercus gambelii*, is consistently present throughout the elevation zones, whereas *Pseudotsuga mensiezii* is present only from stands above the 7,500 ft level.

The 6,500 ft level appears to be a cutoff for the presence or absence of several taxa. A number of taxa are absent above 6,500 ft (Figs. 5.10 and 5.11). These include *Cassia* sp., *Chenopodium* sp., *Chrysothamnus* sp., *Cucurbita foetidissima, Echinocereus* sp., *Fallugia paradoxa, Gaillardia* sp., *Heliotropium* sp., *Ipomopsis aggregata, Lamiaceae, Lepidium, Linum* sp., *Lycopus* sp., *Opuntia imbricata, Shrankia* sp., *and Solidago* sp. *Opuntia phaecantha*, however, is present up to within the 7,500-8,000 ft levels. Several taxa, including *Achillea* sp., *Anemone* sp., *Corepsis* sp., *Lupinus* sp., *Polygonum* sp., *Potentilla* sp., *Ratiba* sp., *and Sedum* sp. are found only in stands above 7,000 ft.

The surface pollen assemblages present a somewhat different distribution. Again, Principal Components Analysis was used on the data set, including the variables for mileage and elevation. The Eigenvalues (Table 5.72) obtained showed that the first component (*Pinus* pollen) completely dominated these assemblages, accounting for 93 percent of the observed variation. This might be expected given the production and dispersion mechanisms for *Pinus* pollen. *Pinus* is wind pollinated and produces enormous quantities of pollen. The pollen is produced in strobili, usually in clusters of five to seven at the terminal ends of branches. Each strobilus produces in excess of one million pollen grains, and thus it is not unexpected to have such large quantities of pollen. *Pinus* pollen is often the dominant taxon even in communities with no local pine source. In a study of surface pollen spectra from central and southern Alberta, Holloway (1984) noted that pine pollen was present in amounts of 15 percent or greater from sites in which the nearest pine source was over 150 miles distant.

Elevation (Factor 2) accounted for an additional 3.8 percent of the variation and Factors 3 [?] and represented the contributions of *Quercus* pollen (also wind pollinated) and cheno-am pollen. When the mileage and elevation variables were removed from consideration, *Pinus* pollen still accounted for 96 percent of the observed variation and completely dominated the assemblages. The third and fourth factors represented the variations in cheno-am and Poaceae pollen. In fact, the first eight factors contained the same sequence once elevation was removed from consideration. Again the eigenvectors and the component scores are not provided in Table 5.72 but can be obtained from the author.

*Pinus* pollen was generally high throughout these assemblages but gradually decreased on the south side of the divide toward the lower elevations. The communities on the north side of Luna contained slightly higher pine values, but toward the higher elevations near the state line and the north side of the San Francisco Mountains, pine concentration values decrease. This is likely related to wind circulation patterns, and even though pollen concentration values decrease, they are still very high. Cheno-am pollen remains relatively stationary across the U.S. 180 transect, although this taxon tends to increase at the lower elevation stands in the south. This same general pattern of moderately consistent concentration values holds in the northern, higher elevations, with increases toward the southern, lower elevations. This phenomenon probably correlates with the pollen production capabilities of the stands at lower elevations. These plant communities produce generally lower quantities of pollen, and the nonarboreal pollen types are more diagnostic. *Pinus* pollen, while dominating the area, is also reduced, so the masking effect of *Pinus* is also reduced (Figs. 5.12 and 5.13).

This is also indicated by the NM 12 transect, where the stands are generally open grasslands or very open piñon-juniper woodlands. The open nature of these communities (Figs. 5.14 and 5.15) shows an overall reduction of the pollen concentration values. *Pinus* (Fig. 5.14) shows a gradual trend to increasing concentration values from east to west, which coincides with a gradual rise in elevation. The easternmost stands all show higher values for the nonarboreal pollen types (Fig. 5.15), which decrease in the vicinity of the open desert scrub communities between Miles 4 and 5 (Figs. 5.14 and 5.15).

*Surface Control Samples*

Surface control samples were taken from three sites: LA 39968, LA 39969, and LA 70189. Average concentration values for these samples are provided in Table 5.73. *Pinus* pollen was moderate from LA 39968 and somewhat higher from LA 39969. *Quercus* pollen was present in both, while *Juniperus* and *Pseudotsuga*

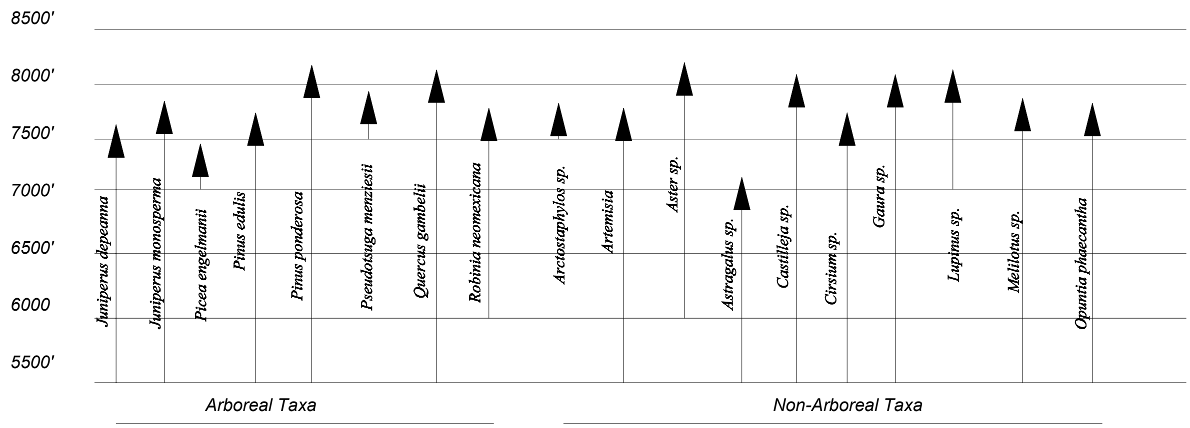



*Figure 5.10. Elevational ranges of arboreal and nonarboreal taxa from releve stands.*

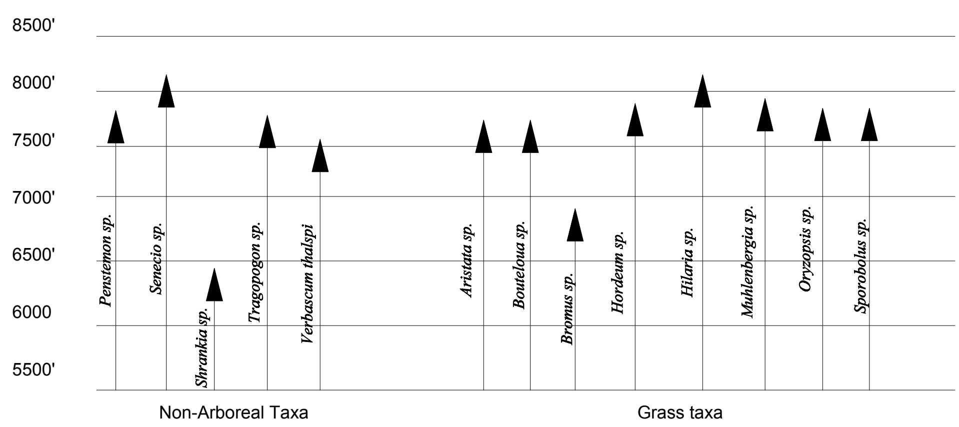



*Figure 5.11. Elevational ranges of nonarboreal and grass taxa from releve stands.*

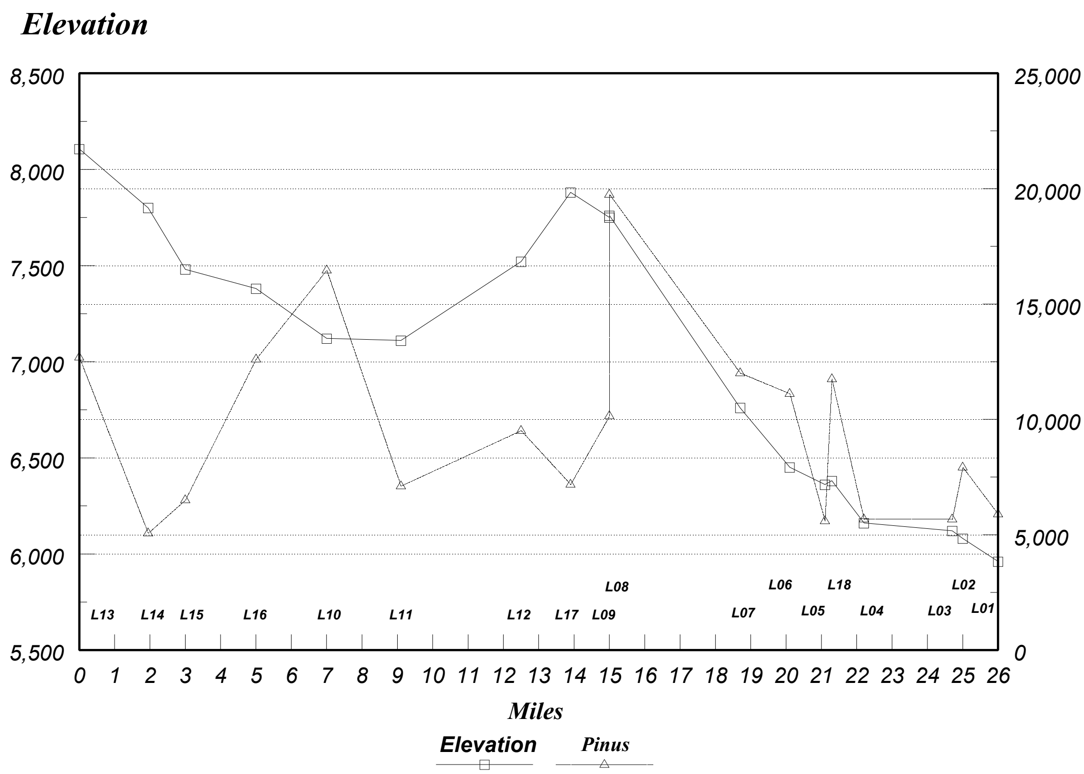



*Figure 5.12. Pinus pollen concentration and elevation, U.S. 180 releve stands.*

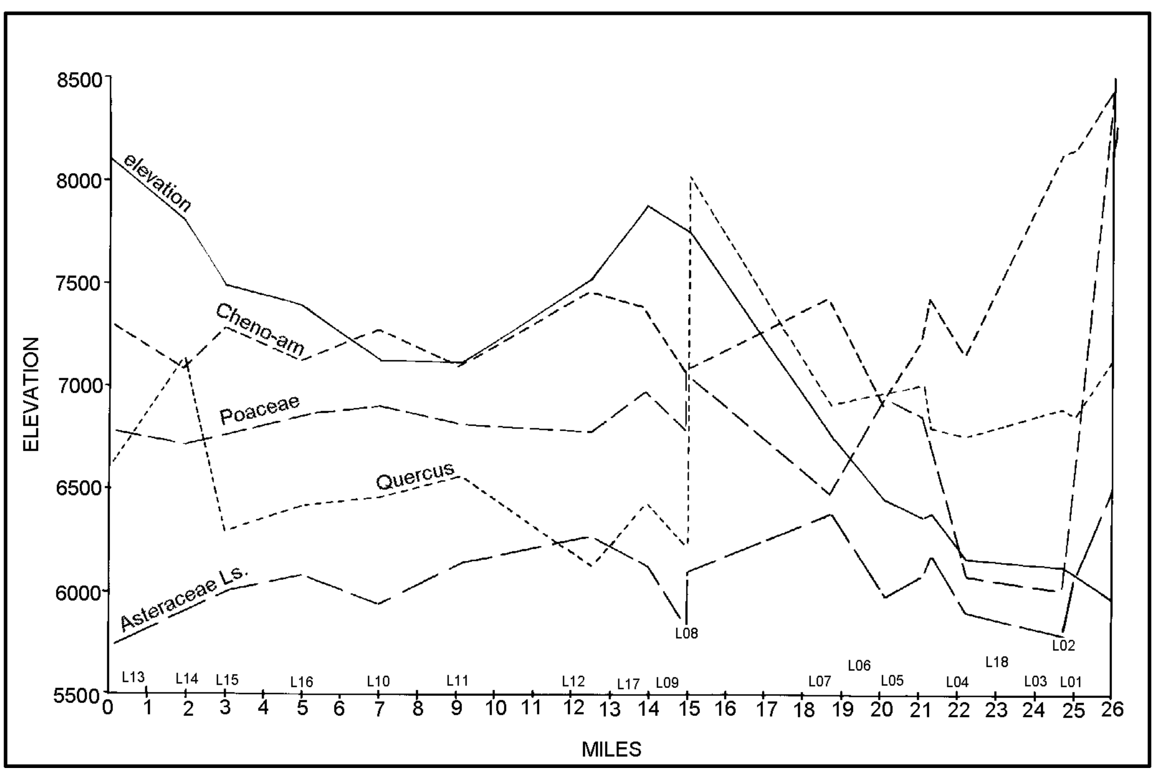



*Figure 5.13. Pollen concentration of selected taxa and elevation, U.S. 180 releve stands.*

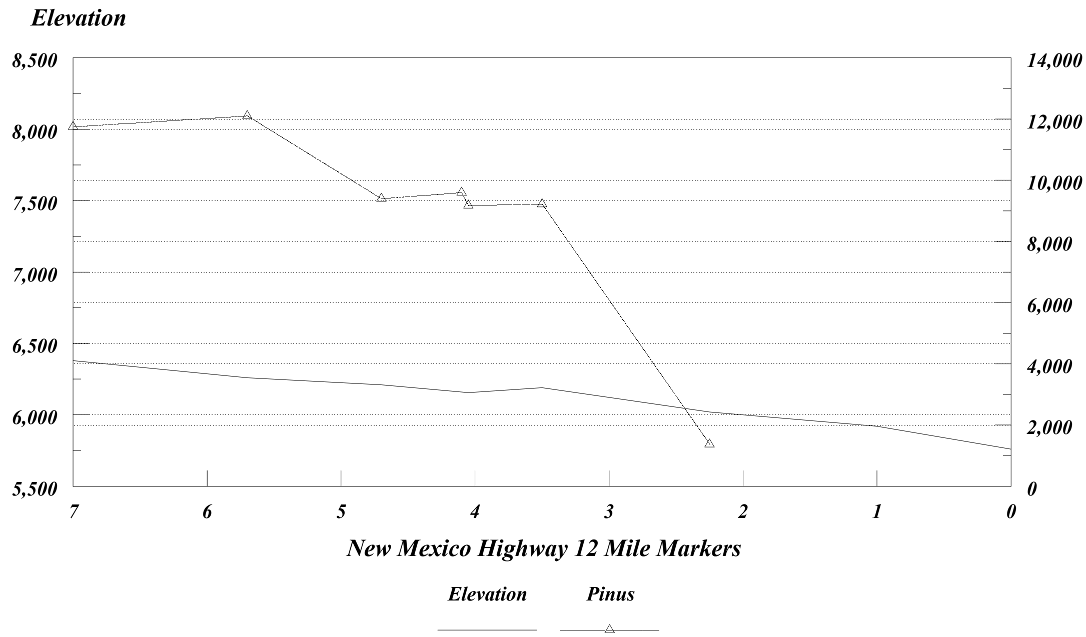



*Figure 5.14. Pinus pollen concentration and elevation, NM 12 releve stands.*

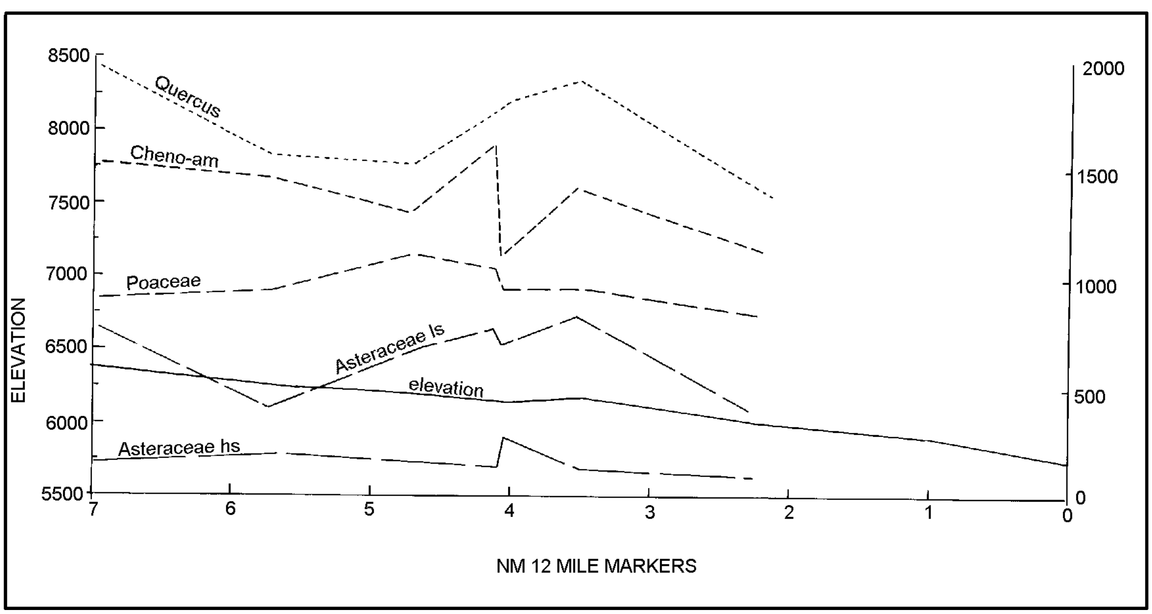



*Figure 5.15. Pollen concentration of selected taxa and elevation, NM 12 releve stands.*

pollen were present only in one sample from LA 39969. The presence of *Pseudotsuga* is likely the result of long-distance transport from the higher elevations of the San Francisco Mountains, where it is present today. Poaceae pollen was high in both sites, while cheno-am pollen concentration values were moderate, at best. Low spine Asteraceae pollen was high, and higher amounts of both high spine Asteraceae and *Artemisia* were recovered from LA 39968. A significant quantity of *Zea mays* pollen was also recovered from LA 39968 and was absent from LA 39969. The presence of corn pollen may have been modern contamination or the result of mixing of sediments. LA 39968 and LA 39969 are along NM 12 and at somewhat lower elevations than other areas of the project. The vegetational assemblages along U.S. 180 are much more open, with less canopy cover than at the higher elevations.

The sample from LA 70189 (Table 5.73) contained an extremely large total pollen concentration value. This site was near the junction of U.S. 12 and NM 180. A large number of the sites examined were from this general vicinity. The pollen assemblage reflected a pine-dominated forest environment, with *Pinus* pollen (28,378 grains/g) dominating the assemblage. *Juniperus* and *Quercus* pollen were present in significant amounts. While *Juniperus* is quite common in the vegetational assemblage, it is not surprising that this taxon is rare in the pollen assemblage. Holloway (1981, 1989) has demonstrated experimentally that the pollen of *Juniperus* rapidly deteriorates after minimal exposure to either freezing/thawing or wetting/drying conditions. In these experiments (Holloway 1981, 1989), 75-80 percent of fresh juniper pollen exhibited breakage or deterioration after only 25 cycles of wetting/drying. Thus it is not unexpected to have lowered amounts of *Juniperus* pollen. *Quercus* is a common understory component of the vegetation from this vicinity and likewise is not unexpected. Poaceae pollen (1,113 grains/g) was quite high and was a common constituent of the vegetation. This community signature, consisting of high *Pinus* along with high grasses, is indicative of the piñon-juniper forest association commonly present along the southern slopes of the San Francisco Mountains.

While this assemblage is consistent with the modern vegetational community, given the sampling locale of within 5 km from site LA 70189, I suggest that a similar vegetational community was present prehistorically. However, none of the other archaeological pollen samples produced pollen concentration values even remotely similar to this control sample. *Pinus* pollen was present generally well below 500 grains/g. This lowered background pollen concentration represents the protected nature of the individual sampling locales. These samples were all taken from feature contexts, room blocks, or within structures from these sites. The pollen concentration values reflect these protected type of micro-environments. The presence of masonry construction or other structures effectively shields the living floors from the deposition of the naturally occurring pollen rain. The pollen rain accumulated on these surfaces therefore reflects pollen being intentionally brought into the living areas. As expected, these pollen assemblages are much lower in concentration values.

*Soil Pollen Samples*

A total of 41 samples were taken from designated features other than burial contexts. Table 5.74 contains the calculated pollen concentration values from these features. These feature samples are arranged by age and site in Table 5.74 and are discussed below by time period.

*540 B.C.* The single sample from this period was taken from Pit 1 from LA 89846 (Table 5.74). *Pinus* pollen is very low and likely indicates long-distance transport. *Zea mays* pollen is the only economic taxon present. The presence of corn pollen from this pit feature may indicate this feature was used for storage. The relatively high concentration values for low spine Asteraceae may likewise suggest a storage function or simply indicate a background pollen deposition.

*A.D. 885-970*. Sixteen samples were taken from LA 45507, which dated to this period (Table 5.74). The floor contact sample from Pit Structure 1 contained very little pollen. No obligate economic taxa were present in this assemblage. The low pollen concentration values are consistent with those taken from within structures and may indicate either a shorter period of use or a short occupation.

Two samples were taken from below each of two metates from Pit Structure 1. Low concentrations of cheno-am and *Pinus* are consistent from each sample, and the total pollen concentration values are similar. *Sphaeralcea* pollen was found below Metate 2, while *Zea mays* pollen was found under Metate 1. This suggests that this structure may have been used for processing plant materials. The mutually exclusive economic taxa also suggest that particular plants were processed on specific metates. The evidence for this is weak, but highly suggestive.

Four samples were taken in association with Pit Structure 3 (Table 5.74). The sample taken from under the comal contained very low pollen concentration values. Interestingly, Onagraceae pollen was present from this sample. This may have been intentionally introduced, or the plant may have been local.

The sample from under the mano/metate in Pit Structure 3 contained a fairly large number of taxa. The high amount of Platyopuntia pollen (54 grains/g) is almost certainly the result of cultural behavior. Some form of processing of prickly pear cactus probably occurred within this feature.

Two samples were associated with ceramics from Pit Structure 3, but the pollen data is inconclusive. No economic taxa were present.

In Pit Structure 9, the sample was taken from under a mano on a metate from the floor of this feature (Table 5.74). *Platyopuntia* pollen was high (31 grains/g) and may indicate processing of this cactus material.

A total of seven samples were taken from Pit Structure 12 (Table 5.74). The sample from the interior of a jar recovered from the floor contained fairly low pollen concentration values. No pollen evidence for use was present, because the assemblage consisted entirely of background pollen types.

The sample taken from sherds under a metate above the floor contained only background pollen types. No economic taxa were present. The sample taken from under a sherd on the floor of the feature contained almost no pollen.

The sample from the top of the comal in Pit Structure 12 contained low pollen concentration values and consisted only of background pollen taxa.

Two samples were taken from under two metates (2 and 3) from the floor of Pit Structure 12. No economic pollen taxa were present, so no function could be determined. Both samples contained relatively low pollen concentration values.

The final sample from Pit Structure 12 was taken from under a lapidary stone in the fill. No economic pollen was present.

In general, the samples from Pit Structure 12 produced little information relative to the function of the feature. The pollen assemblages were generally weak and lacked economic taxa.

In Pit Structure 13, the sample was from the floor under the comal (Table 5.74) and contained very low pollen concentration values. Again, no economic taxa were present.

*A.D. 1000-1100.* Two samples were taken from a trash pit (Feature 1) from LA 39972, which is along NM 12 (Table 5.74). The pollen concentration values from this feature were quite similar. Neither sample contained any economic taxa.

*A.D. 1043*. These samples were all recovered from LA 39969, along NM 12 (Table 5.74). The features sampled were all associated with pits.

The sample from the fill of the large pit (Feature 2) contained only background pollen but no economic taxa (Table 5.74). Two samples were associated with ceramics from this feature. Both contained high levels of Poaceae pollen. The sample below Vessel 1 contained *Zea mays* pollen, which may suggest this vessel was used in storage. A second sample was taken below Vessel 1, and this also contained *Zea mays* and *Cylindropuntia* pollen. The large pit also contained no cheno-am pollen but a high number of cheno-am anther fragments.

In Feature 9, the sample was taken from the fill of this hearth feature and contained very little pollen.

This pit feature (Feature 15) contained no economic pollen.

Only pine and cheno-am pollen were recovered from this pit feature (Feature 17).

Both samples from Pit 19 contained only low amounts of background pollen. No economic pollen was present.

In Pits 21 and 22, the pollen assemblages were very weak and contained no economic pollen.

*Late 1200s.* These feature samples were taken from LA 3279 (Table 5.74). The sample from the platform in Room 13 (Feature 4) contained only background pollen, and the pollen concentration values were very low. Three samples were taken from postholes (Features 5, 8, and 15), and while *Pinus* pollen was slightly higher than in other samples, the concentration values were all very low. One sample contained *Platyopuntia* pollen, but given the feature type, this was probably a naturally occurring taxon. However, the same posthole containing the *Platyopuntia* pollen also contained a small amount of *Zea mays* pollen. These two economic pollen types may have been intentionally added as a ritual during the placement of the post, but this is speculative.

Four pit features (Features 6, 9, 10, and 18) were also sampled. Feature 18 contained very high levels of Poaceae pollen (394 grains/g), which might indicate that the feature was covered by a grass mat. Feature 6 contained *Cylindropuntia*, and this might indicate a possible storage function. Likewise, Features 10 and 18 contained *Zea mays* pollen, again possibly indicating storage.

The last sample was taken in association with a vessel in the pit from Feature 8. This sample also contained corn pollen. This was taken from the same feature as the posthole, which also contained *Platyopuntia* and corn pollen. The vessel may have been placed as an offering, or perhaps the presence of the vessel indicates that this pit may not have been a posthole.

A total of 12 pollen samples were taken in context with burials. These samples dated between A.D. 885-950 and the late 1200s and were taken from four sites.

*A.D. 885-950*. Two samples were obtained from Feature 14 from LA 45507, taken from the skull cavity and pelvis region of the burial respectively (Table 5.75). No corn pollen was present from either of these burial samples, although *Platyopuntia* pollen was present from the skull cavity, which suggests some type of ritual. Either flowers, pollen, or fruits of this plant may have been intentionally interned with the body.

The concentration value for *Platyopuntia* is sufficiently high (31 grains/g) that this pollen type was probably not deposited as part of the natural pollen rain.

*A.D. 1043.* Samples from two burials were also recovered from LA 39969. The samples associated with Burials 1 (Feature 10) and 2 (Feature 14) were similar in containing very low amounts of *Pinus* pollen and no other background pollen types (Table 5.75). Interestingly, *Cylindropuntia* pollen was present from both burials but no other economic types. *Cylindropuntia* is insect pollinated, and studies have shown that the soil immediately below these plants contain very little pollen from the plants. Again, given the burial location and the fairly high concentration values (at least from Burial 1) for this taxon, a ritual use of these plants is suggested. *Cylindropuntia* generally flowers from late May to late June in this area, and fruits throughout the summer, which would indicate a late spring through summer period for internment, depending upon the source of the pollen.

A sample was taken from the fill of a ceramic associated with Burial 1. This sample also contained high concentration values for *Cylindropuntia* (32 grains/g). This vessel may have held some type of offering-- flowers or fruits.

The sample associated with Burial 2 from this site contained very little pollen. *Pinus,* cheno-am, and indeterminate pollen were the only taxa present, and these taxa provide no interpretive value.

A sample was also obtained from the fill of a ceramic vessel (2) associated with Burial 2. This pollen sample also contained high amounts of Cylindropuntia (33 grains/g) pollen, again supporting the interpretation of the use of this plant in ritual. Quercus pollen was also present in this assemblage.

A.D. 1185. Two ceramic artifacts from LA 39968 were associated with a burial (Table 5.75). The assemblages contained *Polygonum* and fairly high amounts of Poaceae, and *Zea mays* pollen was present. While corn pollen may be expected within burial context, the presence of *Polygonum* pollen is intriguing. This taxon is generally insect pollinated and thus produces little pollen. Its presence might suggest the presence of *Polygonum* flowers as part of a ritual offering. This would also suggest a late spring through summer period for internment. It is unlikely that the *Polygonum* pollen would have been present naturally, given the burial location of the sample and the high average concentration value of over 12 grains/g. These two vessels both contained *Zea mays* pollen, and they were the only burial samples containing this taxon. This suggests that *Zea mays* was used only at this site.

*Late 1200s*. A sample from a burial vessel was obtained from LA 3279. The background pollen types were generally low, but *Quercus* pollen was present. Given the higher elevation for this site, this is not altogether surprising. Unfortunately, no economic indicators were present in this assemblage.

*Ceramic Samples*

A total of 46 of the pollen samples from this project were taken in association with ceramics. Table 5.76 presents the average concentration values for these samples by age and site. *Pinus* generally contained very low pollen concentration values throughout the assemblages. The exception is from LA 70189 (A.D. 1010), in which one sample contained an anomalously high concentration value that elevated the means from this site. The absence and/or relatively low concentration values for *Juniperus* pollen are not unexpected. *Juniperus* pollen is extremely thin walled and does not generally preserve well. Holloway (1981, 1989), in a series of controlled experiments, demonstrated that after only 25 cycles of alternating wet/dry and freeze/thaw conditions, over 80 percent of fresh juniper pollen was deteriorated in some form (mostly broken). The exines of *Juniperus* contain a very low percentage of the compound sporopollenin, which has been correlated with the ability to resist deterioration (Brooks 1971) Given these conditions, it is not surprising that often this taxon is absent from the assemblages. *Quercus* pollen is generally restricted to the later occupations, but there is no observable trend correlating the presence of this taxon with elevation or position along the highway corridors.

Both high and low spine Asteraceae pollen are moderate in quantity and intermittently present. High spine Asteraceae generally is slightly higher prior to A.D. 800, while the highest values for low spine Asteraceae occur after A.D. 1000. None of these samples contained *Platyopuntia* pollen, and *Cylindropuntia* pollen is intermittently present, again after A.D. 1000. *Zea mays* pollen is much more consistently present after A.D. 1000. Fairly high amounts of corn are present from the A.D. 330 period. Corn obviously was present in the area early on but has not been recovered from the ceramics until after ca. A.D. 1000. This may reflect the growing importance of corn to the occupations in this area after A.D. 1000. During the earlier periods, corn may have been used more as a supplement, with intensive agriculture not really developing until around the A.D. 1000 period. Alternatively, this may reflect a change in the use of ceramic materials with corn materials more likely to have been stored or used in ceramics during the later periods.

*Ground Stone Samples*

A single sample was taken from a miscellaneous ground stone artifact, 4 were associated with manos, and 22 with metates. The average concentration values for these artifacts by site and age are presented in Table 5.77. The metates were recovered from seven sites and ranged in age from A.D. 880 to 1275.

*A.D. 880-970*. Metates from this period (Table 5.77) contained moderate amounts of Poaceae and both high and low spine Asteraceae. Additionally, pollen of Platyopuntia, *Spheralcea,* and *Zea mays* were all present. This suggests that a wide diversity of plant materials were being processed.

*A.D. 960-1200s*. The metates from this period contained corn pollen but few other taxa. Again, this provides evidence for the processing of corn materials.

Metates from two sites (LA 39969 and LA 70185) that ranged from A.D. 1043 to 1060 contained no corn pollen (Table 5.77). However, a single sample from LA 75792 had fairly high *Zea mays* pollen, indicating that processing of this taxa was occurring. Grass pollen was slightly higher in concentration values. The pollen assemblages may reflect simply the background pollen rain from the sediments, or the higher grass values may suggest processing of noncultivated plant materials. I suspect the former, since corn pollen is present from these sites in other contexts.

The metates from the later periods (A.D. 1185 and the late 1200s) again contain corn, *Sphaeralcea,* and *Cylindropuntia* pollen. Poaceae pollen is moderate to high, and Solanaceae pollen is present from LA 39968 (A.D. 1185). These assemblages suggest a mixture of cultivated and wild plant materials.

Four samples in association with manos were recovered from sites dating from A.D. 885 to the late 1200s. Corn was present in all samples except from LA 3279 (late 1200s), which indicates processing of this material. Additionally, *Platyopuntia* pollen was present. Grass pollen was moderate to high from these periods and extremely high from the mano taken from LA 3279. The high concentration values suggest that this mano was likely used in processing grass materials.

The pollen assemblage from the indeterminate ground stone artifact contained no economic taxa.

The floor samples from the 70 B.C.–A.D. 90 period (LA 70188) contained the lowest pollen concentration values of any floor samples (Table 5.78). No economic pollen taxa were present.

Samples from A.D. 330-370 (LA 39975) and the A.D. 700s (LA 70196) contained moderate amounts of *Zea mays* pollen. Platyopuntia pollen was present from LA 39975 but absent from LA 70196. Poaceae pollen was low to moderate at both sites.

Samples from A.D. 885-970 (LA 45507), A.D. 1020-1060 (LA 70185), and A.D. 1185 (LA 39968) contained no *Zea mays* pollen. A trace of *Cylindropuntia* was present from LA 39968 but absent from the others. At the same time, grass pollen was usually fairly high, and a trace of Onagraceae pollen was present. Corn pollen was observed in the low-magnification scan of the slide from LA 39968, thus indicating at least its presence. The floor area contained small amounts of high and low spine Asteraceae as well as *Artemisia* pollen. These pollen signatures, however, are not unique to the floor sediments.

The assemblage from floor samples dating to the late 1200s (LA 3279) also contained corn pollen but not other economic taxa. The protohistoric component (LA 70189) contained no economic pollen and low pollen concentration values for the background types.

The distribution of corn and other economic taxa is interesting. During the earlier periods, perhaps from A.D. 330 through A.D. 1000, economic taxa are generally present from the floor sediments. From A.D. 1000 on, while these taxa are present, they are sporadically present and generally do not occur together. This might indicate a shift in the organization of activity areas within a structure. During the early periods, several activities involving plant processing may have occurred within these rooms. Later, as perhaps specialization occurred, these various activities moved to separate areas, thus decreasing the co-occurrence of these economic indicators. However, based on the generally low concentration values from these sites, this interpretation is speculative.

A total of 19 samples were collected from locations designated as pits. These collection areas ranged in age from 540 B.C. to the late A.D. 1200s and were taken from six sites. Table 5.79 presents the average concentration values of taxa by age and site. The total pollen concentration values obtained from these samples were fairly low, generally well below 800 grains/g. The pit from the earliest period (540 B.C., LA 89846) contained significant concentration values of *Zea mays*. Poaceae pollen was moderate, and there was a fairly high concentration of low spine Asteraceae pollen. Based on the high amounts of corn pollen, this pit likely functioned as storage with perhaps several different taxa being stored.

The pit from LA 75791 (A.D. 880) contained no corn pollen but high amounts of *Platyopuntia* pollen (Table 5.79). This taxa was likely stored within the pit. The pit from A.D. 1043 (LA 39969) contained a trace of *Zea mays* pollen and was probably used for storage. While cheno-am pollen was fairly low, clumps of cheno-am pollen were present from this pit. The presence of pollen clumps generally indicates the presence of flowers, particularly from an archaeological feature context. The pit may have been covered by small shrubby or herbaceous plants such as cheno-ams and the pollen introduced accidentally by this means.

The pits from LA 70185 (A.D. 1060) contained very little pollen, and no economic taxa were present.

The samples from LA 39968 (A.D. 1185) contained no economic pollen. The Poaceae concentration values are moderate, which might suggest the presence of grass coverings or a mat over the pit. The pit from the late 1200s period contained *Zea mays*, *Platyopuntia*, and *Cylindropuntia* pollen. It is likely that this pit was used to store corn and perhaps cactus fruits. The concentration values of *Cylindropuntia* and *Platyopuntia* are very low, and thus it is more likely that fruits or other nonflower structures were being stored. If flowering structures were present, the pollen concentration values would probably have been much higher.

*Miscellaneous Samples*

A number of samples were also taken from postholes, pot rests, rock clusters, roof fall, and subfloor locations. These have been combined (Table 5.80) and summarized by date and site.

Postholes were present from the A.D. 1185 (LA 39968) and the late 1200s (LA 3279) periods (Table 5.80). In general the posthole from A.D. 1185 contained much fewer taxa, although the total pollen concentration values were quite similar. Those from the late 1200s contained small amounts of *Zea mays*, *Platyopuntia*, and other background pollen types. The presence of corn and cactus pollen from posthole areas suggests that the pollen was added ritually during the placement of the post. While corn pollen is wind pollinated, the grains are large and heavy and do not travel great distances from their source. *Platyopuntia* pollen is insect pollinated, and although the concentration values are low, this pollen type would not likely be present as a component of the sediments.

Pot rests were also recovered from these two time periods and the same sites (Table 5.80). The samples from the late 1200s contained almost twice as much pollen as the sample from A.D. 1185. The corn pollen concentration values suggest that the pollen was incorporated into the sediments from the pot itself, or that corn pollen may have been placed on the pot rest. Possibly, the pot rest was covered by grass matting, because the Poaceae pollen from this sample is very high.

The samples from the rock clusters (Table 5.80) were all recovered from LA 3279 (late 1200s). A small amount of corn pollen was present. The presence of this pollen type might indicate that corn processing was occurring in the area of the rock cluster. Alternatively, since all rock clusters were taken from within rooms, where presumably corn pollen would have been present, the pollen may have been introduced more accidentally.

A single sample from roof fall was taken from LA 70196 (A.D. 700s). Only Onagraceae pollen was present as an economic indicator. If we examine this sample as an indicator of what was on the roof before collapse, then the presence of this taxon indicates that these plants may have been placed on the roof to dry and the pollen was incorporated later into the sediments. This is a common occurrence among Pueblo Indians today and, presumably, prehistorically too.

The subfloor samples were taken from LA 70185 (A.D. 1020-1060) and LA 39969 (A.D. 1043). No economic taxa were present, and the pollen concentration values were generally quite low.

*Pollen Wash Samples*

The pollen concentration values obtained from the pollen wash samples appear to be much lower than those obtained from the soil samples. In part, this is a function of the calculation of the pollen concentration values. The area of the artifact washed was computed for each artifact, and thus the pollen concentration values for this suite of samples is presented in the form of grains/sq cm. While this reduces the overall pollen concentration values, the data is in a more meaningful format. The reduction of the pollen concentration values to a uniform measure allows for a more insightful cross comparison between artifacts rather than simply relying on the total estimated number of grains present on the artifact.

In order to assess the degree of variability among the pollen assemblages, average concentration values were computed using three criteria. Table 5.81 presents the pollen wash samples by age, and material, while Table 5.82 combines the samples by major artifact type and age. Table 5.83 provides the mean total pollen concentration values by age and material and by material.

The total pollen concentration values by material (Table 5.83) show only minimal differences. The pollen concentration values do suggest, however, that the artifacts of vesicular basalt contain slightly less pollen than do those of the finer grained basalt and that this is reversed in those artifacts made of rhyolite. The total pollen concentration values also suggest that pollen concentration values decreased with the age of the artifact, which is not altogether surprising.

The majority of the artifacts are constructed of basalt or rhyolite; however, ceramic artifact samples first appear in the A.D. 420 period (Table 5.81). Certainly ceramic artifacts may be present earlier, but they were not sampled. *Pinus* values throughout the assemblage reflect extremely low pollen concentration values. Only one sample contains values in excess of 32 grains/sq cm, and this is only 58 grains/sq cm. While *Pinus* is certainly common within the area, the low pollen concentration values for this dominant taxon suggest that the areas containing these artifacts were likely protected such as within structures, etc. These areas likely effectively blocked the natural pollen rain, and thus these artifacts contain primarily a culturally derived assemblage.

Solanaceae pollen was obtained only from basalt artifacts and only from the A.D. 0 through A.D. 700 periods, while *Polygala* pollen was present only from basalt artifacts from the A.D. 700 period. Cheno-am pollen is consistently low, although the slightly higher values tend to correlate with basalt artifacts prior to A.D. 1100 and with ceramic and ground stone artifacts during the later periods. Also, cheno-am anther fragments are correlated with basalt artifacts.

Small amounts of *Zea mays* pollen appear during the A.D. 0 period and are generally confined to basalt artifacts until the A.D. 790 period. The highest average concentration value for this taxon is correlated with the artifact made of sedimentary (probably sandstone) material. *Zea mays* pollen is not present in ceramic artifacts until the A.D. 1100 period, and this may correlate with the development of ceremonial usage of this taxon. Alternatively, *Zea mays* may not have been common in this region until this later period.

Table 5.82 presents the mean pollen concentration values for each of the four major artifact types subdivided by time period. The discussion of the pollen assemblages below are presented by time period.

*1055 B.C.* Ground stone and metates were recovered from this time period (Table 5.82). The ground stone artifact contained very little pollen, and this was restricted to the indeterminate type. The only corn pollen recovered was observed in the low-magnification scan of the slide and indicates only its presence. This particular sample was excluded from the data set because no pollen was present during the count.

*A.D. 0-30*. Both manos and metates were recovered from this temporal period. The manos contained only a trace of *Pinus* with small amounts of cheno-am and both high and low spine Asteraceae. The metates from this period contained higher concentration values of these taxa in addition to Solanaceae and *Zea mays*. This indicates that cultivated and wild taxa were probably being processed.

*A.D. 200*. Ground stone artifacts, manos, and metates were present from this time period. The ground stone contained no corn pollen. The manos also contained no corn pollen. Poaceae, cheno-am, and the Asteraceae were present in very small amounts. The metates contained these same taxa along with a trace of Solanaceae.

*A.D. 380*. This period was represented by a metate from LA 39972. The artifact contained some evidence of Poaceae and cheno-am. The presence of these two taxa from a metate suggests that wild plant materials were being processed.

*A.D. 420*. Ceramic artifacts, manos, and metates were recovered from this time period. The ceramic artifacts contained only Poaceae pollen. The manos contained slightly higher average concentration values for cheno-am, and cheno-am anther fragments were present, indicating that these materials were being processed. No corn pollen was present from the manos. The metates contained only cheno-am, *Pinus*, Asteraceae, and indeterminate pollen.

*A.D. 700-900*. Ground stone, manos, and metates were present from this period. The ground stone artifacts contained only cheno-am pollen.

The manos from this period contained Poaceae, cheno-am, and Asteraceae along with a small amount of *Zea mays* pollen. The metates contained these same taxa along with very small traces of Solanaceae and *Polygala.* These two artifact types suggest the processing of cultivated and wild plant materials.

*A.D. 790*. Only manos and metates were recovered from this period. The manos contained cheno-am, Asteraceae, and *Zea mays* pollen. The metates contained Poaceae, cheno-am high spine Asteraceae, and *Zea mays* pollen along with a small amount of *Polygala.* This again suggests processing of cultivated and wild plant materials.

*A.D. 800*. A single metate was taken from this period. This artifact contained cheno-am and cheno-am anther fragments, Asteraceae, and *Zea mays* pollen. Both wild and cultivated plant materials appear to have been processed.

*A.D. 1000-1100.* Only manos and metates were present from this period. The manos contained small amounts of cheno-am and indeterminate pollen. The metates contained Poaceae and cheno-am along with a small amount of Solanaceae pollen. While corn was likely present, no pollen evidence was obtained.

*A.D. 1043*. Ceramics, manos, and metates were present from this period. Primarily, the ceramic artifacts contained indeterminate pollen. The mano contained Poaceae, cheno-am, and *Zea mays* pollen. The metate samples contained Poaceae and cheno-am but no corn pollen. Given the evidence from these artifacts, cultivated and wild plant materials were being processed.

*A.D. 1100*. Ceramics, manos, and metate artifacts were recovered. The ceramic materials contained higher amounts of Poaceae, cheno-am, and *Zea mays* pollen. The manos contained higher amounts of Poaceae, cheno-am, Asteraceae, and a trace of *Zea mays*. The metate artifacts contained Poaceae, cheno-am, and traces of Asteraceae, but no corn pollen. Again, the evidence suggests processing of wild and cultivated materials.

*A.D. 1185*. Ceramic artifacts and manos were present from this period. The ceramics contained Poaceae, cheno-am, and *Zea mays* pollen. The presence

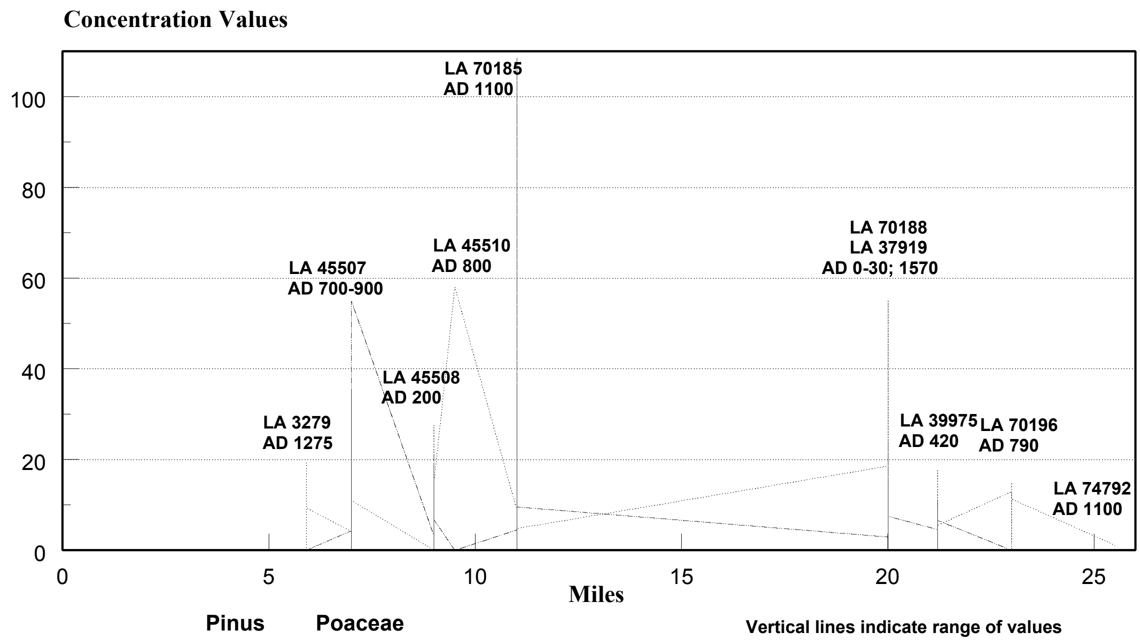



*Figure 5.16. Distribution of* Pinus *and Poaceae, U.S. 180 sites.*

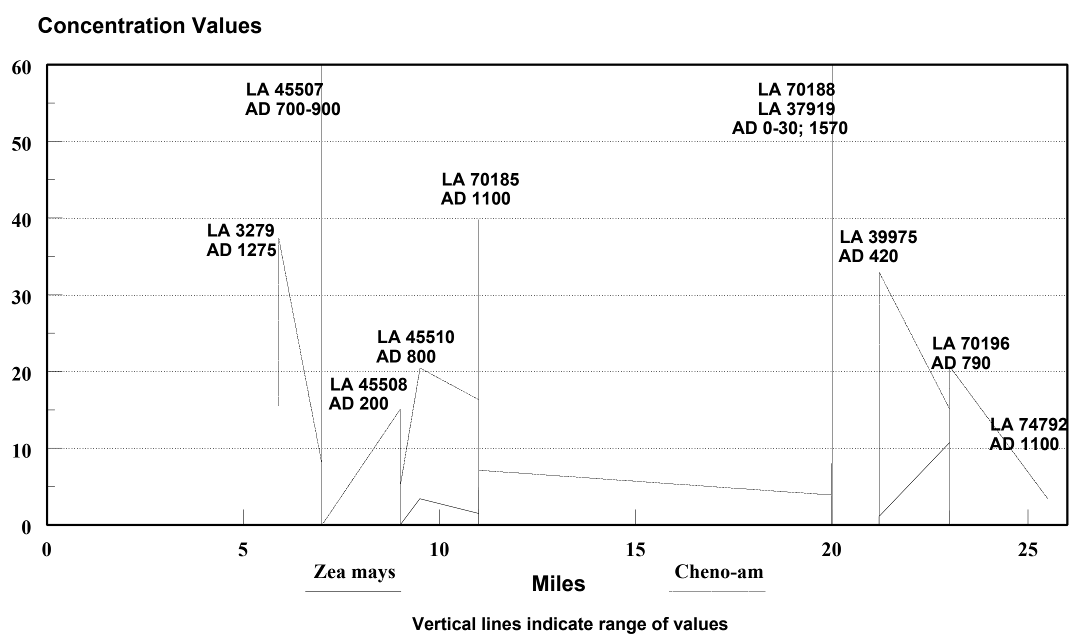



*Figure 5.17. Distribution of* Zea mays *and cheno-am pollen, U.S. 180 sites.*

of corn from these ceramic artifacts suggests a ceremonial usage for this taxon. The manos contained only cheno-am pollen.

*Late A.D. 1200s*. The samples from LA 3279 were all dated to approximately A.D. 1275. All of the pollen washes were taken from ground stone artifacts. Cheno-am, low spine Asteraceae, and indeterminate pollen were the only taxa present.

*A.D. 1570*. A single metate was obtained from this late period. Poaceae, cheno-am, Asteraceae, and indeterminate pollen were the only taxa present.

In general, these artifacts reflect a continued utilization of both the cultivated and wild plant materials through time. There is no evidence for the presence of corn prior to about A.D. 0, but its importance increases from there on. The evidence suggests that cultivated materials including but not restricted to corn were simply appended to the subsistence base rather than replacing it. The pollen recovery from these artifacts was marginal at best.

Figures 5.16 and 5.17 show the distribution of four pollen taxa along U.S. 180. The higher values for corn pollen are mostly clustered in the lower elevation, in the southernmost areas, which also correlate to the first millennium A.D. While corn pollen is present in samples from the higher elevation around the townsite of Luna, the concentration values are somewhat reduced. *Pinus* pollen, on the other hand is slightly higher than the higher elevation sites near Luna and west to the Arizona state line. This distribution correlates well with elevation. Poaceae pollen is somewhat higher in these higher elevation areas and surprisingly lower in the southernmost area of the project (Miles 20-25). This may be expected given the overall canopy cover of the southern area.

Corn pollen is present at two sites along NM 12, both of which date to the A.D. 1043-1185 period. The one site (LA 43766) containing an occupation from 1055 B.C. is lacking corn pollen (Fig. 5.18). *Pinus* pollen steadily increases along NM 12 to the intersection with U.S. 180 (Fig. 5.19). This area is covered by desert scrub grasslands, and the highest *Pinus* values are correlated with the higher elevation. Poaceae is also elevated along NM 12, although the concentration values are still somewhat low. Thus the distribution of these pollen assemblages, although primarily culturally derived, still reflects the effects of elevation and the vegetational assemblages.

*Principal Components Analysis*

Principal Components Analysis (PCA) was computed separately for the soil sample and pollen wash data sets because of the nature of the samples and the differences used in computing the pollen concentration values (grains/g and grains/sq cm). The results of PCA from the soil samples (Table 5.84) revealed that a large number of factors contributed to the observed variation in the pollen concentration values. The first four axes explained only 48 percent of the total variation. Many of the taxa overlapped between axes. Thus there appeared to be some other controlling factor influencing the distribution of these samples. This is not totally unexpected given that the majority of these samples were taken from specific archaeological contexts. Plotting of Component 1 by Component 2 (not included) clustered many of the samples but showed little variation that could be effectively distributed.

The results of the PCA from the pollen wash samples (Table 5.85) showed that a much larger percentage of the total variation could be explained. The first four components accounted for 93 percent of the total variation. Again, the majority of these samples clustered around the center of the distribution. However, this Principal Components Analysis was successful in separating the pollen wash samples by artifact type. Figures 5.20 and 5.21 plot the first and second principal component by artifact type. Figure 5.20 shows that the mano artifacts are positively loaded for the first component, and these are clustered around the ordinal with the other artifact types clustered along the Y zero line.

In Figure 5.21, this cluster is expanded. The ground stone artifacts appear to be negatively loaded for the first PC, and clustered in the positive 1 to 2 area for the second PC. Interestingly, these four samples, all from LA 3279, were identified only as ground stone artifacts rather than being separated into discrete categories like the samples from Phases 1-3. Secondly, all four of these samples were taken from one of the later time periods. It is therefore likely that this clustering is a function of both artifact function and the later time period. These two factors were apparently sufficiently different to cause this clustering. The first and second principal components were also plotted against each other by time period (not included), and while, in general, the data is not discrete, the samples from the late 1200s period did cluster together. This reinforces the interpretation that the principal components are reflecting the changes to the pollen assemblages as a function of time.

The ceramic and metate artifact categories are not totally discrete from this analysis. The metate artifact data are essentially restricted to negative loadings from the first and second component, although there are isolated outliers in each of the other three quadrants. In any event, the component scores for this artifact type remain close to the zero line. The ceramic artifacts are basically negatively loaded for the first component and range from negative to positive loadings for the second component. The distribution of these particular artifacts

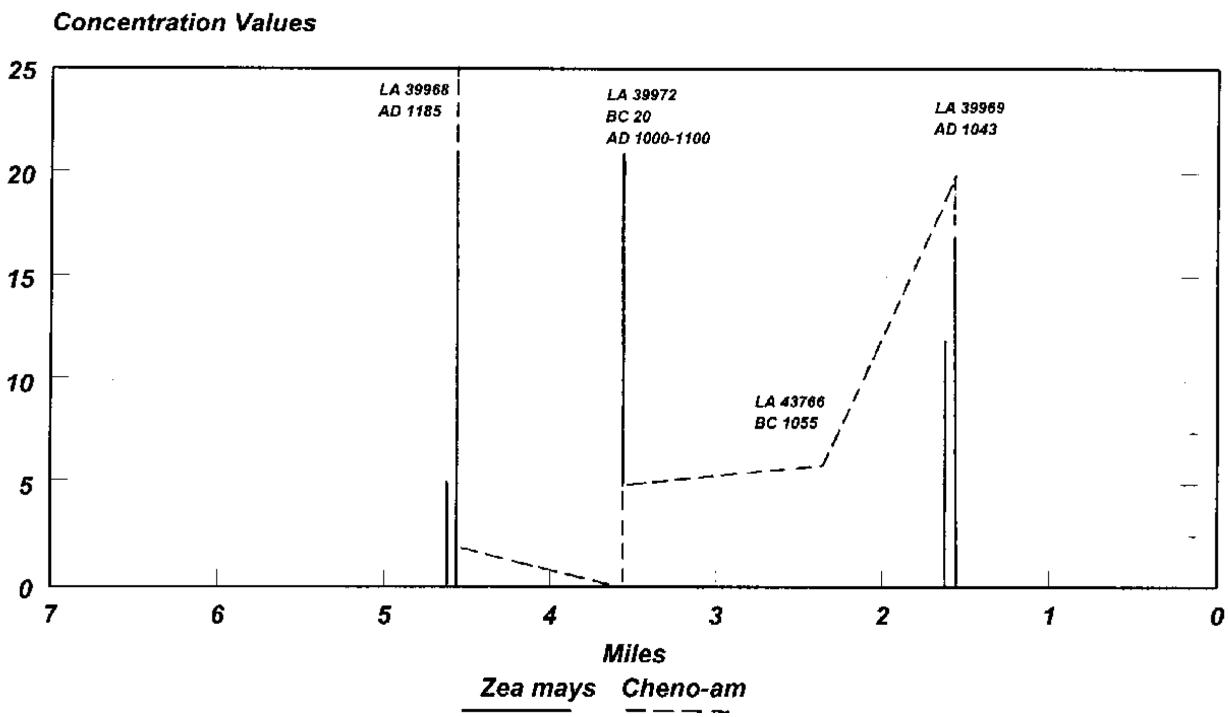



*Figure 5.18. Distribution of* Zea mays *and cheno-am pollen, NM 12 sites.*

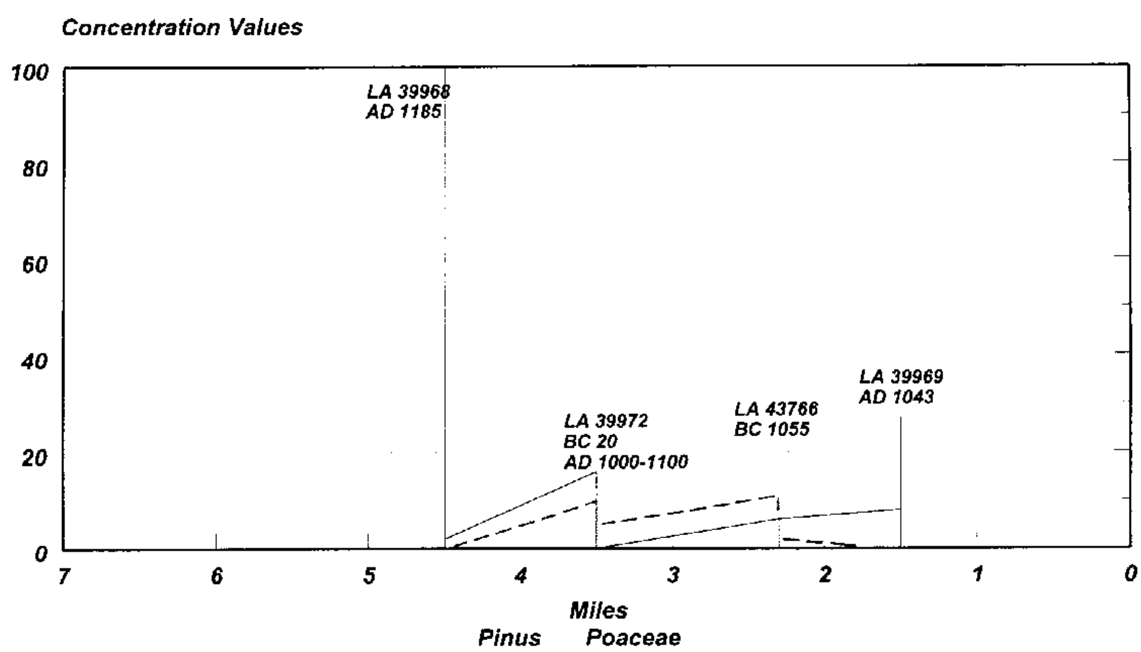



*Figure 5.19. Distribution of Pinus and Poaceae, NM 12 sites.*

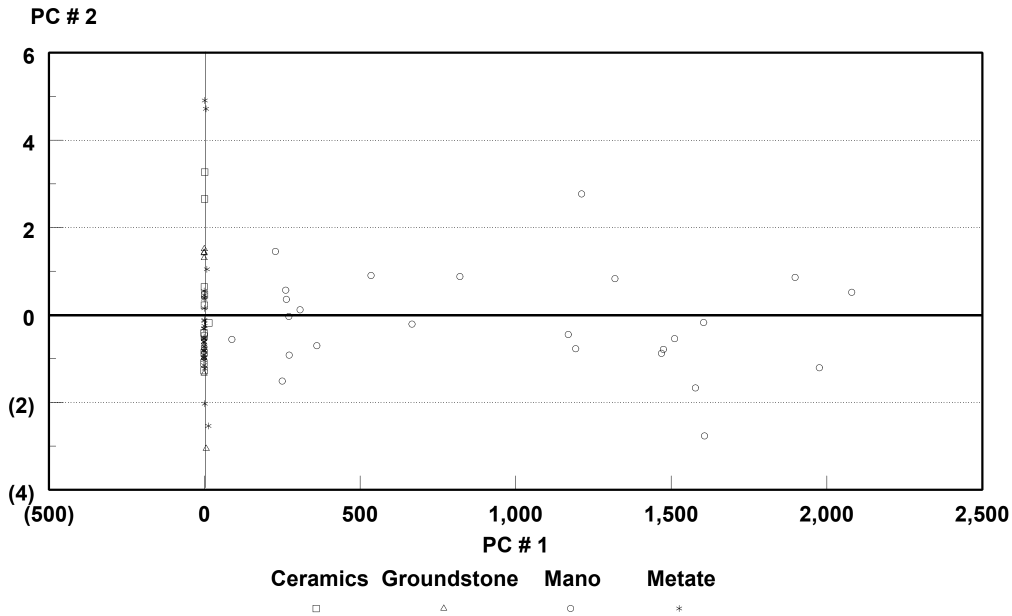



*Figure 5.20. Comparison of first and second principal component by artifact type, pollen wash samples.*

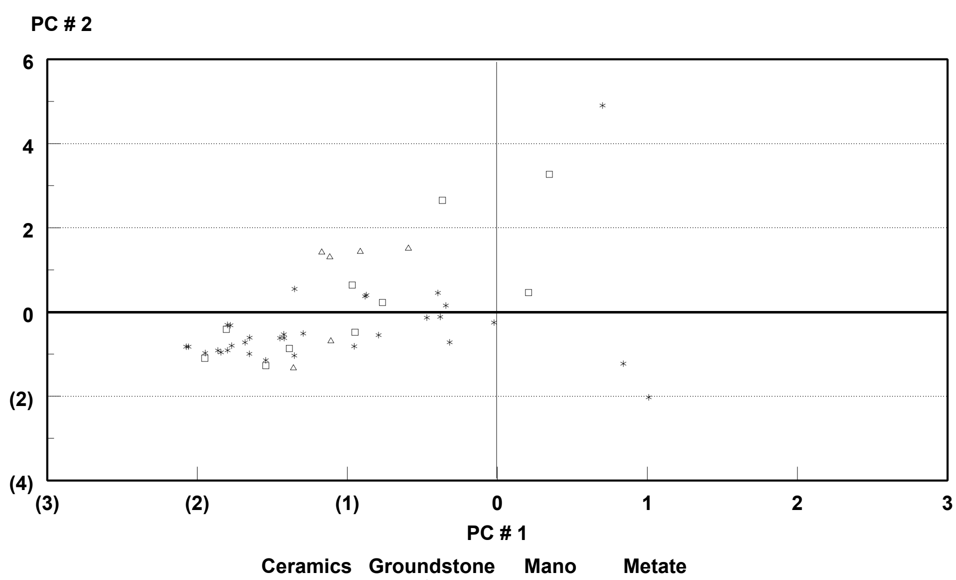



*Figure 5.21. Comparison of first and second principal component by artifact type, pollen wash samples.*

appears unrelated to the age of the sample.

*Corn and Economic Pollen*

The corn pollen concentration values generally tend to increase with decreases in elevation. This suggests that the higher quantities of corn are associated with sites from the east side of the San Francisco Mountains. This area may have provided slightly better agricultural areas than those slightly higher elevations near Luna. The pollen concentration values for corn show a slight increase with increasing age of the sample. However, I feel that this is a function of the number of samples rather than a real reverse trend. The periods represented by these samples are all within established ranges for the presence of corn, and it is not unlikely that this taxon was present.

The evidence from both the pollen wash samples and the soil samples from these sites suggest a varied subsistence. There is ample pollen evidence of processing several types of wild or gathered materials such as *Platyopuntia* and Poaceae. This is indicated by elevated pollen concentration values for these taxa from several classes of artifacts, notably the metates and ceramic vessels.

Corn pollen, especially from the pollen wash samples, is rather low and only rarely present. There does not appear to be any strong correlation between samples containing corn pollen and those that did not. However, by inclusion of the presence of corn starch grains and corn pollen observed in the low-magnification scan of the slides, a much higher proportion of the samples contain at least some evidence of corn. Corn starch grains are identifiable based on their morphology (Simpson and Ogarzaly 1986), and their presence is yet another tool in understanding the subsistence base in this area. The lack of corn evidence seemed to be a diagnostic feature of this area. However, the presence of corn starch as an indicator implies a somewhat heavier reliance upon this staple than was previously thought. Corn appears to have been present in this region for at least the last 2,000 years. While there are several fluctuations in the record, it appears as if corn usage was continually increasing.

The slightly higher concentration values for corn on the east side of the San Francisco Mountains may suggest that these slightly lower elevations were the primary producing areas for this taxon. However, all sites from the Luna area contained ample evidence of corn utilization. Alternatively, it seems more than likely than several areas around Luna would have been most ideally suited to corn agriculture. Perhaps suitable areas can be identified and tested for possible agricultural fields. Additionally, either the flotation or macrobotanical data can provide insights into possible fields, and these can later be tested for the presence of corn pollen.

The presence of corn from both the pollen wash and the soil samples was deemed significant. Table 5.86 shows the number of corn positive samples and the percentage of corn positive samples by time period and site. Also, the total percentage of corn positive samples by age is provided. The pollen wash samples contained no evidence of corn prior to A.D. 0. The percentage of artifacts containing corn peaks during the period A.D. 700-1000 and gradually decrease to 20 percent in the post-1200 period.

The soil pollen samples, however, contained evidence of corn from even the earliest time periods. The A.D. 700-1000 period contained the lowest overall percentage of corn positive samples. The A.D. 1000-1200 and post-1200 periods were comparable to those obtained from the pollen wash samples. Prior to A.D. 700, I believe that plant processing, as an activity, was not differentiated from other activities. These all occurred within a structure, and thus the pollen all generally combined to form the interior pollen assemblages. From about A.D. 700 on, specialized activity areas may have been developed, or at least specialization in terms of the artifacts may have occurred. Thus the ambient economic pollen would have been restricted to certain areas or particular artifacts. Thus, higher percentages of the pollen wash samples contained evidence of corn and economic type pollen. The other sampling locales (soil samples) would have a better chance of not containing these particular economic taxa. While this is intriguing, the evidence supporting this interpretation remains rather speculative for the present.

Because of the nature of the artifacts, a comparison was made between economic and noneconomic pollen types (Table 5.87). Average concentration values were computed for economic and noneconomic pollen taxa by age for the pollen wash and soil pollen samples. Two separate calculations were conducted. In one data set, pollen concentration values of the Poaceae and cheno-am were included in the economic pollen category, while in the other data set they are excluded. This was done because very often these taxa were used economically. The fact that many of the samples were taken from protected contexts further supports the inclusion of these two taxa within the economic category. The pollen wash samples reveal very little economic pollen, but the highest average value occurs in the A.D. 700-1000 period. The data from the soil pollen samples suggests that the amount of economic pollen was fairly constant through time. I believe that when Poaceae and cheno-am pollen is included, a more realistic interpretation of the samples is possible.

The data provides ample evidence for the processing of cultivated materials such as corn, as well as wild plant materials. The palynological evidence indicates that corn agriculture was likely extensively practiced, although the reliance upon cultivation was probably not as extensive as from other areas, such as the Colorado Plateau. This is likely due to the higher elevations in the Reserve-Luna area. The diet was also likely supplemented by wild plant materials.

Many of the taxa found locally within the modern flora have known medicinal, ceremonial, food and/or utilitarian uses. Table 5.88 summarizes these potential uses. Much of the information has been drawn from earlier ethnobotanies (Castetter 1935; Bailey 1940; and Moermann 1986 on medicinal uses). Similar species and genera within these families would have similar properties. The majority of the uses identified were taken from cultures in close proximity to the study area. These taxa provide a baseline or minimal species list for materials that could have been exploited.

## Conclusions

The modern vegetation analyses revealed primarily a forested environment in this area of Catron County, which likely has seen little change since the prehistoric occupations. The area on the east side of the San Francisco Mountains is primarily piñon-juniper forest interspersed with open meadows or grasslands. As one increases in elevation, the piñon gives way to ponderosa pine forest. At the lower elevations at the southern end of U.S. 180 and along NM 12, the piñon-juniper forest is more open, and along NM 12 there are ample stands of grassland or desert scrub type communities. While these more open areas were probably present prehistorically, much of this grassland expansion may also be due to more recent disturbances.

On the northern slopes of the San Francisco Mountains and continuing northward to the Arizona–New Mexico state line, piñon drops out completely and is replaced by denser stands of ponderosa pine. Comparisons with the wood charcoal data should be conducted to determine if this separation is observed prehistorically, and if this separation correlates with the radiocarbon ages of particular sites. This species replacement is likely correlated with elevational differences, but this may play an important role in the prehistoric pattern of exploitation of the natural environment.

The palynological data from this project was marginal at best. By far, the majority of the pollen samples produced extremely low pollen concentration values. This is likely due to the samples being taken from archaeological contexts from within structures. The presence of structures acts to block the deposition of the natural pollen rain and thus the assemblage truly represents a cultural deposition. With this in mind, the pollen assemblages did provide much useful information concerning the use of many feature types, including floors and pits.

The pollen washes of artifacts also provided a great deal of information. Since the area of the artifact washed was measured in all instances, the pollen concentration values were reported in comparable units of measure (grains/sq cm). This permitted comparison of these concentration values between artifacts without the encumbrance of comparing which artifacts contained more pollen grains. When the data were analyzed using PCA, the major artifact types were effectively separated. This suggests that these different artifacts contained somewhat different pollen assemblages. While this might be intuitively suspected, it is reassuring when the data confirms the hypothesis. The majority of the ground stone artifacts provided evidence of their use in plant processing activities. However, there is no indication of a radical change in the subsistence over time. This indicates that both cultivated and noncultivated materials were being exploited during the whole of the period of occupation. There is also the suggestion that during the earlier occupations, the structures contained several different activities that were occurring simultaneously. During the later periods, processing activities may have been specialized and restricted to separate structures with little overlap of the pollen assemblages. This is speculative but provides an interesting avenue for comparison.

Previous investigations in this area provided little evidence for the presence of corn agriculture although it was assumed that this activity was occurring. In fact, had just the data from the pollen counts been utilized, the same interpretation would have been inferred. By using pollen concentration values in this investigation, we were able to quantify the data obtained from low-magnification scans of the slide. This, in addition to other indications of the presence of corn (i.e. starch grains), enabled us to infer that corn was a more substantial component of the diet than previously thought. The evidence indicates that corn materials were present in this area from the earliest occupations. However, corn materials generally did not constitute the bulk of the diet as observed in other locales (Colorado Plateau for example). Additionally, the evidence from the pollen washes also indicate the use of corn pollen ritually, usually in association with human burials. In fact, the ceramic artifacts recovered from these burial contexts generally contained evidence of corn.

The later periods (A.D. 1300+) are generally under-represented, and the pollen assemblages are much more poorly preserved than the others. Thus, these occupation periods are still relatively unknown. Additional sites from the protohistoric transition periods are needed to resolve whether the relative paucity of the pollen assemblages is indicative of the occupation, or, as I believe, is a matter of preservation and the relative infrequency of the samples.

Table 5.64. Index of Scientific and Common Names of Taxa

| Scientific Name | Common Name |
|---|---|
| *Achillea* sp. | Yarrow |
| *Amaranthus* | Pigweed |
| *Anemone* sp. | Anemone |
| *Arctostaphylos* sp. | Bear berry (kinnikinic) |
| *Aristata* sp. | Three-awn grass |
| *Argemone* sp. | |
| Asteraceae | Composite family |
| *Aster* sp. | Common aster |
| High Spine Asteraceae | Pollen morphological group, spines >2.5 microns height |
| Low Spine Asteraceae | Pollen morphological group, spines <2.5 microns height |
| Liguliflorae | Pollen morphological group, fenestrate type pollen |
| *Astragalus* sp. | Locoweed |
| *Artemisia* sp. | Sagebrush |
| *Atriplex canescens* | Saltbush |
| *Boutelua* sp. | |
| Brassicaceae | Mustard family |
| *Bromus* sp. | |
| Cactaceae | Cactus family |
| *Cassia* sp. | |
| *Castilleja* sp. | Indian paintbrush |
| Cheno-am | Pollen morphological group, members of the family Chenopodiaceae and genus Amaranthus |
| Chenopodiaceae | Goosefoot family |
| *Chenopodium* sp. | Lamb's quarters, goosefoot |
| Chichoreae | Tribe of Asteraceae, heads comprised entirely of ligulate flowers |
| *Chrysothamnus* sp. | Snakeweed |
| *Cirsium* sp. | Thistle |
| *Coreopsis* sp. | |
| *Cucrubita foetidissima* | Buffalo gourd |
| Cylindropuntia | Subgenus of *Opuntia*, cholla cactus |
| *Dalea* sp. | Dalea |

| **Scientific Name** | **Common Name** |
| --- | --- |
| *Eichinocerus* sp. | Pincushion cactus |
| *Ephedra* | Mormon tea |
| *Erigeron* sp. | Fleabane daisy |
| *Eriogonum* | Buckwheat |
| Fabaceae | Bean family |
| *Fallugia paradoxa* | Apache plume |
| *Gaillardia* sp. | Gaillardia |
| *Gaura* sp. | |
| *Hedyotis* sp. | |
| *Heliotropium* sp. | |
| *Hilaria* sp. | |
| *Hordeum* sp. | Foxtail barley |
| Indeterminate | Pollen morphological group beyond identification |
| *Ipomopsis aggregata* | Blazing rocket, red rocket |
| *Juniperus* sp. | Juniper |
| *Juniperus depeanna* | Alligator bark juniper |
| *Juniperus monosperma* | One-seeded juniper |
| *Lactuca* | Lettuce |
| Lamiaceae | Mint family |
| *Lepidium* sp. | |
| *Linum* sp. | Wild flax |
| *Lupinus* sp. | Bluebonnets, lupines |
| *Lycopodium* | Club moss |
| *Lycopus* sp. | Wolfberry |
| Malvaceae | Cotton family |
| *Melilotus* sp. | Wild sweet clover |
| *Muhlenbergia* sp. | Muhly grass |
| Nyctaginaceae | Desert four o'clock family |
| *Opuntia* | Prickly pear or cholla cactus pollen |
| *Opuntia imbricata* | Cholla cactus |
| *Opuntia phaecantha* | Prickly pear cactus |
| *Oryzopsis* sp. | Indian rice grass |
| *Penstemon barbatus* | Penstemon |

| Scientific Name | Common Name |
|---|---|
| *Picea engelmanii* | Engelmann spruce |
| *Pinus* | Pine |
| *Pinus edulis* | Piñon pine |
| *Pinus ponderosa* | Ponderosa pine |
| Platyopuntia | Subgenus of *Opuntia,* prickly pear cactus |
| Poaceae | Grass family |
| *Polygonum* sp. | Buckwheat |
| *Potentilla* sp. | |
| *Pseudotsuga menziesii* | Douglas fir |
| *Quercus* sp. | Oak |
| *Quercus gambelii* | Gambel's oak |
| *Ranunculus* sp. | Buttercup |
| *Ratiba* sp. | Coneflower |
| *Robinia neomexicana* | New Mexico locust |
| Rosaceae | Rose family |
| *Sedum* sp. | |
| *Senecio* sp. | |
| *Shrankia* sp. | |
| Solanaceae | Nightshade family |
| *Solidago* sp. | Ragweed |
| *Sphaeralcea* | Globe mallow |
| *Sporobolus* sp. | |
| *Taraxacum* | Dandelion |
| *Tragopogon* sp. | Goat's beard |
| *Trifolium* sp. | Clover |
| *Verbascum thalspi* | Wild mullen |
| *Zea mays* | Corn |

Table 5.65. Locations and Type of Releve Plots

| Plot Number | Type | Longitude | Latitude |
|---|---|---|---|
| L-01 | Piñon/juniper | 108° 53' 42" | 33° 37' 49" |
| L-02 | Piñon/juniper | 108° 53' 30" | 33° 38' 30" |
| L-03 | Meadow | 108° 53' 23" | 33° 38' 46" |
| L-04 | Piñon/juniper | 108° 51' 57" | 33° 40' 19" |

| Plot Number | Type | Longitude | Latitude |
|---|---|---|---|
| L-05 | Piñon/juniper | 108° 51' 39" | 33° 41' 20" |
| L-06 | Piñon/juniper | 108° 52' 10" | 33° 42' 08" |
| L-07 | Piñon/juniper | 108° 53' 25" | 33° 42' 29" |
| L-08 | Piñon/juniper | 108° 55' 05" | 33° 43' 41" |
| L-09 | Ponderosa pine | 108° 56' 04" | 33° 43' 43" |
| L-10 | Ponderosa pine | 108° 58' 05" | 33° 49' 06" |
| L-11 | Ponderosa pine | 108° 56' 56" | 33° 47' 50" |
| L-12 | Ponderosa pine | 108° 57' 42" | 33° 45' 10" |
| L-13 | Ponderosa pine | 109° 02' 45" | 33° 48' 36" |
| L-14 | Ponderosa pine | 109° 00' 51" | 33° 48' 48" |
| L-15 | Ponderosa pine | 109° 01' 05" | 33° 49' 30" |
| L-16 | Ponderosa pine | 108° 59' 40" | 33° 49' 24" |
| L-17 | Ponderosa pine | 108° 56' 48" | 33° 44' 14" |
| L-18 | Pine | 108° 51' 37" | 33° 41' 32" |
| L-19 | Piñon/juniper | 108° 47' 20" | 33° 43' 00" |
| L-20 | Piñon/juniper | 108° 48' 25" | 33° 42' 50" |
| L-21 | Desert scrub | 108° 48' 42" | 33° 42' 39" |
| L-22 | Desert scrub | 108° 48' 45" | 33° 42' 36" |
| L-23 | Piñon/juniper | 108° 49' 16" | 33° 42' 22" |
| L-24 | Piñon/juniper | 108° 50' 26" | 33° 41' 53" |

Table 5.66. Percentage Cover by Taxa, Releve Plots, U.S. 180

| Stand | L-1 | L-2 | L-3 | L-4 | L-18 | L-5 |
|---|---|---|---|---|---|---|
| Mile | 26 | 25 | 24.7 | 22.2 | 21.3 | 21.1 |
| Slope | 6 | 3 | 0 | 6 | 0 | 1 |
| Aspect | 220 | 180 | 180 | 270 | 295 | 180 |
| Elevation | 5960 | 6080 | 6120 | 6160 | 6380 | 6360 |
| Canopy cover | 0.3 | 0.35 | 0 | 0.5 | 0.2 | 0.1 |
| Canopy height | 15 | 20 | | 20 | 10 | 5 |
| Tall shrub cover | 0.05 | 0.07 | 0.05 | 0.25 | 0.15 | 0 |
| Tall shrub height | 3 | 3 | 1.5 | 4 | 1.5 | |
| Small shrub cover | 0.05 | 0 | 0 | 0.1 | 0.05 | 0.01 |
| Small shrub height | 0.5 | | | | 0.5 | 0.5 |
| Herb cover | 0.03 | 0.1 | 0.10 | 0.05 | 0.10 | 0.05 |

| Stand | L-1 | L-2 | L-3 | L-4 | L-18 | L-5 |
|---|---|---|---|---|---|---|
| Herb height | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 |
| Grass cover | 0.1 | 0.3 | 0.65 | 0.3 | 0.01 | 0.4 |
| Grass height | | 1 | 0.5 | 0.5 | | 0.1 |
| | | | Arboreal Species | | | |
| *Juniperus depeanna* | 0.003 | 0.0525 | 0 | 0.24 | 0.1 | 0.075 |
| *Juniperus monosperma* | 0.003 | 0.0035 | 0 | 0 | 0 | 0 |
| *Juniperus* sp. | 0.084 | 0.0007 | 0.0005 | 0.025 | 0 | 0 |
| *Picea engelmanii* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pinus edulis* | 0.12 | 0.0455 | 0 | 0.005 | 0.02 | 0.9845 |
| *Pinus ponderosa* | 0.15 | 0.0875 | 0 | 0.255 | 0.06 | 0 |
| *Pseudotsuga menziesii* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Quercus gambelii* | 0.0105 | 0.1575 | 0 | 0.225 | 0.15 | 0 |
| *Quercus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Robinia neomexicana* | 0.03 | 0 | 0 | 0 | 0 | 0 |
| | | | Nonarboreal Species | | | |
| *Achillea* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Anemone* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Arctostapylos* sp. | 0.995 | 0 | 0 | 0 | 0 | 0 |
| *Argemone* sp. | 0 | 0 | 0.02 | 0 | 0 | 0 |
| *Artemisia* sp. | 0 | 0.005 | 0 | 0 | 0 | 0 |
| *Aster* sp. | 0 | 0 | 0 | 0 | 0.005 | 0 |
| *Aster* sp. | 0 | 0.005 | 0.005 | 0 | 0 | 0.0025 |
| *Astragalus* sp. | 0.0003 | 0 | 0.001 | 0.0025 | 0 | 0.0005 |
| cf. *Cassia* sp. | 0 | 0 | 0 | 0 | 0.001 | 0 |
| *Castilleja* sp. | 0.0009 | 0 | 0 | 0.0045 | 0 | 0.0005 |
| *Chenopodium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Chrysothamnus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cirsium* sp. | 0 | 0.005 | 0.005 | 0 | 0 | 0 |
| *Coreopsis* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cucurbita foetidissima* | 0 | 0 | 0.005 | 0 | 0 | 0 |
| cf. *Dalea* sp. | 0 | 0 | 0 | 0.0005 | 0 | 0 |
| *Echinocerus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Erigeron* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Fallugia paradoxa* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gaillardia* sp. | 0 | 0 | 0 | 0 | 0 | 0 |

| Stand | L-1 | L-2 | L-3 | L-4 | L-18 | L-5 |
|---|---|---|---|---|---|---|
| *Gaura* sp. | 0 | 0.005 | 0 | 0 | 0.095 | 0.005 |
| *Hedyotis* sp. | 0 | 0.005 | 0 | 0 | 0 | 0 |
| *Heliotropium* sp. | 0 | 0 | 0 | 0 | 0 | 0.0005 |
| *Ipomopsis aggregata* | 0 | 0 | 0.001 | 0 | 0 | 0 |
| Lamiaceae | 0 | 0 | 0.04 | 0 | 0 | 0 |
| *Lepidium* sp. | 0 | 0 | 0.001 | 0 | 0 | 0.0005 |
| cf. *Linum* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Lupinus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Lycopus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Melilotus* sp. | 0.0009 | 0 | 0 | 0.0025 | 0 | 0 |
| *Opuntia imbricata* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Opuntia pahaecantha* | 0.0105 | 0.011 | 0.01 | 1.1 | 1.05 | 0.051 |
| *Penstemon barbatus* | 0.0009 | 0 | 0 | 0 | 0 | 0 |
| *Polygonum* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Potentilla* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ranunculus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ratiba* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sedum* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Senecio* sp. | 0.0003 | 0 | 0.007 | 0.02 | 0 | 0.0025 |
| *Shrankia* sp. | 0 | 0.05 | 0.001 | 0 | 0 | 0.0375 |
| *Solidago* sp. | 0 | 0.015 | 0 | 0 | 0 | 0 |
| *Tragopogon* sp. | 0 | 0.005 | 0 | 0 | 0 | 0 |
| *Trifolium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Verbascum thalspi* | 0 | 0 | 0.057 | 0 | 0 | 0 |
| Unknown | 0 | 0.005 | 0.001 | 0 | 0 | 0 |
| Grass Species | | | | | | |
| *Aristata* sp. | 0 | 0.015 | 0.195 | 0.075 | 0.004 | 0.02 |
| *Boutelua* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Bromus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hordeum* sp. | 0 | 0 | 0.13 | 0 | 0 | 0 |
| *Hilaria* sp. | 0.05 | 0 | 0 | 0 | 0 | 0 |
| *Muhlenbergia* sp. | 0.05 | 0.255 | 0.195 | 0 | 0.006 | 0.24 |
| *Oryzopsis* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sporobolus* sp. | 0 | 0 | 0 | 0.15 | 0 | 0.14 |
| Unknown 2 | 0 | 0 | 0 | 0 | 0 | 0 |

| Stand | L-1 | L-2 | L-3 | L-4 | L-18 | L-5 |
|---|---|---|---|---|---|---|
| Unknown (l-2) | 0 | 0.03 | 0.13 | 0.075 | 0 | 0 |
| Bare/open | | 0.3 | 0.25 | | | |

| Stand | L-6 | L-7 | L-8 | L-9 | L-17 | L-12 |
|---|---|---|---|---|---|---|
| Mile | 20.1 | 18.7 | 15 | 15 | 13.9 | 12.5 |
| Slope | 0 | 6 | | 8 | 25% | 5 |
| Aspect | 90 | 180 | 5 | 90 | 95 | 180 |
| Elevation | 6450 | 6760 | 7760 | 7750 | 7880 | 7520 |
| Canopy cover | 0.5 | 0.55 | 0.25 | 0.3 | 0.55 | 0.55 |
| Canopy height | | 20 | 15 | 25 | 27 | 25 |
| Tall shrub cover | 0.2 | 0.1 | 0.05 | 0.6 | 0.05 | 0.05 |
| Tall shrub height | 3 | 1 | 1.5 | 15 | 2.5 | 2 |
| Small shrub cover | 0 | 0.01 | 0.04 | 0.05 | 0.05 | 0 |
| Small shrub height | | | 0.3 | 0.5 | 1 | |
| Herb cover | 0.05 | 0.10 | 0.01 | 0.05 | 0.10 | 0.05 |
| Herb height | 1 | 0.5 | | 0.5 | 0.5 | 0.5 |
| Grass cover | 0.1 | 0 | 0.25 | 0.1 | 0.01 | 0.03 |
| Grass height | 0.5 | | 0.5 | 0.5 | 0.5 | 0.5 |
| Arboreal Species | | | | | | |
| *Juniperus depeanna* | 0.1 | 0.11 | 0.0375 | 0 | 0 | 0 |
| *Juniperus monosperma* | 0 | 0 | 0 | 0 | 0.055 | 0 |
| *Juniperus* sp. | 0.18 | 0 | 0.26 | 0 | 0 | 0 |
| *Picea engelmanii* | 0 | 0 | 0 | 0 | 0 | 0.1375 |
| *Pinus edulis* | 0 | 1.2749 | 0.1875 | 0 | 0 | 0 |
| *Pinus ponderosa* | 0.4 | 0.11 | 0.075 | 0.495 | 0.605 | 0.4565 |
| *Pseudotsuga menziesii* | 0 | 0 | 0 | 0.135 | 0.1775 | 0.006 |
| *Quercus gambelii* | 0.02 | 0.155 | 0.26 | 1.365 | 0.8125 | 0.0275 |
| *Quercus* sp. | 0 | 0 | 0 | 0 | 0 | 0.0005 |
| *Robinia neomexicana* | 0 | 0 | 0 | 0 | 0 | 0 |
| Nonarboreal Species | | | | | | |
| *Achillea* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Anemone* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Arctostapylos* sp. | 0 | 0 | 0.26 | 0 | 0 | 0 |
| *Argemone* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Artemisia* sp. | 0 | 0.005 | 0 | 0 | 0 | 0 |

| Stand | L-6 | L-7 | L-8 | L-9 | L-17 | L-12 |
|---|---|---|---|---|---|---|
| *Aster* sp. | 0 | 0.044 | 0 | 0 | 0.005 | 0 |
| *Aster* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Astragalus* sp. | 0.01 | 0.001 | 0 | 0 | 0 | 0 |
| cf. *Cassia* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Castilleja* sp. | 0 | 0 | 0.00425 | 0.0005 | 0 | 0 |
| *Chenopodium* sp. | 0 | 0.001 | 0 | 0 | 0 | 0 |
| *Chrysothamnus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cirsium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Coreopsis* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cucurbita foetidissima* | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Dalea* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Echinocerus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Erigeron* sp. | 0.01 | 0.001 | 0.00425 | 0 | 0 | 0 |
| *Fallugia paradoxa* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gaillardia* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gaura* sp. | 0 | 0.005 | 0.0005 | 0.005 | 0.03 | 0.0075 |
| *Hedyotis* sp. | 0 | 0 | 0 | 0 | 0 | 0.0025 |
| *Heliotropium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ipomopsis aggregata* | 0 | 0 | 0 | 0 | 0 | 0 |
| Lamiaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| *Lepidium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Linum* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Lupinus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Lycopus* sp. | 0.01 | 0 | 0 | 0 | 0 | 0 |
| *Melilotus* sp. | 0 | 0.044 | 0 | 0 | 0.02 | 0 |
| *Opuntia imbricata* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Opuntia pahaecantha* | 0 | 0.0101 | 0.26 | 0 | 0 | 0 |
| *Penstemon barbatus* | 0.0005 | 0 | 0.0005 | 0 | 0 | 0 |
| *Polygonum* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Potentilla* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ranunculus* sp. | 0.01 | 0 | 0 | 0 | 0 | 0 |
| *Ratiba* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sedum* sp. | 0 | 0 | 0.0005 | 0 | 0 | 0 |
| *Senecio* sp. | 0.01 | 0 | 0 | 0 | 0 | 0.0075 |
| *Shrankia* sp. | 0.0005 | 0 | 0 | 0 | 0 | 0 |

| Stand | L-6 | L-7 | L-8 | L-9 | L-17 | L-12 |
|---|---|---|---|---|---|---|
| *Solidago* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Tragopogon* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Trifolium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Verbascum thalspi* | 0 | 0 | 0 | 0 | 0 | 0.0025 |
| Unknown | 0 | 0 | 0 | 0 | 0.005 | 0 |
| Grass Species | | | | | | |
| *Aristata* sp. | 0.033 | 0 | 0.0375 | 0.025 | 0 | 0 |
| *Boutelua* sp. | 0 | 0 | 0.0375 | 0 | 0 | 0 |
| *Bromus* sp. | 0.033 | 0 | 0 | 0 | 0 | 0 |
| *Hordeum* sp. | 0.033 | 0 | 0 | 0 | 0 | 0 |
| *Hilaria* sp. | 0 | 0 | 0 | 0 | 0.0015 | 0.03 |
| *Muhlenbergia* sp. | 0 | 0 | 0.05 | 0 | 0.0085 | 0 |
| *Oryzopsis* sp. | 0 | 0 | 0.125 | 0 | 0 | 0 |
| *Sporobolus* sp. | 0 | 0 | 0.0375 | 0.025 | 0 | 0 |
| Unknown 2 | 0 | 0 | 0 | 0.05 | 0 | 0 |
| Unknown (l-2) | 0 | 0 | 0 | 0 | 0 | 0 |
| Bare/open | 0.6 | | 0.85 | | | |

| Stand | L-11 | L-10 | L-16 | L-15 | L-14 | L-13 |
|---|---|---|---|---|---|---|
| Mile | 9.1 | 7 | 5 | 3 | 1.95 | 0 |
| Slope | 1 | 2 | 1 | 1 | 4 | 1 |
| Aspect | 90 | 180 | 230 | 235 | 300 | 5 |
| Elevation | 7110 | 7120 | 7380 | 7480 | 7800 | 8106 |
| Canopy cover | 0.1 | 0.4 | 0.5 | 0.4 | 0.45 | 0.5 |
| Canopy height | 30 | 20 | 25 | 25 | 30 | 25 |
| Tall shrub cover | 0.01 | 0.01 | 0.15 | 0.01 | 0.15 | 0.05 |
| Tall shrub height | 1 | 2 | 1.5 | 1 | 1.5 | 3.5 |
| Small shrub cover | 0 | 0 | 0 | 0 | 0 | 0 |
| Small shrub height | | | | | | |
| Herb cover | 0.20 | 0.10 | 0.50 | 0.50 | 0.10 | 0.25 |
| Herb height | 0.75 | 0.5 | 1 | 0.5 | 0.5 | 1 |
| Grass cover | 0.6 | 0.5 | 0.05 | 0.3 | 0.05 | 0.05 |
| Grass height | 1 | 1 | 1 | | 1 | 1 |
| Arboreal Species | | | | | | |
| *Juniperus depeanna* | 0 | 0 | 0.05 | 0 | 0 | 0 |

| Stand | L-11 | L-10 | L-16 | L-15 | L-14 | L-13 |
|---|---|---|---|---|---|---|
| *Juniperus monosperma* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Juniperus* sp. | 0 | 0 | 0.0075 | 0 | 0 | 0 |
| *Picea engelmanii* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pinus edulis* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pinus ponderosa* | 0.11 | 0.4 | 0.45 | 0.4 | 0.27 | 0.5 |
| *Pseudotsuga menziesii* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Quercus gambelii* | 0 | 0.01 | 0.135 | 0.01 | 0.18 | 0.05 |
| *Quercus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Robinia neomexicana* | 0 | 0 | 0 | 0 | 0.15 | 0 |
| Nonarboreal Species | | | | | | |
| *Achillea* sp. | 0 | 0 | 0 | 0 | 0 | 0.0125 |
| *Anemone* sp. | 0 | 0.001 | 0 | 0 | 0 | 0 |
| *Arctostapylos* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Argemone* sp. | 0.01 | 0 | 0 | 0 | 0 | 0 |
| *Artemisia* sp. | 0 | 0 | 0.1 | 0 | 0.015 | 0 |
| *Aster* sp. | 0.01 | 0 | 0 | 0 | 0 | 0 |
| *Aster* sp. | 0.01 | 0.001 | 0.1 | 0.485 | 0.005 | 0.0125 |
| *Astragalus* sp. | 0.01 | 0 | 0 | 0 | 0 | 0 |
| cf. *Cassia* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Castilleja* sp. | 0.02 | 0 | 0 | 0 | 0 | 0.0125 |
| *Chenopodium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Chrysothamnus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cirsium* sp. | 0.01 | 0.005 | 0.1 | 0 | 0.005 | 0 |
| *Coreopsis* sp. | 0.002 | 0 | 0 | 0 | 0 | 0 |
| *Cucurbita foetidissima* | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Dalea* sp. | 0 | 0.001 | 0 | 0 | 0.045 | 0 |
| *Echinocerus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Erigeron* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Fallugia paradoxa* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gaillardia* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gaura* sp. | 0.01 | 0 | 0.1 | 0.005 | 0 | 0.0125 |
| *Hedyotis* sp. | 0.02 | 0 | 0 | 0 | 0 | 0 |
| *Heliotropium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ipomopsis aggregata* | 0 | 0 | 0 | 0 | 0 | 0 |
| Lamiaceae | 0 | 0 | 0 | 0 | 0 | 0 |

| Stand | L-11 | L-10 | L-16 | L-15 | L-14 | L-13 |
|---|---|---|---|---|---|---|
| *Lepidium* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Linum* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Lupinus* sp. | 0.03 | 0 | 0 | 0 | 0 | 0.1375 |
| *Lycopus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Melilotus* sp. | 0 | 0.005 | 0.1 | 0.005 | 0.015 | 0 |
| *Opuntia imbricata* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Opuntia pahaecantha* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Penstemon barbatus* | 0 | 0 | 0.005 | 0 | 0 | 0 |
| *Polygonum* sp. | 0.01 | 0 | 0 | 0 | 0 | 0 |
| *Potentilla* sp. | 0 | 0 | 0 | 0 | 0 | 0.0125 |
| *Ranunculus* sp. | 0.01 | 0.005 | 0 | 0.005 | 0 | 0 |
| *Ratiba* sp. | 0.01 | 0.001 | 0 | 0 | 0 | 0 |
| *Sedum* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Senecio* sp. | 0.01 | 0 | 0 | 0 | 0 | 0.0125 |
| *Shrankia* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Solidago* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Tragopogon* sp. | 0.01 | 0.001 | 0 | 0 | 0.015 | 0 |
| *Trifolium* sp. | 0 | 0.005 | 0 | 0 | 0 | 0 |
| *Verbascum thalspi* | 0.01 | 0 | 0 | 0 | 0 | 0 |
| Unknown | 0.01 | 0 | 0 | 0 | 0 | 0.0125 |
| Grass Species | | | | | | |
| *Aristata* sp. | 0.3 | 0.45 | 0 | 0 | 0 | 0 |
| *Boutelua* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Bromus* sp. | 0.03 | 0 | 0 | 0 | 0 | 0 |
| *Hordeum* sp. | 0 | 0 | 0 | 0 | 0.0025 | 0 |
| *Hilaria* sp. | 0.12 | 0 | 0.05 | 0.3 | 0 | 0.05 |
| *Muhlenbergia* sp. | 0.12 | 0.05 | 0 | 0 | 0 | 0 |
| *Oryzopsis* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sporobolus* sp. | 0 | 0 | 0 | 0 | 0 | 0 |
| Unknown 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unknown (l-2) | 0.03 | 0 | 0 | 0 | 0 | 0 |
| Bare/open | | 0.6 | | 0.6 | | 0.45 |

Table 5.67. Percentage Cover by Taxa, Releve Plots, NM 12

| **Stand** | **L-19** | **L-20** | **L-21** | **L-22** | **L-23** | **L-24** | **L-18** |
|---|---|---|---|---|---|---|---|
| Mile | 2.25 | 3.5 | 4.05 | 4.1 | 4.7 | 5.7 | 7 |
| Slope | 20 | 3% | 0 | | <1% | 1% | 0 |
| Aspect | 105 | 241 | 325 | 285 | 320 | 320 | 295 |
| Elevation | 6020 | 6190 | 6155 | 6160 | 6210 | 6260 | 6380 |
| Canopy cover | 0.3 | 0.4 | 0.01 | 0 | 0.25 | 0.25 | 0.2 |
| Canopy height | 27 | 10 | 3 | | | 0.9 | 10 |
| Tall shrub cover | 0.05 | 0.01 | 0.3 | 0 | 0.05 | 0.05 | 0.15 |
| Tall shrub height | 1.5 | 2 | 1.5 | | 2 | 1.5 | 1.5 |
| Small shrub cover | 0 | 0.01 | 0 | 0 | 0 | 0 | 0.05 |
| Small shrub height | | 0.5 | | | | | 0.5 |
| Herb cover | 0.10 | 0.05 | 0.10 | 0.01 | 0.20 | 0.05 | 0.10 |
| Herb height | 0.5 | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 0.5 |
| Grass cover | 0.3 | 0.45 | 0.3 | 0.75 | 0.66 | 0.3 | 0.01 |
| Grass height | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | |
| Arboreal Species | | | | | | | |
| *Juniperus depeanna* | 0 | 0.2 | 0 | 0 | 0.225 | 0 | 0.1 |
| *Juniperus monosperma* | 0.105 | 0 | 0.01 | 0 | 0 | 0 | 0 |
| *Juniperus* sp. | 0.005 | 0 | 0 | 0 | 0.05 | 0.045 | 0 |
| Pcea engelmanii | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pinus edulis* | 0.06 | 0.2 | 0 | 0 | 0.0225 | 0.0225 | 0.02 |
| *Pinus ponderosa* | 0.135 | 0 | 0 | 0 | 0.0025 | 0.0075 | 0.06 |
| *Pseudotsuga menziesii* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Quercus gambelii* | 0 | 0.0075 | 0 | 0 | 0 | 0 | 0.15 |
| *Quercus* sp. | 0.045 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Robinia neomexicana* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nonarboreal Species | | | | | | | |
| *Achillea* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Anemone* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Arctostapylos* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Argemone* sp. | 0 | 0 | 0 | 0.0005 | 0 | 0 | 0 |
| *Artemisia* sp. | 0.04 | 0.015 | 0.15 | 0 | 0.01 | 0 | 0 |
| *Aster* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0.005 |
| *Aster* sp. | 0.015 | 0 | 0.02 | 0 | 0.01 | 0 | 0 |

| Stand | L-19 | L-20 | L-21 | L-22 | L-23 | L-24 | L-18 |
|---|---|---|---|---|---|---|---|
| *Astragalus* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Cassia* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0.001 |
| *Castilleja* sp. | 0 | 0 | 0 | 0 | 0 | 0.045 | 0 |
| *Chenopodium* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Chrysothamnus* sp. | 0.005 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cirsium* sp. | 0.015 | 0 | 0.025 | 0.0005 | 0 | 0 | 0 |
| *Coreopsis* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cucurbita foetidissima* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Dalea* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Echinocerus* sp. | 0 | 0.0025 | 0 | 0 | 0 | 0 | 0 |
| *Erigeron* sp. | 0 | 0 | 0 | 0 | 0.02 | 0 | 0 |
| *Fallugia paradoxa* | 0 | 0 | 0.15 | 0 | 0 | 0 | 0 |
| *Gaillardia* sp. | 0 | 0 | 0.025 | 0 | 0 | 0 | 0 |
| *Gaura* sp. | 0.005 | 0.0075 | 0 | 0 | 0.1 | 0 | 0.095 |
| *Hedyotis* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Heliotropium* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ipomopsis aggregata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lamiaceae | 0 | 0 | 0 | 0 | 0.01 | 0 | 0 |
| *Lepidium* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Linum* sp. | 0 | 0.01 | 0 | 0 | 0.01 | 0 | 0 |
| *Lupinus* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Lycopus* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Melilotus* sp. | 0 | 0 | 0 | 0.009 | 0 | 0 | 0 |
| *Opuntia imbricata* | 0 | 0.01 | 0 | 0 | 0.002 | 0 | 0 |
| *Opuntia pahaecantha* | 0 | 1.01 | 0 | 0 | 0.032 | 0 | 1.05 |
| *Penstemon barbatus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Polygonum* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Potentilla* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ranunculus* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ratiba* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sedum* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Senecio* sp. | 0 | 0 | 0.005 | 0 | 0 | 0 | 0 |
| *Shrankia* sp. | 0 | 0.0075 | 0 | 0 | 0.01 | 0.005 | 0 |
| *Solidago* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Tragopogon* sp. | 0 | 0 | 0 | 0 | 0.01 | 0 | 0 |

| Stand | L-19 | L-20 | L-21 | L-22 | L-23 | L-24 | L-18 |
|---|---|---|---|---|---|---|---|
| *Trifolium* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Verbascum thalspi* | 0.02 | 0 | 0.025 | 0.0001 | 0 | 0 | 0 |
| Unknown | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Grass Species | | | | | | | |
| *Aristata* sp. | 0 | 0.1125 | 0.105 | 0.375 | 0.198 | 0 | 0.004 |
| *Boutelua* sp. | 0.045 | 0.1125 | 0.105 | 0.15 | 0.099 | 0 | 0 |
| *Bromus* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hordeum* sp. | 0 | 0 | 0 | 0.225 | 0 | 0 | 0 |
| *Hilaria* sp. | 0 | 0 | 0 | 0 | 0.033 | 0 | 0 |
| *Muhlenbergia* sp. | 0 | 0.225 | 0 | 0 | 0.33 | 0.3 | 0.006 |
| *Oryzopsis* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sporobolus* sp. | 0.24 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unknown 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unknown (l-2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bare/open | | | | 0.25 | | 0.55 | |

Table 5.68. Raw Pollen Counts and Concentration Values of Releve Plots, U.S. 180

| Stand | L-1 | L-2 | L-3 | L-4 | L-18 | L-5 |
|---|---|---|---|---|---|---|
| Mile | 26 | 25 | 24.7 | 22.2 | 21.3 | 21.1 |
| Slope | 6 | 3 | 0 | 6 | 0 | 1 |
| Aspect | 220 | 180 | 180 | 270 | 295 | 180 |
| CLES number | 93306 | 93307 | 93308 | 93298 | 93316 | 93314 |
| Raw Counts | | | | | | |
| *Pinus* | 120 | 147 | 163 | 197 | 202 | 191 |
| *Juniperus* | 1 | 5 | 1 | | 4 | 4 |
| *Picea* | | | | | | 3 |
| *Abies* | | | | | | |
| *Quercus* | 42 | 8 | | 2 | 10 | 24 |
| *Juglans* | 4 | | | | | 1 |
| *Pseudotsuga* | | | | | | 1 |
| Rosaceae | | | | | | |
| cf. *Shepherdia* | | | | | | |
| Solanaceae | | 1 | | | | |
| Fabaceae | | | 1 | | 1 | |
| *Eriogonum* | | | | | 1 | |

| Stand | L-1 | L-2 | L-3 | L-4 | L-18 | L-5 |
|---|---|---|---|---|---|---|
| Poaceae | 7 | 2 | 4 | 1 | 6 | 8 |
| Cheno-am | 26 | 19 | 29 | 7 | 11 | 9 |
| Asteraceae hs | 4 | 8 | 2 | 9 | 2 | 2 |
| Asteraceae ls | 14 | 6 | 3 | 7 | 11 | 12 |
| *Artemisia* | 3 | | | 1 | 1 | 5 |
| *Platyopuntia* | | | | | | |
| *Cylindropuntia* | | | | 7 | | 2 |
| Nyctaginaceae | | | | | | |
| *Ephedra* | 1 | 1 | | | | |
| Malvaceae | 1 | | | | | |
| *Sphaeralcea* | | | | | | |
| Indeterminate | 12 | 8 | 8 | 8 | 7 | 9 |
| Unknown triporate | 2 | | | | | |
| Sum | 237 | 205 | 211 | 239 | 256 | 271 |
| Marker | 34 | 31 | 48 | 58 | 47 | 57 |
| Transects | 5 | 5 | 6 | 3 | 8 | 4 |
| *Lycopodium* | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 |

| Stand | L-6 | L-7 | L-8 | L-9 | L-17 | L-12 |
|---|---|---|---|---|---|---|
| Mile | 20.1 | 18.7 | 15 | 15 | 13.9 | 12.5 |
| Slope | 0 | 6 | | 8 | 25% | 5 |
| Aspect | 90 | 180 | 5 | 90 | 95 | 180 |
| CLES number | 93299 | 93309 | 93300 | 93310 | 93315 | 93312 |
| Raw Counts | | | | | | |
| *Pinus* | 213 | 302 | 272 | 231 | 55 | 188 |
| *Juniperus* | 1 | 2 | 3 | | | |
| *Picea* | | | | | | |
| *Abies* | | | | | | 2 |
| *Quercus* | 15 | 10 | 12 | 4 | 3 | 2 |
| *Juglans* | | | | | | |
| *Pseudotsuga* | | | 3 | 5 | | |
| Rosaceae | | | | | | |
| cf. *Shepherdia* | | | 1 | | | |
| Solanaceae | | | | | | |
| Fabaceae | | | 1 | | | |

| Stand | L-6 | L-7 | L-8 | L-9 | L-17 | L-12 |
|---|---|---|---|---|---|---|
| *Eriogonum* | | 1 | 1 | | | |
| Poaceae | 4 | 4 | 15 | 1 | | 1 |
| Cheno-am | | 11 | 2 | 3 | 3 | 9 |
| Asteraceae hs | 2 | 1 | 1 | 2 | | 2 |
| Asteraceae ls | 5 | 15 | 5 | 3 | 12 | 10 |
| *Artemisia* | 2 | 2 | 3 | | | |
| *Platyopuntia* | | | | | | |
| *Cylindropuntia* | 1 | | | 1 | 1 | |
| Nyctaginaceae | | | | | | |
| *Ephedra* | | | | | | |
| Malvaceae | | | | | | |
| *Sphaeralcea* | | | | | | |
| Indeterminate | 2 | 1 | 2 | 1 | 3 | 5 |
| Unknown triporate | | | | | | |
| Sum | 245 | 349 | 321 | 251 | 77 | 219 |
| Marker | 32 | 42 | 23 | 38 | 68 | 33 |
| Transects | 8 | 4 | 4 | 3 | 8 | 4 |
| *Lycopodium* | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 |

| Stand | L-11 | L-10 | L-16 | L-15 | L-14 | L-13 |
|---|---|---|---|---|---|---|
| Mile | 9.1 | 7 | 5 | 3 | 1.95 | 0 |
| Slope | 1 | 2 | 1 | 1 | 4 | 1 |
| Aspect | 90 | 180 | 230 | 235 | nw | 5 |
| CLES number | 93301 | 93311 | 93305 | 93304 | 93303 | 93302 |
| Raw Counts | | | | | | |
| *Pinus* | 183 | 217 | 219 | 187 | 176 | 228 |
| *Juniperus* | | | | | | |
| *Picea* | 2 | 1 | | | | |
| *Abies* | | | | | | |
| *Quercus* | 12 | 5 | 6 | 7 | 33 | 9 |
| *Juglans* | | | | | | |
| *Pseudotsuga* | 1 | | | | 1 | |
| Rosaceae | | | | | | |
| cf. *Shepherdia* | | | | | | |
| Solanaceae | | 1 | | | 1 | |

| Stand | L-11 | L-10 | L-16 | L-15 | L-14 | L-13 |
|---|---|---|---|---|---|---|
| Fabaceae | | | | | | |
| *Eriogonum* | | | 2 | | | |
| Poaceae | 2 | 2 | 2 | 1 | | 1 |
| Cheno-am | 4 | 4 | 3 | 9 | 5 | 6 |
| Asteraceae hs | 1 | 2 | 1 | 1 | 4 | 3 |
| Asteraceae ls | 10 | 3 | 6 | 8 | 7 | 1 |
| *Artemisia* | 1 | | 2 | | 2 | |
| *Platyopuntia* | | | | | | |
| *Cylindropuntia* | | | 1 | | | 1 |
| Nyctaginaceae | | | 1 | | | |
| *Ephedra* | | 1 | | | | |
| Malvaceae | | | | | | |
| *Sphaeralcea* | | | | | | |
| Indeterminate | 4 | 1 | | 1 | 13 | 7 |
| Unknown triporate | | | | | | |
| Sum | 220 | 237 | 243 | 214 | 242 | 256 |
| Marker | 43 | 22 | 29 | 48 | 58 | 30 |
| Transects | 4 | 6 | 4 | 10 | 6 | 4 |
| *Lycopodium* | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 |

| Stand | L-1 | L-2 | L-3 | L-4 | L-18 | L-5 |
|---|---|---|---|---|---|---|
| Mile | 26 | 25 | 24.7 | 22.2 | | 21.1 |
| Slope | 6 | 3 | 0 | 6 | 0 | 1 |
| Aspect | 220 | 180 | 180 | 270 | 295 | 180 |
| CLES number | 93306 | 93307 | 93308 | 93298 | 93316 | 93314 |
| Concentration Values | | | | | | |
| *Pinus* | 5892 | 7916 | 5669 | 5670 | 11747 | 5594 |
| *Juniperus* | 49 | 269 | 35 | 0 | 124 | 117 |
| *Picea* | 0 | 0 | 0 | 0 | 62 | 88 |
| *Abies* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Quercus* | 2062 | 431 | 0 | 58 | 618 | 703 |
| *Juglans* | 196 | 0 | 0 | 0 | 0 | 29 |
| *Pseudotsuga* | 0 | 0 | 0 | 0 | 62 | 29 |
| Rosaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Shepherdia* | 0 | 0 | 0 | 0 | 0 | 0 |

| Stand | L-1 | L-2 | L-3 | L-4 | L-18 | L-5 |
|---|---|---|---|---|---|---|
| Solanaceae | 0 | 54 | 0 | 0 | 0 | 0 |
| Fabaceae | 0 | 0 | 35 | 0 | 0 | 0 |
| *Eriogonum* | 0 | 0 | 0 | 0 | 0 | 0 |
| Poaceae | 344 | 108 | 139 | 29 | 62 | 234 |
| Cheno-am | 1277 | 1023 | 1009 | 201 | 433 | 264 |
| Asteraceae hs | 196 | 431 | 70 | 259 | 62 | 59 |
| Asteraceae ls | 687 | 323 | 104 | 201 | 433 | 351 |
| *Artemisia* | 147 | 0 | 0 | 29 | 124 | 146 |
| *Platyopuntia* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cylindropuntia* | 0 | 0 | 0 | 201 | 124 | 59 |
| Nyctaginaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ephedra* | 49 | 54 | 0 | 0 | 0 | 0 |
| Malvaceae | 49 | 0 | 0 | 0 | 0 | 0 |
| *Sphaeralcea* | 0 | 0 | 0 | 0 | 62 | 0 |
| Indeterminate | 589 | 431 | 278 | 230 | 371 | 264 |
| Unknown triporate | 98 | 0 | 0 | 0 | 0 | 0 |
| Sum | 237 | 205 | 211 | 239 | 256 | 271 |
| Total | 11636 | 11039 | 7338 | 6879 | 14282 | 7937 |
| Marker | 34 | 31 | 48 | 58 | 47 | 57 |
| Transects | 5 | 5 | 6 | 3 | 8 | 4 |
| *Lycopodium* | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 |
| Weight (g) | 25 | 25 | 25 | 25 | 25 | 25 |

| Stand | L-6 | L-7 | L-8 | L-9 | L-17 | L-12 |
|---|---|---|---|---|---|---|
| Mile | 20.1 | 18.7 | 15 | 15 | 13.9 | 12.5 |
| Slope | 0 | 6 | | 8 | 25% | 5 |
| Aspect | 90 | 180 | 5 | 90 | 95 | 180 |
| CLES number | 93299 | 93309 | 93300 | 93310 | 93315 | 93312 |
| | | | Concentration Values | | | |
| *Pinus* | 11111 | 12003 | 19742 | 10148 | 7175 | 9510 |
| *Juniperus* | 52 | 79 | 218 | 0 | 142 | 0 |
| *Picea* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Abies* | 0 | 0 | 0 | 0 | 0 | 101 |
| *Quercus* | 782 | 397 | 871 | 176 | 355 | 101 |
| *Juglans* | 0 | 0 | 0 | 0 | 0 | 0 |

| Stand | L-6 | L-7 | L-8 | L-9 | L-17 | L-12 |
|---|---|---|---|---|---|---|
| *Pseudotsuga* | 0 | 0 | 218 | 220 | 0 | 0 |
| Rosaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Shepherdia* | 0 | 0 | 73 | 0 | 0 | 0 |
| Solanaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| Fabaceae | 0 | 0 | 73 | 0 | 36 | 0 |
| *Eriogonum* | 0 | 40 | 73 | 0 | 36 | 0 |
| Poaceae | 209 | 159 | 1089 | 44 | 213 | 51 |
| Cheno-am | 0 | 437 | 145 | 132 | 391 | 455 |
| Asteraceae hs | 104 | 40 | 73 | 88 | 71 | 101 |
| Asteraceae ls | 261 | 596 | 363 | 132 | 391 | 506 |
| *Artemisia* | 104 | 79 | 218 | 0 | 36 | 0 |
| *Platyopuntia* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cylindropuntia* | 52 | 0 | 0 | 44 | 0 | 0 |
| Nyctaginaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ephedra* | 0 | 0 | 0 | 0 | 0 | 0 |
| Malvaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sphaeralcea* | 0 | 0 | 0 | 0 | 0 | 0 |
| Indeterminate | 104 | 40 | 145 | 44 | 249 | 253 |
| Unknown triporate | 0 | 0 | 0 | 0 | 0 | 0 |
| Sum | 245 | 349 | 321 | 251 | 77 | 219 |
| Total | 12781 | 13871 | 23298 | 11026 | 9092 | 11078 |
| Marker | 32 | 42 | 23 | 38 | | 33 |
| Transects | 8 | 4 | 4 | 3 | | 4 |
| *Lycopodium* | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 |
| Weight (g) | 25 | 25 | 25 | 25 | 25 | 25 |

| Stand | L-11 | L-10 | L-16 | L-15 | L-14 | L-13 |
|---|---|---|---|---|---|---|
| Mile | 9.1 | 7 | 5 | 3 | 1.95 | 0 |
| Slope | 1 | 2 | 1 | 1 | 4 | 1 |
| Aspect | 90 | 180 | 230 | 235 | nw | 5 |
| CLES number | 93301 | 93311 | 93305 | 93304 | 93303 | 93302 |
| Concentration Values | | | | | | |
| *Pinus* | 7104 | 16466 | 12606 | 6503 | 5066 | 12687 |
| *Juniperus* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Picea* | 78 | 76 | 0 | 0 | 0 | 0 |

| Stand | L-11 | L-10 | L-16 | L-15 | L-14 | L-13 |
|---|---|---|---|---|---|---|
| *Abies* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Quercus* | 466 | 379 | 345 | 243 | 950 | 501 |
| *Juglans* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pseudotsuga* | 39 | 0 | 0 | 0 | 29 | 0 |
| Rosaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| cf. *Shepherdia* | 0 | 0 | 0 | 0 | 0 | 0 |
| Solanaceae | 0 | 76 | 0 | 0 | 29 | 0 |
| Fabaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| *Eriogonum* | 0 | 0 | 115 | 0 | 0 | 0 |
| Poaceae | 78 | 152 | 115 | 35 | 0 | 56 |
| Cheno-am | 155 | 304 | 173 | 313 | 144 | 334 |
| Asteraceae hs | 39 | 152 | 58 | 35 | 115 | 167 |
| Asteraceae ls | 388 | 228 | 345 | 278 | 201 | 56 |
| *Artemisia* | 39 | 0 | 115 | 0 | 58 | 0 |
| *Platyopuntia* | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cylindropuntia* | 0 | 0 | 58 | 0 | 0 | 56 |
| Nyctaginaceae | 0 | 0 | 58 | 0 | 0 | 0 |
| *Ephedra* | 0 | 76 | 0 | 0 | 0 | 0 |
| Malvaceae | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sphaeralcea* | 0 | 0 | 0 | 0 | 0 | 0 |
| Indeterminate | 155 | 76 | 0 | 35 | 374 | 390 |
| Unknown triporate | 0 | 0 | 0 | 0 | 0 | 0 |
| Sum | 220 | 237 | 243 | 214 | 242 | 256 |
| Total | 8541 | 17983 | 13988 | 7442 | 6965 | 14245 |
| Marker | 43 | 22 | 29 | 48 | 58 | 30 |
| Transects | 4 | 6 | 4 | 10 | 6 | 4 |
| *Lycopodium* | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 |
| Weight (g) | 25 | 25 | 25 | 25 | 25 | 25 |

Table 5.69. Raw Pollen Counts and Concentration Values from Releve Plots, NM 12

| Stand | L-19 | L-20 | L-21 | L-22 | L-23 | L-24 | L-18 |
|---|---|---|---|---|---|---|---|
| Mile | 2.25 | 3.5 | 4.05 | 4.1 | 4.7 | 5.7 | 7 |
| Slope | 20 | 3% | 0 | | <1% | 1% | 0 |
| Aspect | 105 | 241 | 325 | 285 | 320 | 320 | 295 |
| CLES number | 93317 | 93321 | 93318 | 93319 | 93320 | 93313 | 93316 |

| Stand | L-19 | L-20 | L-21 | L-22 | L-23 | L-24 | L-18 |
|---|---|---|---|---|---|---|---|
| | | | | Raw Counts | | | |
| *Pinus* | 190 | 232 | 242 | 184 | 276 | 232 | 202 |
| *Juniperus* | 2 | 7 | | 1 | 2 | | 4 |
| *Picea* | 1 | | 1 | | | | |
| *Abies* | | | | 1 | | | |
| *Quercus* | 10 | 14 | 12 | 8 | 5 | 4 | 10 |
| *Juglans* | | | | | | | |
| *Pseudotsuga* | 1 | | | | | | |
| Rosaceae | | | 1 | 1 | | | |
| cf. *Shepherdia* | | | | | | | |
| Solanaceae | | | | | | | |
| Fabaceae | | | | | 1 | | 1 |
| *Eriogonum* | | | | | | | 1 |
| Poaceae | 1 | 3 | 3 | 4 | 8 | 2 | 6 |
| Cheno-am | 7 | 8 | | 10 | 6 | 7 | 11 |
| Asteraceae hs | 1 | 1 | 5 | 1 | 2 | 2 | 2 |
| Asteraceae ls | 7 | 12 | 9 | 8 | 9 | 1 | 11 |
| *Artemisia* | 2 | 1 | | | 1 | | 1 |
| *Platyopuntia* | | | | | | 1 | |
| *Cylindropuntia* | 2 | | | 2 | 1 | 2 | |
| Nyctaginaceae | | | | | | | |
| *Ephedra* | | | | | 1 | | |
| Malvaceae | | | | | | | |
| *Sphaeralcea* | 1 | 1 | | | 1 | | |
| Indeterminate | 6 | 2 | 1 | 2 | 6 | 1 | 7 |
| Unknown triporate | | | | | | | |
| Sum | 231 | 281 | 274 | 222 | 319 | 252 | 256 |
| Marker | 27 | 42 | 44 | 32 | 49 | 32 | 47 |
| Transects | 4 | 4 | 3 | 2 | 2 | 3 | 8 |
| *Lycopodium* | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 |

| Stand | L-19 | L-20 | L-21 | L-22 | L-23 | L-24 | L-18 |
|---|---|---|---|---|---|---|---|
| Mile | 2.25 | 3.5 | 4.05 | 4.1 | 4.7 | 5.7 | 7 |
| Slope | 20 | 3% | 0 | | <1% | 1% | 0 |
| Aspect | 105 | 241 | 325 | 285 | 320 | 320 | 295 |

| Stand | L-19 | L-20 | L-21 | L-22 | L-23 | L-24 | L-18 |
|---|---|---|---|---|---|---|---|
| CLES number | 93317 | 93321 | 93318 | 93319 | 93320 | 93313 | 93316 |
| Concentration Values | | | | | | | |
| *Pinus* | 11747 | 9221 | 9181 | 9599 | 9403 | 12103 | 11747 |
| *Juniperu*s | 124 | 278 | 0 | 52 | 68 | 0 | 124 |
| *Picea* | 62 | 0 | 38 | 0 | 0 | 0 | 62 |
| *Abies* | 0 | 0 | 0 | 52 | 0 | 0 | 0 |
| *Quercus* | 618 | 556 | 455 | 417 | 170 | 209 | 618 |
| *Juglans* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pseudotsuga* | 62 | 0 | 0 | 0 | 0 | 0 | 62 |
| Rosaceae | 0 | 0 | 38 | 52 | 0 | 0 | 0 |
| cf. *Shepherdia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Solanaceae | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fabaceae | 0 | 0 | 0 | 0 | 34 | 0 | 0 |
| *Eriogonum* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poaceae | 62 | 119 | 114 | 209 | 273 | 104 | 62 |
| Cheno-am | 433 | 318 | 0 | 522 | 204 | 365 | 433 |
| Asteraceae hs | 62 | 40 | 190 | 52 | 68 | 104 | 62 |
| Asteraceae ls | 433 | 477 | 341 | 417 | 307 | 52 | 433 |
| *Artemisia* | 124 | 40 | 0 | 0 | 34 | 0 | 124 |
| *Platyopuntia* | 0 | 0 | 0 | 0 | 0 | 52 | 0 |
| *Cylindropuntia* | 124 | 0 | 0 | 104 | 34 | 104 | 124 |
| Nyctaginaceae | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ephedra* | 0 | 0 | 0 | 0 | 34 | 0 | 0 |
| Malvaceae | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sphaeralcea*e | 62 | 40 | 0 | 0 | 34 | 0 | 62 |
| Indeterminate | 371 | 79 | 38 | 104 | 204 | 52 | 371 |
| Unknown triporate | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sum | 231 | 281 | 274 | 222 | 319 | 252 | 256 |
| Total | 14282 | 11169 | 10395 | 11581 | 10868 | 13146 | 14282 |
| Marker | 27 | 42 | 44 | 32 | 49 | 32 | 47 |
| *Lycopodium* added | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 | 41733 |
| Weight (g) | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

Table 5.70. Eigenvalue Analysis of Luna Releve Vegetation Plots

| | Including Variables Miles, Elevation | | | Excluding Variables Miles, Elevation | | |
|---|---|---|---|---|---|---|
| PCA Axis | Eigenvalue | Percent of Total | Cumulative Percent | Eigenvalue | Percent of Total | Cumulative Percent |
| 1 | 532509.8243 | 99.9858650 | 99.9859 | 0.0699 | 30.0809 | 30.0809 |
| 2 | 75.0485 | 0.0140914 | 100.0000 | 0.0451 | 19.4307 | 49.5116 |
| 3 | 0.0431 | 0.0000081 | 100.0000 | 0.0378 | 16.2737 | 65.7852 |
| 4 | 0.0412 | 0.0000077 | 100.0000 | 0.0231 | 9.9301 | 75.7153 |
| 5 | 0.0410 | 0.0000077 | 100.0000 | 0.0138 | 5.9338 | 81.6491 |
| 6 | 0.0302 | 0.0000057 | 100.0000 | 0.0098 | 4.2105 | 85.8597 |
| 7 | 0.0168 | 0.0000031 | 100.0000 | 0.0085 | 3.6509 | 89.5106 |
| 8 | 0.0127 | 0.0000024 | 100.0000 | 0.0067 | 2.8893 | 92.3999 |
| 9 | 0.0099 | 0.0000019 | 100.0000 | 0.0041 | 1.7591 | 94.1590 |
| 10 | 0.0058 | 0.0000011 | 100.0000 | 0.0030 | 1.2941 | 95.4531 |
| 11 | 0.0042 | 0.0000008 | 100.0000 | 0.0022 | 0.9650 | 96.4181 |
| 12 | 0.0041 | 0.0000008 | 100.0000 | 0.0019 | 0.8163 | 97.2344 |
| 13 | 0.0038 | 0.0000007 | 100.0000 | 0.0013 | 0.5607 | 97.7951 |
| 14 | 0.0037 | 0.0000007 | 100.0000 | 0.0011 | 0.4824 | 98.2774 |
| 15 | 0.0027 | 0.0000005 | 100.0000 | 0.0009 | 0.3917 | 98.6691 |
| 16 | 0.0020 | 0.0000004 | 100.0000 | 0.0009 | 0.3811 | 99.0502 |
| 17 | 0.0020 | 0.0000004 | 100.0000 | 0.0006 | 0.2711 | 99.3213 |
| 18 | 0.0013 | 0.0000002 | 100.0000 | 0.0006 | 0.2631 | 99.5843 |
| 19 | 0.0010 | 0.0000002 | 100.0000 | 0.0003 | 0.1481 | 99.7324 |
| 20 | 0.0010 | 0.0000002 | 100.0000 | 0.0003 | 0.1202 | 99.8526 |
| 21 | 0.0009 | 0.0000002 | 100.0000 | 0.0002 | 0.0679 | 99.9205 |
| 22 | 0.0008 | 0.0000002 | 100.0000 | 0.0001 | 0.0443 | 99.9648 |
| 23 | 0.0008 | 0.0000001 | 100.0000 | 0.0001 | 0.0352 | 100.0000 |
| 24 | 0.0007 | 0.0000001 | 100.0000 | | | |

Table 5.71. Average Cover Percentages by Elevation, Releve Vegetational Plots

| Elevation | <6000' | 6000-6500' | 6500-7000' | 7000-7500' | 7500-8000' | >8000' |
|---|---|---|---|---|---|---|
| Canopy cover | 0.3 | 0.235388 | 0.55 | 0.35 | 0.42 | 0.5 |
| Tall shrub cover | 0.05 | 0.102307 | 0.1 | 0.045 | 0.18 | 0.05 |
| Small shrub cover | 0.05 | 0.016923 | 0.01 | 0 | 0.028 | 0 |
| Herb cover | 0.03 | 0.081538 | 0.1 | 0.325 | 0.062 | 0.25 |
| Grass cover | 0.1 | 0.348461 | 0 | 0.3625 | 0.088 | 0.05 |

| Elevation | <6000' | 6000-6500' | 6500-7000' | 7000-7500' | 7500-8000' | >8000' |
|---|---|---|---|---|---|---|
| Arboreal Species | | | | | | |
| *Juniperus depeanna* | 0.003 | 0.084034 | 0.11 | 0.0125 | 0.0075 | 0 |
| *Juniperus monosperma* | 0.003 | 0.009112 | 0 | 0 | 0.011 | 0 |
| *Juniperus* sp. | 0.084 | 0.023555 | 0 | 0.001875 | 0.052 | 0 |
| *Picea engelmanii* | 0 | 0 | 0 | 0 | 0.0275 | 0 |
| *Pinus edulis* | 0.12 | 0.106155 | 0.12749 | 0 | 0.0375 | 0 |
| *Pinus ponderosa* | 0.15 | 0.0775 | 0.11 | 0.34 | 0.3803 | 0.5 |
| *Pseudotsuga menziesii* | 0 | 0 | 0 | 0 | 0.0637 | 0 |
| *Quercus gambelii* | 0.0105 | 0.054612 | 0.155 | 0.03875 | 0.2833 | 0.05 |
| *Quercus* sp. | 0 | 0.003461 | 0 | 0 | 0.0001 | 0 |
| *Robinia neomexicana* | 0.03 | 0 | 0 | 0 | 0.03 | 0 |
| Nonarboreal Species | | | | | | |
| *Achillea* sp. | 0 | 0 | 0 | 0 | 0 | 0.0125 |
| *Anemone* sp. | 0 | 0 | 0 | 0.00025 | 0 | 0 |
| *Arctostapylos* sp. | 0.995 | 0 | 0 | 0 | 0.052 | 0 |
| *Argemone* sp. | 0 | 0.001576 | 0 | 0.0025 | 0 | 0 |
| *Artemisia* sp. | 0 | 0.016923 | 0.005 | 0.025 | 0.003 | 0 |
| *Aster* sp. | 0 | 0.000769 | 0.044 | 0.0025 | 0.001 | 0 |
| *Aster* sp. | 0 | 0.004423 | 0 | 0.149 | 0.001 | 0.0125 |
| *Astragalus* sp. | 0.0003 | 0.001076 | 0.001 | 0.0025 | 0 | 0 |
| cf. *Cassia* sp. | 0 | 0.000153 | 0 | 0 | 0 | 0 |
| *Castilleja* sp. | 0.0009 | 0.003846 | 0 | 0.005 | 0.00095 | 0.0125 |
| *Chenopodium* sp. | 0 | 0 | 0.001 | 0 | 0 | 0 |
| *Chrysothamnus* sp. | 0 | 0.000384 | 0 | 0 | 0 | 0 |
| *Cirsium* sp. | 0 | 0.003884 | 0 | 0.02875 | 0.001 | 0 |
| *Coreopsis* sp. | 0 | 0 | 0 | 0.0005 | 0 | 0 |
| *Cucurbita foetidissima* | 0 | 0.0003846 | 0 | 0 | 0 | 0 |
| *Dalea* sp. | 0 | 0.000038 | 0 | 0.00025 | 0.009 | 0 |
| *Echinocerus* sp. | 0 | 0.000192 | 0 | 0 | 0 | 0 |
| *Erigeron* sp. | 0 | 0.002307 | 0.001 | 0 | 0.00085 | 0 |
| *Fallugia paradoxa* | 0 | 0.011538 | 0 | 0 | 0 | 0 |
| *Gaillardia* sp. | 0 | 0.001923 | 0 | 0 | 0 | 0 |
| *Gaura* sp. | 0 | 0.024038 | 0.005 | 0.02875 | 0.0086 | 0.0125 |
| *Hedyotis* sp. | 0 | 0.000384 | 0 | 0.005 | 0.0005 | 0 |
| *Heliotropium* sp. | 0 | 0.000034 | 0 | 0 | 0 | 0 |
| *Ipomopsis aggregata* | 0 | 0.000078 | 0 | 0 | 0 | 0 |

| Elevation | <6000' | 6000-6500' | 6500-7000' | 7000-7500' | 7500-8000' | >8000' |
|---|---|---|---|---|---|---|
| Lamiaceae | 0 | 0.003845 | 0 | 0 | 0 | 0 |
| *Lepidium* sp. | 0 | 0.000112 | 0 | 0 | 0 | 0 |
| cf. *Linum* sp. | 0 | 0.001534 | 0 | 0 | 0 | 0 |
| *Lupinus* sp. | 0 | 0 | 0 | 0.0075 | 0 | 0.1375 |
| *Lycopus* sp. | 0 | 0.000767 | 0 | 0 | 0 | 0 |
| *Melilotus* sp. | 0.0009 | 0.000888 | 0.044 | 0.0275 | 0.007 | 0 |
| *Opuntia imbricata* | 0 | 0.000922 | 0 | 0 | 0 | 0 |
| *Opuntia pahaecantha* | 0.0105 | 0.183 | 0.0101 | 0 | 0.052 | 0 |
| *Penstemon barbatus* | 0.0009 | 0.000034 | 0 | 0.00125 | 0.0001 | 0 |
| *Polygonum* sp. | 0 | 0 | 0 | 0.0025 | 0 | 0 |
| *Potentilla* sp. | 0 | 0 | 0 | 0 | 0 | 0.0125 |
| *Ranunculus* sp. | 0 | 0.000767 | 0 | 0.005 | 0 | 0 |
| *Ratiba* sp. | 0 | 0 | 0 | 0.00275 | 0 | 0 |
| *Sedum* sp. | 0 | 0 | 0 | 0 | 0.0001 | 0 |
| *Senecio* sp. | 0.0003 | 0.003422 | 0 | 0.0025 | 0.0015 | 0.0125 |
| *Shrankia* sp. | 0 | 0.008576 | 0 | 0 | 0 | 0 |
| *Solidago* sp. | 0 | 0.001155 | 0 | 0 | 0 | 0 |
| *Tragopogon* sp. | 0 | 0.001155 | 0 | 0.00275 | 0.003 | 0 |
| *Trifolium* sp. | 0 | 0 | 0 | 0.00125 | 0 | 0 |
| *Verbascum thalspi* | 0 | 0.007855 | 0 | 0.0025 | 0.0005 | 0 |
| Unknown | 0 | 0.000466 | 0 | 0.0025 | 0.001 | 0.0125 |
| | | | Grass Species | | | |
| *Aristata* sp. | 0 | 0.087422 | 0 | 0.1875 | 0.0125 | 0 |
| *Boutelua* sp. | 0 | 0.039345 | 0 | 0 | 0.0075 | 0 |
| *Bromus* sp. | 0 | 0.002534 | 0 | 0.0075 | 0 | 0 |
| *Hordeum* sp. | 0 | 0.029845 | 0 | 0 | 0.0005 | 0 |
| *Hilaria* sp. | 0.05 | 0.002584 | 0 | 0.1175 | 0.0063 | 0.05 |
| *Muhlenbergia* sp. | 0.05 | 0.119769 | 0 | 0.0425 | 0.0117 | 0 |
| *Oryzopsis* sp. | 0 | 0 | 0 | 0 | 0.025 | 0 |
| *Sporobolus* sp. | 0 | 0.040767 | 0 | 0 | 0.0125 | 0 |
| Unknown 2 | 0 | 0 | 0 | 0 | 0.01 | 0 |
| Unknown (I-2) | 0 | 0.018078 | 0 | 0.0075 | 0 | 0 |
| Bare/open | insufficient data | 0.39 | insufficient data | 0.6 | 0.85 | 0.45 |
| Number species | 16 | 49 | 12 | 32 | 36 | 11 |

Table 5.72. Results of Eigenvalue Analysis, Surface Pollen Samples, Releve Plots

| | Including Variables Mile, Elevation | | | Excluding Variables Mile, Elevation | | |
|---|---|---|---|---|---|---|
| **PCA Axis** | **Eigenvalue** | **Percent of Total** | **Cumulative Percent** | **Eigenvalue** | **Percent of Total** | **Cumulative Percent** |
| 1 | 12959239.1208 | 93.2747 | 93.2747 | 12959239.1208 | 96.9928 | 96.9928 |
| 2 | 532509.8243 | 3.8328 | 97.1075 | 173283.5208 | 1.2969 | 98.2897 |
| 3 | 173283.5208 | 1.2472 | 98.3547 | 99756.6081 | 0.7466 | 99.0363 |
| 4 | 99756.6081 | 0.7180 | 99.0727 | 45825.3596 | 0.3430 | 99.3793 |
| 5 | 45825.3596 | 0.3298 | 99.4026 | 25347.1891 | 0.1897 | 99.5690 |
| 6 | 25347.1891 | 0.1824 | 99.5850 | 24527.4397 | 0.1836 | 99.7526 |
| 7 | 24527.4397 | 0.1765 | 99.7615 | 8037.3082 | 0.0602 | 99.8127 |
| 8 | 8037.3082 | 0.0578 | 99.8194 | 7571.4289 | 0.0567 | 99.8694 |
| 9 | 7571.4289 | 0.0545 | 99.8739 | 3985.2311 | 0.0298 | 99.8992 |
| 10 | 3985.2311 | 0.0287 | 99.9026 | 3845.9277 | 0.0288 | 99.9280 |
| 11 | 3845.9277 | 0.0277 | 99.9302 | 3054.0196 | 0.0229 | 99.9509 |
| 12 | 3054.0196 | 0.0220 | 99.9522 | 1621.9568 | 0.0121 | 99.9630 |
| 13 | 1621.9568 | 0.0117 | 99.9639 | 948.8478 | 0.0071 | 99.9701 |
| 14 | 948.8478 | 0.0068 | 99.9707 | 803.5465 | 0.0060 | 99.9761 |
| 15 | 803.5465 | 0.0058 | 99.9765 | 520.7472 | 0.0039 | 99.9800 |
| 16 | 520.7472 | 0.0037 | 99.9803 | 449.5631 | 0.0034 | 99.9834 |
| 17 | 449.5631 | 0.0032 | 99.9835 | 401.7608 | 0.0030 | 99.9864 |
| 18 | 401.7608 | 0.0029 | 99.9864 | 380.9041 | 0.0029 | 99.9893 |
| 19 | 380.9041 | 0.0027 | 99.9891 | 366.8985 | 0.0027 | 99.9920 |
| 20 | 366.8985 | 0.0026 | 99.9918 | 330.2081 | 0.0025 | 99.9945 |
| 21 | 330.2081 | 0.0024 | 99.9942 | 219.4880 | 0.0016 | 99.9961 |
| 22 | 219.4880 | 0.0016 | 99.9957 | 166.1901 | 0.0012 | 99.9974 |
| 23 | 166.1901 | 0.0012 | 99.9969 | 138.0625 | 0.0010 | 99.9984 |
| 24 | 138.0625 | 0.0010 | 99.9979 | 113.3871 | 0.0008 | 99.9992 |
| 25 | 113.3871 | 0.0008 | 99.9987 | 100.4422 | 0.0008 | 100.0000 |
| 26 | 100.4422 | 0.0007 | 99.9995 | | | |

Table 5.73. Pollen Concentration Values, Surface Control Samples

| Site | Elevation | *Pinus* | *Juniperus* | *Quercus* | *Pseudotsuga* | Rosaceae |
|---|---|---|---|---|---|---|
| LA 39968 | 6190 | 1964 | 0 | 65 | 0 | 0 |
| LA 39969 | 5920 | 4513 | 278 | 124 | 31 | 0 |
| LA 39969 | 5920 | 1717 | 0 | 48 | 0 | 24 |
| LA 70189 | 6501 | 28378 | 139 | 417 | 0 | 0 |

| Site | Elevation | Solanaceae | *Polygonum* | Fabaceae | Poaceae | Cheno-am | Asteraceae hs |
|---|---|---|---|---|---|---|---|
| LA 39968 | 6190 | 0 | 0 | 0 | 360 | 818 | 196 |
| LA 39969 | 5920 | 0 | 0 | 0 | 309 | 556 | 31 |
| LA 39969 | 5920 | 24 | 24 | 48 | 119 | 167 | 48 |
| LA 70189 | 6501 | 0 | 0 | 0 | 1113 | 696 | 278 |

| Site | Elevation | Asteraceae ls | *Artemisia* | Indeterminate | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|
| LA 39968 | 6190 | 131 | 33 | 164 | 65 | 3797 |
| LA 39969 | 5920 | 155 | 0 | 371 | 0 | 6368 |
| LA 39969 | 5920 | 262 | 24 | 48 | 0 | 2576 |
| LA 70189 | 6501 | 974 | 278 | 556 | 0 | 32969 |

Table 5.74. Pollen Concentration Values from Designated Features

| Site | Age | Feature | Description | *Pinus* | Onagraceae | Poaceae | Cheno-am |
|---|---|---|---|---|---|---|---|
| LA 89846 | BC 540 | 1 | pit | 215 | 0 | 27 | 162 |
| LA45507 | A.D. 885-970 | 1 | floor contact | 83 | 0 | 0 | 182 |
| LA45507 | A.D. 885-970 | 1 | under Metate 1 | 135 | 0 | 54 | 188 |
| LA45507 | A.D. 885-970 | 1 | under Metate 2 | 259 | 0 | 0 | 115 |
| LA45507 | A.D. 885-970 | 3 | under comal | 91 | 30 | 0 | 91 |
| LA45507 | A.D. 885-970 | 3 | under mano/metate | 269 | 0 | 27 | 81 |
| LA45507 | A.D. 885-970 | 3 | under sherd in fill | 96 | 0 | 0 | 173 |
| LA45507 | A.D. 885-970 | 3 | under broken pot | 111 | 0 | 0 | 83 |
| LA45507 | A.D. 885-970 | 9 | under mano on metate on floor | 155 | 0 | 31 | 278 |
| LA45507 | A.D. 885-970 | 12 | jar interior on floor | 85 | 0 | 85 | 170 |
| LA45507 | A.D. 885-970 | 12 | sherds under metate above floor | 83 | 0 | 28 | 390 |
| LA45507 | A.D. 885-970 | 12 | top of comal on floor | 89 | 0 | 30 | 163 |
| LA45507 | A.D. 885-970 | 12 | under Metate 2 on floor | 74 | 0 | 25 | 172 |
| LA45507 | A.D. 885-970 | 12 | Metate 3 face on floor | 119 | 0 | 51 | 204 |
| LA45507 | A.D. 885-970 | 12 | under sherd on floor | 53 | 0 | 0 | 53 |
| LA45507 | A.D. 885-970 | 12 | under lapidary stone in fill | 223 | 0 | 0 | 134 |
| LA45507 | A.D. 885-970 | 13 | floor under comal | 171 | 0 | 43 | 214 |
| LA 39972 | AD 1000-1100 | 1 | trash pit | 318 | 0 | 40 | 238 |
| LA 39972 | AD 1000-1100 | 1 | trash pit | 350 | 0 | 27 | 242 |
| LA 39969 | AD 1043 +/-20 | 2 | pit fill | 287 | 0 | 52 | 287 |
| LA 39969 | AD 1043 +/-20 | 2 | pit, ceramic below Vessel 1 | 433 | 0 | 93 | 340 |
| LA 39969 | AD 1043 +/-20 | 2 | pit, ceramic associated with vessel | 687 | 0 | 131 | 360 |
| LA 39969 | AD 1043 +/-20 | 2 | pit large | 85 | 0 | 0 | 0 |
| LA 39969 | AD 1043 +/-20 | 2 | pit, ceramic below Vessel 1 | 371 | 0 | 0 | 503 |
| LA 39969 | AD 1043 +/-20 | 9 | hearth-Feat fill | 301 | 0 | 0 | 109 |
| LA 39969 | AD 1043 +/-20 | 15 | pit | 149 | 0 | 30 | 238 |
| LA 39969 | AD 1043 +/-20 | 17 | pit feature base | 126 | 0 | 0 | 126 |

| Site | Age | Feature | Description | *Pinus* | Onagraceae | Poaceae | Cheno-am |
|---|---|---|---|---|---|---|---|
| LA 39969 | AD 1043 +/-20 | 19 | pit, Room 3 base of pit | 235 | 0 | 94 | 188 |
| LA 39969 | AD 1043 +/-20 | 19 | pit, Room 3 upright slab | 245 | 0 | 0 | 216 |
| LA 39969 | AD 1043 +/-20 | 21 | pit, Room 3 | 289 | 0 | 0 | 289 |
| LA 39969 | AD 1043 +/-20 | 22 | pit, subfloor | 438 | 0 | 0 | 137 |
| LA 3279 | AD 1275 | 4 | bench | 209 | 0 | 0 | 130 |
| LA 3279 | AD 1275 | 5 | posthole | 317 | 0 | 0 | 144 |
| LA 3279 | AD 1275 | 8 | posthole | 438 | 0 | 0 | 27 |
| LA 3279 | AD 1275 | 15 | posthole | 651 | 0 | 28 | 170 |
| LA 3279 | AD 1275 | 16 | post rest | 720 | 0 | 262 | 229 |
| LA 3279 | AD 1275 | 6 | pit | 556 | 0 | 33 | 131 |
| LA 3279 | AD 1275 | 9 | pit | 356 | 0 | 0 | 109 |
| LA 3279 | AD 1275 | 10 | pit | 350 | 0 | 54 | 135 |
| LA 3279 | AD 1275 | 18 | pit | 821 | 0 | 394 | 164 |
| LA 3279 | AD 1275 | 8 | vessel in pit | 229 | 0 | 0 | 229 |

| Site | Feature | Cheno-am af | Asteraceae hs | Asteraceae ls | *Artemisia* | *Platyopuntia* | *Cylindropuntia* |
|---|---|---|---|---|---|---|---|
| LA 89846 | 1 | 0 | 0 | 135 | 0 | 0 | 0 |
| LA45507 | 1 | 0 | 0 | 17 | 0 | 0 | 0 |
| LA45507 | 1 | 0 | 27 | 27 | 27 | 0 | 0 |
| LA45507 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA45507 | 3 | 0 | 0 | 61 | 0 | 0 | 0 |
| LA45507 | 3 | 0 | 27 | 27 | 0 | 54 | 0 |
| LA45507 | 3 | 0 | 0 | 19 | 0 | 0 | 0 |
| LA45507 | 3 | 0 | 0 | 28 | 0 | 0 | 0 |
| LA45507 | 9 | 0 | 0 | 0 | 0 | 31 | 0 |
| LA45507 | 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA45507 | 12 | 0 | 28 | 0 | 0 | 0 | 0 |

| Site | Feature | Cheno-am af | Asteraceae hs | Asteraceae ls | *Artemisia* | *Platyopuntia* | *Cylindropuntia* |
|---|---|---|---|---|---|---|---|
| LA45507 | 12 | 0 | 15 | 15 | 0 | 0 | 0 |
| LA45507 | 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA45507 | 12 | 0 | 34 | 17 | 0 | 0 | 0 |
| LA45507 | 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA45507 | 12 | 0 | 0 | 22 | 0 | 0 | 0 |
| LA45507 | 13 | 0 | 21 | 0 | 0 | 0 | 0 |
| LA 39972 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA 39972 | 1 | 0 | 54 | 0 | 0 | 0 | 0 |
| LA 39969 | 2 | 0 | 0 | 26 | 52 | 0 | 0 |
| LA 39969 | 2 | 0 | 31 | 0 | 0 | 0 | 0 |
| LA 39969 | 2 | 0 | 33 | 65 | 0 | 0 | 0 |
| LA 39969 | 2 | 283 | 0 | 0 | 0 | 0 | 0 |
| LA 39969 | 2 | 0 | 26 | 0 | 26 | 0 | 26 |
| LA 39969 | 9 | 0 | 27 | 0 | 0 | 0 | 0 |
| LA 39969 | 15 | 0 | 0 | 89 | 0 | 0 | 0 |
| LA 39969 | 17 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA 39969 | 19 | 0 | 24 | 0 | 24 | 0 | 0 |
| LA 39969 | 19 | 0 | 14 | 0 | 0 | 0 | 0 |
| LA 39969 | 21 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA 39969 | 22 | 0 | 0 | 27 | 0 | 0 | 0 |
| LA 3279 | 4 | 0 | 26 | 26 | 0 | 0 | 0 |
| LA 3279 | 5 | 0 | 29 | 86 | 29 | 0 | 0 |
| LA 3279 | 8 | 0 | 55 | 82 | 0 | 27 | 0 |
| LA 3279 | 15 | 0 | 57 | 28 | 0 | 0 | 0 |
| LA 3279 | 16 | 0 | 0 | 524 | 33 | 0 | 0 |
| LA 3279 | 6 | 0 | 0 | 0 | 0 | 0 | 33 |

| Site | Feature | Cheno-am af | Asteraceae hs | Asteraceae ls | *Artemisia* | *Platyopuntia* | *Cylindropuntia* |
|---|---|---|---|---|---|---|---|
| LA 3279 | 9 | 0 | 27 | 0 | 55 | 0 | 0 |
| LA 3279 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| LA 3279 | 18 | 0 | 0 | 33 | 0 | 0 | 0 |
| LA 3279 | 8 | 0 | 0 | 65 | 0 | 0 | 0 |

| Site number | Feature | *Ephedra* | Indeterminate | *Sphaeralcea* | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|
| LA 89846 | 1 | 0 | 0 | 0 | 27 | 565 |
| LA45507 | 1 | 0 | 50 | 0 | 0 | 331 |
| LA45507 | 1 | 0 | 81 | 0 | 27 | 565 |
| LA45507 | 1 | 0 | 29 | 29 | 0 | 432 |
| LA45507 | 3 | 0 | 30 | 0 | 0 | 304 |
| LA45507 | 3 | 27 | 135 | 0 | 0 | 646 |
| LA45507 | 3 | 0 | 38 | 0 | 0 | 326 |
| LA45507 | 3 | 56 | 167 | 0 | 0 | 445 |
| LA45507 | 9 | 0 | 0 | 0 | 31 | 526 |
| LA45507 | 12 | 0 | 28 | 0 | 0 | 396 |
| LA45507 | 12 | 0 | 83 | 0 | 0 | 612 |
| LA45507 | 12 | 0 | 59 | 0 | 0 | 399 |
| LA45507 | 12 | 0 | 74 | 0 | 0 | 344 |
| LA45507 | 12 | 0 | 51 | 0 | 0 | 477 |
| LA45507 | 12 | 0 | 0 | 0 | 0 | 106 |
| LA45507 | 12 | 0 | 67 | 0 | 0 | 445 |
| LA45507 | 13 | 0 | 107 | 0 | 0 | 556 |
| LA 39972 | 1 | 0 | 79 | 0 | 0 | 676 |
| LA 39972 | 1 | 0 | 81 | 0 | 0 | 754 |
| LA 39969 | 2 | 0 | 0 | 0 | 0 | 756 |

| Site number | Feature | *Ephedra* | Indeterminate | *Sphaeralcea* | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|
| LA 39969 | 2 | 0 | 62 | 0 | 31 | 989 |
| LA 39969 | 2 | 33 | 131 | 0 | 0 | 1440 |
| LA 39969 | 2 | 0 | 0 | 0 | 0 | 368 |
| LA 39969 | 2 | 0 | 79 | 0 | 26 | 1060 |
| LA 39969 | 9 | 27 | 55 | 0 | 0 | 547 |
| LA 39969 | 15 | 0 | 0 | 0 | 0 | 507 |
| LA 39969 | 17 | 0 | 0 | 0 | 0 | 252 |
| LA 39969 | 19 | 0 | 71 | 0 | 0 | 635 |
| LA 39969 | 19 | 0 | 14 | 0 | 0 | 489 |
| LA 39969 | 21 | 0 | 128 | 0 | 0 | 706 |
| LA 39969 | 22 | 0 | 0 | 0 | 0 | 602 |
| LA 3279 | 4 | 0 | 104 | 0 | 0 | 496 |
| LA 3279 | 5 | 0 | 173 | 0 | 0 | 777 |
| LA 3279 | 8 | 0 | 27 | 0 | 27 | 684 |
| LA 3279 | 15 | 0 | 255 | 0 | 0 | 1188 |
| LA 3279 | 16 | 0 | 33 | 0 | 33 | 1833 |
| LA 3279 | 6 | 0 | 0 | 0 | 0 | 753 |
| LA 3279 | 9 | 0 | 137 | 0 | 0 | 684 |
| LA 3279 | 10 | 0 | 54 | 0 | 27 | 619 |
| LA 3279 | 18 | 0 | 66 | 0 | 33 | 1511 |
| LA 3279 | 8 | 0 | 131 | 0 | 33 | 687 |

Table 5.75. Concentration Values from Burial Samples

| Site | Age (A.D.) | Feature | Sample | *Pinus* | *Quercus* | *Polygonum* | Poaceae | Cheno-am | Asteraceae hs | Asteraceae ls |
|---|---|---|---|---|---|---|---|---|---|---|
| LA 45507 | 885-950 | 14 | skull cavity | 155 | 0 | 0 | 185 | 62 | 31 | 0 |
| | | | pelvis | 229 | 0 | 0 | 98 | 262 | 0 | 33 |
| LA 39969 | 1043 | 10 | Burial 1 | 77 | 0 | 0 | 0 | 257 | 0 | 0 |
| | | | ceramic fill | 161 | 0 | 0 | 64 | 321 | 32 | 0 |
| | | 14 | Burial 2 (n=3) | 203 | 0 | 0 | 20 | 230 | 0 | 10 |
| | | | associated with Burial 2 | 212 | 0 | 0 | 0 | 182 | 0 | 0 |
| | | | ceramic fill, Vessel 2 | 164 | 33 | 0 | 0 | 458 | 0 | 0 |
| LA 39968 | 1185 | | ceramic vessels (n=2) | 190 | 9 | 13 | 117 | 166 | 6 | 0 |
| LA 3279 | 1275 | 4 | burial vessel 2 | 146 | 29 | 0 | 0 | 234 | 29 | 0 |

| Site | Age | Feature | Sample | *Artemisia* | Platyopuntia | Cylindropuntia | Indeterminate | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|---|---|---|
| LA 45507 | 885-950 | 14 | skull cavity | 0 | 31 | 0 | 31 | 0 | 495 |
| | | | pelvis | 0 | 0 | 0 | 229 | 0 | 884 |
| LA 39969 | 1043 | 10 | Burial 1 | 26 | 0 | 26 | 0 | 0 | 385 |
| | | | ceramic fill | 0 | 0 | 32 | 96 | 0 | 706 |
| | | 14 | Burial 2 (n=3) | 0 | 0 | 10 | 72 | 0 | 546 |
| | | | associated with Burial 2 | 0 | 0 | 0 | 61 | 0 | 455 |
| | | | ceramic fill, Vessel 2 | 0 | 0 | 33 | 65 | 0 | 753 |
| LA 39968 | 1185 | | ceramic vessels (n=2) | 0 | 0 | 0 | 54 | 15 | 570 |
| LA 3279 | 1275 | 4 | burial, Vessel 2 | 29 | 0 | 0 | 88 | 0 | 556 |

Note: Burial 2, LA 39969, and ceramic vessels, LA 39968, are average concentration values.

Table 5.76. Average Pollen Concentration Values, Samples from Ceramic Artifacts by Age and Site

| Age | Site | *Pinus* | *Juniperus* | *Quercus* | Onagraceae | *Polygonum* | Poaceae | Cheno-am | Asteraceae hs | Asteraceae ls |
|---|---|---|---|---|---|---|---|---|---|---|
| 180 B.C. | LA 75792 | 74.75 | 0.00 | 0.00 | 0.00 | 0.00 | 74.75 | 124.58 | 49.83 | 24.92 |
| A.D. 200 | LA 45508 | 15.90 | 0.00 | 0.00 | 0.00 | 0.00 | 15.90 | 79.49 | 0.00 | 47.69 |
| A.D.330 | LA 39975 | 146.43 | 0.00 | 0.00 | 0.00 | 0.00 | 29.29 | 175.72 | 0.00 | 58.57 |
| A.D. 800 | LA 45510 | 163.66 | 0.00 | 0.00 | 0.00 | 0.00 | 16.37 | 81.83 | 32.73 | 32.73 |
| A.D. 885 | LA 45507 | 85.71 | 0.00 | 5.66 | 0.00 | 0.00 | 22.54 | 173.68 | 5.56 | 9.40 |
| A.D. 980 | LA 70185 | 191.49 | 0.00 | 0.00 | 9.71 | 0.00 | 0.00 | 108.61 | 0.00 | 9.71 |
| A.D. 1010 | LA 70189 | 1733.52 | 32.10 | 32.10 | 0.00 | 0.00 | 0.00 | 158.76 | 0.00 | 48.15 |
| A.D. 1043 | LA 39969 | 345.06 | 2.84 | 4.68 | 0.00 | 0.00 | 64.12 | 351.43 | 20.30 | 15.55 |
| A.D. 1160 | LA 70185 | 211.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 47.02 | 0.00 | 0.00 |
| A.D. 1185 | LA 39968 | 150.42 | 0.00 | 7.21 | 0.00 | 3.61 | 80.41 | 166.75 | 12.51 | 13.04 |
| A.D. 1275 | LA 3279 | 499.99 | 0.00 | 7.90 | 6.88 | 0.00 | 21.84 | 261.95 | 26.84 | 71.65 |

| Age | Site | *Artemisia* | Cylindropuntia | *Ephedra* | Indeterminate | *Sphaeralcea* | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|---|---|
| 180 B.C. | LA 75792 | 24.92 | 0.00 | 0.00 | 149.49 | 0.00 | 0.00 | 523.22 |
| A.D. 200 | LA 45508 | 0.00 | 0.00 | 0.00 | 79.49 | 0.00 | 0.00 | 238.47 |
| A.D. 330 | LA 39975 | 0.00 | 0.00 | 0.00 | 351.44 | 29.29 | 29.29 | 820.02 |
| A.D. 800 | LA 45510 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 327.32 |
| A.D. 885 | LA 45507 | 0.00 | 0.00 | 11.13 | 63.41 | 0.00 | 0.00 | 377.10 |
| A.D. 980 | LA 70185 | 0.00 | 0.00 | 0.00 | 9.71 | 0.00 | 0.00 | 329.21 |
| A.D. 1010 | LA 70189 | 0.00 | 0.00 | 16.05 | 219.46 | 0.00 | 32.10 | 2272.26 |
| A.D. 1043 | LA 39969 | 13.34 | 15.89 | 4.68 | 79.56 | 0.00 | 11.04 | 928.47 |
| A.D. 1160 | LA 70185 | 0.00 | 0.00 | 23.51 | 23.51 | 0.00 | 0.00 | 305.65 |
| A.D. 1185 | LA 39968 | 9.48 | 0.00 | 0.00 | 40.92 | 0.00 | 4.34 | 488.70 |
| A.D. 1275 | LA 3279 | 8.36 | 1.63 | 3.50 | 213.53 | 0.00 | 3.34 | 1127.42 |

Table 5.77. Average Concentration Values of Ground Stone Artifacts by Site and Age

| Site | Age | *Pinus* | *Quercus* | Solanaceae | Poaceae | Cheno-am | Asteraceae hs | Asteraceae ls |
|---|---|---|---|---|---|---|---|---|
| | | | | Metate | | | | |
| LA 75792 | BC 180 | 235.12 | 0.00 | 0.00 | 23.51 | 141.07 | 0.00 | 23.51 |
| LA 45507<br>LA 75791 | A.D. 880-970 | 139.57 | 0.00 | 0.00 | 31.46 | 174.92 | 12.20 | 8.79 |
| LA 70185 | A.D. 980-1000 | 196.12 | 0.00 | 0.00 | 0.00 | 28.79 | 0.00 | 0.00 |
| LA 39969 | A.D. 1043 | 345.38 | 0.00 | 0.00 | 143.91 | 316.60 | 28.78 | 57.56 |
| LA 70185 | A.D. 1160 | 244.12 | 0.00 | 0.00 | 54.73 | 255.20 | 0.00 | 40.18 |
| LA 39968 | A.D. 1185 | 230.79 | 0.00 | 2.51 | 60.73 | 318.25 | 32.43 | 16.18 |
| LA 3279 | A.D. 1275 | 689.19 | 0.00 | 0.00 | 49.10 | 255.49 | 30.91 | 292.77 |
| | | | | Manos | | | | |
| LA 45507 | A.D. 885-970 | 264.13 | 5.49 | 0.00 | 40.48 | 151.06 | 27.26 | 50.66 |
| LA 39969 | A.D. 1043 | 259.31 | 0.00 | 0.00 | 16.21 | 113.45 | 16.21 | 0.00 |
| LA 3279 | late A.D. 1200s | 373.40 | 21.96 | 0.00 | 87.86 | 131.79 | 65.89 | 175.72 |
| | | | | Ground Stone | | | | |
| LA 3279 | late A.D. 1200s | 690.75 | 0.00 | 0.00 | 28.78 | 230.25 | 0.00 | 201.47 |

| Site | Age | *Artemisia* | *Platyopuntia* | *Cylindropuntia* | Indeterminate | *Sphaeralcea* | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | Metate | | | | |
| LA 75792 | 180 B.C. | 0.00 | 0.00 | 0.00 | 47.02 | 0.00 | 23.51 | 540.77 |
| LA 45507<br>LA 75791 | A.D. 880-970 | 10.95 | 5.56 | 0.00 | 91.38 | 5.76 | 5.38 | 485.97 |
| LA 70185 | A.D. 980-1000 | 0.00 | 0.00 | 0.00 | 67.91 | 0.00 | 15.75 | 324.32 |
| LA 39969 | A.D.. 1043 | 28.78 | 0.00 | 0.00 | 86.34 | 0.00 | 0.00 | 1007.35 |
| LA 70185 | A.D. 1160 | 0.00 | 0.00 | 0.00 | 26.93 | 0.00 | 0.00 | 621.16 |
| LA 39968 | A.D. 1185 | 13.81 | 0.00 | 9.92 | 55.19 | 3.04 | 8.90 | 754.39 |
| LA 3279 | A.D. 1275 | 0.00 | 0.00 | 0.00 | 171.84 | 0.00 | 31.82 | 1521.12 |

| Site | Age | *Artemisia* | *Platyopuntia* | *Cylindropuntia* | Indeterminate | *Sphaeralcea* | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | Manos | | | | |
| LA 45507 | A.D. 885-970 | 5.49 | 21.19 | 0.00 | 66.60 | 0.00 | 15.83 | 658.97 |
| LA 39969 | A.D. 1043 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 32.41 | 453.80 |
| LA 3279 | late A.D. 1200s | 21.96 | 0.00 | 0.00 | 131.79 | 0.00 | 0.00 | 1010.38 |
| | | | | Ground Stone | | | | |
| LA 3279 | late A.D. 1200s | 0.00 | 0.00 | 0.00 | 115.13 | 0.00 | 0.00 | 1266.38 |

Table 5.78. Average Pollen Concentration of Floor Samples by Age and Site

| Age | Site | *Pinus* | *Juniperus* | *Quercus* | Onagraceae | Poaceae | Cheno-am | Asteraceae hs | Asteraceae ls |
|---|---|---|---|---|---|---|---|---|---|
| 70 B.C.-A.D. 90 | LA 70188 | 54.77 | 0.00 | 0.00 | 0.00 | 0.00 | 71.53 | 0.00 | 0.00 |
| A.D. 330-370 | LA 39975 | 136.29 | 16.69 | 0.00 | 0.00 | 30.51 | 247.03 | 18.33 | 26.85 |
| A.D. 580-650 | LA 70196 | 134.63 | 0.00 | 0.00 | 0.00 | 10.70 | 142.78 | 10.70 | 40.26 |
| A.D. 885-970 | LA 45507 | 114.16 | 4.92 | 4.92 | 0.00 | 24.12 | 186.11 | 12.06 | 10.43 |
| A.D. 980-1000 | LA 70185 | 191.49 | 0.00 | 0.00 | 9.71 | 0.00 | 108.61 | 0.00 | 9.71 |
| A.D. 1185 | LA 39968 | 240.76 | 4.56 | 0.00 | 0.00 | 92.10 | 327.85 | 9.28 | 22.24 |
| late A.D. 1200s | LA 3279 | 765.66 | 0.00 | 10.70 | 0.00 | 41.70 | 176.38 | 42.80 | 73.80 |
| A.D. 1400 | LA 70189 | 180.84 | 0.00 | 0.00 | 0.00 | 0.00 | 91.19 | 15.46 | 30.91 |

| Age | Site | *Platyopuntia* | *Cylindropuntia* | Indeterminate | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|
| 70 B.C.-A.D. 90 | LA 70188 | 0.00 | 0.00 | 126.81 | 0.00 | 253.11 |
| A.D. 330-370 | LA 39975 | 6.14 | 0.00 | 144.82 | 12.37 | 639.02 |
| A.D. 580-650 | LA 70196 | 0.00 | 0.00 | 136.16 | 21.40 | 505.20 |
| A.D. 885-970 | LA 45507 | 0.00 | 0.00 | 71.89 | 0.00 | 428.62 |
| A.D. 980-1000 | LA 70185 | 0.00 | 0.00 | 9.71 | 0.00 | 329.21 |
| A.D. 1185 | LA 39968 | 0.00 | 5.06 | 30.34 | 0.00 | 755.61 |
| late A.D. 1200s | LA 3279 | 0.00 | 10.70 | 113.28 | 10.70 | 1245.72 |
| A.D. 1400 | LA 70189 | 0.00 | 0.00 | 149.93 | 0.00 | 468.34 |

Table 5.79. Mean Pollen Concentration Values of Samples from Pits by Site and Age

| Site | Age | *Pinus* | Poaceae | Cheno-am | Cheno-am af | Asteraceae hs | Asteraceae ls |
|---|---|---|---|---|---|---|---|
| LA 89846 | 540 B.C. | 215.40 | 26.92 | 161.55 | 0.00 | 0.00 | 134.62 |
| LA 75791 | A.D. 880 | 57.56 | 28.78 | 86.34 | 0.00 | 28.78 | 28.78 |
| LA 39969 | A.D. 1043 | 245.77 | 22.82 | 202.52 | 28.29 | 3.79 | 11.55 |
| LA 70185 | A.D. 1160 | 185.48 | 0.00 | 92.74 | 0.00 | 0.00 | 0.00 |
| LA 39968 | A.D. 1185 | 179.84 | 47.24 | 191.01 | 0.00 | 0.00 | 0.00 |
| LA 3279 | late A.D. 1200s | 498.41 | 72.74 | 125.76 | 0.00 | 23.92 | 32.80 |

| Site | Age | *Artemisia* | Platyopuntia | Cylindropuntia | Indeterminate | Zea mays | Conccentration |
|---|---|---|---|---|---|---|---|
| LA 89846 | 540 B.C. | 0.00 | 0.00 | 0.00 | 0.00 | 26.92 | 565.41 |
| LA 75791 | A.D. 880 | 0.00 | 57.56 | 0.00 | 115.13 | 0.00 | 402.94 |
| LA 39969 | A.D. 1043 | 7.57 | 0.00 | 0.00 | 43.16 | 2.53 | 573.22 |
| LA 70185 | A.D. 1160 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 278.22 |
| LA 39968 | A.D. 1185 | 29.21 | 0.00 | 0.00 | 56.14 | 0.00 | 503.44 |
| LA 3279 | late A.D. 1200s | 11.93 | 3.91 | 4.68 | 101.58 | 12.45 | 888.19 |

Table 5.80. Average Pollen Concentration Values of Minor Sample Types by Age and Site

| Sample | Age | Site | *Pinus* | Onagraceae | Poaceae | Cheno-am | Asteraceae hs | Asteraceae ls | *Artemisia* |
|---|---|---|---|---|---|---|---|---|---|
| Postholes | A.D. 1185 | LA 39968 | 364.22 | 0.00 | 0.00 | 242.81 | 0.00 | 91.05 | 60.70 |
| | Late 1200s | LA 3279 | 468.40 | 0.00 | 9.43 | 113.68 | 46.70 | 65.58 | 9.59 |
| Pot rest | A.D. 1185 | LA 39968 | 455.27 | 0.00 | 50.59 | 303.51 | 25.29 | 0.00 | 25.29 |
| | Late 1200s | LA 3279 | 720.10 | 0.00 | 261.85 | 229.12 | 0.00 | 523.71 | 32.73 |
| Rock cluster | Late 1200s | LA 3279 | 458.91 | 0.00 | 9.06 | 159.18 | 18.98 | 69.84 | 5.86 |
| Roof fall | A.D. 580-650 | LA 70196 | 137.20 | 22.87 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subfloor | A.D. 980-1000 | LA 70185 | 0.00 | 0.00 | 0.00 | 154.09 | 0.00 | 0.00 | 0.00 |
| | A.D. 1043 | LA 39969 | 339.31 | 0.00 | 24.08 | 172.75 | 8.03 | 29.73 | 16.05 |

| Sample | Age | Site | Platyopuntia | Cylindropuntia | *Ephedra* | Indeterminate | *Zea mays* | Concentration |
|---|---|---|---|---|---|---|---|---|
| Postholes | A.D. 1185 | LA 39968 | 0.00 | 0.00 | 0.00 | 182.11 | 0.00 | 940.89 |
| | Late 1200s | LA 3279 | 9.12 | 0.00 | 0.00 | 151.57 | 9.12 | 883.19 |
| Pot rest | A.D. 1185 | LA 39968 | 0.00 | 0.00 | 25.29 | 126.46 | 0.00 | 1011.71 |
| | Late 1200s | LA 3279 | 0.00 | 0.00 | 0.00 | 32.73 | 32.73 | 1832.98 |
| Rock cluster | Late 1200s | LA 3279 | 0.00 | 0.00 | 5.86 | 159.96 | 6.55 | 894.18 |
| Roof fall | A.D. 580-650 | LA 70196 | 0.00 | 0.00 | 0.00 | 251.54 | 0.00 | 411.61 |
| Subfloor | A.D. 980-1000 | LA 70185 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 154.09 |
| | A.D. 1043 | LA 39969 | 0.00 | 0.00 | 0.00 | 8.03 | 0.00 | 606.00 |

Table 5.81. Average Pollen Concentration Values (grains/sq cm) of Selected Taxa by Age and Material

| Age | Material | *Pinus* | Solanaceae | *Polygala* | Poaceae | Cheno-am | Cheno-am af | Asteraceae hs |
|---|---|---|---|---|---|---|---|---|
| 1055 B.C. | rhylolite | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | basalt | 2.8 | 0.0 | 0.0 | 5.6 | 2.8 | 0.0 | 0.0 |
| 20 B.C. | rhyolite | 0.0 | 0.0 | 0.0 | 3.0 | 6.0 | 0.0 | 0.0 |
| | basalt | 0.0 | 0.0 | 0.0 | 4.6 | 4.6 | 0.0 | 0.0 |
| A.D. 0 | basalt | 13.9 | 1.1 | 0.0 | 7.6 | 16.2 | 0.0 | 2.0 |
| A.D. 200 | basalt | 13.7 | 0.1 | 0.0 | 5.6 | 7.9 | 0.0 | 2.6 |
| A.D. 420 | basalt | 8.7 | 0.0 | 0.0 | 2.3 | 11.6 | 0.2 | 1.9 |
| | ceramic | 0.0 | 0.0 | 0.0 | 4.6 | 0.0 | 0.0 | 0.0 |
| A.D. 700 | basalt | 8.2 | 8.0e-03 | 8.0e-03 | 14.1 | 8.6 | 0.0 | 2.4 |
| | rhyolite | 1.1 | 0.0 | 0.0 | 4.4 | 26.1 | 0.0 | 1.5 |
| A.D. 790 | basalt | 5.2 | 0.0 | 0.1 | 0.3 | 8.3 | 0.0 | 0.8 |
| | rhyolite | 11.3 | 0.0 | 0.0 | 0.0 | 20.6 | 0.0 | 0.0 |
| | sediment | 14.9 | 0.0 | 0.0 | 0.0 | 5.0 | 0.0 | 5.0 |
| A.D. 800 | basalt | 58.0 | 0.0 | 0.0 | 0.0 | 20.5 | 3.4 | 6.8 |
| A.D. 1000 | basalt | 11.0 | 0.5 | 0.0 | 4.0 | 6.9 | 0.0 | 0.0 |
| A.D. 1043 | basalt | 11.9 | 0.0 | 0.0 | 0.0 | 5.9 | 0.0 | 0.0 |
| | ceramic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | rhyolite | 5.7 | 0.0 | 0.0 | 2.4 | 8.0 | 0.0 | 1.3 |
| | ves basalt | 16.1 | 0.0 | 0.0 | 5.1 | 4.4 | 0.0 | 3.3 |

| Age | Material | *Pinus* | Solanaceae | *Polygala* | Poaceae | Cheno-am | Cheno-am af | Asteraceae hs |
|---|---|---|---|---|---|---|---|---|
| A.D. 1100 | basalt | 9.2 | 0.0 | 0.0 | 3.2 | 13.2 | 0.0 | 1.6 |
| | ceramic | 16.1 | 0.0 | 0.0 | 31.7 | 18.5 | 0.0 | 0.6 |
| | rhyolite | 9.0 | 0.0 | 0.0 | 5.7 | 16.8 | 0.0 | 1.7 |
| A.D. 1185 | basalt | 2.1 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 |
| | ceramic | 19.1 | 0.0 | 0.0 | 8.8 | 12.5 | 0.0 | 0.0 |
| | ryolite | 32.1 | 0.0 | 0.0 | 2.8 | 7.2 | 0.0 | 0.0 |
| A.D. 1275 | ground stone | 10.3 | 0.0 | 0.0 | 0.0 | 26.4 | 0.0 | 0.0 |
| A.D. 1570 | basalt | 6.3 | 0.0 | 0.0 | 0.4 | 0.7 | 0.0 | 2.4 |

| Age | Material | Asteraceae ls | *Artemisia* | *Platyopuntia* | *Cylindropuntia* | Indeterminate | *Sphaeralcea* | *Zea mays* |
|---|---|---|---|---|---|---|---|---|
| 1055 B.C. | rhylolite | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | basalt | 2.8 | 0.0 | 0.0 | 0.0 | 9.9 | 0.0 | 0.0 |
| 20 B.C. | rhyolite | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 0.0 | 0.0 |
| | basalt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| A.D. 0 | basalt | 11.1 | 2.4 | 0.0 | 0.0 | 35.2 | 0.0 | 0.9 |
| A.D. 200 | basalt | 1.0 | 3.4 | 2.2 | 0.0 | 21.4 | 0.0 | 0.0 |
| A.D. 420 | basalt | 6.8 | 1.2 | 0.0 | 0.0 | 13.8 | 0.0 | 0.0 |
| | ceramic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| A.D. 700 | basalt | 4.8 | 4.8 | 0.0 | 0.0 | 23.1 | 0.0 | 0.6 |
| | rhyolite | 0.9 | 0.0 | 0.0 | 0.0 | 17.0 | 0.0 | 0.0 |
| A.D. 790 | basalt | 1.4 | 0.1 | 0.0 | 0.0 | 13.0 | 0.0 | 4.4 |
| | rhyolite | 5.6 | 0.0 | 0.0 | 0.0 | 15.0 | 0.0 | 0.0 |
| | sediment | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 19.9 |
| A.D. 800 | basalt | 3.4 | 0.0 | 0.0 | 0.0 | 10.2 | 0.0 | 3.4 |
| A.D. 1000 | basalt | 0.0 | 0.0 | 0.0 | 0.0 | 16.1 | 0.0 | 0.0 |
| A.D. 1043 | basalt | 5.9 | 0.0 | 0.0 | 0.0 | 17.8 | 0.0 | 0.0 |
| | ceramic | 0.0 | 0.0 | 0.0 | 0.0 | 6.5 | 0.0 | 0.0 |
| | rhyolite | 2.2 | 0.0 | 0.0 | 0.0 | 3.9 | 0.0 | 0.0 |
| | vesicular basalt | 6.7 | 0.0 | 0.0 | 0.0 | 15.4 | 0.0 | 0.0 |

| Age | Material | Asteraceae ls | *Artemisia* | *Platyopuntia* | *Cylindropuntia* | Indeterminate | *Sphaeralcea* | *Zea mays* |
|---|---|---|---|---|---|---|---|---|
| A.D. 1100 | basalt | 2.2 | 1.1 | 0.0 | 0.0 | 5.7 | 0.0 | 0.2 |
| | ceramic | 1.9 | 0.0 | 0.0 | 0.0 | 31.0 | 0.0 | 2.7 |
| | rhyolite | 0.6 | 2.2 | 0.0 | 0.0 | 7.3 | 0.0 | 0.4 |
| A.D. 1185 | basalt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | ceramic | 1.1 | 0.0 | 0.0 | 0.0 | 4.9 | 0.0 | 1.1 |
| | rhyolite | 1.3 | 2.1 | 0.0 | 0.0 | 2.0 | 0.0 | 0.9 |
| A.D. 1275 | ground stone | 0.8 | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 | 0.0 |
| A.D. 1570 | basalt | 2.6 | 0.2 | 0.0 | 0.0 | 5.4 | 0.0 | 0.0 |

Table 5.82. Average Pollen Concentration Values (grains/sq cm) of Selected Taxa by Artifact Type and Age

| Artifact | Age | *Pinus* | Solanaceae | *Polygala* | *Eriogonum* | Poaceae | Cheno-am | Cheno-am af | Asteraceae hs |
|---|---|---|---|---|---|---|---|---|---|
| Ceramic | A.D. 420 | 0.0 | 0.0 | 0.0 | 0.0 | 4.6 | 0.0 | 0.0 | 0.0 |
| | A.D. 1043 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | A.D. 1100 | 16.1 | 0.0 | 0.0 | 0.0 | 31.7 | 18.5 | 0.0 | 0.6 |
| | A.D. 1185 | 19.1 | 0.0 | 0.0 | 0.0 | 8.8 | 12.5 | 0.0 | 0.0 |
| Ground stone | 1055 B.C. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | A.D. 200 | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | 14.2 | 0.0 | 3.0 |
| | A.D. 700-900 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 63.2 | 0.0 | 0.0 |
| | A.D. 1275 | 10.3 | 0.0 | 0.0 | 0.0 | 0.0 | 26.4 | 0.0 | 0.0 |
| Mano | A.D. 0-30 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 8.6 | 0.0 | 1.2 |
| | A.D. 200 | 22.3 | 0.0 | 0.0 | 0.0 | 8.1 | 4.6 | 0.0 | 1.2 |
| | A.D. 420 | 3.1 | 0.0 | 0.0 | 0.0 | 4.7 | 18.6 | 0.4 | 3.0 |
| | A.D. 700-900 | 9.1 | 0.0 | 0.0 | 0.0 | 18.1 | 9.6 | 0.0 | 3.2 |
| | A.D. 790 | 10.1 | 0.0 | 0.0 | 0.0 | 0.0 | 12.1 | 0.0 | 1.8 |
| | A.D. 1000-1100 | 12.6 | 0.0 | 0.0 | 0.0 | 0.0 | 12.6 | 0.0 | 0.0 |
| | A.D. 1043 | 2.8 | 0.0 | 0.0 | 0.0 | 11.9 | 8.5 | 0.0 | 0.0 |

| Artifact | Age | *Pinus* | Solanaceae | *Polygala* | *Eriogonum* | Poaceae | Cheno-am | Cheno-am af | Asteraceae hs |
|---|---|---|---|---|---|---|---|---|---|
| | A.D. 1100 | 14.8 | 0.0 | 0.0 | 0.0 | 8.7 | 28.6 | 0.0 | 4.5 |
| | A.D. 1185 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 39.9 | 0.0 | 0.0 |
| Metate | 1055 B.C. | 5.6 | 0.0 | 0.0 | 0.0 | 6.6 | 5.6 | 0.0 | 0.0 |
| | 20 B.C. | 0.0 | 0.0 | 0.0 | 0.0 | 3.8 | 5.3 | 0.0 | 0.0 |
| | A.D. 0-30 | 15.4 | 1.3 | 0.0 | 0.0 | 8.6 | 17.2 | 0.0 | 2.1 |
| | A.D. 200 | 15.4 | 0.5 | 0.0 | 0.5 | 6.7 | 5.1 | 0.0 | 6.2 |
| | A.D. 420 | 14.3 | 0.0 | 0.0 | 0.0 | 0.0 | 4.6 | 0.0 | 0.8 |
| | A.D. 700-900 | 3.3 | 2.5e-03 | 2.5e-03 | 0.0 | 3.3 | 6.4 | 0.0 | 1.0 |
| | A.D. 790 | 1.4 | 0.0 | 0.3 | 0.0 | 0.8 | 1.9 | 0.0 | 0.3 |
| | A.D. 800 | 58.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.5 | 3.4 | 6.8 |
| | A.D. 1000-1100 | 4.8 | 1.6 | 0.0 | 0.0 | 1.6 | 8.0 | 0.0 | 0.0 |
| | A.D. 1043 | 8.0 | 0.0 | 0.0 | 0.0 | 2.6 | 4.2 | 0.0 | 0.0 |
| | A.D. 1100 | 5.0 | 0.0 | 0.0 | 0.0 | 1.1 | 3.8 | 0.0 | 0.2 |
| | A.D. 1570 | 6.3 | 0.0 | 0.0 | 0.0 | 0.4 | 0.7 | 0.0 | 2.4 |

| Artifact | Age | Asteraceae ls | *Artemisia* | Platyopuntia | Cylindropuntia | Indeterminate | *Sphaeralcea* | *Zea mays* |
|---|---|---|---|---|---|---|---|---|
| Ceramic | A.D. 420 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | A.D. 1043 | 0.0 | 0.0 | 0.0 | 0.0 | 6.5 | 0.0 | 0.0 |
| | A.D. 1100 | 1.9 | 0.0 | 0.0 | 0.0 | 31.0 | 0.0 | 2.7 |
| | A.D. 1185 | 1.1 | 0.0 | 0.0 | 0.0 | 4.9 | 0.0 | 1.1 |
| Ground stone | 1055 B.C. | 0.0 | 0.0 | 0.0 | 0.0 | 8.5 | 0.0 | 0.0 |
| | A.D. 200 | 0.0 | 0.0 | 6.7 | 0.0 | 46.0 | 0.0 | 0.0 |
| | A.D. 700-900 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | A.D. 1275 | 0.8 | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 | 0.0 |

| Artifact | Age | Asteraceae ls | *Artemisia* | Platyopuntia | Cylindropuntia | Indeterminate | *Sphaeralcea* | *Zea mays* |
|---|---|---|---|---|---|---|---|---|
| Mano | A.D. 0-30 | 1.2 | 0.0 | 0.0 | 0.0 | 8.6 | 0.0 | 0.0 |
| | A.D. 200 | 0.6 | 5.9 | 0.0 | 0.0 | 10.6 | 0.0 | 0.0 |
| | A.D. 420 | 12.0 | 2.4 | 0.0 | 0.0 | 13.2 | 0.0 | 0.0 |
| | A.D. 700-900 | 6.2 | 5.1 | 0.0 | 0.0 | 31.7 | 0.0 | 0.7 |
| | A.D. 790 | 2.5 | 0.0 | 0.0 | 0.0 | 12.5 | 0.0 | 8.0 |
| | A.D. 1000-1100 | 0.0 | 0.0 | 0.0 | 0.0 | 37.8 | 0.0 | 0.0 |
| | A.D. 1043 | 2.8 | 0.0 | 0.0 | 0.0 | 14.7 | 0.0 | 6.2 |
| | A.D. 1100 | 3.9 | 1.1 | 0.0 | 0.0 | 12.6 | 0.0 | 0.7 |
| | A.D. 1185 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Metate | 1055 B.C. | 4.2 | 0.0 | 0.0 | 0.0 | 5.6 | 0.0 | 0.0 |
| | 20 B.C. | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| | A.D. 0-30 | 12.3 | 2.7 | 0.0 | 0.0 | 38.5 | 0.0 | 1.0 |
| | A.D. 200 | 4.1 | 2.6 | 0.0 | 0.0 | 4.6 | 0.0 | 0.0 |
| | A.D. 420 | 1.5 | 0.0 | 0.0 | 0.0 | 14.3 | 0.0 | 0.0 |
| | A.D. 700-900 | 0.5 | 1.8 | 0.0 | 0.0 | 9.2 | 0.0 | 0.1 |
| | A.D. 790 | 0.0 | 0.3 | 0.0 | 0.0 | 4.2 | 0.0 | 1.1 |
| | A.D. 800 | 3.4 | 0.0 | 0.0 | 0.0 | 10.2 | 0.0 | 3.4 |
| | A.D. 1000-1100 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | A.D. 1043 | 4.2 | 0.0 | 0.0 | 0.0 | 10.3 | 0.0 | 0.0 |
| | A.D. 1100 | 0.6 | 0.0 | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 |
| | A.D. 1570 | 2.6 | 0.2 | 0.0 | 0.0 | 5.4 | 0.0 | 0.0 |

Table 5.83. Average Total Pollen Concentration Values by Age and Material and by Material

| Age | Material | Concentration |
|---|---|---|
| By Age and Material | | |
| 1055 B.C. | rhylolite | 16.9772866 |
| | Basalt | 23.98436347 |
| 20 B.C. | rhyolite | 14.87807487 |
| | basalt | 9.172087912 |
| A.D. 0 | basalt | 92.44 |
| A.D. 200 | basalt | 58.52166667 |
| A.D. 420 | basalt | 47.855 |
| | ceramic | 9.18 |
| A.D. 700 | basalt | 68.81333333 |
| | rhyolite | 61.49 |
| A.D. 790 | basalt | 33.62666667 |
| | rhyolite | 52.52 |
| | sediment | 49.79 |
| A.D. 800 | basalt | 105.84 |
| A.D. 1000 | basalt | 39.03312948 |
| A.D. 1043 | basalt | 47.49807939 |
| | ceramic | 6.549435028 |
| | rhyolite | 23.53513989 |
| | ves basalt | 61.09888307 |
| A.D. 1100 | basalt | 36.5325 |
| | ceramic | 111.5175 |
| | rhyolite | 44.502 |
| A.D. 1185 | basalt | 3.188889738 |
| | ceramic | 47.372251 |
| | ryolite | 47.97716178 |
| A.D. 1275 | ground stone | 40.45504499 |
| A.D. 1570 | basalt | 17.91 |

| Material | Concentration |
|---|---|
| All Artifacts by Material | |
| basalt | 61.9301787 |
| vesicular basalt | 37.05474618 |
| rhyolite | 40.43556234 |
| vesicular rhyolite | 49.19435994 |
| ceramic | 63.51460818 |
| ground stone | 40.45504499 |

Table 5.84a. Results of PCA, Soil Pollen Samples

| Axis | Eigenvalue | Percent of Total | Cumulative Percent |
|---|---|---|---|
| 1 | 5.555 | 26.45 | 26.45 |
| 2 | 1.998 | 9.52 | 35.97 |
| 3 | 1.446 | 6.89 | 42.86 |
| 4 | 1.241 | 5.91 | 48.77 |
| 5 | 1.193 | 5.68 | 54.45 |
| 6 | 1.169 | 5.57 | 60.02 |
| 7 | 1.027 | 4.89 | 64.91 |
| 8 | 1.005 | 4.79 | 69.7 |
| 9 | 0.953 | 4.54 | 74.24 |
| 10 | 0.935 | 4.45 | 78.69 |
| 11 | 0.779 | 3.71 | 82.4 |
| 12 | 0.714 | 3.4 | 85.79 |
| 13 | 0.541 | 2.58 | 88.37 |
| 14 | 0.505 | 2.41 | 90.78 |
| 15 | 0.481 | 2.29 | 93.07 |
| 16 | 0.454 | 2.16 | 95.23 |
| 17 | 0.362 | 1.72 | 96.95 |
| 18 | 0.267 | 1.27 | 98.22 |
| 19 | 0.203 | 0.97 | 99.19 |
| 20 | 0.142 | 0.68 | 99.87 |
| 21 | 0.028 | 0.13 | 100 |

Table 5.84b. Eigenvectors (Component Loadings)

| Taxa | Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 |
|---|---|---|---|---|---|---|---|---|
| *Pinus* | 0.4026 | 0.0058 | 0.125 | 0.034 | -0.0066 | 0.0451 | 0.0257 | 0.0366 |
| *Juniperus* | 0.2483 | 0.075 | 0.004 | -0.1048 | 0.0012 | 0.2238 | 0.1106 | 0.1218 |
| *Quercus* | 0.3962 | -0.0169 | 0.1197 | 0.0191 | -0.0538 | 0.078 | 0.0213 | 0.0328 |
| Onagraceae | 0.0168 | 0.001 | 0.015 | 0.0289 | 0.4485 | -0.6955 | -0.0453 | 0.2543 |
| *Polygala* | 0.0169 | 0.053 | -0.3285 | -0.0208 | 0.0727 | -0.1839 | 0.11 | -0.6582 |
| Rosaceae | 0.0215 | -0.5458 | -0.146 | -0.0245 | 0.074 | 0.0956 | -0.0072 | 0.0519 |
| Solanaceae | 0.0281 | -0.5544 | -0.1632 | -0.0647 | -0.0684 | -0.0332 | 0.0033 | -0.0152 |
| *Polygonum* | 0.0271 | -0.546 | -0.1521 | -0.0086 | -0.0868 | -0.0268 | -0.003 | -0.0303 |
| Poaceae | 0.3768 | 0.0026 | 0.0504 | 0.0705 | -0.0863 | 0.0469 | -0.0227 | -0.0728 |
| Cheno-am | 0.1813 | 0.1734 | -0.4723 | -0.3675 | -0.1186 | 0.0872 | 0.0076 | 0.0234 |
| Cheno-am af | -0.0209 | -0.0165 | 0.2041 | 0.0544 | -0.0032 | -0.0078 | 0.5775 | -0.4272 |
| Asteraceae hs | 0.3131 | 0.0038 | -0.0947 | 0.1009 | 0.0828 | -0.2413 | -0.1417 | -0.0605 |
| Asteraceae ls | 0.3173 | -0.0444 | -0.0369 | 0.114 | 0.1463 | -0.2122 | -0.0103 | -0.0161 |
| *Artemisia* | 0.3523 | 0.0071 | 0.1308 | 0.033 | -0.044 | 0.0174 | -0.0472 | -0.0478 |
| *Platyopuntia* | -0.0086 | 0.0318 | -0.0208 | 0.3265 | 0.2982 | 0.2335 | -0.4968 | -0.3181 |
| *Cylindropuntia* | -0.0184 | 0.0574 | -0.0126 | -0.1884 | -0.4853 | -0.134 | -0.4587 | 0.0099 |
| *Ephedra* | -0.0191 | -0.0481 | -0.0368 | 0.0983 | 0.4779 | 0.4673 | -0.0303 | 0.1675 |
| Unknown | 0.305 | -0.0764 | 0.2068 | 0.0371 | -0.0726 | 0.0239 | 0.028 | -0.0189 |
| Indeterminate | 0.1528 | 0.167 | -0.4545 | -0.3265 | 0.267 | 0.084 | 0.1549 | 0.1223 |
| *Sphaeralcea* | -0.0172 | 0.0523 | -0.2397 | 0.5183 | -0.2528 | -0.0337 | 0.3523 | 0.3731 |
| *Zea mays* | 0.033 | 0.1111 | -0.4329 | 0.5346 | -0.1669 | 0.0194 | -0.0942 | -0.0506 |

Table 5.84c. Component Scores

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA45507 | 1985 | -0.0654 | 0.0034 | 0.0357 | -0.0256 |
| LA45507 | 1986 | -0.0285 | 0.0039 | 0.0273 | -0.0167 |
| LA45507 | 1610 | -0.012 | 0.0016 | 0.0615 | 0.112 |
| LA45507 | 1900 | -0.0379 | 0.0095 | 0.0161 | -0.0317 |
| LA45507 | 1987 | -0.0277 | 0.004 | 0.0416 | -0.0211 |
| LA45507 | 1993 | -0.0874 | -0.0117 | 0.0756 | 0.004 |
| LA45507 | 1999 | -0.0265 | 0.021 | -0.0175 | -0.0558 |
| LA45507 | 1989 | -0.0688 | -0.0008 | 0.0443 | -0.0177 |
| LA45507 | 1990 | -0.0272 | -0.0014 | 0.0559 | -0.0137 |
| LA45507 | 664 | -0.0748 | -0.0195 | 0.0145 | 0.0214 |
| LA45507 | 683 | -0.0485 | 0.0063 | 0.0164 | 0.1803 |
| LA45507 | 3 | -0.0695 | 0.0016 | 0.0376 | -0.0233 |
| LA45507 | 641 | -0.0644 | -0.008 | 0.0631 | 0.0046 |
| LA45507 | 883 | 0.003 | 0.0195 | -0.0194 | 0.0515 |
| LA45507 | 1608 | -0.0572 | 0.0313 | -0.0393 | 0.1453 |
| LA45507 | 1609 | 0.0359 | 0.0088 | 0.0209 | -0.0518 |
| LA45507 | 884 | -0.086 | 0.0213 | -0.0613 | 0.246 |
| LA45507 | 893 | -0.0702 | -0.00005058 | 0.042 | -0.0199 |
| LA45508 | 1926 | -0.0651 | -0.0047 | 0.0518 | -0.0084 |
| LA45510 | 302 | -0.0486 | -0.0102 | 0.0629 | 0.0104 |
| LA70185 | 762 | -0.0632 | -0.0096 | 0.0579 | 0.0055 |
| LA70185 | 763 | -0.0564 | 0.0099 | -0.0027 | 0.0374 |
| LA70185 | 690 | -0.0315 | 0.0026 | 0.0398 | -0.0189 |
| LA70185 | 761 | -0.0878 | -0.0199 | 0.065 | 0.0211 |
| LA70185 | 1389 | -0.0855 | -0.0071 | -0.0011 | 0.109 |
| LA70185 | 1425 | -0.0801 | -0.004 | 0.0544 | -0.0124 |
| LA70185 | 1405 | -0.079 | -0.0036 | 0.0536 | -0.0131 |
| LA70185 | 1407 | -0.0749 | -0.0101 | 0.0732 | 0.0062 |
| LA70185 | 1421 | -0.0824 | -0.0087 | 0.0679 | -0.0023 |
| LA70185 | 420 | -0.0538 | 0.007 | 0.0192 | -0.0345 |
| LA70185 | 519 | -0.069 | -0.0029 | 0.0494 | -0.0131 |
| LA70185 | 360 | -0.0764 | -0.0119 | 0.0741 | 0.0053 |
| LA70185 | 238 | -0.0793 | -0.0053 | 0.059 | -0.008 |

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA70185 | 240 | -0.0002 | 0.0207 | -0.0031 | -0.0559 |
| LA70185 | 520 | -0.0564 | -0.0097 | 0.0754 | -0.0009 |
| LA70185 | 666 | -0.0078 | 0.0041 | 0.0342 | -0.0138 |
| LA70185 | 667 | -0.0666 | -0.00001546 | 0.0457 | -0.0175 |
| LA70185 | 665 | -0.0623 | 0.0032 | 0.0386 | -0.0256 |
| LA70185 | 521 | -0.0444 | 0.0015 | 0.0319 | -0.0154 |
| LA70185 | 537 | -0.0711 | 0.0033 | 0.0353 | -0.0267 |
| LA 39975 | 234 | 0.0937 | 0.1056 | -0.4738 | -0.0257 |
| LA 39975 | 269 | -0.0796 | 0.0086 | 0.0215 | 0.1457 |
| LA 39975 | 271 | 0.0178 | 0.0481 | -0.0476 | -0.1079 |
| LA 39975 | 272 | -0.0156 | 0.0315 | -0.0658 | 0.0151 |
| LA 39975 | 360 | 0.0034 | 0.0178 | -0.0131 | -0.0407 |
| LA 39975 | 367 | 0.0542 | 0.0309 | -0.0591 | -0.0554 |
| LA 39975 | 665 | -0.0333 | 0.0662 | -0.2084 | 0.2699 |
| LA 39975 | 682 | 0.0555 | 0.0646 | -0.122 | -0.1405 |
| LA 43786 | 18 | 0.1849 | 0.0978 | -0.2207 | 0.1584 |
| LA 70188 | 1478 | -0.0699 | 0.0067 | 0.0255 | -0.0329 |
| LA 70188 | 1482 | -0.0832 | -0.0067 | 0.062 | -0.0053 |
| LA 70189 | 1516 | 0.0343 | 0.0303 | -0.0439 | -0.0645 |
| LA 70189 | 195 | -0.074 | 0.0036 | 0.0336 | -0.0262 |
| LA 70189 | 196 | 0.1268 | 0.0555 | -0.1354 | 0.1139 |
| LA 70189 | 197 | -0.0246 | 0.012 | -0.0005 | -0.0346 |
| LA 70189 | 198 | -0.0828 | -0.0069 | 0.0625 | -0.0051 |
| LA 70189 | 199 | 2.1095 | 0.0291 | 0.2716 | 0.0711 |
| LA 70196 | 209 | -0.011 | 0.022 | -0.0312 | -0.0544 |
| LA 70196 | 216 | -0.0688 | 0.0048 | 0.0341 | -0.0222 |
| LA 70196 | 229 | -0.0613 | -0.0003 | 0.0375 | -0.0178 |
| LA 70196 | 241 | -0.0108 | 0.0475 | -0.133 | 0.1255 |
| LA 70196 | 304 | -0.0709 | -0.0087 | 0.0284 | -0.0007 |
| LA 75791 | 54 | -0.0462 | 0.0173 | 0.0259 | 0.1721 |
| LA 75791 | 104 | -0.0242 | 0.0263 | 0.0035 | 0.0377 |
| LA 75792 | 450 | -0.0666 | -0.0087 | -0.0151 | 0.0847 |
| LA 75792 | 455 | 0.0174 | 0.0062 | 0.029 | -0.0116 |
| LA 39968 | 915 | 0.3828 | 0.0915 | -0.2478 | 0.1029 |

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA 39968 | 449 | -0.0127 | -0.3975 | -0.0774 | 0.0257 |
| LA 39968 | 449 | -0.0182 | 0.0166 | -0.0043 | 0.0155 |
| LA 39968 | 1847 | 0.1483 | -0.0437 | 0.1604 | 0.0079 |
| LA 39968 | 1848 | -0.0449 | -0.0027 | 0.0469 | -0.0045 |
| LA 39968 | 1849 | -0.0095 | 0.0033 | 0.0444 | -0.0194 |
| LA 39968 | 1850 | -0.0021 | 0.0016 | 0.0577 | -0.0102 |
| LA 39968 | 1851 | -0.0191 | -0.3768 | -0.0914 | -0.0711 |
| LA 39968 | 1852 | -0.0313 | -0.0026 | 0.0541 | -0.0133 |
| LA 39968 | 1932 | 0.1102 | 0.0181 | -0.0034 | 0.0666 |
| LA 39968 | 2082 | -0.0218 | -0.0015 | 0.0475 | -0.0031 |
| LA 39968 | 2083 | -0.0031 | 0.0254 | 0.012 | -0.069 |
| LA 39968 | 2085 | -0.0253 | 0.0391 | -0.079 | 0.0201 |
| LA 39968 | 2188 | -0.0799 | 0.0357 | 0.0253 | -0.1323 |
| LA 39968 | 2189 | -0.0096 | 0.0045 | 0.0505 | -0.0198 |
| LA 39968 | 2190 | 0.0291 | 0.0161 | 0.0186 | -0.0421 |
| LA 39968 | 2191 | -0.036 | 0.089 | -0.3175 | 0.499 |
| LA 39968 | 2192 | 0.031 | 0.0535 | -0.114 | -0.0295 |
| LA 39968 | 2193 | 0.002 | 0.0082 | -0.0042 | -0.024 |
| LA 39968 | 2194 | -0.0381 | 0.0121 | -0.0139 | 0.0496 |
| LA 39968 | 2244 | -0.0438 | 0.0037 | 0.0459 | -0.0236 |
| LA 39968 | 2245 | 0.0625 | 0.0323 | -0.0281 | -0.0649 |
| LA 39968 | 2322 | -0.0084 | 0.0069 | 0.0455 | -0.0221 |
| LA 39968 | 2326 | -0.0872 | 0.0001 | 0.0764 | -0.0376 |
| LA 39968 | 2327 | -0.01 | 0.0221 | -0.0162 | -0.0601 |
| LA 39968 | 2374 | 0.0984 | 0.0663 | -0.1239 | -0.1396 |
| LA 39968 | 2375 | -0.0554 | -0.0081 | 0.0702 | 0.0019 |
| LA 39968 | 2381 | -0.0757 | 0.0003 | 0.0429 | -0.0204 |
| LA 39968 | 2520 | -0.0287 | -0.001 | 0.0408 | -0.0076 |
| LA 39968 | 2521 | -0.0348 | 0.0245 | -0.0772 | 0.2346 |
| LA 39969 | 343 | -0.0677 | 0.0131 | -0.0062 | 0.0444 |
| LA 39969 | 364 | -0.0325 | 0.0037 | 0.0121 | 0.0845 |
| LA 39969 | 365 | 0.0474 | 0.0148 | 0.012 | -0.0305 |
| LA 39969 | 397 | -0.0502 | 0.0069 | 0.0287 | -0.0303 |
| LA 39969 | 449 | -0.0704 | 0.0031 | 0.0361 | -0.0263 |

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA 39969 | 694 | -0.0031 | 0.0336 | -0.0186 | -0.0162 |
| LA 39969 | 697 | 0.0276 | 0.0065 | 0.0517 | -0.0189 |
| LA 39969 | 722 | -0.0233 | 0.0454 | -0.0471 | -0.126 |
| LA 39969 | 832 | -0.0441 | -0.4278 | -0.0723 | -0.003 |
| LA 39969 | 956 | -0.1122 | -0.0322 | 0.2911 | 0.0671 |
| LA 39969 | 956 | -0.0479 | 0.0166 | 0.0407 | -0.0667 |
| LA 39969 | 956 | -0.0216 | 0.0323 | -0.0087 | -0.0942 |
| LA 39969 | 970 | -0.0435 | -0.0002 | 0.0364 | -0.0173 |
| LA 39969 | 1046 | -0.0806 | -0.0061 | 0.0608 | -0.0077 |
| LA 39969 | 1050 | 0.0244 | 0.0076 | -0.0284 | -0.0188 |
| LA 39969 | 1050 | 0.0933 | -0.0145 | 0.1065 | -0.0134 |
| LA 39969 | 1050 | -0.0563 | 0.0195 | 0.0264 | -0.0765 |
| LA 39969 | 1050 | -0.0499 | 0.0241 | -0.0213 | -0.0699 |
| LA 39969 | 1050 | -0.0727 | -0.0066 | 0.0637 | -0.0042 |
| LA 39969 | 1050 | -0.0251 | 0.0389 | -0.0173 | -0.1217 |
| LA 39969 | 1050 | 0.0055 | 0.0566 | -0.0868 | -0.0466 |
| LA 39969 | 1050 | -0.002 | 0.032 | -0.0628 | 0.0387 |
| LA 39969 | 1096 | -0.0013 | 0.0052 | 0.0404 | -0.0162 |
| LA 39969 | 1097 | -0.0605 | 0.002 | 0.0364 | -0.0211 |
| LA 39969 | 1123 | -0.0558 | 0.0167 | -0.0007 | -0.0542 |
| LA 39969 | 1141 | -0.0694 | -0.0061 | 0.0592 | -0.0069 |
| LA 39969 | 1143 | -0.0557 | 0.016 | 0.0015 | -0.0531 |
| LA 39969 | 1154 | 0.0083 | 0.0008 | 0.0548 | -0.0109 |
| LA 39969 | 1174 | 0.2315 | -1.1597 | -0.2366 | -0.0427 |
| LA 39969 | 1175 | 0.5047 | 0.1132 | -0.0544 | -0.1798 |
| LA 39972 | 281 | -0.0612 | -0.0072 | 0.0645 | -0.0008 |
| LA 39972 | 495 | -0.0164 | 0.0099 | 0.0092 | -0.0253 |
| LA 39972 | 496 | -0.052 | 0.009 | 0.0222 | -0.0362 |
| LA 3279 | 79 | -0.0627 | 0.0223 | -0.036 | 0.0542 |
| LA 3279 | 114 | 0.2155 | 0.0193 | -0.0147 | -0.0252 |
| LA 3279 | 168 | 0.0729 | 0.0406 | -0.0577 | 0.0239 |
| LA 89846 | 191 | -0.0354 | 0.0067 | -0.004 | 0.067 |
| LA 3279 | 230 | -0.0703 | -0.0055 | 0.0608 | -0.0066 |
| LA 3279 | 231 | -0.0397 | 0.02 | -0.0307 | 0.0447 |

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA 3279 | 256 | 0.1384 | 0.0047 | -0.0104 | 0.0397 |
| LA 3279 | 306 | -0.0277 | -0.0032 | -0.0023 | -0.0094 |
| LA 3279 | 307 | -0.0596 | -0.0057 | 0.056 | -0.0057 |
| LA 3279 | 347 | 0.0312 | 0.0528 | -0.1266 | 0.0956 |
| LA 3279 | 348 | 0.0514 | -0.0129 | 0.0303 | 0.023 |
| LA 3279 | 352 | -0.0401 | 0.0033 | 0.0244 | -0.0233 |
| LA 3279 | 353 | -0.0189 | -0.0071 | 0.0264 | 0.000093389 |
| LA 3279 | 357 | -0.0429 | -0.0018 | 0.0561 | -0.0157 |
| LA 3279 | 358 | 0.0054 | 0.0175 | -0.0179 | -0.0433 |
| LA 3279 | 360 | -0.0033 | 0.0074 | 0.0105 | -0.0159 |
| LA 3279 | 361 | 0.0234 | -0.0055 | 0.0516 | 0.0195 |
| LA 3279 | 362 | 0.0046 | 0.0023 | 0.0193 | -0.0125 |
| LA 3279 | 363 | 0.0851 | 0.000064 | 0.0305 | 0.0073 |
| LA 3279 | 370 | -0.0232 | 0.0094 | 0.001 | 0.179 |
| LA 3279 | 372 | -0.0701 | 0.01 | 0.0594 | -0.0577 |
| LA 3279 | 373 | 0.0058 | 0.0075 | 0.0226 | -0.0216 |
| LA 3279 | 374 | -0.0535 | 0.0133 | -0.0053 | 0.0538 |
| LA 3279 | 387 | 0.0034 | 0.0177 | -0.0141 | -0.0379 |
| LA 3279 | 475 | 0.0976 | 0.0311 | -0.019 | -0.0541 |
| LA 3279 | 492 | 0.0953 | 0.0136 | -0.0624 | 0.0849 |
| LA 3279 | 493 | 0.1652 | 0.007 | -0.0234 | 0.1123 |
| LA 3279 | 505 | 0.0489 | 0.0281 | -0.1061 | -0.0557 |
| LA 3279 | 519 | 0.16 | 0.2242 | -0.56 | -0.4717 |
| LA 3279 | 519 | -0.0427 | 0.0289 | -0.0338 | -0.0804 |
| LA 3279 | 519 | -0.0467 | -0.0006 | 0.0333 | -0.0154 |
| LA 3279 | 522 | -0.0081 | 0.0187 | 0.0227 | -0.0672 |
| LA 3279 | 555 | -0.0418 | 0.0276 | -0.0581 | 0.0432 |
| LA 3279 | 610 | 0.0147 | 0.0384 | -0.0963 | 0.0315 |
| LA 3279 | 614 | 0.0083 | 0.0051 | 0.0504 | -0.0148 |
| LA 3279 | 632 | -0.0524 | 0.0038 | 0.0332 | -0.0248 |
| LA 3279 | 650 | -0.0471 | 0.0021 | 0.0309 | -0.0169 |
| LA 3279 | 674 | -0.0803 | -0.0072 | 0.0641 | -0.0054 |
| LA 3279 | 678 | -0.0842 | -0.0085 | 0.0668 | -0.0024 |
| LA 3279 | 678 | 0.0593 | 0.0194 | -0.0124 | 0.0831 |

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA 3279 | 714 | 0.012 | 0.009 | 0.0318 | -0.0283 |
| LA 3279 | 735 | -0.0038 | 0.0052 | 0.0121 | -0.0248 |

Eigenvectors (Component Loadings**)**

| Taxa | Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 |
|---|---|---|---|---|---|---|---|---|
| *Pinus* | 0.4026 | 0.0058 | 0.125 | 0.034 | -0.0066 | 0.0451 | 0.0257 | 0.0366 |
| *Juniperus* | 0.2483 | 0.075 | 0.004 | -0.1048 | 0.0012 | 0.2238 | 0.1106 | 0.1218 |
| *Quercus* | 0.3962 | -0.0169 | 0.1197 | 0.0191 | -0.0538 | 0.078 | 0.0213 | 0.0328 |
| Onagraceae | 0.0168 | 0.001 | 0.015 | 0.0289 | 0.4485 | -0.6955 | -0.0453 | 0.2543 |
| *Polygala* | 0.0169 | 0.053 | -0.3285 | -0.0208 | 0.0727 | -0.1839 | 0.11 | -0.6582 |
| Rosaceae | 0.0215 | -0.5458 | -0.146 | -0.0245 | 0.074 | 0.0956 | -0.0072 | 0.0519 |
| Solanaceae | 0.0281 | -0.5544 | -0.1632 | -0.0647 | -0.0684 | -0.0332 | 0.0033 | -0.0152 |
| *Polygonum* | 0.0271 | -0.546 | -0.1521 | -0.0086 | -0.0868 | -0.0268 | -0.003 | -0.0303 |
| Poaceae | 0.3768 | 0.0026 | 0.0504 | 0.0705 | -0.0863 | 0.0469 | -0.0227 | -0.0728 |
| Cheno-am | 0.1813 | 0.1734 | -0.4723 | -0.3675 | -0.1186 | 0.0872 | 0.0076 | 0.0234 |
| Cheno-am af | -0.0209 | -0.0165 | 0.2041 | 0.0544 | -0.0032 | -0.0078 | 0.5775 | -0.4272 |
| Asteraceae hs | 0.3131 | 0.0038 | -0.0947 | 0.1009 | 0.0828 | -0.2413 | -0.1417 | -0.0605 |
| Asteraceae ls | 0.3173 | -0.0444 | -0.0369 | 0.114 | 0.1463 | -0.2122 | -0.0103 | -0.0161 |
| *Artemisia* | 0.3523 | 0.0071 | 0.1308 | 0.033 | -0.044 | 0.0174 | -0.0472 | -0.0478 |
| *Platyopuntia* | -0.0086 | 0.0318 | -0.0208 | 0.3265 | 0.2982 | 0.2335 | -0.4968 | -0.3181 |
| *Cylindropuntia* | -0.0184 | 0.0574 | -0.0126 | -0.1884 | -0.4853 | -0.134 | -0.4587 | 0.0099 |
| *Ephedra* | -0.0191 | -0.0481 | -0.0368 | 0.0983 | 0.4779 | 0.4673 | -0.0303 | 0.1675 |
| Unknown | 0.305 | -0.0764 | 0.2068 | 0.0371 | -0.0726 | 0.0239 | 0.028 | -0.0189 |
| Indeterminate | 0.1528 | 0.167 | -0.4545 | -0.3265 | 0.267 | 0.084 | 0.1549 | 0.1223 |
| *Sphaeralcea* | -0.0172 | 0.0523 | -0.2397 | 0.5183 | -0.2528 | -0.0337 | 0.3523 | 0.3731 |
| *Zea mays* | 0.033 | 0.1111 | -0.4329 | 0.5346 | -0.1669 | 0.0194 | -0.0942 | -0.0506 |

| Taxa | Axis 9 | Axis 10 | Axis 11 | Axis 12 |
|---|---|---|---|---|
| *Pinus* | 0.0521 | -0.024 | 0.0288 | -0.0657 |
| *Juniperus* | 0.0511 | 0.1327 | 0.7689 | 0.0784 |
| *Quercus* | 0.0649 | -0.0038 | 0.1459 | -0.0393 |
| Onagraceae | 0.116 | 0.1761 | 0.1299 | -0.0204 |
| *Polygala* | 0.1582 | -0.4845 | 0.2219 | -0.2735 |
| Rosaceae | 0.1576 | 0.011 | -0.0593 | -0.1382 |
| Solanaceae | -0.1006 | 0.0849 | 0.0382 | -0.0139 |
| *Polygonum* | -0.0921 | 0.072 | 0.0964 | 0.1316 |
| Poaceae | -0.0429 | -0.0388 | 0.0109 | 0.1418 |

| Taxa | Axis 9 | Axis 10 | Axis 11 | Axis 12 |
|---|---|---|---|---|
| Cheno-am | -0.0885 | 0.1538 | -0.2142 | 0.0848 |
| Cheno-am af | 0.2504 | 0.5975 | -0.126 | -0.0016 |
| Asteraceae hs | 0.0276 | 0.0704 | -0.2477 | 0.0122 |
| Asteraceae ls | 0.1247 | -0.045 | 0.064 | 0.104 |
| *Artemisia* | -0.0818 | -0.0518 | -0.2984 | -0.042 |
| *Platyopuntia* | -0.3429 | 0.392 | 0.1145 | -0.3021 |
| *Cylindropuntia* | 0.54 | 0.2572 | 0.0529 | -0.3237 |
| *Ephedra* | 0.5845 | -0.1366 | -0.1592 | -0.0564 |
| Unknown | -0.0527 | -0.1373 | -0.2016 | -0.2238 |
| Indeterminate | -0.1162 | 0.2141 | -0.0817 | -0.2028 |
| *Sphaeralcea* | -0.0846 | -0.014 | 0.0308 | -0.5325 |
| *Zea mays* | 0.1974 | 0.0909 | -0.0234 | 0.512 |

Table 5.85a. Results of PCA, Pollen Wash Samples

| Axis | Eigenvalue | Percent of Total | Cumulative Percent |
|---|---|---|---|
| 1 | 688.438 | 54.04 | 54.04 |
| 2 | 229.874 | 18.05 | 72.09 |
| 3 | 158.304 | 12.43 | 84.52 |
| 4 | 111.754 | 8.77 | 93.29 |
| 5 | 47.135 | 3.7 | 96.99 |
| 6 | 10.946 | 0.86 | 97.85 |
| 7 | 9.174 | 0.72 | 98.57 |
| 8 | 7.45 | 0.58 | 99.15 |
| 9 | 4.424 | 0.35 | 99.5 |
| 10 | 2.669 | 0.21 | 99.71 |
| 11 | 1.33 | 0.1 | 99.81 |
| 12 | 1.204 | 0.09 | 99.91 |
| 13 | 0.473 | 0.04 | 99.95 |
| 14 | 0.467 | 0.04 | 99.98 |
| 15 | 0.178 | 0.01 | 100 |
| 16 | 0.045 | 0.003497 | 100 |

Table 5.85b. Eigenvectors

| Taxon | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|
| *Pinus* | 0.225 | 0.8792 | -0.4014 | -0.1066 |
| *Juniperus* | 0.0029 | 0.0058 | 0.003 | -0.0042 |
| *Quercus* | -0.0013 | 0.0046 | -0.0148 | -0.0164 |
| *Ulmus* | 0.0771 | 0.0186 | 0.104 | 0.2766 |
| Solanaceae | 0.0121 | 0.0046 | 0.0313 | -0.0081 |
| *Campanula* | 0 | 0 | 0 | 0 |
| Poaceae | 0.3871 | -0.0561 | -0.1628 | 0.86 |
| Cheno-am | 0.1906 | 0.371 | 0.8735 | 0.073 |
| Asteraceae hs | 0.0496 | -0.0064 | -0.0133 | -0.0672 |
| Asteraceae ls | 0.1209 | 0.0194 | 0.18 | -0.0968 |
| *Artemisia* | 0.0377 | -0.0187 | -0.0225 | -0.0714 |
| *Platyopuntia* | 0.0114 | -0.0205 | 0.0062 | -0.0401 |
| *Ephedra* | 0.0166 | -0.0062 | -0.0015 | -0.0277 |
| Unknown | 0.0102 | 0.0021 | 0.0302 | -0.0072 |
| Indeterminate | 0.859 | -0.2905 | -0.0486 | -0.3779 |
| *Zea mays* | 0.0146 | 0.0143 | -0.0312 | -0.0523 |

Table 5.85c. Component Scores

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA 45507 | 682 | -1.4232 | -0.5295 | -0.2762 | 0.0272 |
| LA 45507 | 684 | -1.842 | -0.955 | -0.4387 | 0.0027 |
| LA 45507 | 1193 | -0.6587 | -0.7701 | -0.5905 | -0.1777 |
| LA 45507 | 1196 | 0.8399 | -1.2248 | -0.0275 | -0.3964 |
| LA 45507 | 1475 | 0.414 | -0.7856 | 0.2455 | -0.954 |
| LA 45507 | 1578 | 0.5535 | -1.6653 | -0.2575 | -0.3524 |
| LA 45507 | 1604 | 5.8151 | -0.1694 | -0.3422 | -2.1413 |
| LA 45507 | 1607 | 7.5322 | -2.7625 | -2.3985 | 1.7886 |
| LA 45507 | 1783 | -1.2935 | -0.507 | -0.0409 | 0.2648 |
| LA 45507 | 1898 | 0.9728 | 0.8628 | 0.8466 | 0.7531 |
| LA 45507 | 1976 | -0.2254 | -1.205 | -0.4867 | 2.9316 |
| LA 45507 | 1995 | -0.5931 | 1.5119 | 5.722 | 1.4784 |
| LA 45508 | 228 | 0.1819 | 1.4554 | -1.5067 | 1.3597 |
| LA 45508 | 307 | -0.8732 | 0.1224 | -0.4968 | -0.0569 |

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA 45508 | 535 | 0.2039 | 0.9042 | -1.8322 | -1.0633 |
| LA 45508 | 541 | -0.5651 | -0.8638 | 0.7404 | -0.0901 |
| LA 45508 | 556 | -0.8732 | 0.4038 | -0.8101 | 0.2278 |
| LA 45508 | 593 | 5.4935 | -3.0526 | 0.2872 | -3.1411 |
| LA 45510 | 489 | 0.7007 | 4.9076 | -1.1404 | -0.9759 |
| LA 70185 | 125 | -1.6514 | -0.6082 | -0.2661 | 0.1116 |
| LA 70185 | 350 | -0.8813 | 0.3758 | 0.9117 | 0.1799 |
| LA 70185 | 627 | -0.4699 | -0.1342 | 0.6266 | 0.682 |
| LA 70185 | 650 | 14.2637 | -0.1774 | -0.7769 | 6.5977 |
| LA 70185 | 766 | -0.9494 | -0.4771 | -0.1312 | 0.9069 |
| LA 70185 | 767 | -0.7665 | 0.2306 | 0.625 | 0.157 |
| LA 70185 | 768 | -0.9681 | 0.6449 | -0.1255 | -0.044 |
| LA 70185 | 1211 | -1.6818 | -0.7203 | -0.2715 | -0.0323 |
| LA 70185 | 1212 | 1.3093 | 2.7707 | 1.8017 | 0.2452 |
| LA 70185 | 1319 | 0.9005 | 0.8331 | 2.4628 | -0.0248 |
| LA 70185 | 1326 | -1.7737 | 0.3907 | -1.2172 | -0.1308 |
| LA 70185 | 1511 | -1.023 | -0.5388 | -0.2597 | 0.7046 |
| LA 37919 | 45 | -1.421 | -0.6177 | -0.7499 | -0.2449 |
| LA 39975 | 361 | -1.0761 | -0.6996 | 0.8723 | -0.2079 |
| LA 39975 | 577 | -1.9511 | -1.0931 | -0.6171 | 0.4656 |
| LA 39975 | 587 | -0.0633 | 0.4291 | 2.2539 | 0.3655 |
| LA 39975 | 631 | -0.3431 | 0.1548 | -1.399 | -0.7621 |
| LA 39975 | 632 | -0.3808 | -0.1146 | -0.1702 | -0.613 |
| LA 39975 | 667 | 0.8781 | -0.2065 | 1.3795 | -0.0183 |
| LA 70188 | 1206 | 7.6623 | 1.0487 | 4.6032 | -1.261 |
| LA 70188 | 1273 | 1.0087 | -2.0255 | -0.6937 | -0.553 |
| LA 70188 | 1276 | 12.793 | -2.5362 | -0.8407 | -3.9623 |
| LA 70188 | 1296 | -1.5436 | -1.1464 | -0.5502 | -0.2307 |
| LA 70188 | 1400 | 4.74 | 4.7176 | 1.407 | -0.7554 |
| LA 70188 | 1426 | -1.9469 | -0.9743 | -0.6282 | -0.0432 |
| LA 70188 | 1438 | -0.3962 | 0.4552 | -1.0815 | -0.3651 |
| LA 70188 | 1462 | -0.9541 | -0.8135 | -0.013 | -0.3639 |
| LA 70188 | 1469 | -1.1244 | -0.8744 | 0.1795 | -0.2715 |
| LA 70196 | 261 | -1.6275 | 0.5694 | -0.8101 | -0.2422 |
| LA 70196 | 263 | 0.0019 | 0.3597 | 0.9259 | -0.5879 |

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA 70196 | 270 | -1.6527 | -0.9925 | -0.4705 | -0.0567 |
| LA 70196 | 271 | 0.9332 | -0.0314 | 0.2127 | -1.1497 |
| LA 70196 | 272 | -1.1067 | -0.9139 | 0.0765 | -0.2867 |
| LA 75792 | 781 | -1.798 | -0.9084 | -0.2958 | -0.051 |
| LA 39968 | 552 | 0.2071 | 0.4652 | -1.8816 | 1.3212 |
| LA 39968 | 552 | -1.8066 | -0.4046 | 1.0062 | 0.1761 |
| LA 39968 | 552 | 0.3461 | 3.2731 | -0.9788 | 0.1319 |
| LA 39968 | 1105 | 1.1324 | 8.9177 | -4.5488 | -0.6128 |
| LA 39968 | 1495 | -1.3526 | 0.0412 | 0.2713 | 0.1514 |
| LA 39968 | 1871 | -0.3672 | 2.6577 | 0.1273 | -0.4551 |
| LA 39968 | 1947 | | | | |
| LA 39968 | 2080 | -1.3304 | 0.5221 | 3.1881 | 0.3585 |
| LA 39968 | 2338 | -1.3863 | -0.8625 | -0.1201 | 1.4587 |
| LA 39968 | 2378 | | | | |
| LA 39968 | 2379 | -1.3521 | 0.5484 | -0.4608 | 0.017 |
| LA 39968 | 2380 | -2.0585 | -0.8237 | -0.4491 | 0.0332 |
| LA 39968 | 2381 | -1.7706 | -0.798 | -0.2327 | 0.2106 |
| LA 39968 | 2562 | -2.0736 | -0.8238 | -0.5438 | 0.0299 |
| LA 39969 | 250 | -0.4678 | -1.509 | -0.875 | 0.6183 |
| LA 39969 | 339 | -1.5435 | -1.2705 | -0.586 | -0.2194 |
| LA 39969 | 367 | -1.4486 | -0.6148 | -0.6771 | 0.1491 |
| LA 39969 | 709 | -0.0223 | -0.2504 | -0.4946 | -0.8371 |
| LA 39969 | 792 | -1.3249 | 0.0611 | 0.221 | -0.1167 |
| LA 39969 | 821 | 1.5877 | 0.8828 | -1.1037 | -0.8889 |
| LA 39969 | 827 | | | | |
| LA 39969 | 1101 | -1.5387 | 0.4429 | 0.9343 | 0.0813 |
| LA 39969 | 1169 | 0.4416 | -0.4432 | 0.6168 | 0.4108 |
| LA 39969 | 1169 | -0.7917 | -0.5457 | -0.4164 | -0.0157 |
| LA 39969 | 1185 | -1.7286 | -0.9152 | -0.726 | 0.1526 |
| LA 39972 | 88 | 1.8924 | -0.5553 | -0.1116 | -1.5295 |
| LA 39972 | 181 | -1.7991 | -0.3039 | -0.0343 | 0.1969 |
| LA 39972 | 262 | -1.8625 | -0.9116 | -0.2024 | 0.5046 |
| LA 39972 | 356 | -1.3875 | 1.0668 | 0.7986 | 0.0502 |
| LA 39972 | 504 | -0.3734 | 0.0221 | -1.4627 | 0.4066 |
| LA 39972 | 549 | -1.3534 | -1.033 | -0.0775 | 0.1258 |

| Site | FS | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---|---|---|---|---|---|
| LA 43766 | 448 | | | | |
| LA 43766 | 478 | | | | |
| LA 43766 | 650 | -0.3178 | -0.7184 | -0.4134 | 0.5493 |
| LA 43766 | 689 | -1.3596 | -1.3326 | -0.5964 | -0.3003 |
| LA 43766 | 693 | -1.7796 | -0.313 | -0.2452 | 0.1683 |
| LA 3279 | 337 | -1.1093 | -0.6889 | 0.8685 | -0.148 |
| LA 3279 | 347 | -1.1167 | 1.3083 | 2.6073 | 0.1993 |
| LA 3279 | 507 | -0.9138 | 1.4355 | 0.4185 | -0.1833 |
| LA 3279 | 541 | -1.171 | 1.4195 | 2.0131 | 0.163 |

Table 5.86. Percentage of Corn Positive Samples

| Date Range | Site | Zea mays +/ | Percentage Corn Positive | Percentage Sample Corn Positive by Period |
|---|---|---|---|---|
| Pollen Wash Samples | | | | |
| 1055-20 B.C. | LA 43766 | 0/3 | 0.00 | o.oo |
| | LA 39972 | 0/3 | 0.00 | |
| A.D. 0-420 | LA 70188 | 2/9 | 22.22 | 47.61 |
| | LA 45508 | 5/6 | 83.33 | |
| | LA 39975 | 3/6 | 50.00 | |
| A.D. 700-1000 | LA 45507 | 11/12 | 91.66 | 88.88 |
| | LA 70196 | 4/5 | 80.00 | |
| | LA 45510 | 1/1 | 100.00 | |
| A.D. 1000-1200 | LA 39972 | 0/3 | 0.00 | 36.84 |
| | LA 39969 | 1/10 | 10.00 | |
| | LA 70185 | 9/12 | 75.00 | |
| | LA 39968 | 2/12 | 16.66 | |
| | LA 75792 | 1/1 | 100.00 | |
| Post-A.D. 1200 | LA 3279 | 0/4 | 0.00 | 20.00 |
| | LA 37919 | 1/1 | 100.00 | |
| Soil Pollen Samples | | | | |
| 1120-70 B.C. | LA 43786 | 1/1 | 100.00 | 66.66 |
| | LA 75792 | 1/2 | 50.00 | |
| | LA 75791 | 1/1 | 100.00 | |
| | LA 70188 | 1/2 | 50.00 | |
| A.D. 330-700 | LA 39975 | 5/8 | 62.50 | 50.00 |

| Date Range | Site | Zea mays +/ | Percentage Corn Positive | Percentage Sample Corn Positive by Period |
|---|---|---|---|---|
| | LA 39972 | 0/1 | 0.00 | |
| | LA 70189 | 0/1 | 0.00 | |
| | LA 70196 | 2/4 | 50.00 | |
| | LA 45508 | 0/1 | 0.00 | |
| | LA 45507 | 1/1 | 100.00 | |
| A.D. 700-1000 | LA 75791 | 0/1 | 0.00 | 16.66 |
| | LA 70196 | 0/1 | 0.00 | |
| | LA 45507 | 2/17 | 11/76 | |
| | LA 89846 | 0/1 | 0.00 | |
| | LA 70185 | 3/10 | 30.00 | |
| A.D. 1000-1200 | LA 39972 | 0/2 | 0.00 | 32.89 |
| | LA 70189 | 2/4 | 50.00 | |
| | LA 39969 | 7/30 | 23.33 | |
| | LA 70185 | 1/9 | 11.11 | |
| | LA 45510 | 0/1 | 0.00 | |
| | LA 39968 | 15/30 | 50.00 | |
| Post-A.D. 1200 | LA 3279 | 11/41 | 26.82 | 30.23 |
| | LA 70189 | 2/2 | 100.00 | |

Table 5.87. Average Economic and Noneconomic Pollen Concentration Values (grains sq/cm) by Age

| Age Range | Forbs Excluded from Economic Pollen | | Forbs Included in Economic Pollen | |
|---|---|---|---|---|
| | Economic | Noneconomic | Economic | Noneconomic |
| | | Pollen Wash Samples | | |
| 1055-20 B.C. | 0.0000 | 20.6073 | 10.5548 | 10.0525 |
| A.D. 0-420 | 1.6000 | 67.3281 | 20.4476 | 48.4805 |
| A.D. 700-1000 | 2.5217 | 59.2900 | 22.9250 | 38.8867 |
| A.D. 1000-1200 | 0.9668 | 45.8646 | 19.7977 | 27.0336 |
| Post-A.D. 1200 | 0.0000 | 35.9460 | 21.3472 | 14.5988 |
| | | Soil Pollen Samples | | |
| 1120-70 B.C. | 23.8627 | 520.5990 | 232.5096 | 411.9521 |
| A.D. 330-700 | 17.2063 | 650.8937 | 250.9781 | 417.1220 |
| A.D. 700-1000 | 11.8208 | 475.7998 | 190.4670 | 297.1531 |
| A.D. 1000-1200 | 12.8254 | 682.8533 | 294.3528 | 401.3259 |
| Post-A.D. 1200 | 15.1187 | 1063.543 | 252.5095 | 826.1517 |

Table 5.88. Potential Economic Use of Local Taxa

| Taxon | Medicinal | Food | Ritual | Utilitarian |
|---|---|---|---|---|
| Amaranthaceae | | | | |
| *Amaranthus* sp. | *x* | *x* | *x* | |
| *Asteraceae* | | | | |
| *Achillea* sp. | *x* | | *x* | |
| *Artemisia* sp. | *x* | | *x* | *x* |
| *Aster* sp. | *x* | | | |
| *Chrysothamnus* sp. | *x* | | | |
| *Cirsium* sp. | *x* | | | |
| *Coreopsis* sp. | *x* | | | |
| *Erigeron* sp. | *x* | | | |
| *Gaillardia sp.* | *x* | | *x* | |
| *Lactuca sp.* | | *x* | *x* | |
| *Ratiba sp.* | *x* | | | |
| *Senecio sp.* | *x* | | *x* | |
| *Solidago sp.* | *x* | | | |
| *Taraxacum sp.* | *x* | | | |
| *Tragopogon sp.* | *x* | | *x* | |
| *Boraginaceae* | | | | |
| *Heliotropium sp.* | *x* | | | |
| *Brassicaceae* | | | | |
| *Lepidium sp.* | *x* | | | |
| *Cactaceae* | | | | |
| *Eichinocerus sp.* | *x* | *x* | | |
| *Opuntia imbricata* | | *x* | | |
| *Opuntia phaecantha* | *x* | *x* | | |
| *Chenopodiaceae* | | | | |
| *Atriplex canescens* | *x* | | | *x* |
| *Chenopodium sp.* | *x* | | | *x* |
| *Convolvulaceae* | | | | |
| *Ipomopsis aggregata* | | | | |
| *Crassulaceae* | | | | |
| *Sedum sp.* | | | | |

| Taxon | Medicinal | Food | Ritual | Utilitarian |
|---|---|---|---|---|
| *Cucurbitaceae* | | | | |
| *Cucrubita foetidissima* | *x* | | *x* | |
| *Cucurbita pepo* | *x* | *x* | *x* | |
| *Cupressaceae* | | | | |
| *Juniperus depeanna* | | | | |
| *Juniperus monosperma* | *x* | | | *x* |
| *Ephedraceae* | | | | |
| *Ephedra* | *x* | | | *x* |
| *Ericaceae* | | | | |
| *Arctostaphylos sp.* | *x* | | *x* | |
| *Fabaceae* | | | | |
| *Astragalus sp.* | *x* | | | |
| *Cassia sp.* | *x* | | | |
| *Dalea sp.* | *x* | | | |
| *Lupinus sp.* | *x* | | | |
| *Melilotus sp.* | *x* | | | |
| *Robinia neomexicana* | *x* | | | *x* |
| *Shrankia sp.* | | | | |
| *Trifolium sp.* | *x* | | *x* | |
| *Fagaceae* | | | | |
| *Quercus gambelii* | *x* | | | *x* |
| *Hedyotis sp.* | | | | |
| *Lamiaceae* | | | | |
| *Lycopus sp.* | | *x* | | |
| *Linaceae* | | | | |
| *Linum sp.* | *x* | | | *x* |
| *Malvaceae* | | | | |
| *Sphaeralcea* | *x* | *x* | | |
| *Nyctaginaceae* | *x* | | | |
| *Onagraceae* | | | | |
| *Gaura sp.* | *x* | | | |
| *Papaveraceae* | | | | |
| *Argemone* sp. | x | | | |
| Pinaceae | | | | |

| Taxon | Medicinal | Food | Ritual | Utilitarian |
|---|---|---|---|---|
| Picea engelmanii | x | | x | x |
| Pinus edulis | x | x | | x |
| Pinus ponderosa | x | | x | x |
| Pseudotsuga menziesii | x | | x | x |
| Poaceae | | | | used in matting |
| Aristata sp. | | | | x |
| Boutelua sp. | x | | | x |
| Bromus sp. | x | | | x |
| Hilaria sp. | x | | | x |
| Hordeum sp. | x | | | x |
| Muhlenbergia sp. | x | | | x |
| Oryzopsis sp. | | x | | x |
| Sporobolus sp. | | | | x |
| Zea mays | x | x | | x |
| Polygonaceae | | | | |
| Polygonum sp. | x | | | |
| Eriogonum | x | | | |
| Ranunculaceae | | | | |
| Ranunculus sp. | x | | | |
| Anemone sp. | | | | |
| Rosaceae | | | | |
| Fallugia paradoxa | | | x | |
| Potentilla sp. | x | | | |
| Rubiaceae | | | | |
| Hedyotis | | | | |
| Scrophulariaceae | | | | |
| Castilleja sp. | x | | | |
| Penstemon barbatus | x | | | |
| Verbascum thalspi | x | | | |
| Solanaceae- several taxa | x | | x | |

# *POLLEN, PHYTOLITH, MACROFLORAL, AND PARASITE ANALYSIS OF A CANID COPROLITE FROM LA 45507*

Linda Scott Cummings and Kathryn Puseman

A Canidae (dog family) coprolite was recovered from an encircling dirt bench within a large pithouse at Luna Village (LA 45507) near Luna, New Mexico. LA 45507 is a large pithouse village of the Mogollon culture, dating in the A.D. 900s. The coprolite was most likely deposited after abandonment of the pithouse and was examined for pollen, phytolith, macrofloral, and parasite remains.

## METHODS

Approximately 1.25 ml of coprolitic material from the interior of the coprolite was placed in trisodium phosphate to disaggregate and wet the organic remains in preparation for extraction of pollen. This material was then screened through 150 micron mesh. After concentrating in a centrifuge tube, the sample was rinsed until neutral, using distilled water. The sample received a short (10 minute) treatment in hot hydrofluoric acid to remove any inorganic particles. The samples were then acetolated for three minutes to remove extraneous organic matter.

A light microscope was used to count the pollen to a total of 100 pollen grains at a magnification of 500x. Pollen preservation in this sample was fairly good. Comparative reference material collected at the Intermountain Herbarium at Utah State University and the University of Colorado Herbarium was used to identify the pollen to the family, genus, and species level, where possible.

Pollen aggregates were recorded during identification of the pollen. Aggregates are clumps of a single type of pollen and may be interpreted to represent pollen dispersal over short distances or the actual introduction of portions of the plant into an archaeological setting.

Indeterminate pollen includes pollen grains that are folded, mutilated, and otherwise distorted beyond recognition. These grains are included in the total pollen count because they are part of the pollen record.

Extraction of phytoliths used 1.25 ml of coprolite, again added to trisodium phosphate. The phytolith sample was also sieved through 150 micron mesh. The material passing through the mesh was saved and concentrated in a centrifuge tube. Clorox bleach was used to destroy the organic fraction from the coprolite. Once this reaction was complete, the remaining material was rinsed with distilled water. The remaining inorganic fraction was dried, then mixed with zinc bromide (density 2.3) and centrifuged to separate the phytoliths, which will float, from the other silica, which will not. Phytoliths, in the broader sense, may include opal phytolith and calcium oxylate crystals. Calcium oxylate crystals are formed by *Opuntia* (prickly pear cactus) and are separated, rather than destroyed, using this extraction technique, since it employs no acids. Any clay present is floated with the phytoliths and is further removed by mixing distilled water, then alcohols to remove the water. After several alcohol rinses, the samples are mounted in benzyl benzonate for counting with a light microscope at a magnification of 500x.

A small quantity of coprolite was placed in trisodium phosphate in a 4 dram glass vial. After this section rehydrated, it was rinsed while still in the vial. AFA (alcohol-formation-acetic acid) was added to the coprolite remains to fill the vial, and the material was shaken to suspend the light fraction, including any parasite eggs present. After 24 hours the uppermost portion of the liquid was drawn off and used to make a microscope slide for examination.

The remaining part of the coprolite was screened through a 150 micron mesh sieve to recover any macrofloral remains and allowed to dry. The sample was passed through a series of graduated screens (US Standard Sieves with 2 mm, 1 mm, 0.5 mm, and 0.25 openings) to separate charcoal debris and to initially sort the material. The contents of each screen were then examined. Charcoal pieces larger than 2 mm in diameter were broken to expose a fresh cross section and examined under a binocular microscope at magnifications up to 80 x. The material that remained in the 2 mm, 1 mm, 0.5 mm, and 0.25 sieves was scanned under a binocular stereo microscope at a magnification of 8x. The material that passed through the .25 mm screen was not examined. Estimates of bone fragment frequencies were calculated from the sort of a portion of the total volume floated and are represented in the macrofloral table by an asterisk (*). Remains were recorded as charred and/or uncharred, whole and/or fragments.

## DISCUSSION

Pollen, phytolith, and macrofloral analysis were undertaken on this canid coprolite to identify foods that the dog may have eaten. Parasite examination was undertaken to identify any parasites represented through the presence of eggs. The pollen record (Table 5.89) is typical of that anticipated for late spring or early summer in this area. The *Pinus* pollen frequency is elevated, while the *Artemisia* pollen frequency is very low. The Poaceae pollen frequency also appears to be elevated, suggesting that grasses were in flower. Recovery of *Cercocarpus*, *Holodiscus*, and cf. *Prunus* pollen indicates that these shrubs were probably also in flower, suggesting an early summer time of deposition for this coprolite. Apiaceae also flowers during the late spring and early summer. The pollen record appears to represent plants expected to be growing in this area, rather than specific foods consumed. Pollen was probably consumed clinging to grass or animals eaten, or as part of the local sediment, a small quantity of which was also consumed.

The phytolith record was dominated by forms produced by grasses (Table 5.90). The relative abundance of grass phytoliths recovered from this coprolite combined with the apparently elevated Poaceae pollen frequency suggests that this dog ate grass, as many do today. The grass phytoliths are primarily a mixture of festucoid or cool-season and chloridoid or warm-season grasses that tolerate dry conditions. Very few panicoid phytoliths are present, which represent warm-season grasses that prefer more humid conditions. Recovery of a single Cyperaceae phytolith suggests that sedges were growing with the grasses eaten by this animal.

No macrofloral remains were recovered from this coprolite, which yielded 1,263 bone fragments (estimated frequency based on the sort of a portion of the total volume floated). Recovery of the large quantity of bone fragments and coloration and shape of the coprolite contributed to identification of the coprolite as canid. The parasite sample exhibited no evidence of parasite eggs.

## Summary and Conclusions

The combined pollen, phytolith, and macrofloral analyses point to a diet composed largely of animals, since bone fragments constituted the majority of bulk noted in the macrofloral record. The pollen and phytolith records point to consumption of grasses, which is a common canid trait. The grasses consumed include cool-season (festucoid) and warm-season (chloridoid) grasses. The pollen record points to a probable time of deposition in the late spring or early summer, since *Pinus*, Poaceae, and various members of the Rosaceae and Apiaceae pollen were present. Other pollen may well be present through ingestion of small quantities of dirt.

Table 5.89. Pollen Data from the Canid Coprolite, LA 45507

| Scientific Name | Common Name | Count | Absolute | Percent |
|---|---|---|---|---|
| | Arboreal Pollen | | | |
| *Pinus* | *Pine* | 39 | 775.69 | 39.0 |
| *Quercus* | *Oak* | h a | 19.89 | 1.0 |
| | Nonarboreal Pollen | | | |
| Cheno-ams | Includes amaranth and pigweed family | 4* | 79.56 | 4.0* |
| *Artemisia* | Sagebrush | 3 | 59.67 | 3.0 |
| Low-spine | Includes aster, rabbitbrush, snakeweed, sunflower, etc. | 10 | 198.90 | 10.0 |
| High-spine | Includes aster, rabbitbrush, snakewee, sunflower, etc. | 8 | 159.12 | 8.0 |
| Poaceae | Grass family | 10 | 198.90 | 10.0 |
| Rosaceae: | | | | |
| *Cercocarpus* | Mountain mahogany | 8 | 459.12 | 8.0 |
| *Holidiscus*-type | Spirea, ocean spray | 1 | 19.89 | 1.0 |
| cf. *Prunus* | Plum, cherry | 2 | 39.78 | 2.0 |
| Sphaeralcea | Globemallow | 3 | 59.67 | 3.0 |
| Apiaceae | Parsley family | 1 | 19.89 | 1.0 |

| Scientific Name | Common Name | Count | Absolute | Percent |
|---|---|---|---|---|
| Indeterminate | | 10 | 198.90 | 10.0 |
| Total | | 100 | 1988.95 | 100.0 |

* aggregates
absolute # = number of pollen grains per ml of dry coprolite residue

Table 5.90. Phytolith Data from the Canid Coprolite, LA 45507

| Phytolith Type | Count | Percent * |
|---|---|---|
| Festucoid: | | |
| Circular | 79 | 39.3 |
| Elliptical | 32 | 15.9 |
| Bilobate | 1 | 0.5 |
| Paicoid: | | |
| Bilobate | 8 | 4.0 |
| Small Cross | 1 | 0.5 |
| Chloridoid: | | |
| Buliform | 1 | 0.5 |
| Pillow | 9 | 4.5 |
| Trichrome | 11 | 5.5 |
| Tower | 2 | 1.0 |
| Cyperaceae | 1 | 0.5 |
| Total | 201 | |

# *MICROSCOPIC ANALYSIS OF TWO PIPES FROM LUNA VILLAGE (LA 45507)*

Linda Scott Cummings[1]

Two pipes that contained obvious burned residue were submitted to Paleo Research Labs for analysis. Microscopic analysis was undertaken to identify any plant remains present in this residue. These pipes were recovered from a pithouse site (LA 45507) dating between A.D. 800 and 900.

## METHODS

The pipes first were sprayed with "canned air" to remove surficial contamination. Following this, we attempted to remove the residue by wetting the surface with dilute hydrochloric acid and scrubbing with a toothbrush. Very little residue was loosened using this technique. Therefore, this sample was referred to as the control sample for each pipe. The residue had to be scraped out using a thin metal spatula. This residue was crushed mechanically to liberate phytoliths and cells contained in it. Because the extraction methods were so harsh, no pollen survived. Nitric acid was used to break down this burned residue to view the microscopic remained trapped in it.

Separate microscope slides were made using glycerine and cinnamaldehyde to view the phytoliths and remnants of cells. These two liquids provide different indices of refraction, which enhance microscopic viewing. Magnification of 400x to 600x was used to identify remains recovered from the burned pipe residue. Cross-polar illumination was employed to identify remains and scan slides for additional identifiable remains.

## PHYTOLITH REVIEW

Phytoliths are silica bodies produced by plants when soluble silica in the groundwater is absorbed by the roots and carried up to the plant via the vascular system. Evaporation and metabolism of this water result in precipitation of the silica in and around the cellular walls. The general term phytoliths, while strictly applied to opal phytoliths, may also be used to refer to calcium oxylate crystals produced by a variety of plants, including *Opuntia* (prickly pear cactus). Opal phytoliths, which are distinct and decay-resistant plant remains, are deposited in the soil as the plant or plant parts die and break down. They are, however, subject to mechanical breakage and erosion and deterioration in high pH soils. Phytoliths are usually introduced directly into the soils in which the plants decay. Transportation of phytoliths occurs primarily by animal consumption, man's gathering of plants, or by erosion or transportation of the soil by wind, water, or ice.

The major divisions of grass short-cell phytoliths recovered include festucoid, chloridoid, and panicoid. Smooth elongate phytoliths are currently of no aid in interpreting either paleoenvironmental conditions or the subsistence record because they are produced by a large number of grasses. Phytoliths tabulated to represent "total phytoliths" include all forms representing plants. Frequencies of all other bodies recovered are calculated by dividing the number of each type recovered by the "total phytoliths."

The festucoid class of phytoliths is ascribed primarily to the subfamily Pooideae and occur most abundantly in cool, moist climates. However, Brown (1984) notes that festucoid phytoliths are produced in small quantity by nearly all grasses. Therefore, while they are typical phytoliths produced by the subfamily Pooideae, they are not exclusive to this subfamily. Chloridoid phytoliths are found primarily in the subfamily Chloridoideae, a warm-season grass that grows in arid to semiarid areas and requires less available soil moisture. Chloridoid grasses are the most abundant in the American Southwest (Gould and Shaw 1983:120). Panicoid phytoliths occur in warm-season or tall grasses that frequently thrive in humid conditions. Twiss (1987:181) also notes that some members of the subfamily Chloridoideae produce both bilobate (panicoid) and festucoid phytoliths. "According to Gould and Shaw (1983, p. 110) more than 97 percent of the native US grass species (1,026 or 1,053) are divided equally among three subfamilies Pooideae, Chloridoideae, and Panicoideae" (Twiss 1987:181).

Buliform phytoliths are produced by grasses in response to wet conditions (Irwin Rovner, pers. comm., January 1991) and are to be expected in wet habitats of floodplains and other places. Phytoliths referred to as "pillows" are the same as those reported by Rovner (1971). While these phytoliths are described, no taxonomic nor environmental significance has been assigned. They probably represent grasses.

Trichomes and papilla represent epidermal hairs on grasses and/or sedges. Epidermal forms represent

[1]Paleo Research Laboratories Technical Report 95-37

epidermal cells, probably of dicotyledonous plants. Diatoms also were noted, indicating wet conditions.

Volcanic ash fragments are noted to be widely dispersed in sediments across the North American continent in quantities varying from mere presence to dominance of the record. At present, volcanic ash fragments are interpreted to represent tiny fragments present in the upper atmosphere that fall to the earth, rather than any specific volcanic event.

### DISCUSSION

Two pipes recovered from Luna Village contained visible burned residue that was analyzed microscopically for evidence of plant residue. Luna Village, in the Mogollon Highlands of west-central New Mexico, was occupied between A.D. 800 and 900. The pipes were recovered from the fill of Pithouses 3 and 9 (Table 5.91).

Table 5.91. Provenience Data for Pipe Samples from LA 45507

| Sample Number | Provenience | Phytos Counted |
|---|---|---|
| 125 | Fill of Pithouse 3, Level 3, scrape of burned residue | 16 |
| 125kC | Wash and scrape of outer portion of burned residue | 29 |
| 1189 | Fill of Pithouse 9, Level 3 | 35 |
| 1189C | Wash and scrape of outer portion of burned residue | 101 |

Microscopic analysis of the pipe residue yielded evidence of phytoliths representing grasses. The difference between the control sample and the scrape sample should be that more contamination would be present in the control sample. For Sample 1189 there were more similarities than dissimilarities between the control and scrape samples. Both were dominated by chloridoid saddle forms. Festucoid forms were subdominant, with crescent shapes most numerous in this category. Crescent forms are common in such grasses as *Vulpia* (six weeks fescue), *Agropyron* (wheat grass), *Oryzopsis* (ricegrass), *Sitanion* (squirrel tail grass), and *Stipa* (needle grass). Other forms noted represent grasses but are not specific to any particular group of grasses. These include buliform, pillow, elongates, epidermal tissues, papilla, and trichomes. An interesting difference between the control and scrape samples for 1189 are the presence of tracheary elements, fibers, starch granules with hila, and volcanic ash plates in the scrape sample and their near absence in the control sample. These forms probably combine to indicate the contents of the pipe.

Sample 125 exhibits more differences between the control and scrape samples. The scrape sample contains more crescent-shaped phytoliths, as well as a small quantity of irregular with irregular platform shapes. These irregular shapes are noted in both *Vulpia* (six weeks fescue) and *Oryzopsis* (ricegrass), and to a much lesser extent in *Sitanion* (squirrel tail grass) and *Stipa* (needle grass). Not all grasses growing in this area have been examined in detail for evidence of specific forms, so specific phytolith forms may be used only as gross indicators. The scrape sample also exhibits spiny irregular trichome bases, which are absent from the control sample. Trichomes, on the other hand, are noted only in the control sample. These forms should be recovered together, because they represent different views of the same cell in many of the grasses. Only the control sample exhibits starch granules with hila, while the scrape sample contains long diatoms. Only a few volcanic ash fragments are noted in the control sample.

*Nicotiana* (native tobacco) is the primary plant assumed to have been smoked in pipes. Microscopic examination of leaves of *Nicotiana attenuata*, as well as commercial Mexican tobacco, yield a variety of fibers, some starch granules, and small forms that are birefringent under cross-polar illumination. These birefringent forms were the most identifiable element of the reference specimens. Further examination of the pipe scrape and control samples using cross-polar illumination yielded birefringent forms in sample 1189 (scrape). Recovery of these forms in this sample indicate that native tobacco was present. Sample 125 did not yield any of these birefringent forms.

Whiting (1939:40) notes that the Hopi mixed native tobacco with young leaves of Douglas fir, pine, and aspen to form "cloud tobacco." They mixed tobacco with *Onosmodium thurberi* dried leaves and flowers to increase its rain-making ability. Tobacco also may be mixed with cotton (*Gossypium*), reeds (*Phragmites*), aspen (*Populus*), pine (*Pinus ponderosa*), Douglas fir ("spruce") (*Pseudotsuga mucronata*), and corn (*Zea mays*). For medicinal purposes, tobacco may be mixed with sage (*Salvia carnosa*) or mullein (*Verbascum thapsus*).

No silicified hairs of the type commonly noted on members of the borage family, to which *Onosmodium* belongs, were noted in either sample. Conifers also were not represented. No diagnostic phytoliths forms are noted in aspen leaves. If maize (corn) leaves were present, one would expect to recover bilobate phytoliths, which were absent from both samples. Neither sage nor mullein leaves have yielded phytoliths similar to any noted in the scrape samples from either pipe.

### SUMMARY AND CONCLUSIONS

Microscopic analysis of residues from two pipes yielded positive evidence for the presence of tobacco in Sample 1189, recovered from Pithouse 9. In addition, presence of fibers and starch granules with hila may be present as a result of use of tobacco. Starch granules with hila also are produced by grass seeds and maize. Recovery of an abundance of volcanic ash fragments in the scrape sample is puzzling. It may indicate that tobacco was mixed with other nonplant substances, which included volcanic ash either in a relatively pure form or accidentally. Recovery of grass phytoliths may represent the combination of grass with tobacco or some form of contamination. In both samples grass phytoliths were liberated from the burned residue, indicating that their presence was likely not due to postuse contamination. Sample 125 yielded a very different phytolith signature from Sample 1189, which contained evidence of tobacco. This microscopic evidence suggests that this pipe, represented by sample 125, was used differently than the pipe represented by Sample 1189.

# *SOIL AND GEOMORPHIC INVESTIGATION OF BURIED ARCHAEOLOGICAL SITES IN THE RESERVE-LUNA AREA*

Dennis McMahon

Soil and geomorphic investigations were conducted at three archaeological sites along U.S. 180 and NM 12 between Luna and Reserve in Catron County. Whereas the vast majority of the cultural deposits identified in this area were on or close to the surface, the sites slated for geomorphic investigation were buried by up to 1 m of sediment. Prior to this study, the three sites, LA 43766, LA 70188, and LA 89846, were systematically excavated and backfilled. However, persistent questions regarding the geomorphic processes responsible for burial at these sites and the potential for similar burial at other locations in the region prompted a study to determine the cause of burial, general timing of deposition, and styles of deposition. Additionally, there were questions regarding the origin of a surface scatter of material at LA 75791. There was no soil investigation at this site, but observations were made of the geomorphology and surficial processes operating at the site.

Each of the sites investigated reveals a distinct set of factors contributing to burial and represents depositional setting with a wide range of areal extents and frequency of occurrence in the landscape. In order to assess the likelihood of finding similar depositional settings elsewhere in the region, each of the settings was evaluated and ranked based on the following factors: (1) the potential for deposition at the site; (2) the lateral extent of the depositional setting; and (3) the preservation potential of the surface.

In order from highest (1) to lowest (3) likelihood for replication in the landscape, the ranking is:

LA 43766: A low-lying terrace with strong potential for overbank deposition and great lateral extent.

LA 89846: A colluvial toe slope setting with some potential for burial by colluviation and sheetwash runoff, but with limited lateral extent.

LA 70188: An erosional hollow area acting as a temporary sediment storage between erosional events. Very limited lateral extent.

The development of such a hierarchical approach to rating the potential for late Holocene deposition at sites may serve as an effective means of maximizing resources for future archaeological investigations.

## METHODS

### *Geomorphic Mapping*

Local geomorphic maps covering areas of 2 to 4 sq km around each of the sites were produced to place the sites in a broad geomorphic context. The position of a site in this broader context helps to establish the lateral extent of its general depositional setting and holds implications for the potential burial of other sites in the area. Geomorphic map units used in this study, listed below, are descriptive units that represent processes acting on the surfaces.

As: Alluvial slope. Gently-sloping (<15 degrees) erosion or transport surfaces with small temporary storage sites in hollow areas and minor fan lobes. Alluvial slopes are identified by gently rolling topography, gullying, and rilling associated with sheet flow runoff and minor amounts of colluvial movement of surface clasts.

Cs: Colluvial slope. Steeply sloping (>15 degrees) erosion and transport surfaces largely characterized by colluvial or gravity-driven movement of sediment as well as a strong alluvial component. Surfaces are often cut by deep V-shaped drainage tracks and debris flow scars. While the colluvial slopes are principally erosional, some temporary storage may be noted in the hollows of debris flow tracks or as colluvial wedges at the inflection line of the colluvial slope with lower gradient surfaces.

Fp: Floodplain. Fluvial/alluvial bottomlands, subjected to flooding during normal flow events. This unit includes the active stream channel and low-lying terraced surfaces exposed to seasonal flooding. There is little or no soil development associated with this surface.

T-1: Terrace Surface 1. A surface following the gradient of the riverbed and formed by either the erosion or aggradation of the stream floodplain. It is the next highest terrace surface above the active flood plain. This is generally considered a stable surface, often showing some incipient soil development.

Af: Alluvial fan. This is the terminus of a confined stream or channel, where the stream emerges from its constriction into a wider, shallow-gradient setting. The surface is formed by rapid deposition of alluvial material, often resting in a lobate or fan-shaped pattern.

Ac: Active arroyo channel. Ephemeral stream channel characterized by bed of coarse sands, gravels and boulders with extremely sparse vegetation. There is generally a bar and swale topography and sparse vegetation associated with this surface.

TS-2: Table Surface 2. Upper flat-lying surface above site LA 89846. Surface formed on Tertiary porphyritic andesite flows and may be the upper aggradation surface of that unit.

TS-1: Table Surface 1. The lower flat-lying surface above LA 89846. It is a broad, erosionally cut terrace carved into Tertiary andesite cap rock and set about 100 ft below TS-2 surface.

*Landscape Position Characterization*

While the overall geomorphic mapping of each of the locations places the sites in a broad geomorphic context, the characterization of landscape position aims at identifying the specific landforms and surficial processes that may contribute to deposition at a given site. Observations were made at each of the study sites, and slope and distance measurements were taken where appropriate. The flow patterns and likely material transport pathways are illustrated as overlays on panoramic photographs of the study sites.

*Soil Profile Investigation*

One soil pit was excavated at each of the three study sites. Both lithologic and pedologic observations were made for each of the profiles. Lithologic observations such as angularity of clasts, clast orientations, and grain size distribution aid in the determination of the style of deposition at the site in question. Pedologic observations such as the degree of soil development, horizon thickness, and soil texture help in the determination of surface stability during occupation of the site and since burial. Other observations noted for each of the horizons include percent gravel content, the clarity and topography of the horizon boundary, dry consistency, moist consistency, texture, clay films, and roots. Soils are described from a soil genesis perspective as outlined in Birkeland (1984).

*Background Information*

Investigations were made to determine previous soils and geomorphic or geologic studies in the area. Literature searches were conducted, and geologists from the U.S. Geological Survey and the New Mexico Bureau of Mines and Mineral Resources were consulted. In general, there has been very little work done on the Quaternary period in Catron County. Soils information that was obtained from the USDA Forest Service derives from a soil taxonomy perspective that caters chiefly to agricultural interests. It has no inherent implication for studies of surface age or stability. However, this information, as well as the bedrock geology, is offered here as a means of identifying references for possible future use. For each of the sites, this information is incorporated in the section titled “Overall Geologic/Geomorphic Setting.”

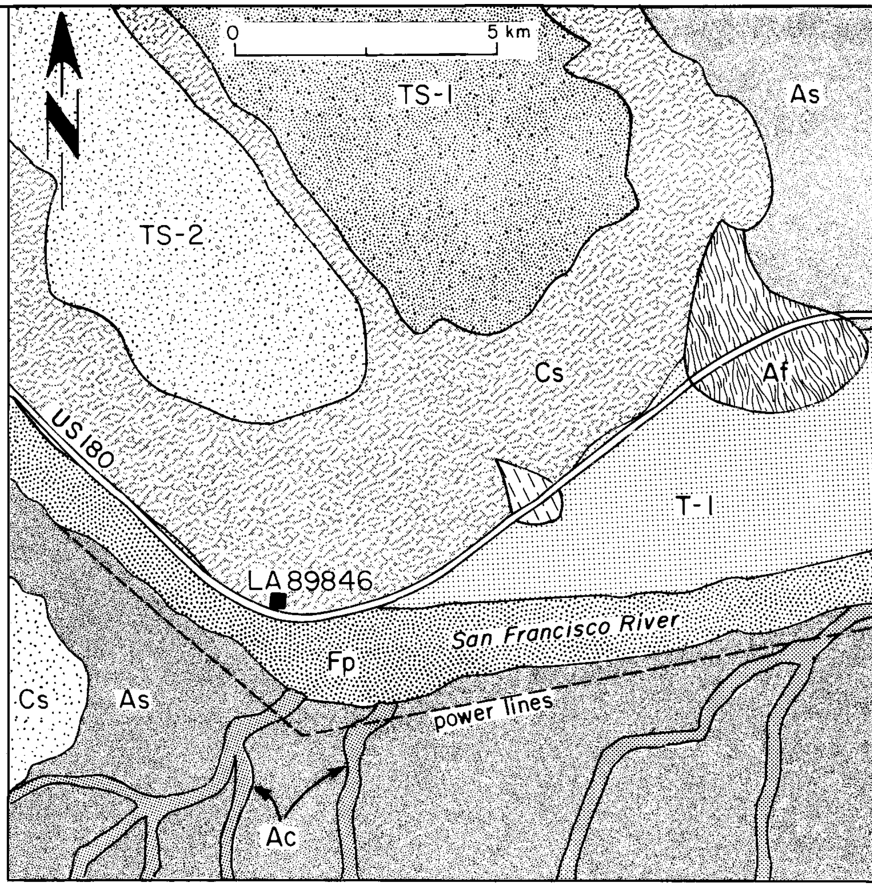
## RESULTS

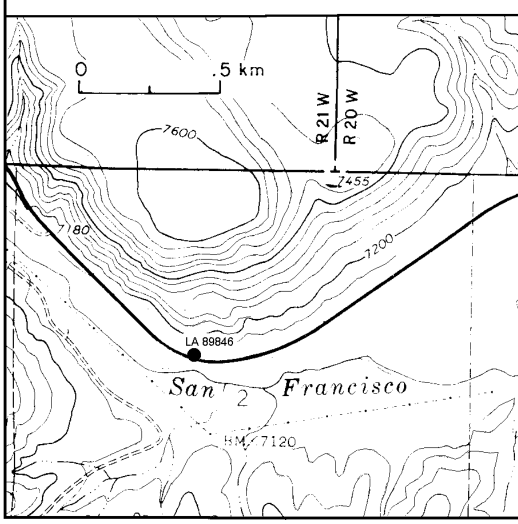
*LA 89846*

*Overall Geologic/Geomorphic Setting*. The area surrounding LA 89846 is characterized by prominent mesa tops capped by Tertiary volcanic rocks. These rocks were mapped by Finnell (1981-82) as porphyritic andesite flows ranging in color from greenish black to brownish gray and containing numerous large (~5 cm) stubby feldspar crystals and smaller pyroxenes. This unit is the source rock of what is known to mineral collectors as Luna agate, which is prized for lapidary work. The thickness of this unit ranges from 0 to 85 m and is the primary constituent of the colluvial mantle on adjacent slopes. The bedrock unit on which the sideslopes were cut were mapped as volcaniclastic rocks of Spur Lake Basin. They are characterized as light gray to pale brown, poorly indurated sandstone and conglomerate with interbedded thin ashflow tuffs. The soil at this site has been mapped as a Lithic, Udic Argiustol by the Apache National Forest Soil Survey. It is described as a shallow, clay and clay-loam soil from the Datil Formation that is found on steep mountain sideslopes.

At this site, the steep colluvial slope skirting the mesa grades down to the terraces and floodplain of the San Francisco River. The study site is at the base of this colluvial slope, as illustrated in the geomorphic map (Fig. 5.22). The tributary drainage pathways north of the river in the vicinity of the site are small and poorly developed. Some drainages in the eastern portion of the mapped area have contributed to alluvial fan construction atop the T-1 surface. Across the river to the south of the site, numerous well-developed ephemeral stream networks join the river as they emerge from a forested, rolling hill topography. These streams do not constitute a potential sediment source for the burial of the site. However, the river itself may constitute a potential, but not likely, source of sediment during only the most extreme of flooding events.

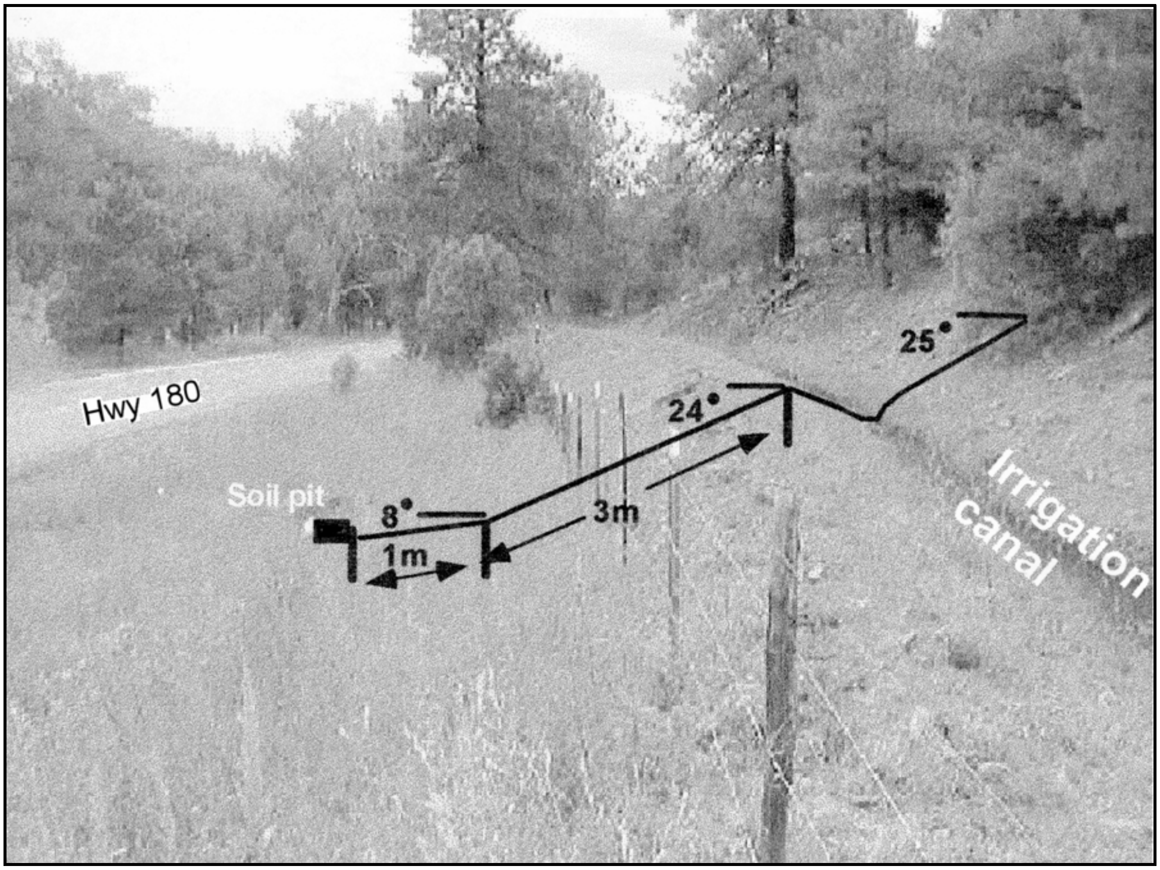
*Landscape Position*. LA 89846 is at the toe of a colluvial hill slope with a south-facing orientation (Fig. 5.23). The soil pit is 18 m west of the datum and 1.8 m south of the fence. The slope directly above the site is laterally convex, sloping down to an incised gully to




TS-1 = lower table, surface-mesa top
TS-2 = upper table, surface-mesa top
Cs = colluvial slope (>15 degree slope)
As = alluvial slope (<15 degree slope)
T1 = fluvial terrace of San Francisco River
Fp = active floodplain of San Francisco River
Ac = tributary arroyo channels
Af = alluvial fan

*Figure 5.22. Geomorphic surfaces near LA 89846.*



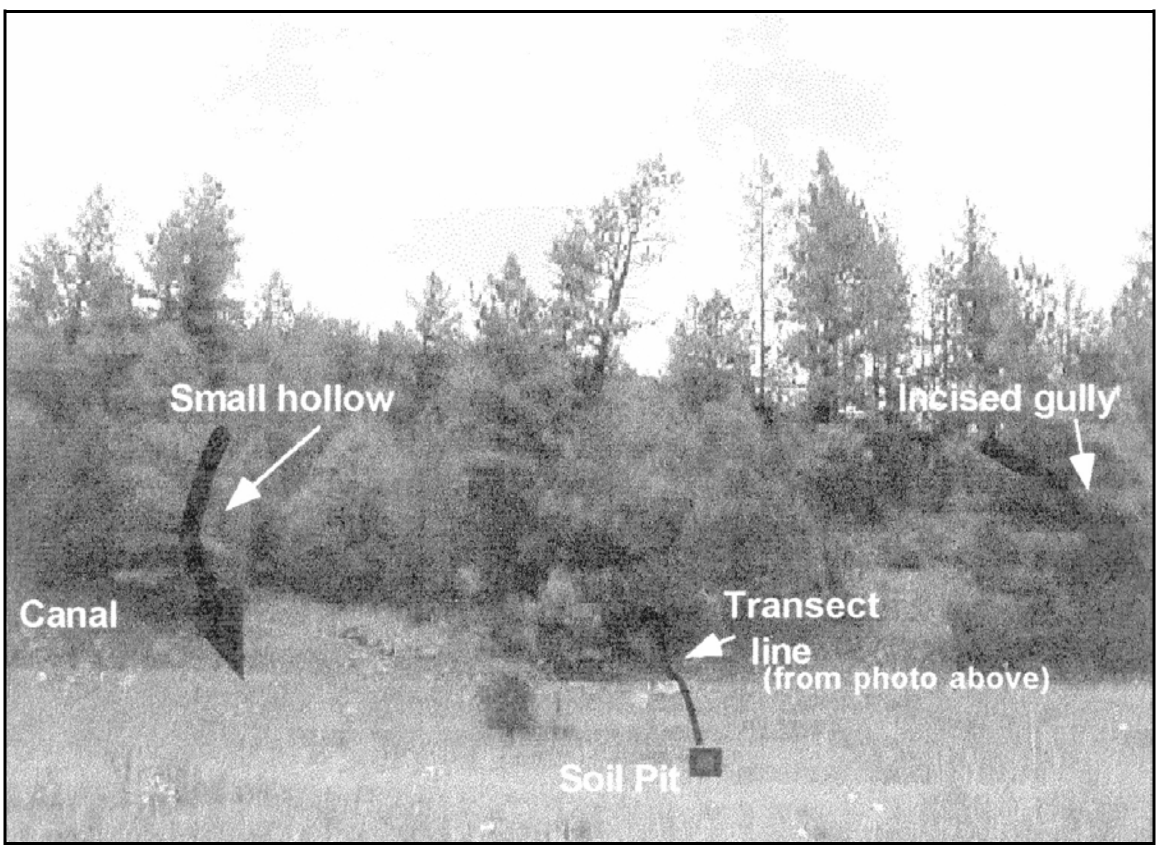




*Figure 5.23. Landscape setting of LA 89846; (upper) view of site looking west, (lower) view of site looking north.*

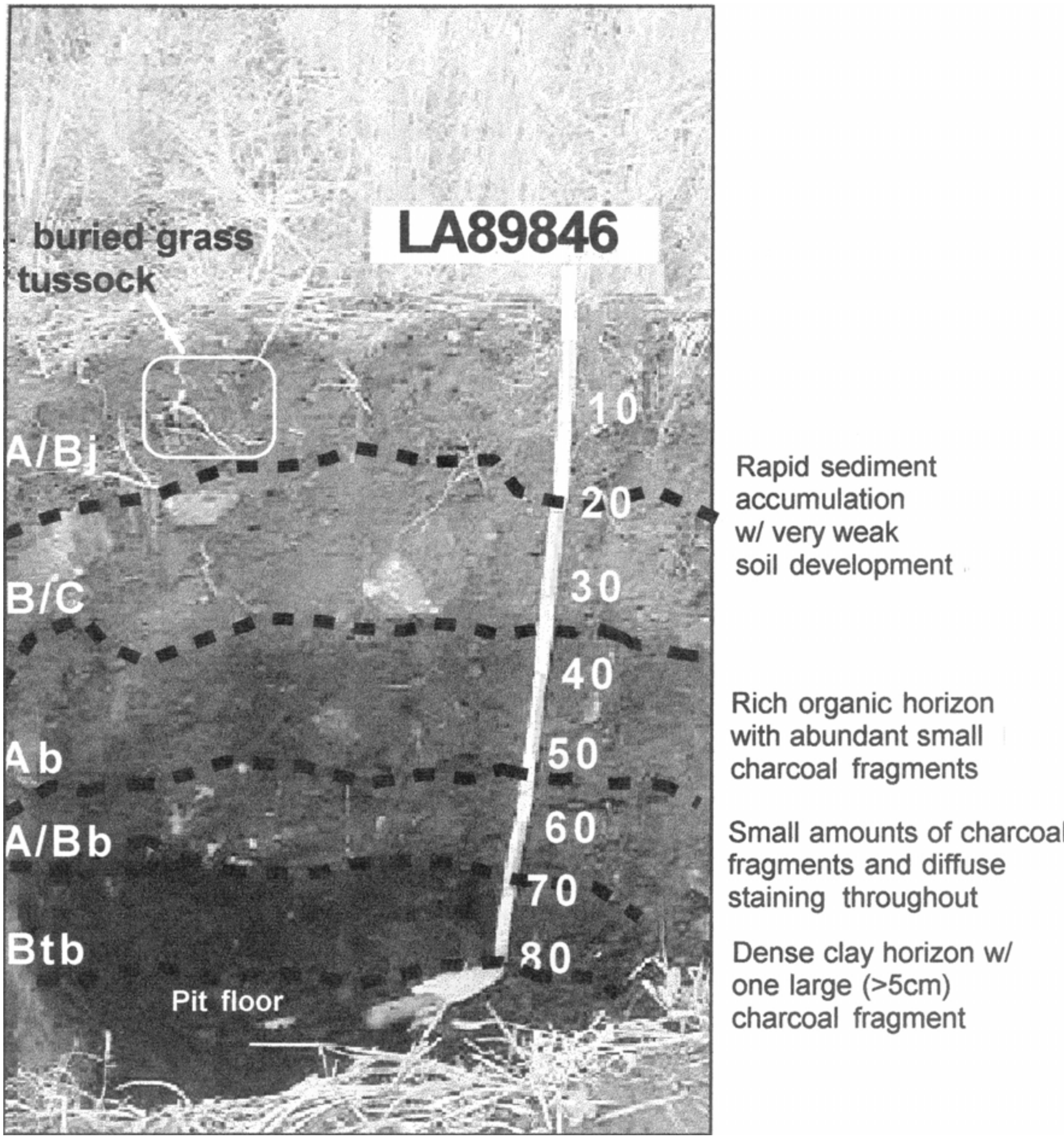



*Figure 5.24. Soil profile for LA 89846.*

the east and a small hollow to the west. The proximity of the site to the colluvial slope and distance from the drainage pathways (Fig. 5.23b) suggest that the site is not a likely candidate for deposition from concentrated runoff from those drainage pathways. However, the site position at the base of the colluvial slope allows for deposition through colluvial movement of large clasts and sheet wash deposition of fine materials.

A complicating factor at this site is the presence of an irrigation canal dug into the colluvial slope above the site. Figure 5.23a illustrates the proximity and slope of the various landscape features that may be contributing to the burial of this site. The surface on which the test pit was excavated extends only 1 m upslope from the pit before intersecting the 24 degree slope of a berm created by the excavation of the irrigation canal. The actual contour of the original surface where the colluvial slope grades into the shallower slope of the site is obscured beneath this historical feature. However, a projection of the colluvial slope down to the site would place the site at the toe slope and in a position for burial by original slope processes.

*Soil Profile Results*. The upper horizons of this profile (A/Bj and B/C) show very weak accumulation of organic material and poor structural development (Table 5.92). This suggests that the deposition of this upper 35 cm of sediment was very recent or that it has been a gradual and continuing process up to the present. A very gradual transition marks the boundary between the two horizons. A buried grass tussock approximately 4 cm below the surface and growing upward through the overlying sediment further suggests that the current mode of deposition is rapid and on-going at this site (Fig. 5.24).

The Ab horizon is a rich, very dark gray-brown horizon of clay loam texture and high amounts of organic material. There are abundant small (cm-scale) fragments of charcoal as well as a diffuse charcoal staining throughout the horizon. The A/Bb horizon is lighter in color than the overlying Ab horizon but still has a notable, although more diffuse, organic component. There are few distinct charcoal fragments, but the gray-brown color suggests charcoal staining of the soil matrix, possibly by translocation or diffusion of charcoal from the upper horizon.

Btb is a dark brown clay-rich horizon with strong clay film development and one large (>5 cm) charcoal fragment in abrupt contact with the soil matrix. There is no charcoal staining in the soil matrix as in the upper horizons. The singularity of the charcoal fragment, its size, and the lack of charcoal staining in the remainder of the profile suggest that the fragment may have been burned in place as a root or transported and deposited with the surrounding sediment.

*Overall Site Interpretation*. Surface and subsurface observations at this site indicate two distinct causes and styles of burial. The most recent of these is the historical disturbance of the irrigation canal. The construction and maintenance of this structure provides a constant supply of loose material for deposition on the site. This source is probably responsible for the upper 35 cm of deposition, which comprises the A/Bj and B/C horizons. The low degree of soil development and the buried grass tussock indicate recent, rapid, and on-going deposition at this site.

The underlying soil units may be attributed to natural colluvial toe slope deposition that occurred at variable rates during the late Holocene. The Ab horizon, which marks the existent ground surface prior to historical disturbance, may be considered a depositional unit related to a single event. The abundance of small charcoal fragments and dark staining of the matrix sediment, as well as the uniformity of thickness and lateral continuity along the profile, suggests that this depositional unit may have resulted from increased hill slope erosion following a major burning event.

The lowest two horizons, A/Bb and Btb collectively, represent a distinct period of relative surface stability where toe slope deposition progressed at a slower rate than soil formation. The rich clay texture and abundant clay films within the Btb horizon may have resulted from translocation of clay from the above Ab horizon or in situ weathering of clay minerals in the volcanic sediments. In either case, the presence of such a strong argilic horizon requires at least several hundred years for formation and indicates either general surface stability or very gradual (< 1 mm/year) accumulation of material. The occurrence of cultural features within these lower horizons may be accounted for by site occupations concurrent with the gradual processes of sediment accumulation and soil formation.

In general, the overriding cause of burial at this site may be considered the location of the site at the colluvial toe slope. This narrow zone, where the slope angle changes from 25 degrees to less than 5 degrees within a 10 m distance is constantly subjected to sheet flow runoff from the higher colluvial slopes. The slope may be considered relatively stable with only gradual slope wash erosion/deposition for intervals of hundreds of years and subject to burial by rapid sediment deposition, primarily after episodes of surface instability such as after a fire.

### *LA 70188*

*Overall Geologic/Geomorphic Setting*. LA 70188 is on an alluvial transport slope on the eastern flank of the San Francisco Mountains (Fig. 5.25). North and west of the site (approx. 100 m), the alluvial slope gives way to steeper colluvial hill slopes of the San Francisco Mountains. To the south, the alluvial slope surface grades down to the active channel of Dry Leggett Canyon just east of where the stream bed emerges from the mountain front to form a broad alluvial plain surface.

The geologic unit on which this site rests has been mapped by Ratté (1989) as Quaternary colluvium, described as sheet wash deposits and talus with a maximum thickness of up to 10 m. In his map of the Bull Basin Quadrangle, Ratté maps this unit mainly where it obscures bedrock along the San Francisco Fault Zone. The site is on the northwestern margin of the 0.5-km-wide northeast-trending fault zone, which comprises a series of down-to-the-east normal faults.

Soils at this site are mapped as Unit 510 in the Apache National Forest Soil Survey. It is described as dep, dark-colored soil on rolling mesa tops and uplands areas. It is characterized as loam and gravelly loam that overlies 60-76 cm of clay subsoil. The substrata for this unit is identified as very gravelly sandy clay loam.

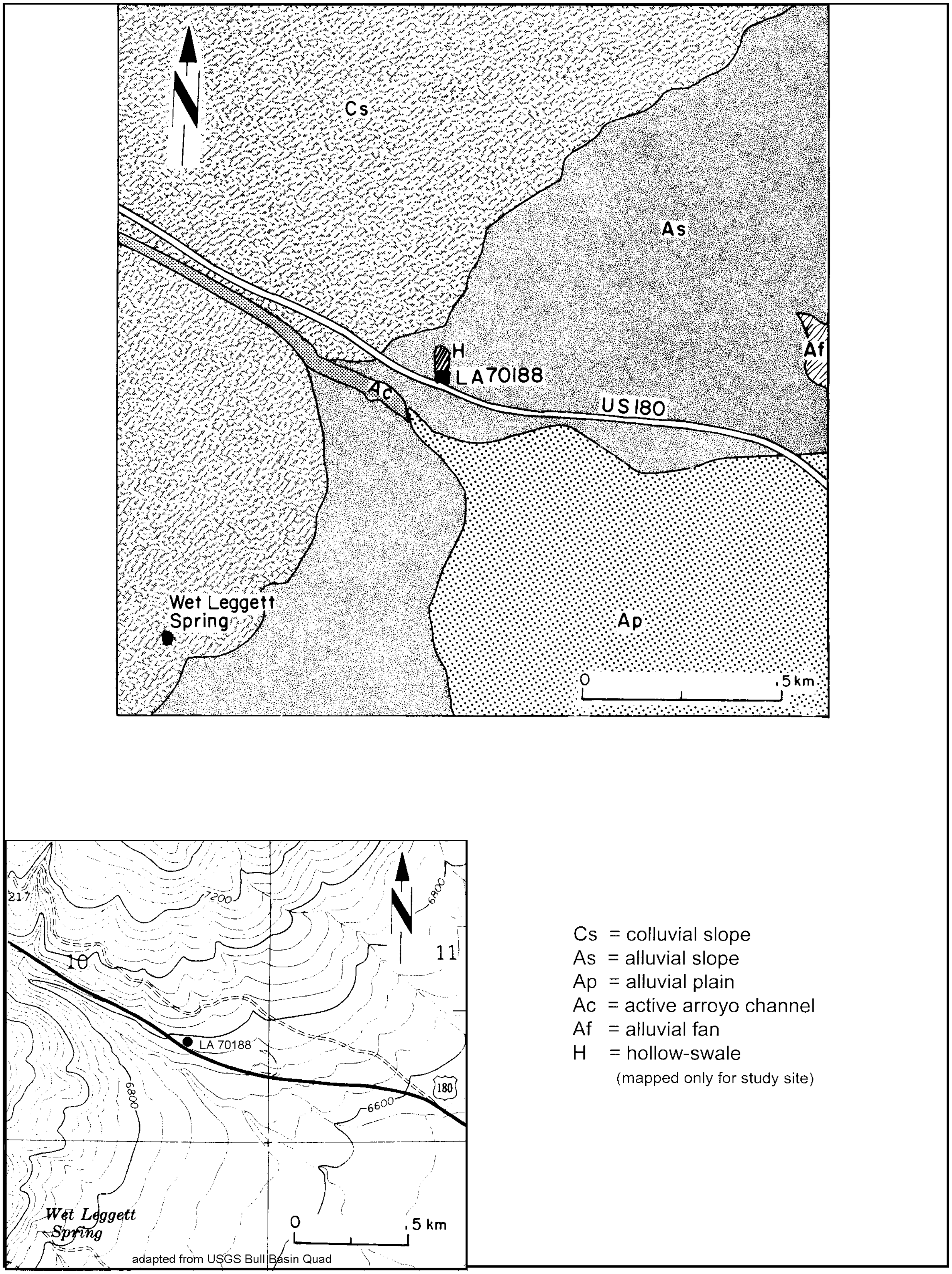



*Figure 2.25. Geormorphic surfaces near LA 70188.*

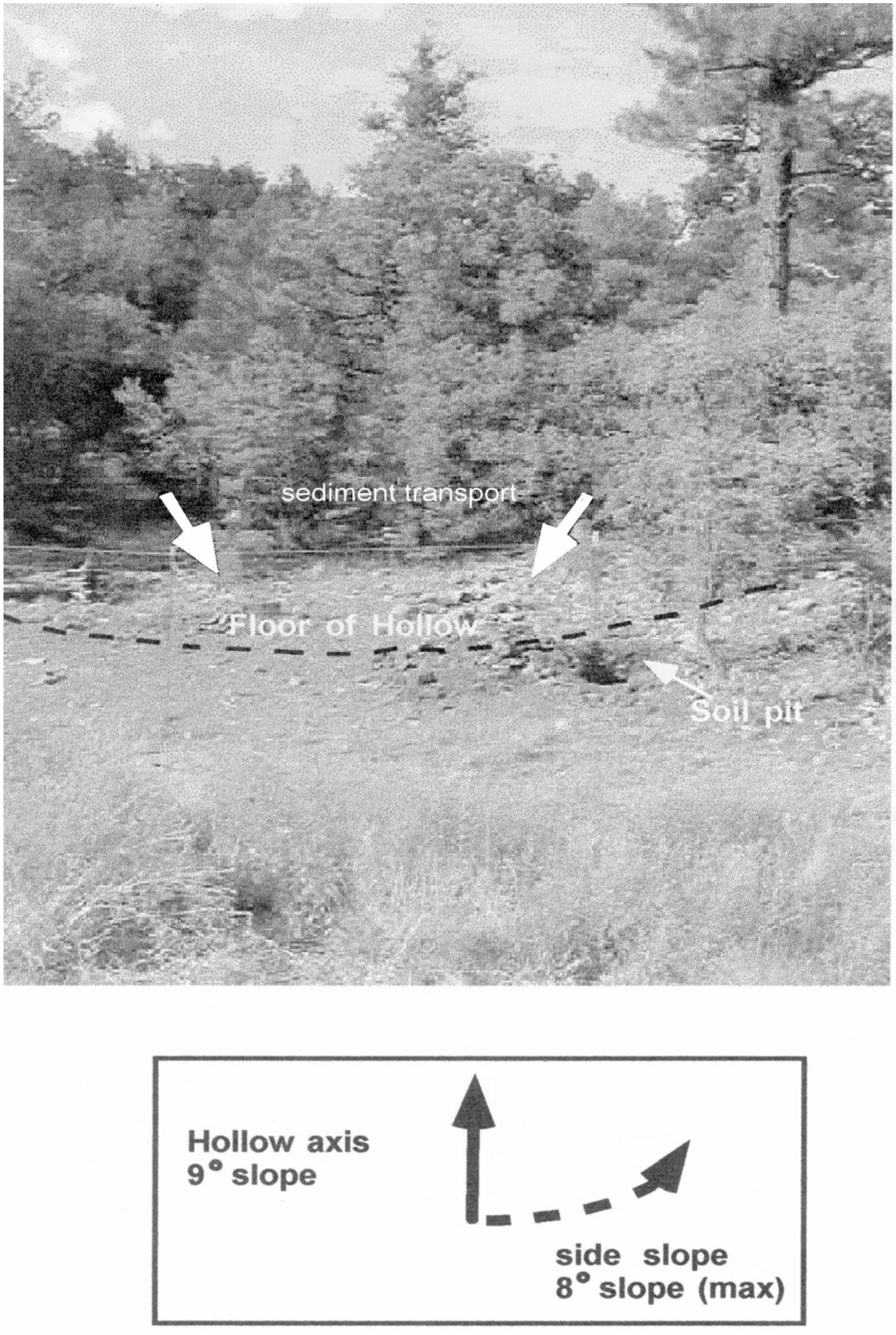



*Figure 5.26. Landscape setting of LA 70188, view of site looking north.*

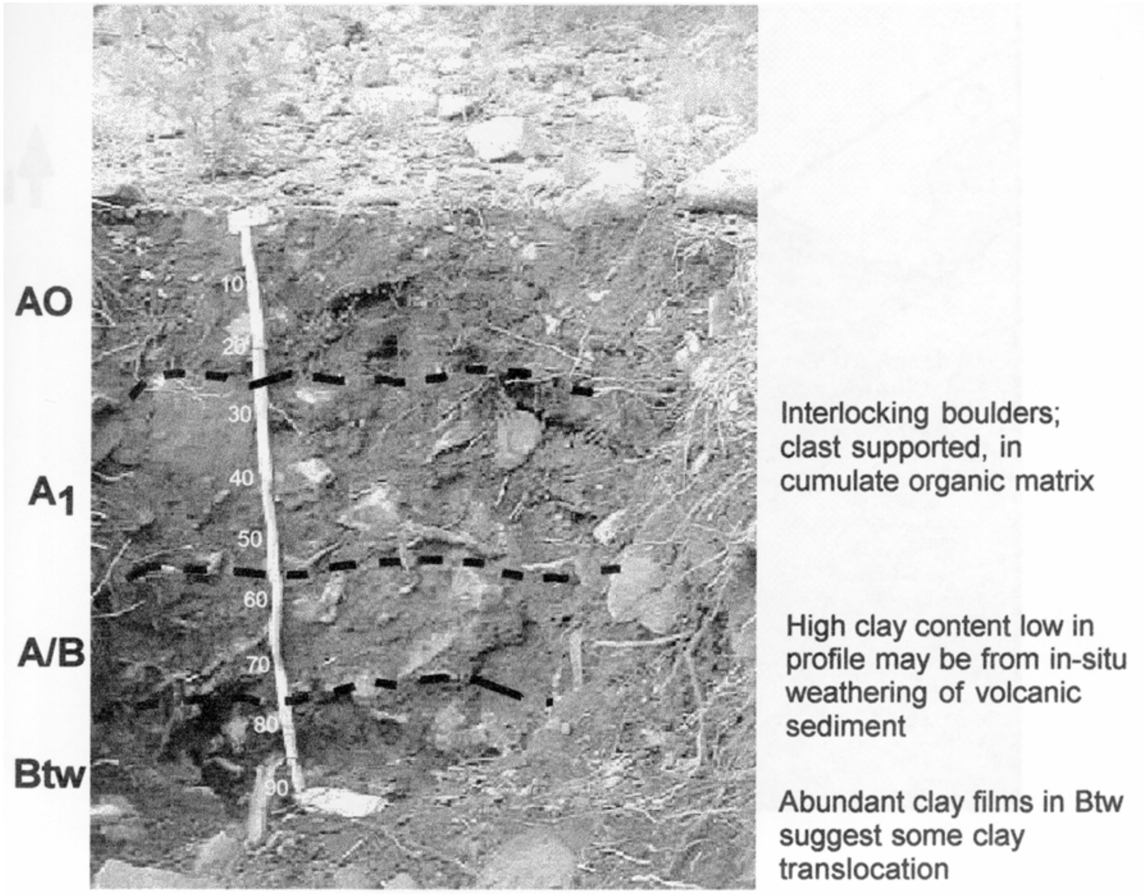



*Figure 5.27. Soil profile for LA 70188.*

*Landscape Position.* The site is within a small hollow with concave sideslopes. The slope along the axis of the hollow in approximately 9 degrees, while the sideslopes fo the hollow have a gradient of about 8 degrees. No sign of active channel incision was observed at or above the site (Fig. 5.26). However, the drainage pathway becomes significantly incised in the downslope direction across the highway from the site. This lower incision is interpreted as a result of channelization of runoff water by a highway culvert and does not reflect the natural geomorphic processes operating there. The surface is lettered with cobbles and boulders as large as 30 cm in diameter. These large exposed clasts, mostly volcanics of intermediate to felsic composition, cover 75 percent of the ground surface near the site.

*Soil Profile.* The soil profile at this site is characterized by a thick cumulic, organic A horizon (Fig. 5.27; Table 5.92). The A horizon comprises the upper 5 cm of the profile and is divided into two subhorizons based on differences in texture and dry consistency. The A/B horizon is transitional from the A to the B horizon, showing some organic component while revealing an increase in reddening, as compared to the upper horizon, and a significant increase in clays characteristic of the Bt horizon. The Bt horizon, ranging from 75 to 90 cm dep, has prominent clay films indicative of transported clay minerals. It is likely that much of the clay minerals were weathered in place from the volcanic source rocks and transported only a short distance from the site of formation, thus giving the appearance of a strongly developed soil. Throughout the profile are angular to subangular cobbles ranging up to 30 cm. There are strong clast-to-clast contacts throughout the profile with the fine clay loam to clay matrix material filling in the void spaces.

The thick cumulic organic horizon suggests a gradual and on-going accumulation at this location. The strong clast-supported structure of the soil profile indicates two modes of deposition contributing to the overall sediment accumulation at this site. The first of these is the colluvial movement of large clasts from nearby hill slopes whereby the clasts collect in the hollow bottom. The second is the sheet flow runoff of fine material from the sideslopes, which collects to fill the spaces between clasts within the hollow.

*Overall Site Interpretation*. LA 70188 is in a kind of hollow typically recognized as an erosional feature rather than a depositional setting. However, as a topographic low along the slope, it is a hydrologic focal point, which sees a concentration of surface runoff during rainfall events and is a likely conduit of sediment transport. Such features are known to act as temporary storage sites whereby material is collected in the hollow area and stored until some threshold conditions of sediment load, soil moisture, and rainfall intensity are exceeded and the material is mobilized and flushed out as a slide or debris flow. The intervals between scouring events may be several thousand years.

The presence of cultural features within the hollow fill indicates that this site has not been eroded since sometime before occupation. In spite of the noted sediment accumulation and burial of cultural features here, the site should not be considered as a persistent or stable part of the landscape. Two scenarios for the emplacement of cultural materials in this site are: (1) The materials were deposited at the site during occupations that were concurrent with the gradual sediment accumulation; and (2) The materials were transported from the adjacent slopes and collected along with the remainder of the hollow fill sediment. It is possible that both scenarios may account for features at this site.

*LA 43766*

*Overall Geologic/Geomorphic Setting*. The site is on a broad alluvial stream terrace of SU Canyon, which is surrounded in this area mostly by moderately sloping (<15 degree) rolling hill topography, which has been mapped as alluvial slopes (Fig. 5.28). The watershed above the study site has a catchment area of approximately 36 sq km. The only geologic map covering this site is the Reconnaissance Geologic Map of the Reserve 30' quadrangle (Weber and Willard 1956-57). Their map represents the deposits at this site as Qal, or recent alluvium.

Soils at this site are designated as Soil Unit 531 in the Apache National Forest Soil Survey. This unit is described as a Cumulic Haplustoll: a very deep clay loam of recent alluvial deposition on gently sloping grassed bottomlands.

The terrace surface lies approximately 1.5 to 2 m above the active stream channel. The channel has a distinct bar and swale topography, with a poorly sorted bedload of clasts ranging in size from coarse sands to boulders up to 50 cm in diameter. Immediately north of the highway, and upstream from the site, there has been recent quarrying of channel sediments.

*Landscape Position*. The soil pit is approximately 50 m west of the active stream channel and directly south of the berm on which the road is constructed (Fig. 5.29). The road berm has a 23 degree gradient which gives way to the 6 degree gradient of a colluvial wedge formed by material shed off the berm. The soil pit lies 1.5 m south of the colluvial wedge, where the surface maintains a 2 to 2.5 degree gradient. This gradient is consistent with the overall slope of the terrace surface, suggesting that sediment inputs from the historical disturbance of road construction are minimal at this location.

Prior to road construction, the terrace was a single, continuous surface extending for nearly 1 km upstream and 600 m downstream from the site. The terrace rests 1.5 to 2 m above the active channel bottom. While there are no signs of recent or rapid accumulation on the surface at this site, its proximity to the active channel indicates a potential for overbank flooding and deposition during large storm events.

*Soil Profile*. There are two lithologic units represented in the profile at this site (Fig. 5.30; Table 5.92). The upper unit is a silty loam with very sparse gravel deposited during generally low-energy overbank flooding of the main channel. There are no distinct bedding planes or depositional features in this unit. The lower unit has a gravel content of 50 percent and a coarse- to medium-grained sand texture. The gravel clasts within this unit are subangular to subrounded, ranging in size up to 5 cm in diameter and composed primarily of mixed volcanic materials. The material of this unit is consistent with that of the active channel floor.

The soil at this site is an inceptisol or juvenile soil showing only a faint development of soil structure and no distinct color or structural horizonation. The 1 A/Bj horizon reveals few medium-sized subangular blocky peds (soil structures) and a diffuse boundary with the lower 1C horizon. The 1C horizon is considered original depositional material without a pedogenic overprint. While the juvenile nature of this profile indicates a very young age for the surface, the presence of a small degree of structural development in the 1A/Bj horizon suggests that the rate of deposition at this site may be slowing, and the surface may be stabilizing.

*Overall Site Interpretation*. The landscape position of this site makes it susceptible to overbank flooding and deposition of fine sediment at a rate that has exceeded the rate of pedogenesis. During large flood events, the channel waters may rise above the confining banks and spill over onto the terrace surface. This spillage is accompanied by rapid deceleration of the water and the deposition of suspended load sediment. This form of accumulation is likely to have occurred at successively greater intervals as the surface has been aggraded and further removed from interaction with stream flows. While the stream channel is a high-energy environment that is not conducive to the preservation of cultural deposits, extended floodplain features and low-lying terraces such as the T-1 surface

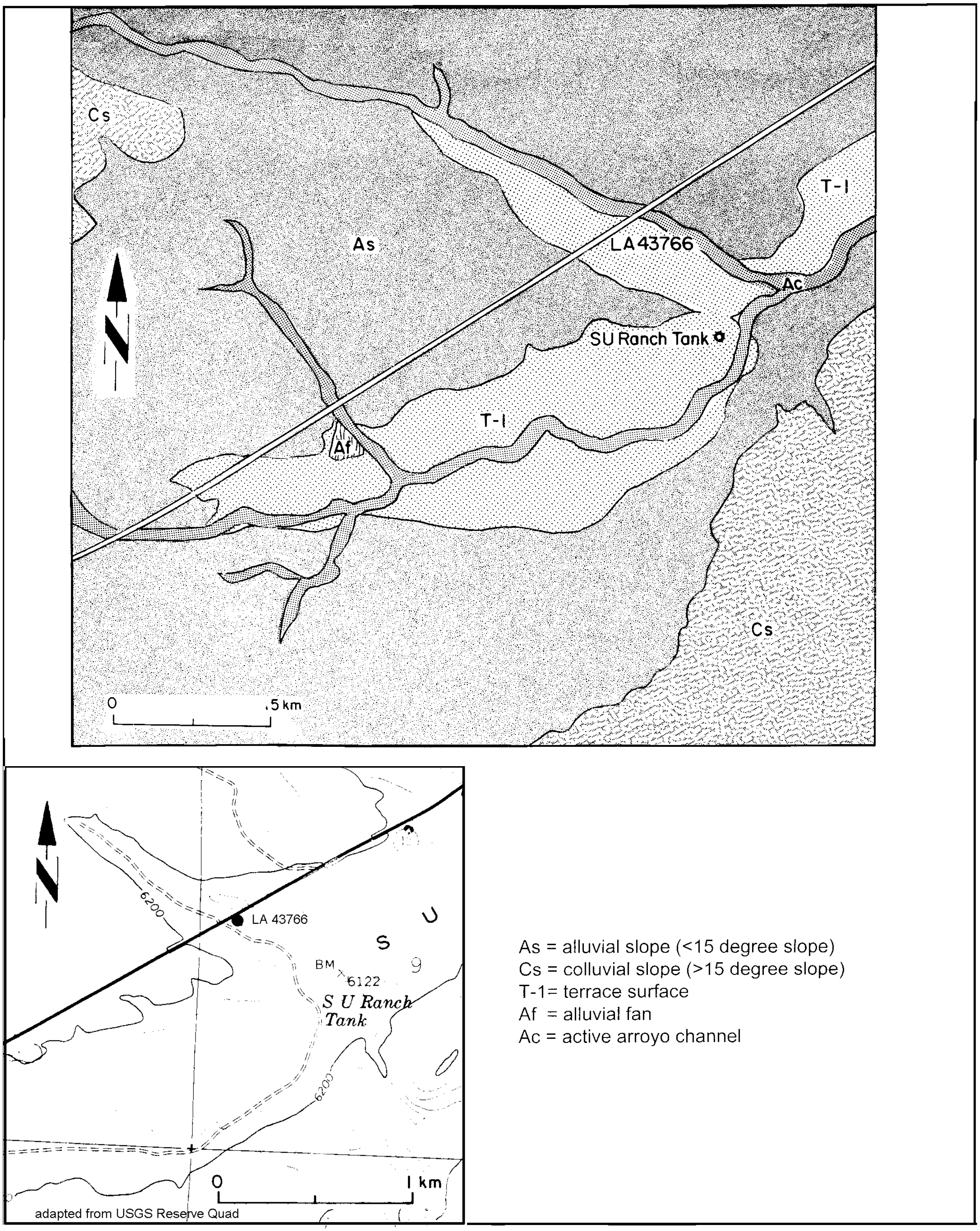



*Figure 5.28. Geomorphic surfaces near LA 43766.*

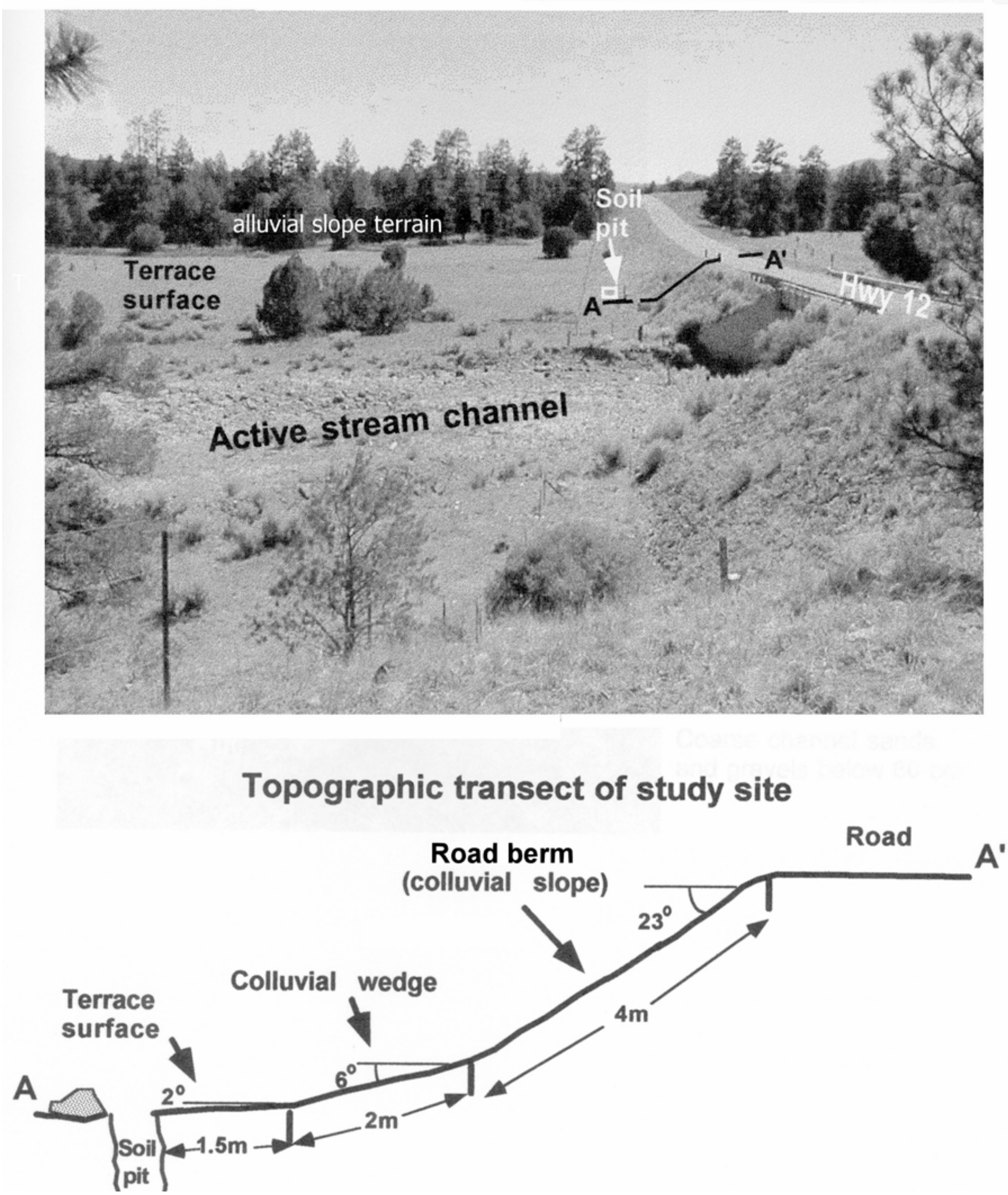



*Figure 5.29. Landscape setting of LA 43766; view of site looking southwest.*

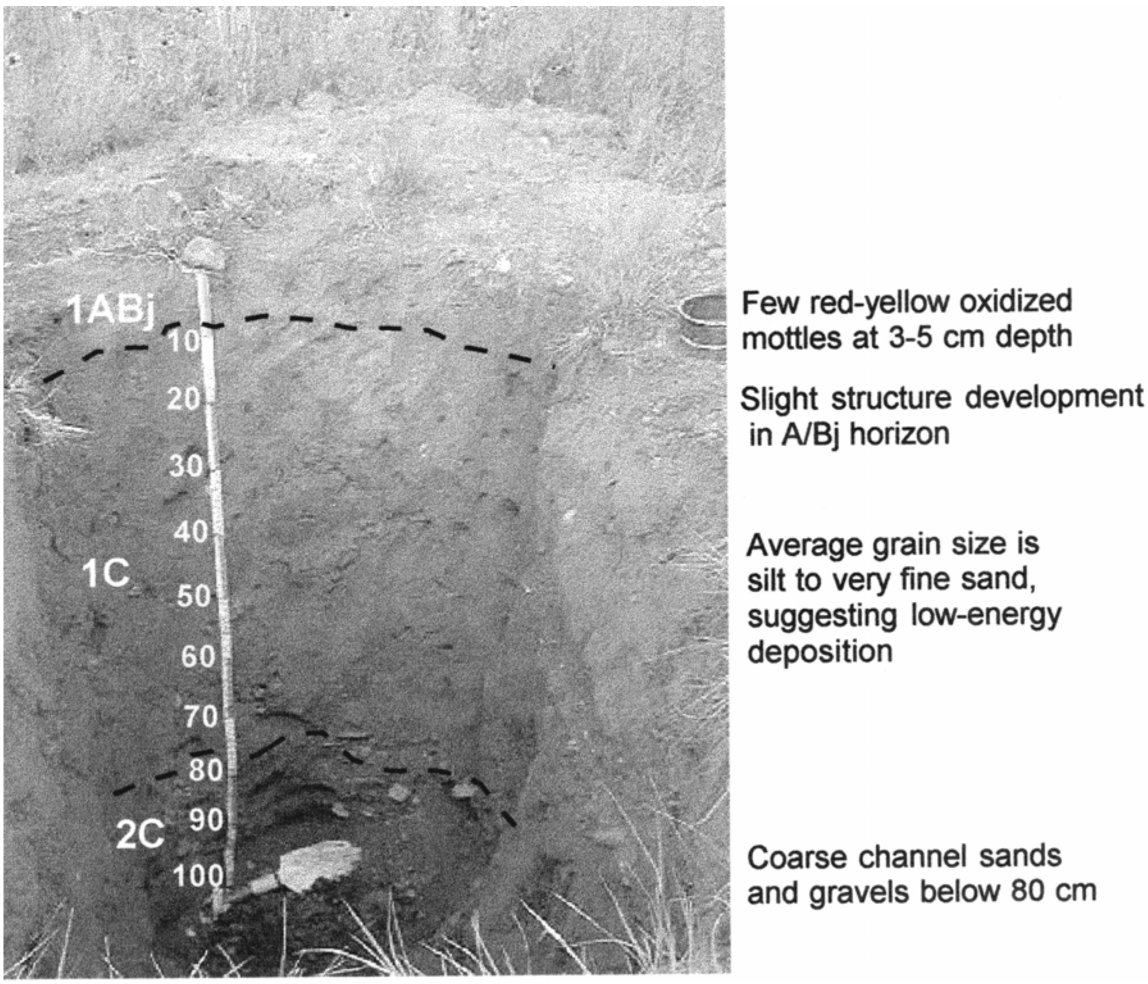



*Figure 5.30. Soil profile for LA 43766.*

here are low-energy depositional settings that are highly conducive to preservation of cultural features and artifact distributions.

*LA 75791*

This site was not among the buried sites, and there was no soil investigation conducted here. Rather, surficial geomorphic mapping was conducted (Fig. 5.31) and landscape position observations were made to characterize the surficial processes operating at this site.

*Overall Geologic/Geomorphic Setting*. A projection of the adjacent Bull Basin geologic map and field observations at the site show the underlying geologic unit to be Gila conglomerate. The unit is described by Ratté (1989) as a buff to pinkish-brown to gray conglomerate and sandstone consisting of locally derived volcanic clasts, with a maximum unit thickness of 200 m. The site is on the inside of a meander bend on a low stream terrace of Leggett Canyon. Steep colluvial slopes and incised ephemeral streams dominate on the east side of the canyon, while the west side is characterized more by lower gradient alluvial slopes and tributary arroyo channels (Fig. 5.32). Field and air photo observations suggest that the bend in the stream may have been induced by sediment influx from Indian Camp Creek. However, that creek is currently incised through the terrace surface and enters the canyon to the southeast of the site.

*Landscape Position*. The site is on a low terrace of Leggett Canyon stream. The terrace occupies the inside of a meander bend in the stream, and, before previous road construction, the surface was continuous across the highway to the east of the site. Such a site is typically a low-energy environment characterized by the accumulation of fine material due to overbank flooding events. The channel bed itself has a bar and swale topography with a bedload of coarse sands, gravels, and boulders indicative of high-energy flows. This environment might be considered too harsh for the preservation of cultural artifacts during transport and deposition. However, the surface may also be subject to small eddy currents, which oppose the normal stream

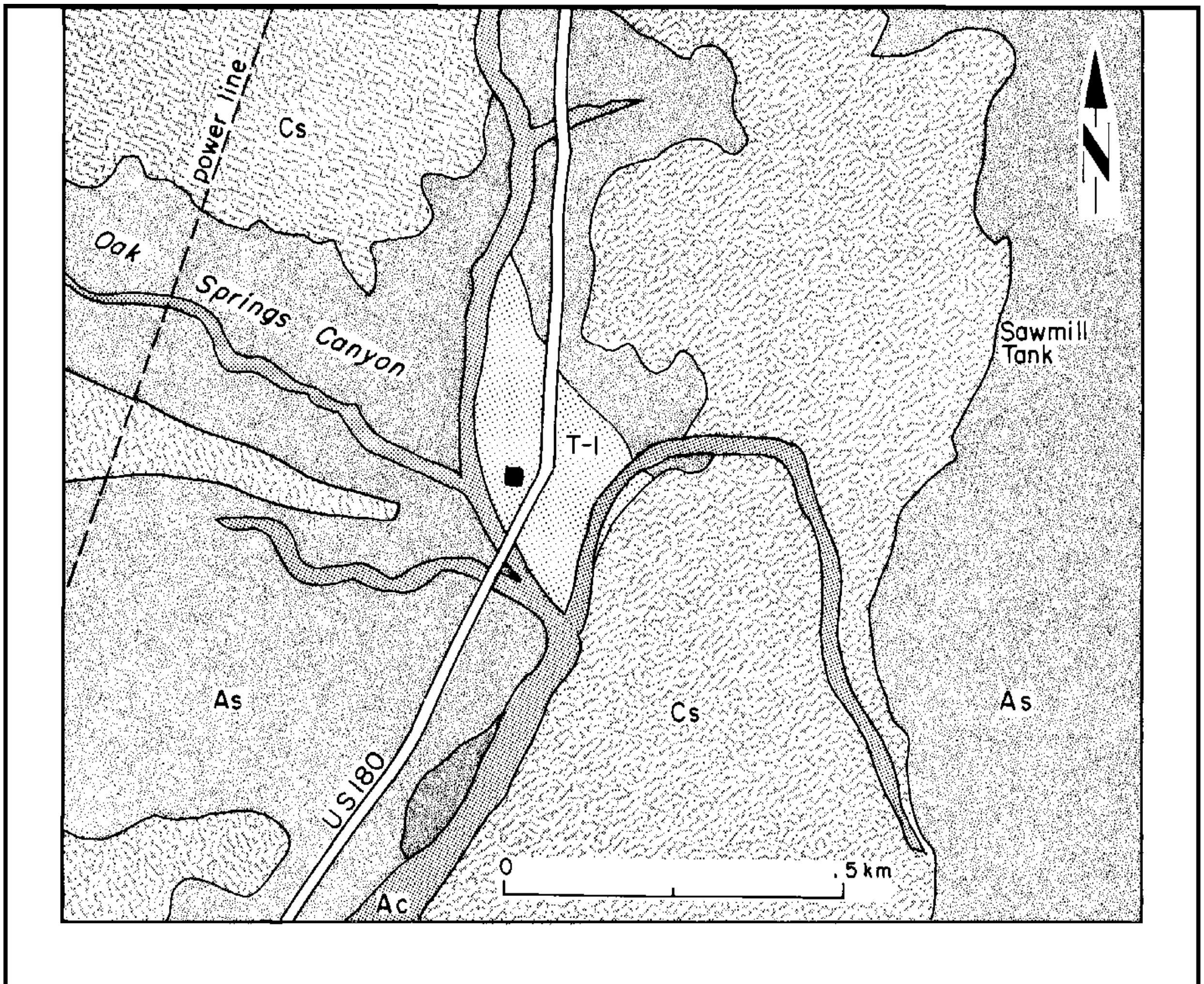



*Figure 5.31. Geomorphic surfaces near LA 75791 and mapped segment of Reserve quadrangle.*

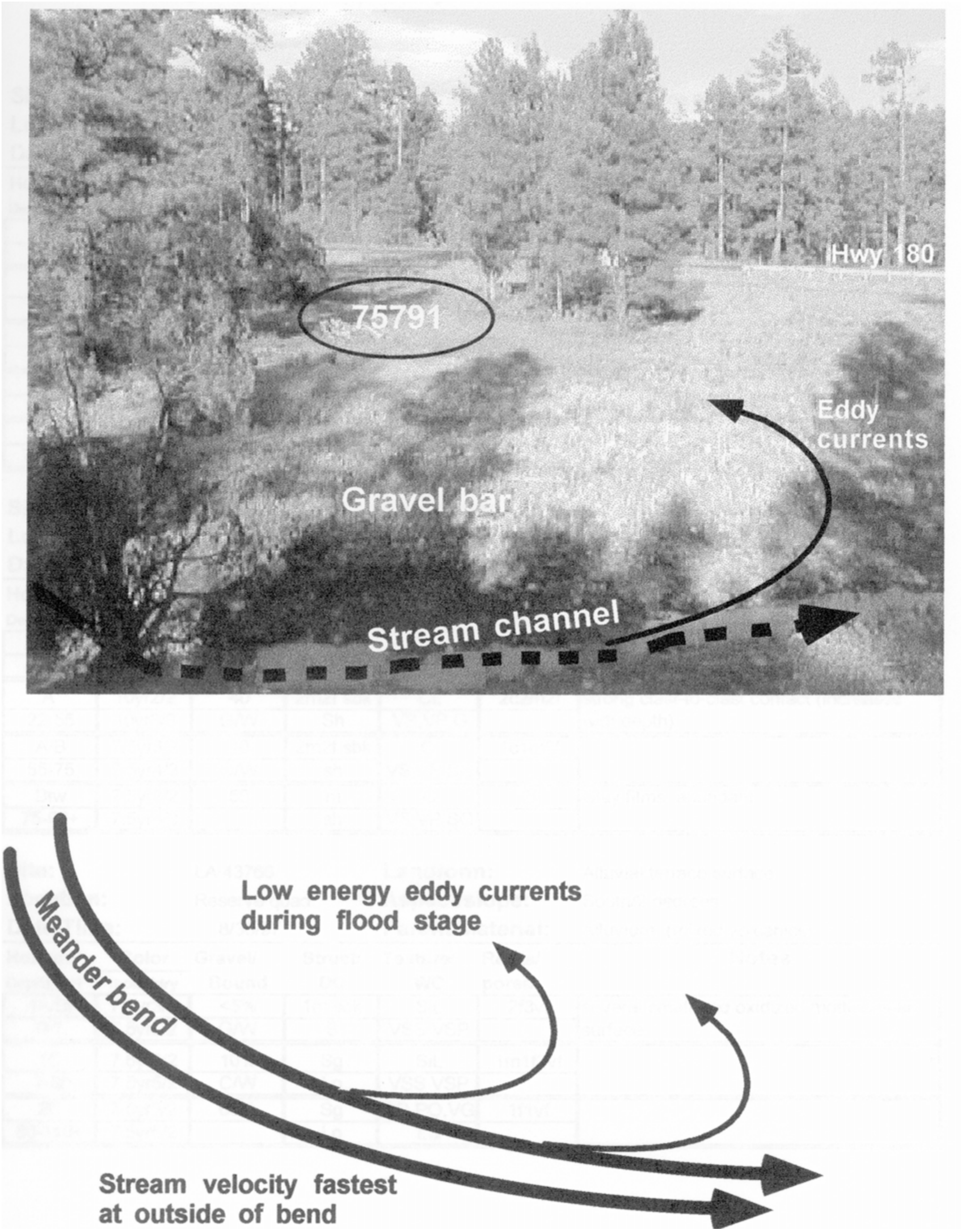



*Figure 5.32. Landscape setting of LA 75791, view looking north-northeast.*

flows during flood events (Fig. 5.32). Positioned at the inside of a meander bend, such a location may see significant eddy currents operating in an upstream direction.

*Overall Site Interpretation*. Given the high-energy environment of the active stream channel, it is unlikely that the surface scatter of artifacts at this site was derived from an upstream source. Incorporation of the artifacts in the bedload of the channel would subject them to intense mechanical weathering during transport with the coarse material in this system. While it is still a distinct possibility that the surface scatter of artifacts at this site was transported and deposited at this location, it is more likely that they were found in place or transported from a proximal site on the same terrace surface. It is difficult to identify the source definitively. However, one possibility is that the artifacts were moved by lower-energy eddy currents from the pithouse site (LA 70196), which is southeast and downstream from LA 75791.

## Summary of Results

This investigation was conducted to determine the likelihood of finding other similarly buried sites in the region. Given the scope of this project, it is impossible to evaluate the entire region for such potential. However, we can evaluate the sites at hand and identify signs of burial evident in the landscape. In doing so, future researchers may consider these landscape factors in assessing the potential for burial at other sites.

To accomplish this, I have evaluated each of the sites based on a series of factors to determine a qualitative probability for finding similarly buried sites in the landscape. The factors considered are the potential for deposition at the site, the lateral extent of the depositional setting, and the preservation potential of the surface.

The site that represents the most likely occurrence of burial is LA 43766. Its position on a low-lying alluvial terrace in close vertical proximity to the active floodplain makes the site a prime candidate for frequent flooding and sediment deposition. The broad lateral extent of this landscape unit provides considerable possibilities for additional buried sites.

Second in the ranking is LA 89846. In ranking this site, I have considered only the natural factors contributing to deposition. The historical disturbance responsible for the recent episode of deposition is insignificant on a landscape-wide scale. The natural deposition of material at the toe of the colluvial slope takes place in a narrow band where the slope gradient changes from steep to mild. While this setting does not represent great areal extent, the potential for burial due to sheet flow runoff from the colluvial slopes or alluvial fan deposition within this narrow band is considerable.

Finally, the least likely scenario of burial to be replicated in the landscape is that of LA 70188. This site is located in a hollow area that is commonly considered to be an erosional setting. As a hollow area, it is a zone of focused surface water runoff and is likely to see some channelized flow during moderate rainfall events. The site is not a classic depositional setting, but serves as a temporary storage between large erosional events such as debris flows.

While the sample number of sites in this study is limited, the selection of sites represents a diverse cross section of the geomorphic setting, providing insights into the surficial processes operating here. The rating of the sites based on their potential for burial was done on a qualitative basis in this study. However, further work in this area may allow the development of a more systematic approach to rating surfaces on their burial potential and can help to direct the focus of future archaeological investigations.

## Recommendations

The findings and conclusions presented in this report represent fieldwork conducted independent of the original archaeological investigations. Characterization of depositional setting and surficial processes has been based on observations from 1 by 1 m soil pits and does not reflect the full degree of spatial variability that likely exists at these sites. In order to more effectively target sites for excavation and to gain a more complete conception of the geomorphology of future project areas, it is recommended that soil and geomorphic studies be conducted contemporaneously with the archaeological work.

Table 5.92. Soil Profile Data

| | | | |
|---|---|---|---|
| **Site:** | LA 89846 | **Landform:** | Colluvial toe slope |
| **Location:** | Luna | **Aspect/slope:** | South facing/8 degree |
| **Date/Time:** | 8/28/97 | **Parent Material:** | Mixed volcanics |

| Horizon/ Depth (cm) | Color moist/dry | Gravel/ Bound | Struct/ DC | Texture/ WC | Roots/ pores | Notes |
|---|---|---|---|---|---|---|
| A/Bj<br>0-16 | 7.5yr3/2<br>7.5yr5/3 | 15<br>G/S | 2f sbk<br>S | SCL<br>S&P&VG | 2m3f2vf<br>2f | Cumulic horizon: grasses competing with sediment influx |
| B/C<br>16-35 | 7.5yr3/2<br>7.5yr4/3 | 15<br>A/W | 1f sbk<br>S | SCL<br>S&P&VG | 1m1f2vf | |
| Ab<br>33-58 | 5yr2.5/1<br>5yr4/2 | 10<br>C/W | 2f,2m sbk<br>S | CL<br>S&P&G | 1m2f2vf | Abundant cm-size charcoal fragments in dark, charcoal-stained matrix |
| A/Bb<br>58-70 | 5yr2.5/2<br>5yr4/2 | 10<br>G/W | 2f,2m sbk<br>S | SC<br>VS&VP&G | 1f,1vf | |
| Btb<br>70-85+ | 5yr3/2<br>5yr4/3 | 5 | m<br>S | C<br>VS&VP | 1f,1vf | Large (5 cm dia.) charcoal frag. in abrupt contact w/ soil matrix |

| | | | |
|---|---|---|---|
| **Site:** | LA 70188 | **Landform:** | Concave alluvial slope |
| **Location:** | Bull Basin | **Aspect/slope:** | South/8 degrees |
| **Date/Time:** | 8/29/97 | **Parent Material:** | Colluvial debris |

| Horizon/ Depth(cm) | Color moist/dry | Gravel/ Bound | Struct/ DC | Texture/ WC | Roots/ pores | Notes |
|---|---|---|---|---|---|---|
| AO<br>0-22 | 10yr2/2<br>10yr3/2 | 30<br>G/W | 2m2f sbk<br>S | SCL<br>VS,VP,VG | 2m3f | Unusually thick organic horizon |
| A<br>22-55 | 10yr2/2<br>10yr3/3 | 40<br>G/W | 2m2f sbk<br>Sh | CL<br>VS,VP,G | 2c2m2f | strong clast-to-clast contact (increases with depth) |
| A/B<br>55-75 | 7.5yr3/2<br>7.5yr4/3 | 40<br>G/W | 2m2f sbk<br>sh | C<br>VS,VP,SG | 1c1m2f | |
| Btw<br>75-90+ | 7.5yr3/2<br>7.5yr4/3 | 50 | m<br>sh | C<br>VS,VP,SG | 2f | Clay films abundant |

| | | | |
|---|---|---|---|
| **Site:** | LA 43766 | **Landform:** | Alluvial terrace surface |
| **Location:** | Reserve | **Aspect/slope:** | South/2 degrees |
| **Date/Time:** | 8/30/97 | **Parent Material:** | Alluvium (mixed volcanics) |

| Horizon/ Depth(cm) | Color moist/dry | Gravel/ Bound | Struct/ DC | Texture/ WC | Roots/ pores | Notes |
|---|---|---|---|---|---|---|
| 1A/Bj<br>0-7 | 7.5yr3/2<br>7.5yr5/2 | <5%<br>G/W | 1m sbk<br>S | SiL<br>VSS VSP | 2f3vf | several small, red oxidized mottles near surface |
| 1C<br>7-80 | 7.5yr3/2<br>7.5yr5/2 | 10%<br>C/W | Sg<br>Lo | SiL<br>VSS VSP | 1m1f2vf | |
| 2C<br>80-110+ | 7.5yr3/2<br>7.5yr5/2 | 60% | Sg<br>Lo | SO,PO,VG<br>LS | 1f1vf | |