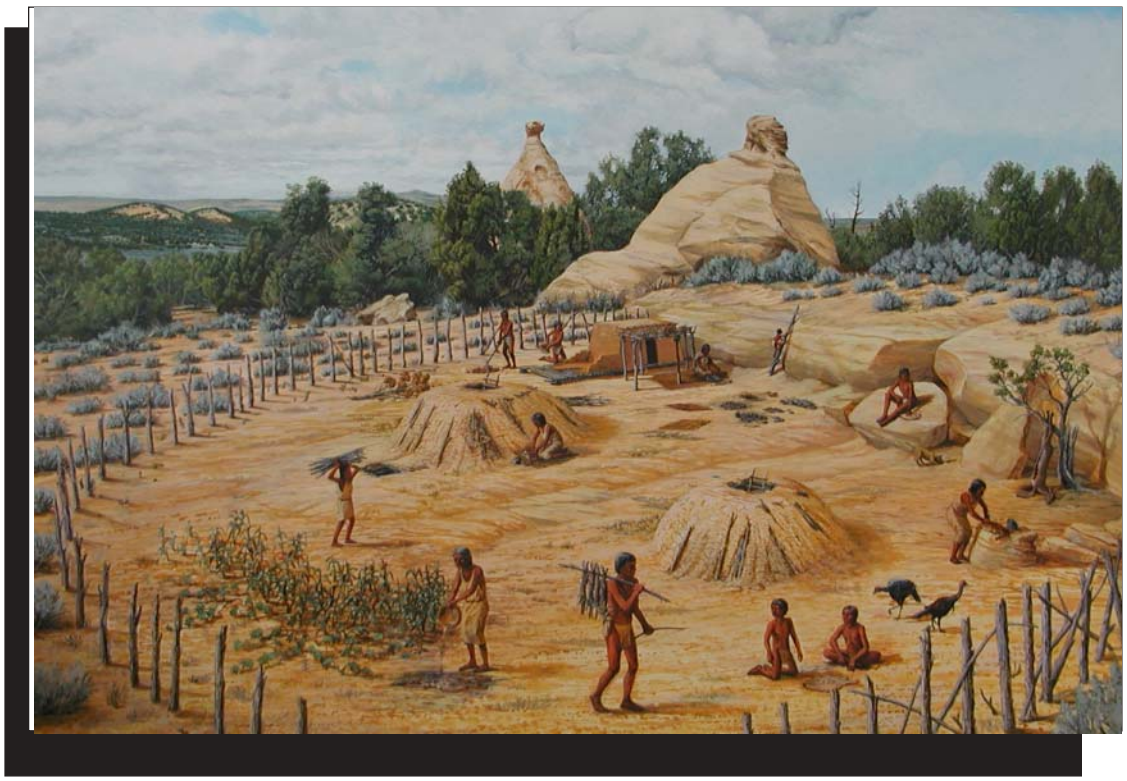
# PUEBLO I



Artist's conception of LA79076 at the time of occupation during the Pueblo I period (by Cory Dangerfield 2000).

# PUEBLO I SYNTHESIS

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## Chapter 4

# PUEBLO I: AD 750-900

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## INTRODUCTION

### Project Area Sites

Fourteen Pueblo I components have been investigated within the project area during the last 21 years, as can be seen from Table 4-1. Thirteen (93%) of these are habitations with at least one pithouse and usually several surface rooms.

Table 4-1. Pueblo I Components along MAPL Pipeline

| Site Number | Type | Area | Project(s) |
|---|---|---|---|
| LA10720 | habitation | Aztec | MAPCO, Loop, MAPL |
| LA80320 | limited activity | Aztec | Loop, El Paso, MAPL |
| LA27092 | habitation | Aztec | MAPCO, Loop, El Paso, MAPL |
| LA79076 | habitation | Aztec | Loop, El Paso, MAPL |
| LA80321 | habitation | Aztec | Loop, MAPL |
| 5LP203 | habitation | Durango | MAPL |
| 5LP378 | habitation | Durango | MAPCO, Replacement, MAPL |
| 5LP379 | habitation | Durango | El Paso-NWP, MAPCO, MAPL |
| 5LP515 | habitation | Durango | MAPL |
| 5MT5453 | habitation | Dolores | MAPCO |
| 5MT5503 | habitation | Dolores | MAPCO |
| 5MT5478 | habitation | Dove Creek | MAPCO |
| 5DL2 | habitation | Dove Creek | MAPCO |
| 5DL291 | habitation | Dove Creek | El Paso-NWP, MAPCO |

As can be seen from Figure 4-1, these 14 sites cluster in four areas: the Aztec area (five sites), the Durango area (four sites), the Dolores area (two sites) and the Dove Creek area (three sites).

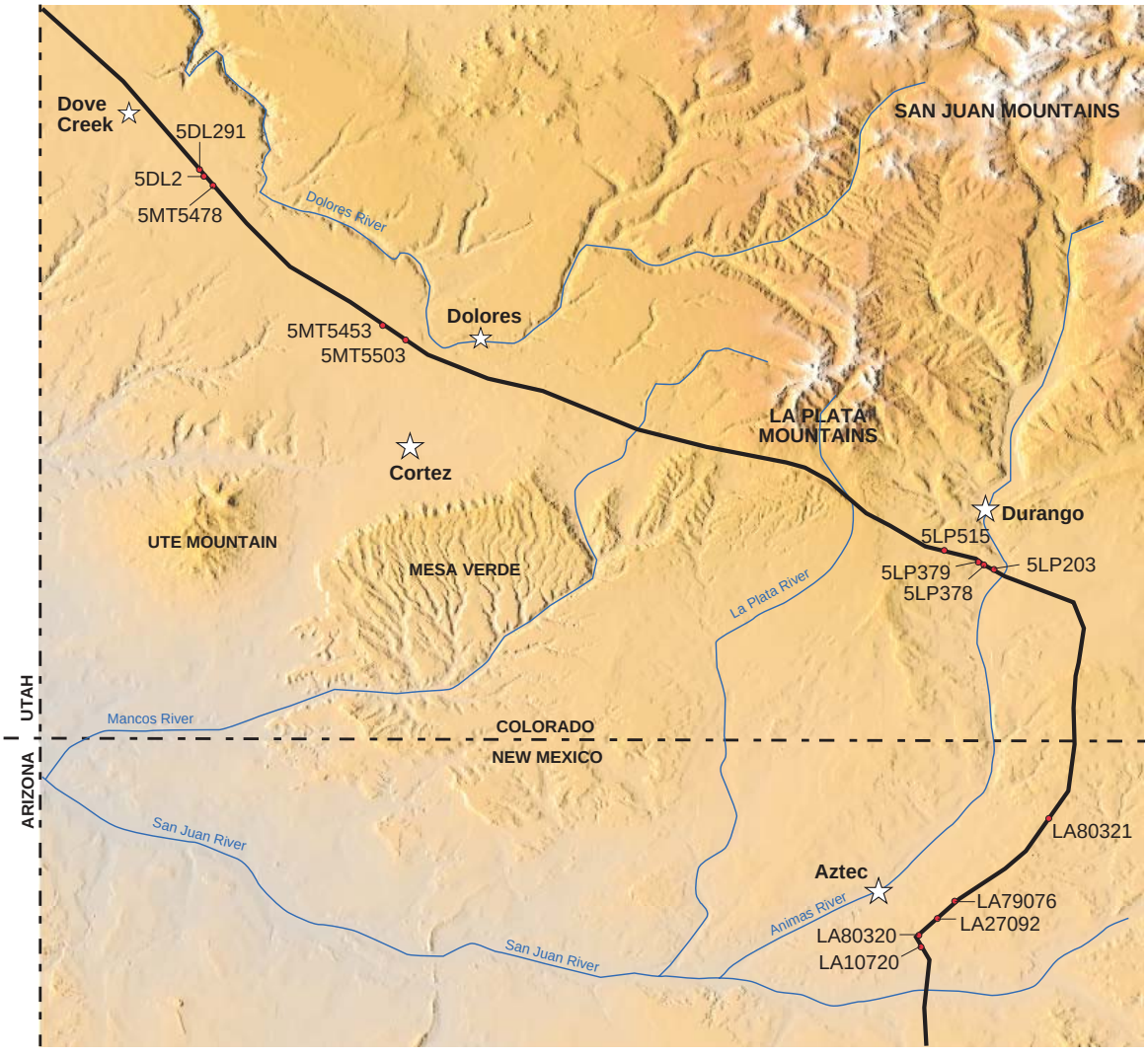



*Figure 4-1. Map showing location of project area sites in southwestern Colorado and northwestern New Mexico.*

### Aztec Area Sites

The five Aztec sites appear to represent two occupations. The earlier occupation is represented by three sites: LA10720, LA27092, and LA79076. These are habitation sites that date to the early 800's and are likely part of a dispersed community. Site LA80320, which lies between LA10720 and LA27092 is a limited activity area that probably is associated with that community. The later occupation is represented by one site: LA80321. This is a habitation occupied during the 850's and 860's.

### Durango Area Sites

The four Durango sites (5LP203, 5LP378, 5LP379, and 5LP515) were all habitations dating from 780-840. They were part of communities centered around Ridges Basin (5LP515) and Blue Mesa (5LP203, 5LP378 and 5LP379).

### Dolores Area Sites

The two Dolores sites (5MT5453 and 5MT5503) were habitations that are only partially excavated. They were probably part of an early Pueblo I community (750-800) at the head of Hartman and Leavell Draws, south of the large Dolores River communities.

### Dove Creek Sites

The three Dove Creek sites (5MT5478, 5DL2 and 5DL291) were habitations that date to the period 800-840. They were part of a dispersed Pueblo I community.

## CHRONOLOGY

### Project Area Sites

The site chronologies have been established primarily by dendrochronological dating and to a lesser extent, by ceramic cross-dating, archaeomagnetic and radiocarbon dating. Table 4-2 shows the occupational date ranges of the MAPL sites.

### Dendrochronological Dating

Structures at nine of the sites had well-preserved wood beams that produced a large sample of dendrochronological dates. Figure 4-2 graphically illustrates the cutting and important non-cutting dates obtained from the Pueblo I sites along the MAPL pipeline corridor. As can be seen from the figure, most of the sites excavated were occupied in the period 800-820. A few of the sites may have been first occupied in the 780's and two (5DL2 and 5LP379) had occupations into 840's. One site, LA80321, was built and occupied in the period 850-870.

Table 4-2. Occupational Date Ranges of Pueblo I Components along Pipeline Corridor

| Site Number | Date Range | Dating method |
|---|---|---|
| Aztec Area Sites | | |
| LA10720 | 790-870 | Ceramic |
| LA27092 | 800-817 | Dendrochronology, ceramic |
| LA79076 | 804-819 | Dendrochronology , archaeomagnetic |
| LA80320 | 670-870 | Radiocarbon |
| LA80321 | 850s-860s | Dendrochronology, ceramic |
| Durango Area Sites | | |
| 5LP203 | early 800s | Dendrochronology, ceramic |
| 5LP378 | early 800s | Dendrochronology, ceramic |
| 5LP379 | ca. 808-840s | Dendrochronology, ceramic |
| 5LP515 | early 800s | Dendrochronology, ceramic |
| Dolores Area Sites | | |
| 5MT5453 | 600-800 | Ceramic |
| 5MT5503 | 750-800 | Ceramic |
| 5MT5478 | 800-850 | Dendrochronology, ceramic |
| Dove Creek Area Sites | | |
| 5DL2 | 800-840 | Dendrochronology, ceramic, radiocarbon, archaeomagnetic |
| 5DL291 | 800-850 | Ceramic |

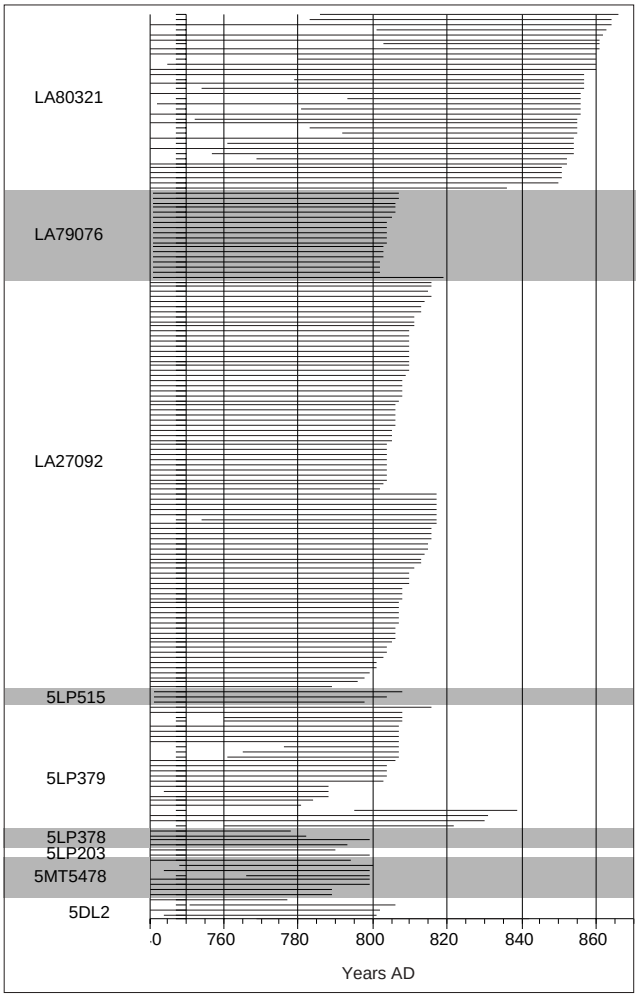



*Figure 4-2. Line graph showing dendrochonolgical dates obtained from sites along MAPL pipeline corridor. Note: Gray bars used to distinguish sites within the graph.*

## Ceramic Chronometry *by Lori Reed*

As documented across the Colorado Plateau (see Colton 1955a, 1955b; Eddy 1966; Reed and Goff 2000; Wilson and Blinman 1993), there is a transition from utility ware and decorated ware characteristic of the Basketmaker III period (e.g., Chapin style gray ware and Chapin white ware design style) to neckbanded gray ware and more complex Piedra-style design motifs during the Pueblo I period. The timing of this transition occurs earlier in some areas, such as the Northern San Juan, and later in other areas, such as the Chuska Valley (Hensler et al. 1999; Hays-Gilpin et al. 1999; Reed and Hensler 1998; Reed and Hensler 1999). In many cases, classification of sites as Pueblo I based on ceramics is a matter of degree rather than kind. For example, Pueblo I assemblages recovered from the southern Chuska Valley included a large percentage of types associated with the late Basketmaker III period, such as plain gray utility ware (Reed and Hensler 1998). Expectations of assemblages dating to the late 700s as having significant numbers of neckbanded vessels are not always fulfilled. In most areas, however, it appears that potters adopted neckband texturing by the late 700s, but its occurrence as the dominant utility ware did not occur until the 800s. The same trend applies to changes in white ware designs, although painted design styles appear to have changed more rapidly than gray ware surface textures. From a regional perspective, the MAPL ceramic assemblages provide further evidence to support these trends and to supplement the growing data set for Pueblo I ceramic chronometry in the Animas River valley.

Pueblo I assemblages from MAPL were recovered from six sites, four of which are located in the New Mexico segment of the project and two located in the Colorado segment. (ed. note: this section does not include data from 1980 MAPCO project from Montezuma or Dolores counties). All of these sites are situated closely to the Animas River valley, providing a geographic glimpse of changes in pottery style along one corridor linking the Upper and Northern San Juan areas. As discussed in detail for each of the sites, tree-ring cutting and non-cutting dates were obtained from 5LP203, 5LP379, LA27092, and LA79076. LA10720 is the only site that did not yield tree-ring dates, but is dated to the same time period using pottery type distributions. Based on the combined tree-ring dates, a range of 794-830 is proposed for the four dated sites. As shown in Figure 4-3, 5LP203, 5LP379, LA27092, and LA79076 are roughly contemporaneous. LA80321 stands out as occupied later in time, having a range of 830-860. Given the temporal difference between LA80321 and the other tree-ring dated sites, it is expected that the assemblage from LA80321 would include a higher percentage of neckbanded gray ware, but with continued use of Chapin and Rosa style gray ware.

A combined data set for the six sites was generated using the MAPL data, the Arkansas Loop 1991 data (Honeycutt and Fetterman 1994), and the MAPCO 1980 (Lucius 1982) data. The distribution of typeable gray ware ceramics from each site is shown in Figure 4-4. Following a similar

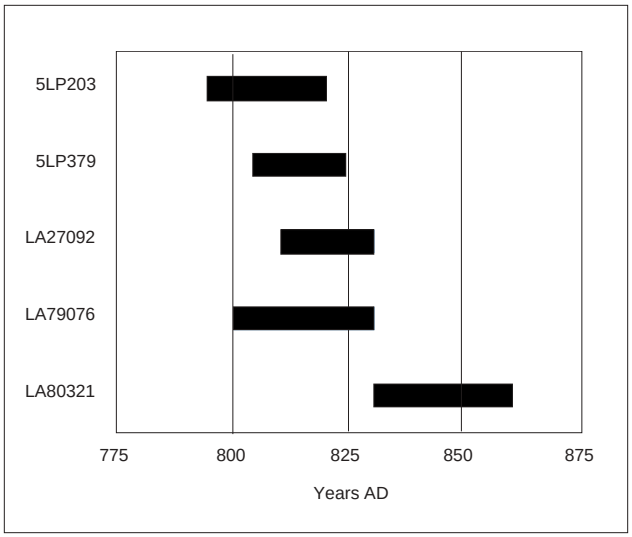



*Figure 4-3. Occupational date ranges for Pueblo I sites based on tree-ring dated contexts.*

pattern to the tree-ring date ranges shown in Figure 4-3, 5LP203 appears to be the earliest of the Pueblo I assemblages with neckbanded gray ware comprising less than 10 percent of the typeable ceramics. Although tree-ring dates are not available for LA10720, the small percentage of neckbanded gray ware is similar to that from 5LP203, suggesting that the two sites were occupied at about the same time.

A second group of sites is evident in Figure 4-4 with 5LP379, LA27092, and LA79076 having neckbanded gray ware comprising between 10 and 20 percent of the assemblage. The tree-ring date ranges for the three sites also cluster, suggesting that these assemblages are probably a few decades later than the occupation at 5LP203.

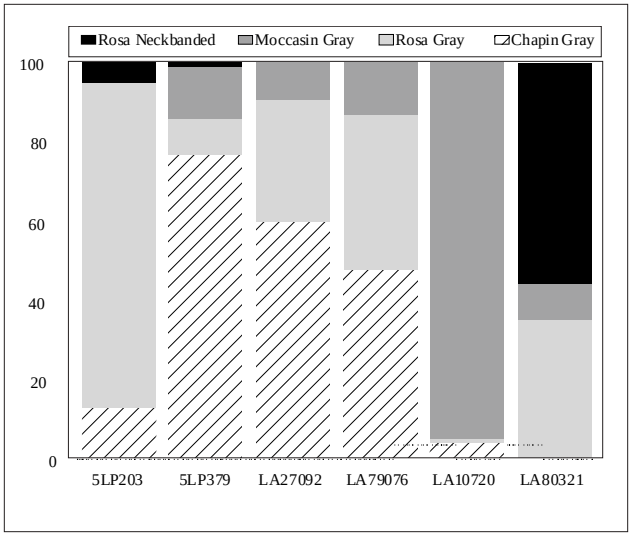



*Figure 4-4. Distribution of gray ware ceramic types in Pueblo I assemblages using combined MAPL, Arkansas Loop, and MAPCO data.*

Finally, LA80321, which clearly dates later in the 9th century, has a gray ware assemblage with over 50 percent neckbanded jars. These data indicate that the frequency of neckbanded gray ware increased through time, but plain gray jars remain a significant portion of the ceramic assemblage in the middle 800s.

Examination of the typeable white ware ceramics from the combined MAPL, Arkansas Loop, and MAPCO data sets also shows temporal trends. Given the slightly earlier date range and the low frequency of neckbanded gray ware from 5LP203, it was expected that the white ware assemblage would be comprised predominantly of Rosa/ Chapin style designs. As shown in Figure 4-5, this pattern occur in the 5LP203 and 5LP379 assemblages. In contrast, Abajo Red-on-orange does not occur in the LA27092, LA79076, and LA80321 assemblages, suggesting that these sites are slightly later in time. Although the presence of Abajo Red-on-orange and Bluff Black-on-red fit with typological/temporal expectations, the identification of McPhee Red and McPhee Black-on-red from LA27092 presents a chronological issue. As defined by Wilson and Erickson (1985), McPhee Black-on-red is a local variety of Bluff Black-on-red produced in the Dolores area between 875 and 920. Because the occupation at LA27092 is tree-ring dated to the early decades of the 800s, identification of this type at a site dating earlier than the type's supposed manufacturing date is problematic. It is possible that McPhee Black-on-red dates earlier than the range proposed by Wilson and Erickson (1985); its identification and dating in the Upper San Juan area may extend the range of manufacture for the type.

Given the relative sensitivity of the painted designs and gray ware texturing to temporal transitions within the Pueblo I period and the increase in locally produced, crushed rock-tempered ceramics through time, ceramics may be an informative data set for addressing larger issues of population movement. Wilshusen and Ortman (1999) propose that population movements from north to south (e.g., Dolores to the Animas River valley) may have been common in the late ninth century marking changes in community organization and the formatting of the cultural landscape. Although Wilshusen (1999) indicates that Rosa design styles dominate the Animas, Piedra, and Upper San Juan drainages until approximately 850, well-dated contexts from MAPL suggest that both Piedra and Bancos style designs were present in assemblages dating to the early decades of the 800s. Given that a variety of design elements and line widths have been subsumed under Rosa Black-on-white (Reed 1999), a closer examination of design style and differentiation between Rosa and Bancos styles is warranted. Differentiation of Rosa, Bancos, and Piedra Black-on-white types undertaken for the MAPL Pueblo I sites is an approach that should be tested further in other assemblages from the Upper San Juan region.

## Projectile Point Dating

Figures 4-6 and 4-7 present illustrations of projectile points recovered from sites in New Mexico and Colorado, respectively. As can be seen from these figures, stemmed points predominate the assemblies and there does not appear to be significant difference in shape between projectile point styles of the Dove Creek (5DL2), Durango (5LP378, 5LP379, and 5LP515), and Aztec (LA80321, LA79076) area sites. In addition, corner-notched points were found on many of the sites.


*Figure 4-6. Photographs of projectile points from New Mexico Pueblo I contexts, actual size..*

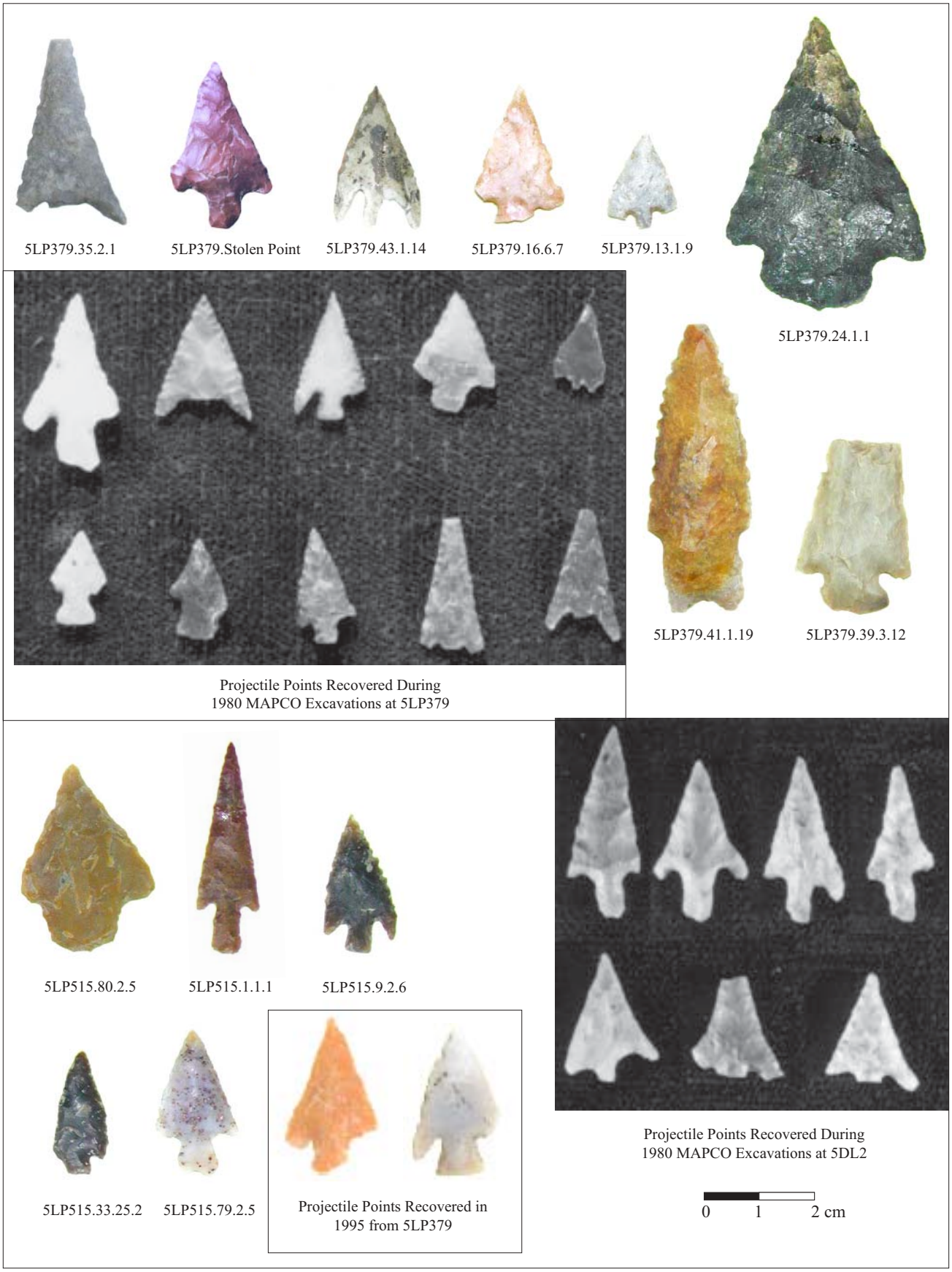



*Figure 4-7. Photographs of projectile points from Colorado Pueblo I contexts, actual size..*

Small stemmed points are commonly located on late Basketmaker III and Pueblo I contexts (Hayes and Lancaster 1975; Smiley 1995; Phagan 1988). They are found on sites dating from 600-1300 (Loosle 1988) but are most common on sites from the period 750-950. Small corner-notched points are found on sites dating from 300-1000. They were common on the Basketmaker III sites excavated on this project and are found on Basketmaker III and early Pueblo II sites in Utah (Firor et al. 1998).

In addition, several large dart points were found on 5LP379 and LA10720. These points are similar to points recovered from Archaic contexts and are believed to be collected and curated objects. Supporting the hypothesis that these are collected and curated objects is one large Sudden side-notched projectile point from 5LP379 (not illustrated) that was found on the floor of a pithouse. This point was no longer functional as a projectile point or knife as its flake scars and edges were well worn and polished from intensive handling.

In summary, the projectile points located on the Pueblo I sites are consistent with the dating of the sites to the Pueblo I period. The styles of points show no regional differences. Collection and curation of large Archaic "style" points is indicated by the presence of these style points in good Pueblo I contexts.

**Regional Chronology**

The Pueblo I period was a period of both population aggregation and movement. During this period, people aggregated into large villages and communities. These villages and communities typically had relatively short lives, 30-40 years (Wilsushen 1999:201). Often, the abandonment of a community was associated with the abandonment of the entire topographic area in which it had been situated. Near the project area, Pueblo I communities have been identified in the Dolores River Valley, the Upper Animas River Valley(Durango), the Cedar Hill area, and the Upper San Juan River Valley. Movements have been postulated to and from the Dolores River Valley and the canyon country to the west (Schlanger 1986) and from the Durango River Valley to the Upper San Juan Drainage (Fetterman et al. 2001), and from the Dolores River Valley to Cedar Hill (Wilshusen 1995).

To evaluate how the sites along the MAPL corridor relate to population movements, a comparison will be made to the communities identified near the corridor: Dolores River Valley, Upper Animas River Valley, the Cedar Hill area, and the Upper San Juan River Valley. Figure 4-8 presents a graph of relative intensity of occupation of the Dolores, San Juan, and Upper Animas River Valleys and a plot of the occupational range of the dendrochronological dated MAPL sites. As can be seen from this figure, the peak of population in the Dolores River Valley occurred in the time frame 850-875; the peak in the Upper Animas Valley 775-800; and the peak in the Upper San Juan River Valley 875-900. Although not shown in Figure 4-8, the occupation of the Cedar Hill area is similar to the Upper San Juan River Valley with most of the occupation in the period 875-900.

As can be seen from Figure 4-8, the majority of the sites investigated along the MAPL corridor were occupied at a time when population levels at nearby communities were not at their maximum.

The Dolores-Dove Creek area sites were occupied during

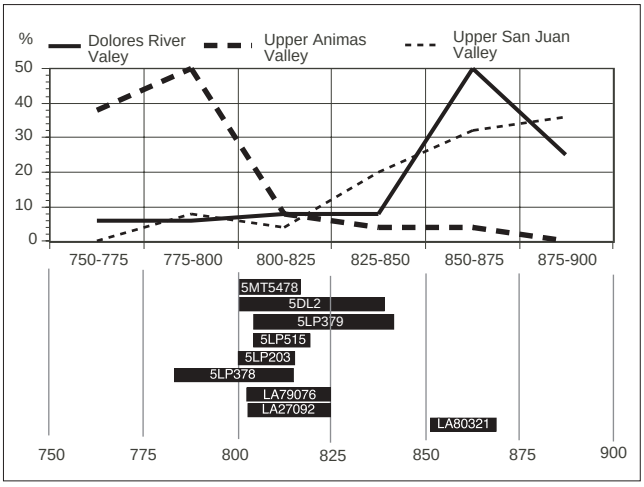



*Figure 4-8. Line graph showing relative percentages of sites by 25 year periods for three Pueblo I communities, in comparison to bar graph showing occupational date ranges for dendrochronologically dated MAPL sites.*

the period when population was growing in the adjacent Dolores River valley. The inhabitants of these sites could have moved to the Dolores River Valley in the early to mid 800s after leaving these sites.

The Durango area MAPL sites were occupied primarily at the tail-end of the Upper Animas River Valley occupation. Fuller (1988:23) suggests that the Blue Mesa Community (where most of the MAPL sites are located) may have been a refugium occupied in the early 800s: the MAPL data support this hypothesis.

The Aztec sites are located on the west side of the Upper San Juan River Valley and southeast of the Cedar Hill area, essentially between the Durango area and the core Upper San Juan River Valley area. The dates for most of the MAPL Aztec sites fall into the period AD 800 and 825. It is possible that the most to the Aztec sites represent a community that was between the Durango and core Upper San Juan River Valley, both physically and temporally.

The only MAPL Aztec site that doesn't date to the period AD 800– 825 is LA80321. This site dates to the period AD850-870, and fits well with the increasing population in the rest of the Upper San Juan River Valley. The inhabitants of these sites could have moved to the Cedar Hill or other parts of the Upper San Juan River Valley after leaving this site.

## CULTURAL AFFILIATION

### Cultural Regions

Pueblo culture has been always been dynamic and diverse. There are more than 20 Puebloan tribes in the Southwest and most of these tribes are formed by many clans who have their own history and migration stories (see Anyon 1999 for discussions of Hopi clans). There is no reason to suggest that during prehistory that the cultural setting was any less diverse.

It can be said, however, with some degree of certainity that the people who lived in the Pueblo I sites excavated along the MAPL corridor were Puebloan people. They were agricultural people who shared many traits to people who consider themselves today as Puebloan.

While there are numerous similarities among the remains left behind by the ancestral Puebloan people who occupied the area, there are local and regional differences that suggest that there was cultural diversity in the past.

Archaeologists have long recognized that this diversity existed and have established local phase sequences to reflect local differences. For the general project area several phase sequences have been devised: the Wetherill Mesa Phase Sequence, the Navajo Reservoir Phase Sequence, and the Dolores Phase Sequence. Unfortunately, these phase sequences are firmly rooted on the local remains and are not as useful in areas outside their intended description. Secondly, it is unfortunate that there are terms used for the phases in two of the sequences that are the same but have different ages and composition. In part as a result of the terminology difficulties and a need to regionalize the discussion, it is proposed to define two regional spatial categories for describing cultural differences during the Pueblo I period: Western and Eastern.

These cultural regions (see Figure 4-9) roughly correspond to the distribution of ceramic manufacture tradition (Western corresponding to the Northern San Juan Ceramic Tradition and Eastern corresponding to the Upper San Juan Ceramic Tradition) but also appear to be correlated to household composition and house architecture.

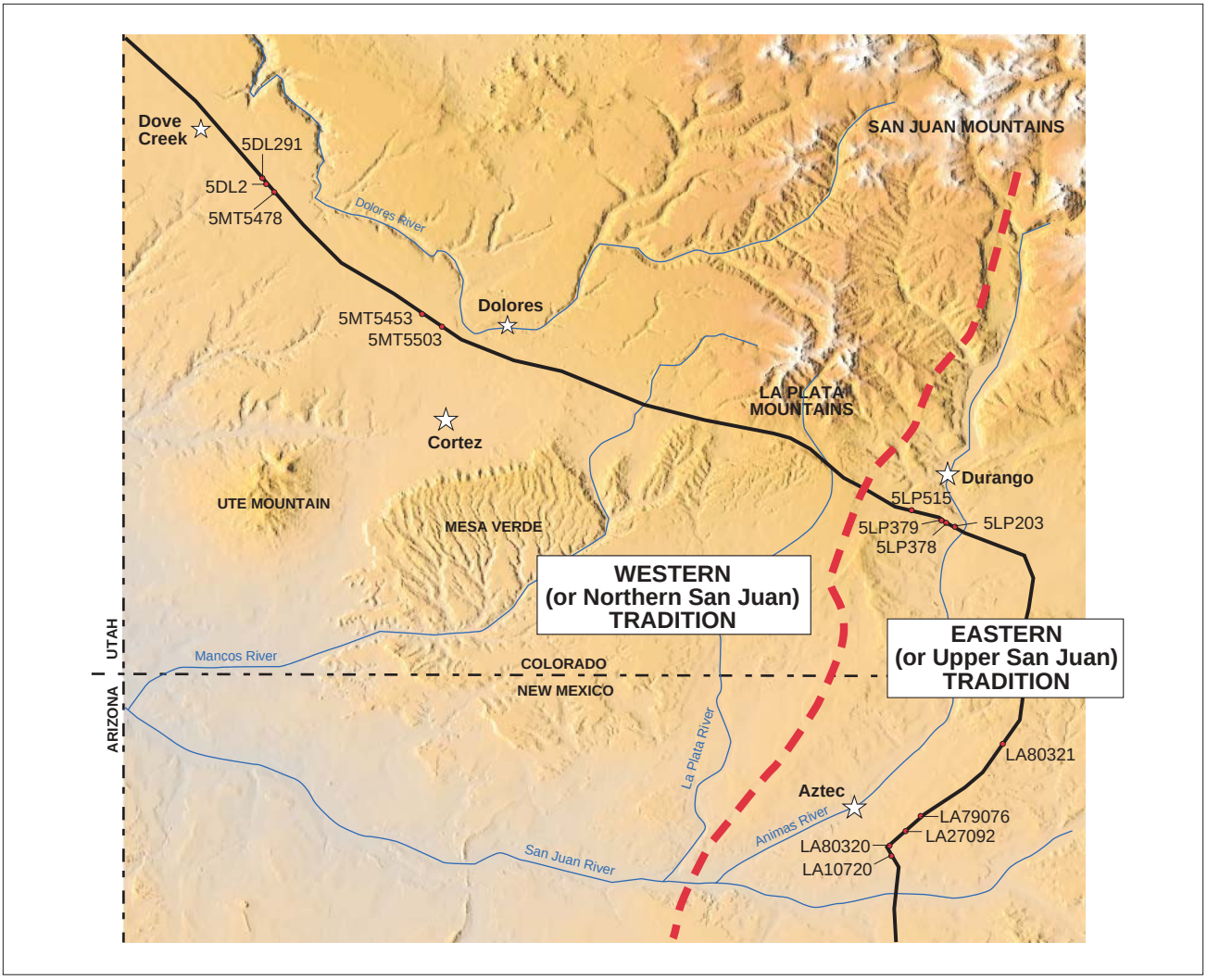



*Figure 4-9. Map illustrating location of the Eastern and Western cultural regions.*

### Western Region

The western region contained the classic†"Pueblo I" as defined by J.O.Brew (1946), Hayes and Lancaster (1975), and others. Typically, the sites were composed of roomblocks, pithouses, and middens in a north-south orientation. Surface roomblocks were commonly built in an arc of double rooms, with the domicillary rooms to the south and the storage rooms behind them to the north. The roomblocks were typically made of adobe with posts and upright-slab base construction, but a trend over time is seen towards complete masonry walls. Pithouses were typically square to rectangular, contained a ventilator system and wingwalls, and were 1.2-2 meters in depth. Interior benches were uncommon after 800.

Ceramics from the western region typically contained crushed igneous rock temper. Neckbanded grayware ceramics were introduced by 775 and become more common in the grayware assemblage after 800. Mineral-painted Piedra Black-on-white ceramics were commonly found in collections starting around 765.

### Eastern Region

In the eastern region, sites exhibited considerably more variability in layout and composition. Sites usually contained roomblocks and pithouses in a southeast-northwest orientation, with the middens often located to the east. Surface roomblocks were almost exclusively built of adobe and, for the most part, were only one room deep. In the early part of the period, most of the roomblocks contained only storage rooms. When domicillary rooms were added later in the period, they were often non-contiguous to the rows of storage rooms. The storage rooms were often built at or above grade. Some of them were built with above-ground floors of beams and adobe. Pithouses were roughly circular in plan, and contained earthen benches, molded adobe milling bins and bifurcated vent tunnels (Sesler 2001). The eastern sites were sometimes encirced by a post stockade or a cobble apron.

Ceramics from the eastern region typically contained sand or quartzite temper. Neckbanded grayware ceramics were introduced around 800 and never became a high percentage of the ceramic assemblage. Decorated wares were dominated by an organic-painted Rosa or Bancos Black-on-white. During the later part of the period (850-900), mineral painted Piedra Black-on-white was introduced.

## Project Area Sites

The sites along the MAPL corridor contain evidence of both western and eastern traits (see Table 4-3). Generally, the sites in the Dolores and Dove Creek areas exhibit western traits and the sites in the Durango and Aztec areas exhibit both western and eastern traits. The Dolores and Dove Creek area sites have rectangular pithouses, roomblocks with front and back rooms, and contain ceramics with igneous rock temper. The Durango and Aztec area sites contain both rectangular and circular pithouses, simple roomblocks that served primarily for storage, and were sometimes surrounded by post stockades or cobble rings. The Durango and Aztec area sites contain a mix of ceramics types: some of the Northern San Juan Tradition and some of the Upper San Juan tradition.

## Summary

In summary, an east-west dichotomy of traits suggests that different cultural groups occupied the project area during the Pueblo I period. The sites along the MAPL corridor in the Dolores and Dove Creek areas were affiliated with the western cultural group. The sites in the Durango and Aztec areas appear to have been affiliated with both groups and the MAPL excavation

Table 4-3. Presence or Absence of Eastern and Western Region Traits in Project Area Sites

| Site Number | Traits of Western Area | | | | Traits of Eastern Area | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pithouse | | surface rooms | artifacts | pithouse | | | | surface rooms | outdoor activity area/plaza |
| | rectangle[1] | wing walls | double row | >50% NJS pottery | circle[1] | bench | adobe bin | bifurcated vent opening | adobe-and-wood floor | stockade or cobble ring |
| Aztec-Durango | | | | | | | | | | |
| LA10720 | | | | | | | | | | |
| LA27092 | X | X | | X (87%) | | X | X | | | |
| LA79076 | | | | | X | X | X | | X | X |
| LA80321 | | | | | X | | X | | X | |
| 5LP203 | | | | | ? | | | | | X |
| 5LP378 | | | | | X | | | X | | |
| 5LP379 | | X | | | X | X | X | X | | |
| 5LP515 | ? | X | | X (56%) | ? | | | | ? | |
| Dolores-Dove Cr. | | | | | | | | | | |
| 5MT5453 | | | X | | | | | | | |
| 5MT5503 | ? | | | | | | | | | |
| 5MT5478 | X | X | | X (79%) | | | | | | |
| 5DL2 | X | X | X | X (91%) | | | | | | |
| 5DL291 | | | | X (96%) | | | | | | |

[1] pithouses are not perfect rectangles or circles. Pithouses were assigned to the shape closest approximating the shape; NJS=Northern San Juan Tradition

data suggest that members of both groups lived together in communities of the Animas River Valley. An example of this co-residency is in the Aztec area. Here, Sites LA27092 and LA79076 are contemporaneous sites located across the drainage from each other but appear to have been built by different cultural groups. Site LA27092 appears to be built and occupied by people affiliated with western groups while site LA79076 appears to be built and occupied by people affiliated with the eastern groups.

A similar co-residency has been proposed for the Dolores River Valley. Here, an east-west dichotmy has been seen in villages dating to 860s on the east and west side of the Dolores River Valley (Wilshusen and Ortman 1999). Villages on the east side of the Dolores River contain long, L-shaped pueblos with multiple roomblocks and great kivas, while those on the west side are composed of bilaterally symmetrical, horseshoe- or crescent-shaped roomblocks and a three-level hierarchy of pithouses. A subtle east-west dichotomy is also present in the ceramic assemblages; to a small extent, Rosa Black-on-white production styles are more prevalent in the east-side villages, while Piedra Black-on-white is more dominant in the west-side villages.

## PALEOENVIRONMENT

In order to practice successful corn agriculture, three environmental conditions must be met: arable soils, adequate moisture (12 inches a year), and a sufficient growing season (110 days) (Hack 1942). Based on archaeological evidence, it is obvious that these conditions were met, and that the Pueblo I people grew corn as an important component of their diet.

### Paleo-Climatic Conditions

Paleoclimatic conditions during most of the Pueblo I period were obviously adequate for the cultivation of corn, as demonstrated by the archaeological record, and supported by the dendroclimatic and palynological records.

With regard to the San Juan Basin in northwestern New Mexico, Hogan (1990) believes that "the climate during this period was characterized by wet summers and dry winters. Assuming that winter precipitation provided the minimal moisture needed to support germination and early growth, farming under this summer-dominant rainfall regime would have been productive in most areas of the [San Juan] basin, and particularly so in upland environments [like the Fruitland study area]" (Hogan, et al. 1990:3-63).

For southwestern Colorado, Peterson (1987) concluded that the dominant weather pattern during the 800's was characterized by lower winter precipitation and higher summer precipitation. This weather pattern resulted in "narrow dry farming belt" that lay between 2,010 m (6,600 ft) and 2,380 m (7,800 ft) above sea level (*ibid*). However, at the higher elevations, some areas were probably marginal for maize agriculture because of localized cold air pockets that produced a shortened growing season.

The Durango area, for example, is a mountainous foothill region that lies at 6,500 feet above sea level and averages about 110 frost-free days (Fuller 1988:373). To test the length of the growing season in Ridges Basin and nearby Bodo Canyon, which range from 6,800 to 7,200 feet above sea level and contain large numbers of Pueblo I sites, Fuller conducted an informal cold air study of nighttime temperatures in these vicinities. The temperature readings revealed that the average growing season varied dramatically from locale to locale and that certain areas were enhanced by†"warm area peninsulas" that may have extended the growing season to as much as 120 days (Fuller 1988a:377). Thus, Fuller concluded that agriculture could have been successfully practiced in the Durango area.

### Project Area Sites

The combined macrobotanical, faunal and artifactual data from the MAPL Pueblo I habitations supports the idea that paleoclimatic conditions remained conducive to maize agriculture during the period of site occupation. The macrobotanical data reflect a paleoclimatic regime which allowed a wide variety of wild plant species to grow, as well as the corn, beans and squash which the Pueblo I people cultivated. The faunal data likewise indicate a healthy, broad-based ecological system that produced a variety of both large and small mammals, which the Pueblo I people hunted for a variety of their uses. Table 4-4 lists the MAPL sites by elevation, biotic zone, and soils. As can be seen from this table, the sites are located in a relatively narrow elevational range (1900 to 2145m) and located where soils are deep and the vegetation is composed Sage, Pinyon, or Juniper.

Table 4-4. Elevation, biotic zone and soils of the MAPL Pueblo I sites

| Site Number | Elevation | Biotic Zone | Soils |
|---|---|---|---|
| LA10720 | 1930 m (6300 ft) | Sage and Juniper | Sandy loam |
| LA80320 | 1900 m (6234 ft) | Sage and Juniper | Sandy loam |
| LA27092 | 1920 m (6300 ft) | Sage, Pinyon, and Juniper | Sandy loam |
| LA79076 | 1930 m (6220 ft) | Sage, Pinyon, and Juniper | Sandy loam |
| LA80321 | 2039 m (6690 ft) | Pinyon - Juniper | Sandy loam |
| 5LP203 | 1957 m (6420 ft) | Pinyon - Juniper | loess |
| 5LP378 | 2017 m (6617 ft) | Pinyon – Juniper | loess |
| 5LP379 | 2024 m (6640 ft) | Pinyon – Juniper | loess |
| 5LP515 | 2056 m (6745 ft) | Pinyon – Juniper | Colluvial clayey loam |
| 5MT5453 | 2145 m (7040 ft) | Pinyon- Juniper ? | loess |
| 5MT5478 | 2103 m (6900 ft) | Pinyon- Juniper ? | loess |
| 5DL2 | 2073 m (6801 ft) | Pinyon- Juniper ? | loess |
| 5DL291 | 2060 m (6758 ft) | Pinyon- Juniper ? | loess |

## SITE ELEMENTS: STRUCTURES AND ACTIVITY AREAS

### Pithouses

#### Morphology

A total of 15 Pueblo I pithouses have been investigated along the MAPL pipeline corridor (see Table 4-5). Ten of these were located in the Durango or Aztec areas and five were located in the Dolores or Dove Creek areas. Fourteen of the pithouses were completely excavated. The fifteenth structure (at 5MT5503) was partially excavated (Fetterman and Honeycutt 1982); when possible, this pithouse is included in the following discussion.

As previously discussed in the *Cultural Affiliation* section, morphological variation between the eastern and western area pithouses included differing plan shape, the presence or absence of benches and wing walls, and dissimilar storage patterns. The eastern area sites tended to contain circular pithouses with benches, adobe bins and bifurcated vent openings, while the western area sites tended to contain rectangular pithouses with wing walls.

Several of the MAPL pithouses exhibited unique architectural attributes. In particular, the two pithouses at LA27092 were subrectangular and contained wing walls. While such pithouses are not unknown for the area, their formality and extensive floor artifact assemblages are suggestive of western influence. In addition, Structure 6 at LA27092 had a narrow bench that ran around all four walls of the structure. Benches are typically present on only three sides of pithouses. In addition, the vent shaft in Structure 6 at LA79076 had a cribbed opening at the prehistoric ground surface; this is unusual mainly because vent cribbing of this type rarely preserves. Finally, in comparing the later (850-870) pithouse at LA80321 with the earlier Aztec structures, several differences are evident. The pithouse was D-shaped, no bench or wing wall was present, and it contained an adobe milling bin.

#### Plan

Figure 4-10 presents the floor plans of three of these pithouses. As can be seen from this figure, the eastern houses (LA79076 and 5LP379) were more likely to be curvilinear, compared to the western houses (5DL2), which were more likely to be rectilinear.

#### Floor Area

Interior floor space ranged from 5.98 square meters to 27.56 square meters; the average interior floor space measured 17.9 square meters. These sizes are well within the typical range of Pueblo I structures (Kane 1986). Floors were earthen and generally level. Many (53%) exhibited prepared, plastered surfaces. Structure 6 at LA79076 had been excavated into bedrock deposits; the floor and partial bench consisted of soft sandstone bedrock.

#### Depth

Generally, the pithouses were greater than 1.5 m in depth, and the Durango area pithouses were the deepest. Floor depth from modern ground surface ranged from only 0.40 m to more than 3.0 m. However, taking all of the pithouses into account, the average depth of the MAPL pithouses was 1.8 m. Consisting of earthen sediments, pithouse walls were typically vertical and some exhibited residual plaster.

#### Orientation

Pithouse orientation (measured along a line through the ventilator, hearth, and sipapu), was with 90 degrees of south (see Figure 4-11). The variation in orientation could be related to ventilator placement; ideally, a ventilator would be located both downwind and downslope. No particular regional differences were noted; as can be seen from Figure 4-10, the orientation of the pithouses at LA79076 (built on rock) and 5DL2 (built in loess) is virtually identical.

Table 4-5. Attributes of Excavated Pueblo I Pithouses along Pipeline Corridor

| Site-Pithouse # | Plan | Area ($m^2$) | Depth bmgs | Orientation | Posts* | | | Wing walls | Bench | Storage pits | Storage bins | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | fpp | sp | l/s | | | | wing wall | f-s a/s | |
| LA27092-5 | S | ~19.7 | 1.60 | s-n | X | | X | X | X | X | | | cut by 1980 MAPCO trench |
| LA27092-6 | R | 25.13 | 1.90-2.25 | s-n | | X | | X | X | X | X | X | 4 sided bench |
| LA79076-1 | I | 12.2 | 0.94 | se-nw | X | | | | X | X | | | vent, inferred SW roof support prob. cut by pipeline trench |
| LA79076-6 | S | 17.2 | 0.59-0.78 | sw-ne | X | X | | | X | | | X | partial bedrock bench, cribbed wooden vent shaft |
| LA80321-1 | D | 23.75 | 2.28 | s-n | | | | | | X | | | adobe milling bin |
| 5LP203-1 | S | 16.2 | 2.05-2.20 | s-n | | | | | | | | | |
| 5LP378-1 | D | 16.97 | 3.30 | se-nw | | | | | | | | X | bifurcated vent opening |
| 5LP379-1 | C | 18.5 | 2.10 | se-nw | | | | | | | | | |
| 5LP379-2 | D | 25.37 | 2.50 | se-nw | | | | X | X | | | X | bifurcated vent opening |
| 5LP515-1 | S | 19.2 | 2.25-2.50 | se-nw | | X | | X | | X | | | |
| 5MT5503 | ? | 22 est | 1.75 | ? | | | | ? | N | | | | documented in trench wall |
| 5MT5478-1 | S | 10.56 | 0.40-0.50 | sw-se | | | | X | | | | X | |
| 5DL2-1 | R | 13.13 | 1.55 | sw-ne | | | | | | | | | |
| 5DL2-2 | S | 27.56 | 1.70 | sw-ne | X | X | | X | | | | X | P.H. 3 built inside this structure |
| 5DL2-3 | S | 5.98 | 1.95 | sw-ne | | | | X | | | | | intrusive into P.H. 2, P.H. 2 roof prob. still present |

Abbreviations: S = subrectangular, R = rectangular, I = irregular, D = D-shaped; bmgs = below modern ground surface; * = in addition to four main-support posts; fpp = floor perimeter posts; sp = secondary posts; l/s = leaners/stringers; f-s a/s = free-standing adobe/slab.
Note: upper boundaries of Montezuma County (5MT) pithouses truncated by plowing

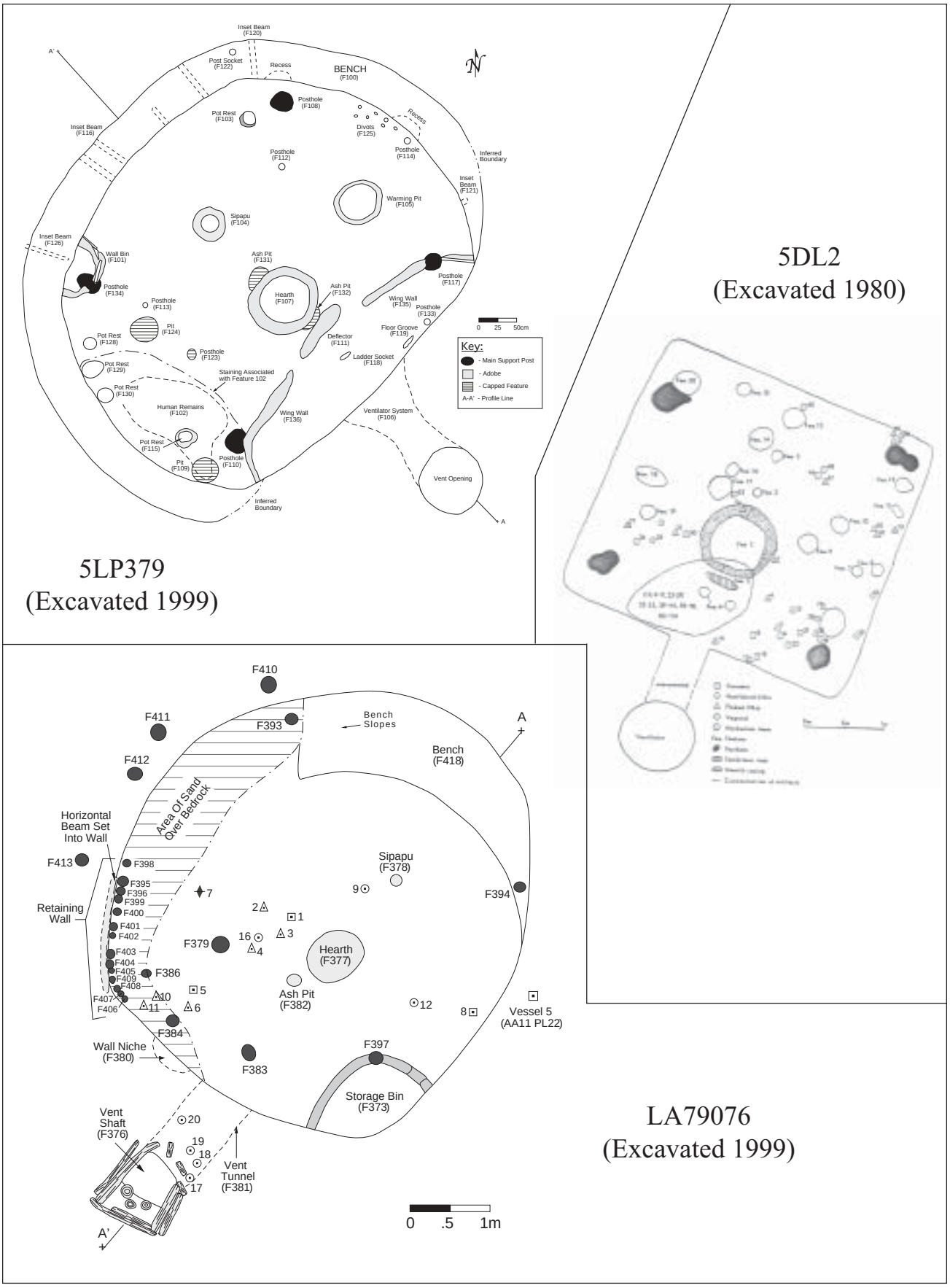



*Figure 4-10. Plan maps of three Pueblo I pithouses (LA79076, 5LP379 and 5DL2), shown at same scale.*

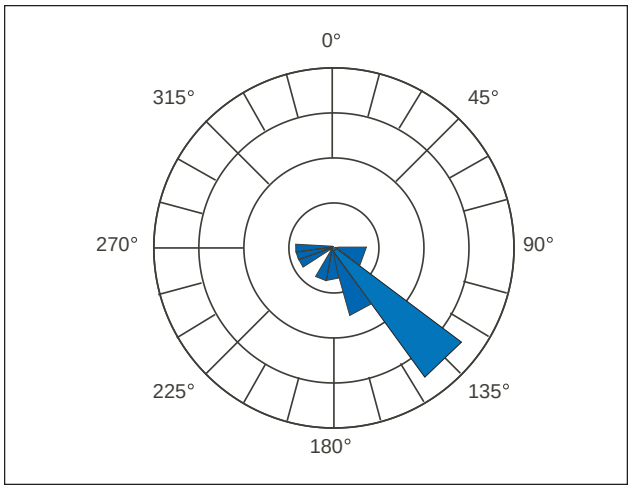



*Figure 4-11. Circular frequency histogram showing pithouse orientation.*

Roof-support Posts

Each of the 14 excavated pithouses had a four-post roof support system. These main support posts were usually inset from the structure walls. However, in four of the pithouses, the posts were set directly against the walls, possibly to free up additional floor space.

Secondary floor perimeter posts may have shored up sagging roofs or, as in Structure 6 at LA79076, kept loose wall sediments from collapsing into the pithouse.

In almost all (13/15) instances, the pithouses contained wood from locally available sources. The pithouse roofs in the Aztec area were overwhelmingly built of juniper wood, although three pinyon pine and five *Populus* elements were also identified in the 1999 assemblage. In contrast, roofs in the Durango pithouses included both ponderosa and pinyon pine in addition to juniper wood beams. Based on ubiquity, the tree ring record suggests that ponderosa pine was preferred over pinyon pine in this area. The few specimens from the Dolores-Dove Creek pithouses were identified as pinyon pine and juniper.

Superstructure remains in the form of burned adobe casts, numerous collapsed beam remnants, layers of burned sediment, and lenses of vegetal closing material were commonly encountered during pithouse excavations. The roof fall deposits measured up to 1 meter thick, indicating that the roofs of these structures were certainly substantial, if not massive. In Structure 5 at LA27092, the patterning of fallen beams suggested that the roof had been built of cribbed timbers.

Timbers were occasionally removed from an abandoned pithouse for use in another structure. At least two re-used or salvaged beams were identified in Pitstructure 1 at 5LP379. In addition, the roof of Pitstructure 2 at 5LP379 was built of both reused and stockpiled elements. Timbers were occasionally stockpiled in preparation for eventual use. This was the case at both LA27092 and LA79076. This pattern "...reflects the long term accumulation of wooden elements for anticipated construction," [Dean 2000:2]). Interestingly, the tree ring dates also indicate that the roofs of both pithouses had been repaired after 8 years of occupation. Thus, each of the pithouses at 5LP379 had been inhabited for a considerable length of time.

Wing Walls

Post-and-adobe or upright slab wing walls were present in 40% of the pithouses and are thought to have functioned as internal spatial dividers. The area "behind" the wing wall was frequently used for the storage of tools and milling equipment.

Wing walls were more often, but not always, located on sites built in the Dolores-Dove Creek areas. Five exceptions exist: a small pithouse at 5LD2 (a Dove Creek area site) lacked wing walls; and two pithouses at LA27092 (an Aztec area site) and a pithouse at 5LP379 and 5LP515 (Durango sites) contained wing walls.

Bench

The western area pithouses lacked benches, while several eastern area pithouses contained them (see Table 4-5). Of the eastern area pithouses with benches, only one (Structure 5 at LA27092) had stringers originating from the bench.

Ventilation System

Each of the 14 excavated pithouses had a ventilation system composed of a ventilator tunnel and shaft. Bifurcated vent openings were present in two of the eastern (Durango) area sites; similar vents have been recorded in pithouses at 5LP236 in Ridges Basin (Duke 1985) and LA82977 in Cox Canyon (Sesler and Hovezak 2001:20).

Floor Features

Hearth. Every excavated pithouse along the MAPL pipeline contained a central hearth. Pithouse hearths are located along the primary axis of the structure between the vent tunnel and sipapu. These formal features are basin-shaped, heavily oxidized, and frequently plaster-lined. Several had raised rims constructed of adobe. Hearth fills were nearly always primary deposits; soil samples frequently yielded abundant burned seeds and faunal bone fragments from cooking activities. The hearths heated the pithouses and were also used for cooking food.

Ash Pit. Most pithouses also had an ash pit. This feature type is usually situated behind the deflector, on axis with the hearth. Ash pits are usually unburned circular basins that contain homogenous ash deposits with few inclusions. Although ash is used for making piki bread, it is still more likely that ash pits were used placing coals to warm food than storing ash.

Sipapu. Another common pithouse feature was the sipapu. These features are usually located along the main axis of the pithouse and to the north of the central hearth. They are small, cylindrical pits that were nearly always sand-filled, and frequently capped, prior to abandonment. They are thought to have had a ritual function. Occasionally, sipapus were paired.

Storage Bins and Pits. The pithouses contained several types of storage facilities, including subfloor pits, adobe bins, bins built into wing walls, and the areas behind wing walls. Because of their ready accessibility, all of these pithouse feature types are interpreted as short-term storage facilities (Lightfoot 1992:148).

Above-floor adobe storage bins were present in three of the eastern area pithouses (see Table 4-5 and Figure 4-10). These large bins stood up to a meter tall and were located in the corners of the pithouses. They were likely roofed, and at least one had been accessed by a coped adobe opening in one wall. In addition, one structure contained small adobe storage bins built into the wing wall. It was unclear if these bins were roofed; however, a porthole was located in the wall of one of them.

Slab-lined storage bins were present in two of the western area pithouses (see Table 4-5). The upright-slab-lined corner bin at 5MT5478 had evidently been built for food storage. The relative paucity of storage features in the western pithouses may indicate a preference for storing foodstuffs in either ceramic containers or surface rooms.

Subfloor storage pits were usually excavated along the pithouse walls in order to conserve floor space. They were earthen, unburned, and often bell-shaped.

Where wing walls were present, the spaces behind them were also used for storage, but primarily of tools and milling equipment.

Milling Bin. Milling bins were located in at least one, and possibly two eastern (Aztec) area pithouses (see Table 4-5). The well-preserved bin at LA80321 was constructed of adobe and contained an open-ended trough metate and an adobe shelf with two two-hand manos. The probably milling bin at LA27092 consisted of a shallow earthen pit.

### Function

The 14 excavated pithouses are thought to have functioned as†“…the dwelling and primary domestic space for small family units,” (Kane 1986b: 407). Based on their floor feature and artifact assemblages, a broad range of activities were identified, including food grinding, cooking and storage, flintknapping for tool manufacture, sandal weaving, game playing (gambling?), pottery manufacture and ritual activity, including burial practices.

### Abandonment

Eventually, all of the MAPL pithouses were abandoned. Six types of abandonment are noted for these structures; four involve burned structures and two involve unburned structures.

1) A well-burned to highly burned structure with a large artifact assemblage

2) A burned structure with primarily incidental artifacts

3) A burned funerary crypt with or without a large number of floor artifacts

4) A partially burned structure, probably salvaged, with some floor artifacts

5) An unburned structure, roof probably not salvaged, with primarily incidental artifacts

6) An unburned structure with a partially or completely salvaged roof and incidental floor artifacts

Based on several attributes, the pithouses are assigned to one of these six abandonment scenarios. Table 4-6 lists the attributes and type assignments.

Table 4-6. Abandonment Attributes and Types for Pueblo I Pithouses along Pipeline Corridor

| Site - Pithouse # | Burned | Floor Assemblage | Burial on Floor | Salvaged Roof | Type of Abandonment |
|---|---|---|---|---|---|
| LA27092 - 5 | X | X | | | 1 |
| LA27092 - 6 | X | X | | | 1 |
| LA79076 - 1 | X | | | | 2 |
| LA79076 - 6 | X | | | | 2 |
| LA80321 - 1 | X | X | | | 1 |
| 5LP203 - 1 | X | | X | X | 3, 4 |
| 5LP378 - 1 | | | | X | 6 |
| 5LP379 - 1 | X | X | | | 1 |
| 5LP379 - 2 | X | X | X | | 1,3 |
| 5LP515 - 1 | X | | | X | 4 |
| 5MT5478 - 1 | X | | | | 2 |
| 5MT5503 | | | | | 5? |
| 5DL2 - 1 | | | | X | 6 |
| 5DL2 - 2 | | | | X | 6 |
| 5DL2 - 3 | | | | | 5 |

**Burned Structure(s)**

A majority (66%) of the MAPL pithouses was burned at or soon after abandonment (see Table 4-7). The intentional destruction of pithouses was a common abandonment sequence during the Pueblo I period (Cameron 1990). The well-documented pattern of conflagration is highly suggestive of ritualized abandonment. “The intentional destruction of buildings is interpreted as a clear sign that there was no anticipation of returning to the site or to reuse of the structures or buried artifacts after it was

abandoned," (Lightfoot 1992:72). Two functional interpretations that do not necessarily contradict the ritual abandonment theory are that pithouses were sometimes intentionally burned to destroy invasive insects or to control the spread of disease.

Three pithouses with all their contents appear to have been intentionally destroyed (Type 1). One pithouse (Pitstructure 2, 5LP379) was probably burned as a funerary crypt (Type 3). For the other two pithouses (Structure 5 and 6, LA27097), the reason behind their apparently ritual sacrifice and destruction remains unknown.

Two pithouses, without their contents, also appear to have been intentionally destroyed (Type 2). The Type 2 abandonment at LA79076 and 5MT5478 suggests that the inhabitants removed valuable items prior to burning their pithouses.

An alternate explanation is that these five pithouses were catastrophically abandoned. However, this theory lacks credence for several reasons. For one, if the purpose was raiding, why did the raiders leave so many valuables to be destroyed? As for the accidental catastrophic house fire, Wilshusen suggests that it is improbable that earthen pithouses burned accidentally (Wilshusen 1986c). Wilshusen's studies indicate that pithouses would require partial removal of the earthen covering, strategically placed kindling, and knowledge of inter-structural draft patterns in order to get to the intensity of burning displayed by archaeological contexts (Wilshusen 1986c). In addition, in many cases it appears as though items had been placed in specific locations prior to the house fire (e.g. metates on-end and facing the wall, vessels placed in ventilators). The fact that two-thirds of the MAPL pithouses were burned is strong evidence that conflagration was a typical abandonment pattern. Likewise, in the opinion of this writer, this ritualized abandonment sequence is far too widespread in both time and space to be classified as the result of an accident or raiding.

The two salvaged, partially burned pithouses (Type 4) may represent a leisurely or gradual abandonment. After beam scavenging activities were concluded, the remainder of the superstructures was burned. At 5LP515, little combustible material remained for a conflagration.

**Unburned Structure(s)**

Three pithouses exhibited Type 6 abandonment (see Table 4-7). The lack of burning may suggest planned salvaging activities. Usable beams would have been at a premium and could have been re-used in a nearby pithouse.

The Type 5 abandonment of Pitstructure 3 at 5DL2 suggests that this was the last occupied pithouse at the site. Salvaging activities may not have been undertaken in Pitstructure 3 because its abandonment may have may coincided with the terminal abandonment of the entire site.

**Reoccupation**

Two pithouses were reoccupied after their initial abandonment. At 5LP378, Pithouse 1 had a post-occupational use surface located about half a meter above the floor surface. This re-use of the structure depression, which may have been partially roofed at that time, was probably a warm season occupation associated with plant-gathering activities. At 5DL2, the diminutive Pitstructure 3 had been built into the floor of existing Pitstructure 2 (see Figure 4-12). With less than 6 square meters of available floor space, it is hard to conceive of this structure as a typical habitation.

Similar structures have been documented at the Duckfoot and Grass Mesa sites (Lightfoot 1992). These small pithouses were usually late additions to the site and were often built between existing structures or in the fill of abandoned structures (Lightfoot 1992:32).

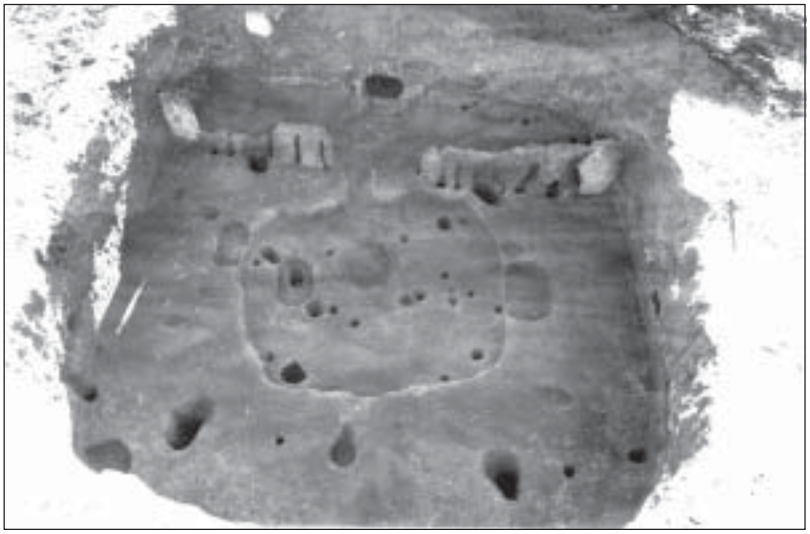


*Figure 4-12. Photograph of superimposed pithouses at 5DL2.*

### Surface Architecture

In the project area, a total of 40 surface rooms were located on Pueblo I sites. These rooms took three main forms: storage rooms, living rooms and ramadas (see Table 4-7). As with the pithouses, there were several marked differences between the surface rooms of the western and eastern areas. Figure 4-13 presents three plan maps of Pueblo I surface rooms from sites in the Aztec, Durango and Dolores-Dove Creek areas.

#### Storage/Living Rooms

In the eastern area, many of the Pueblo I surface rooms were small (< 3 m in diameter) and lacked hearths or food processing tool assemblages, leading to their classification as storage rooms or granaries. These rooms

Table 4-7. Attributes of Pueblo I Surface Architecture along Pipeline Corridor

| Site # | Function | | Arrangement | | | Lined Floor | Ramada |
|---|---|---|---|---|---|---|---|
| | Storage | Living | Single Row | Non-contiguous | Double Row | | |
| LA10720 | ? | ? | | | | | |
| LA80320 | ? | ? | | | | | |
| LA27092 | 4 | 0 | | 4 | | | 2 |
| LA79076 | 2 | 0 | 2 | | | 2 | 1 |
| LA80321 | 3 | 1 | 2 | 2 | | 2 | |
| 5LP203 | ? | ? | | | | | |
| 5LP378 | 3? | 2 | | | 5? | | |
| 5LP379 | 1 | 1? | 2? | | | | |
| 5LP515 | 1 | | 2 | | | ? | 1 |
| 5MT5453 | 4 | 1 | | 4 | | 1 | |
| 5MT5503 | 0/1? | 0/1? | | 1? | | | |
| 5MT5478 | 1? | 0? | | 1 | | | |
| 5DL2 | 6 | 4 | | | 10 | | |
| 5DL291 | 0 | 1 | | 1 | | | |
| Total | 26 | 10 | 8 | 12 | 15 | 5 | 4 |

* = surface room or extremely shall[illegible] pithouse, Structure 5

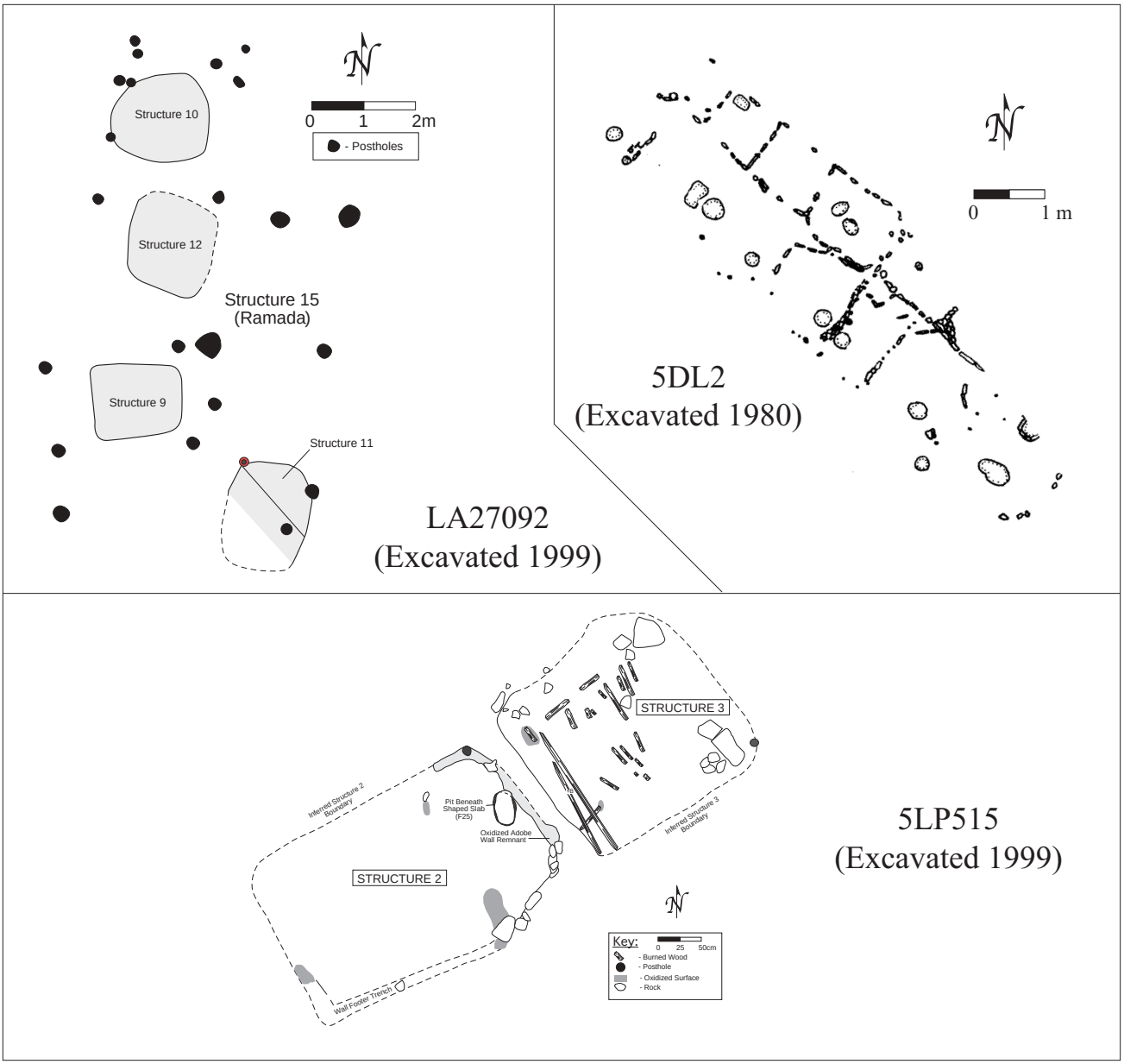



*Figure 4-13. Plan maps of selected Pueblo I surface rooms. 5DL 2, LA27092, 5LP515*

are thought to have been long-term storage facilities, as opposed to pithouse bins and subfloor pits, which functioned as short-term storage receptacles (Lightfoot 1992:148).

Several living rooms were identified in the eastern area. At 5LP378 two rooms were interpreted as probable seasonal domiciles. The better preserved of these rooms, Room 2, contained a hearth, a basin metate, a trough metate, one- and two-hand manos, and a possible piki stone. Based on the processing equipment and evidence of cooking, perhaps this structure had functioned as a living area during the summertime. Found in Room 3 were a metate, two manos, two bone tools, and several hammerstones, bifaces, and cores. Tool production and food preparation can be inferred from these remains; thus seasonal domestic activities were probably undertaken in Room 3 as well. Another living room was found at LA80321. This structure was essentially a pithouse built only 25-40 cm below ground surface. A similar structure was found at Site 12 in the Gobernador area (Hall 1944).

In the western area, a slightly higher percentage of rooms contained internal features such as hearths and ash pits, or large and diverse floor artifact assemblages. These rooms were consequently classified as domestic or living rooms.

The increasing complexity of surface room architecture and evidence of domestic activity are indications of the transformation of surface rooms into dwelling units (i.e. the "pithouse to pueblo" transition). At the base of Mesa Verde, several shallow pithouses were incorporated into the surface rooms of an early Pueblo I site (Brisbin 1999). This transitional architectural pattern is very similar to the pattern seen at LA80321, but occurs approximately 100 years earlier.

In summary, in the eastern area, the surface rooms were more often used for storage, while in the western area, they were increasingly used for domestic activities formerly carried out in the pithouses. As can be seen from Table 4-7, of the 18 surface rooms in the eastern area, 14 are thought to have functioned as storage rooms, while only four are thought to have functioned as living rooms. In contrast, of the 18 surface rooms in the western area, 12 are thought to have functioned as storage rooms, while six are thought to have functioned as living rooms.

### Room Arrangement

In the western area, rooms were more frequently built in contiguous arcs or lines. Site 5DL2 (see Figure 4-13) exemplifies this development. While a "classic" western Pueblo I room suite contains a large front living room and two back storage rooms, the room suites at 5DL2 were not so neatly divided. Resource processing had been conducted in two of the back rooms and storage facilities were located in two of the front rooms. The excavators concluded that†"a clear distinction between storage rooms and domiciliary rooms was not maintained at 5DL2" (Cavenaugh 1982:5-74).

Not all of the western area surface rooms were contiguous, as can be seen from Table 4-7. Of the five western area sites, one (5DL2) had a ten-room roomblock, while the other four contained a total of seven noncontiguous rooms.

In the eastern area, rooms were somewhat evenly divided between noncontiguous (eight), single row contiguous (six) and possible double row contiguous (five) (see Table 4-7).

### Construction

#### Foundation and Superstructure

Room construction took a variety of forms, based on the use of soil, flat (usually sandstone) slabs, smooth, rounded river cobbles, and wooden posts. When rock was used in construction, it usually reflected the local availability of materials: sandstone slabs were used in the Dolores-Dove Creek area rooms, while both slabs and river cobbles were used in the Durango and Aztec area rooms.

In contrast to the pithouses, the surface rooms were often poorly preserved. In particular, eastern area surface rooms were difficult to define. Perhaps the inhabitants of the eastern area sites built ground-surface rooms (see next paragraph) or even above-ground rooms (see *Lined Floors*, below). Either of these types would be less likely to preserve than the pit- or basin-type room. A different type of preservation problem was noted for the Dolores-Dove Creek area sites. Here, modern farmers have removed many of the wall rocks from their fields, and subsequently plowed the soil to a depth of approximately 30 cm. As a consequence, walls, features and even floors were occasionally destroyed.

Two basic types of room construction were apparent. The first, and apparently less common (or at least less-often preserved) type, was constructed on the ground surface; the second was constructed just below the ground surface in a shallow pit or basin excavated in the dirt. In either case, a variety of superstructures were erected over these foundations, based on the inventive use of copious amount of mud, upright posts and/or stacked rocks. The use of slab-lined pit rooms was, not surprisingly, more common in the Dolores-Dove Creek area (particularly at 5DL2) where sandstone slabs are relatively abundant and easy to procure.

At eastern area sites, the walls of the three mud-and-rock (LA79076 and 5LP515) and five post-and-adobe (LA80321 and 5LP379) rooms were load bearing, and might have stood a meter or less tall. The partially excavated basin room at LA27092 had upright juniper posts that supported the roof; this structure type may not have had walls. The eight pit rooms (LA27092 and 5LP378), five of which were slab-lined (5LP378), might have had domed or flat brush-and-mud superstructures anchored to the prehistoric ground surface. Entry into the rooms may have been gained through the roof. Eastern surface room floors, where located, were often shallowly excavated.

Western area sites contained slab-lined pit rooms (5DL2), slab-lined rooms (at 5MT5453 and 5DL291) and basin rooms with posts (at 5MT5453 and 5MT5478). Postholes were usually located in the corners of the rooms, suggesting a four-post roof support system. Upright posts from the rooms at 5DL2 were identified as pinyon pine and juniper. As in the eastern rooms, wall and roof height were indeterminate. However, entry may have been gained through the roofs.

**Lined Floor**

Most (86%) of the surface rooms exhibited unlined, use-compacted earthen floors. Lined floors were uncommon in both the eastern and western areas, but when they occurred, they took different forms. The western area lined floor was made of sandstone slabs, while the eastern area lined floors were made of wood and adobe.

**Slab-lined**

As depicted in Figure 4-14, Structure 1 at 5MT5453 had a paved flagstone floor. This room may have functioned as processing and living area, based on the presence of an interior hearth and adjacent outdoor surface paving.

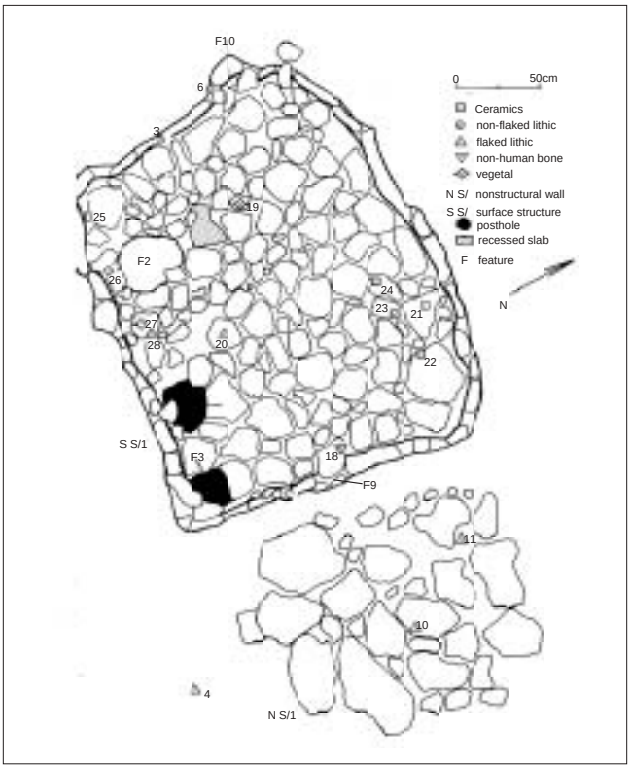



*Figure 4-14. Plan map of slab-lined floor at Structure 1, 5MT5453.*

**Adobe-and-Wood**

One unique type of feature found in the eastern area is the adobe-and-wood above-ground floor. These features have been previously identified on sites in Gobernador Canyon (Hall 1944) and the Durango area (Carlson 1963) and have been found on this project at two sites in the Aztec area. (Similar features have been found on other sites in the eastern area but have been recorded as collapsed roofs [Eddy 1966: 366; Roberts 1930:25]).

When excavated, these features essentially look like roofs built either in pits or on the ground surface, supported by vigas and rocks. They consist of parallel logs that are encased in and covered with adobe. Found in storage rooms, these floors may have had air spaces under them for ventilation, and would have been more rodent-roof than traditional pit room floors.

These floors were identified at two Aztec-area sites on this project. At LA79076, the remains of two rooms containing these features were located (see Figure 4-15). The floor of one of the rooms was supported by vigas resting on large cobbles and the other was supported by vigas resting on a cliff ledge and a stump. At site LA80321, a floor was identified in a post-and-adobe surface room. Originally interpreted as a collapsed roof (Fetterman and Honeycutt 1994), this feature has been reinterpreted as an adobe-and-wood floor. A third site, 5LP515, may also have contained a similar feature but was not identified as such due to its poor state of preservation.

*Figure 4-15. Photograph of adobe-and-wood lined floor at LA79076.*

The identification of these features as above-ground floors may partially explain the difficulty in identifying surface architecture in the eastern area. Preservation of these floors is undoubtedly poor if they are unburned or located on erodable slopes. Unless floors of this type are heavily burned or located where they are buried in place, preservation is probably poor to non-existent. This may partially explain why, during excavation at several sites, surface rooms were not located, even though chunks of burned adobe and small mounds of sandstone were.

Ramada

Located on three eastern area sites were ramadas. Defined at LA27092, LA79076, and 5LP515, these ramadas functioned as covered outdoor work areas. Ramadas provided shade and shelter during the warm months. This structure type is usually defined by patterned postholes commonly located adjacent to storage shelters.

### Outdoor Activity Areas

Outdoor activity areas were identified at ten of the 14 Pueblo I components (see Table 4-8). Most were probably associated with resource processing, cooking, and storage, some were associated with waste disposal, and three were of unknown function. No obvious ceremonial features were located in these activity areas, but this may be a result of poor preservation, limited excavation or limited knowledge.

Table 4-8. Activity Areas and Associated Features at Pueblo I Sites along Pipeline Corridor

| Site # | Midden | Hearth | Roasting Pit | Stockade | Cobble Apron |
|---|---|---|---|---|---|
| LA10720 | X | X | | | |
| LA80320 | | X | | | |
| LA27092 | 6 | 6 | | | |
| LA79076 | 1,2,3,4 | 1,5,11 | 1,7,11, 25, 26 | X | |
| LA 80321 | | X | | | |
| 5LP203 | 3 | | 4 | | 2 |
| 5LP379 | X | | | | |
| 5LP515 | | 2 | | | |
| 5DL2 | | X | | | |
| 5DL291 | | | X | | |

note: X = present, AA # not assigned; 1, 2, 3, etc. = AA #

Outdoor work areas were used for resource processing, tool production, and other domestic activities, particularly during the warmer months. Typically, these extramural living surfaces or plazas are located in the area between the surface rooms and the pithouse(s). Generally overlain by a stratum of associated cultural refuse, living surfaces frequently contain a variety of processing features. Occasionally, outdoor work areas were sheltered by ramadas, as in Activity Area 6 at LA27092 (see Figure 4-16).

#### Middens

Trash middens were used for the disposal of household trash. "The midden represents the accumulation of debris from a broad range of activities over a long period of time," (Lightfoot 1992:87). Characterized by high artifact density and stained sediments, middens are usually located downwind of residential structures. With the exception of LA70976 where four middens were located, a single discrete midden deposit is presumed to have been present at all of the sites. "Though middens vary considerably at a site in number, size, topography, and relative preservation, it does appear that there is a meaningful correspondence between higher numbers of people who lived in a place (and presumably for how long) and higher numbers of artifacts (Wilshusen et al. 2000:127).

The LA10720 midden deposit, which encompasses a 638 square meter area, is the largest that has been documented along the MAPL corridor. At least four small midden deposits have been defined at LA79076; this trait is not uncommon in the eastern area, where sites frequently have multiple midden deposits that may even

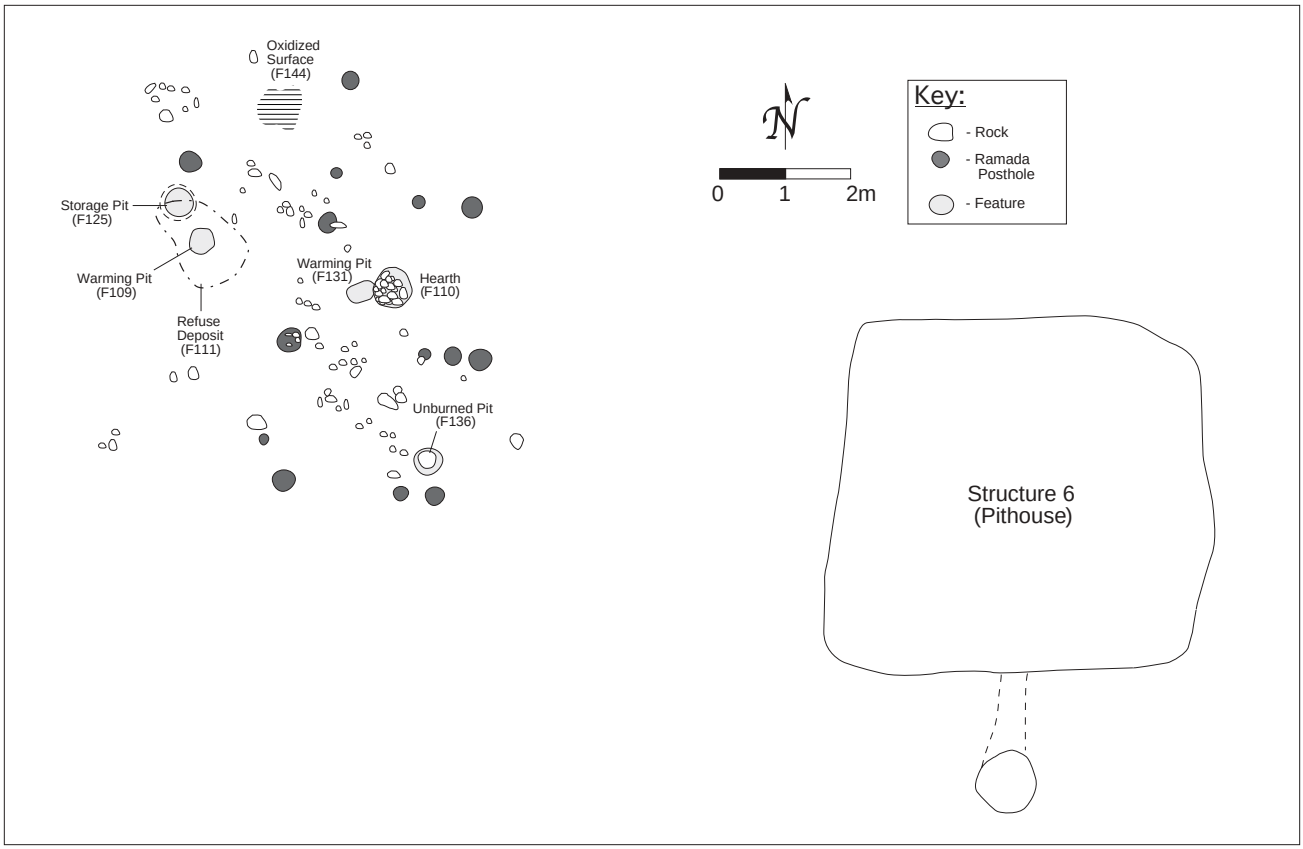



*Figure 4-16. Plan map showing relation of Activity Area 6 to ramada and pithouse at LA27092.*

abut structures. At LA80321, even though the architecture was on a northeast-southwest axis, the midden was located in a nearby arroyo to the west, probably out of convenience. Sites 5LP203 and 5LP515 each contained a small, intact midden deposit. The midden at 5LP378 has been destroyed, and the midden deposit 5LP379 has been partially removed, by modern development. Likewise, the midden deposits on all of the western sites have been removed by modern agriculture.

### Stockade

The single Pueblo I stockade was located on LA79076, which may suggest that these features are another attribute unique to the eastern area during the Pueblo I period.

The stockade was constructed of more than 200 upright posts and represented a substantial expenditure of effort. It enclosed the Pueblo I habitation area to the east, south, and west. While it is possible that this stockade functioned as a defensive fortification, it is more likely that it acted as a spatial enclosure or windbreak.

Pueblo I stockades have been also defined in Gobernador Canyon (Hall 1944), Navajo Reservoir (Eddy 1966), Durango area (Dean 1975), and more recently, in the La Jara Study Area (Kurley-Begay 1996).

### Cobble Apron

The single cobble apron was located at 5LP203, which may suggest that these features are another attribute unique to the eastern area during the Pueblo I period.

The cobble apron consisted of a low wall enclosing the site's pithouse to the south. It was built of cobbles and boulders from a nearby river terrace and cobble and gravel spoils from the excavation of the pithouse depression. Secondary cultural refuse deposits had been dumped over the apron wall, mixing with the construction material as the wall slowly collapsed. This feature is believed to have functioned much like a stockade, as a spatial delimiter.

Similar cobble aprons (also termed stone circles) have been documented in the North Animas Valley and at Navajo Reservoir (Carlson 1963 and Eddy 1966).

## SITE LAYOUT

Site layout pertains to the spatial organization of structures and activity areas at the site level. The layout or structure of a particular site, in turn, may reflect cultural norms, the local setting, or evolution over the course of the site's occupational history.

Pueblo I sites, which usually have an axial layout, typically have surface architecture to the north or northwest, one or more centrally located pithouses, and a trash midden to the south or southeast. A plaza or outdoor work area is also usually present; it is generally located between the surface architecture and pithouse.

As can be seen from Figure 4-17, most of the project area Pueblo I sites exhibited a similar layout in which the surface rooms were located to the west or north of the pithouse(s). Exceptions are found at 5MT5478 (surface rooms to the east) and 5DL291 (the apparent absence of a deep pithouse may be the result of incomplete site excavation).

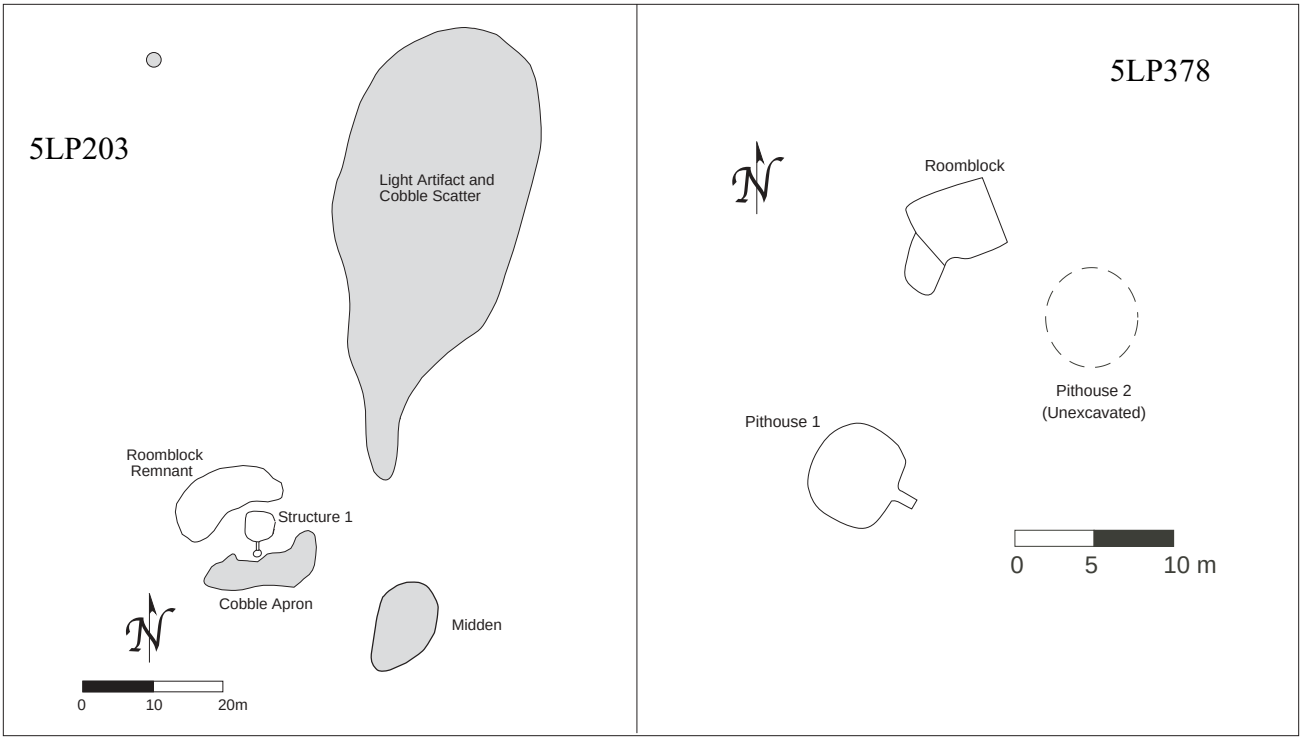



*Figure 4-17. Plan maps of 11 Pueblo I sites, showing relationships of surface rooms, pithouses and features.*

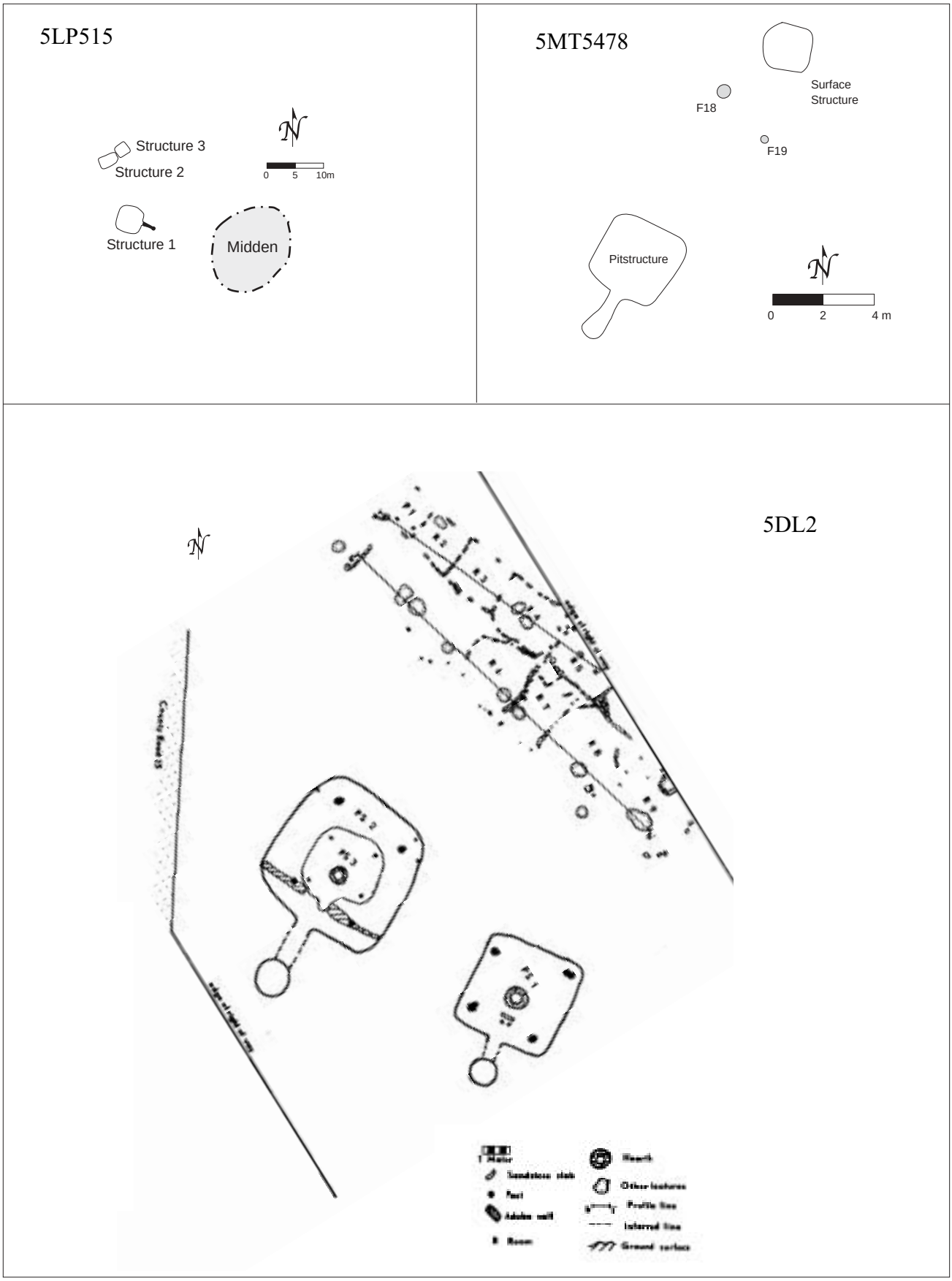



*Figure 4-17. Plan maps of Pueblo I sites, showing relationships of surface rooms, pithouses and features (cont.).*

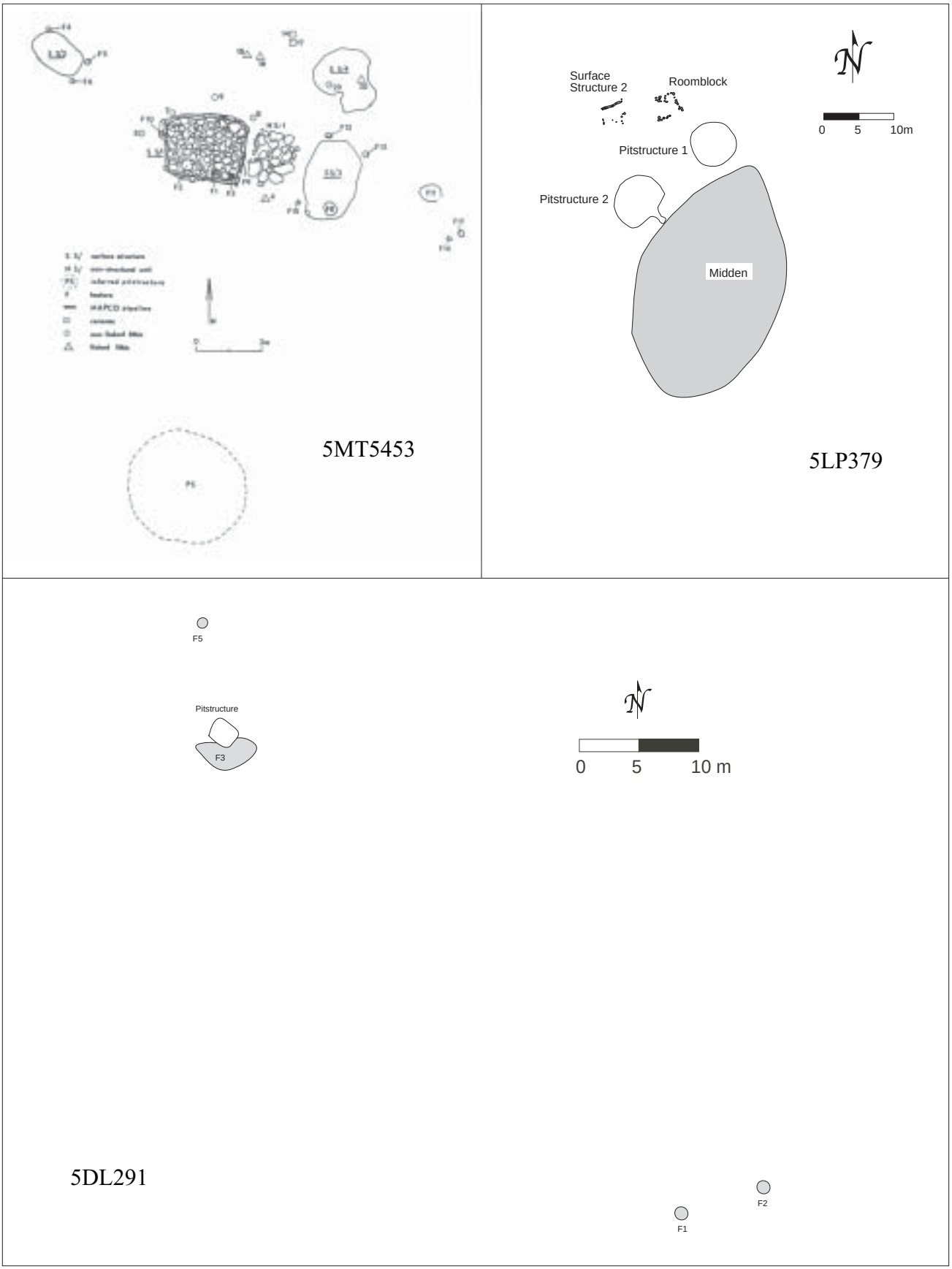



*Figure 4-17. Plan maps of Pueblo I sites, showing relationships of surface rooms, pithouses and features (cont.).*

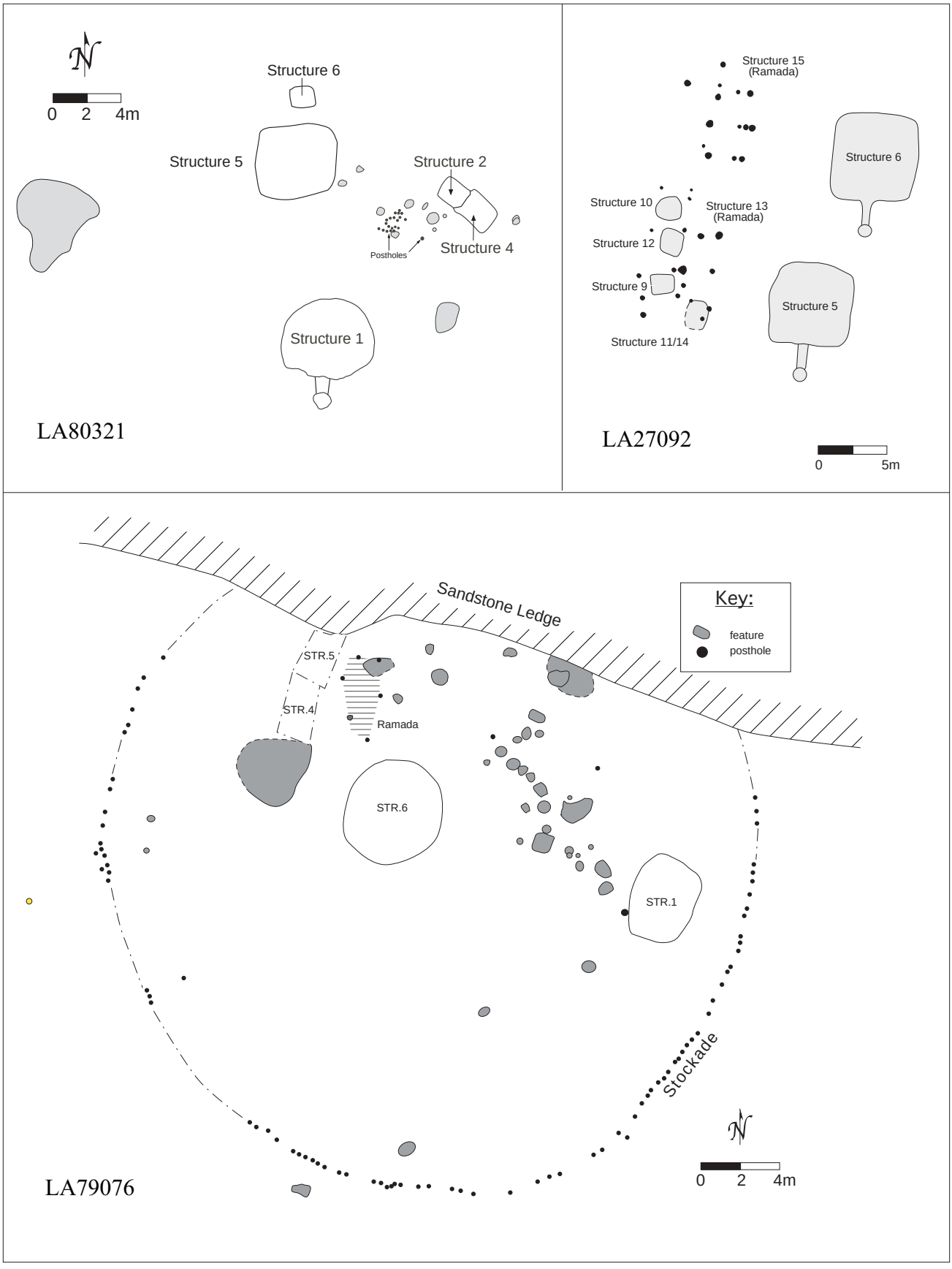



*Figure 4-17. Plan maps of Pueblo I sites, showing relationships of surface rooms, pithouses and features (cont.).*

## SITE TYPE

### Introduction

Sites can be classified based on the number and types of structures that are present. Wilshusen (1999:210-223) proposes six basic types of Pueblo I sites; these are, from largest to smallest, the village, multiple residence, single residence, public architecture, farmstead and limited activity area.

#### Village

Villages first appear in the early Pueblo I period as a new form of social organization and become an increasingly important settlement pattern throughout the era. "Early villages in the Mesa Verde are a large, relatively short-lived phenomena... and are just as aggregated and complex as Pueblo III villages," (Wilshusen and Blinman 1992:264). By definition, a village in the western area is a group of 15-20 aggregated residences (50 or more surface rooms). However, as defined by Eddy, early (Rosa) eastern villages have at least 6 pithouses, while those of the late (Piedra) eastern villages are somewhat larger (Eddy 1966).

Pueblo I villages were not "the central places of more dispersed settlement systems but rather, the primary residential focus for entire communities," (Wilshusen 1999:213). A village is composed of multiple roomblocks that were occupied by multiple households, while plaza and midden areas, as well as pithouses, are shared spaces. In order for a village to be economically successful, storage, exchange, and agricultural intensity would be necessary. Typically, Pueblo I village occupations tended to be short in duration, averaging 25-40 years (Wilshusen 1999:210). For example, the large villages in the Dolores Valley were mainly occupied from the 860s-880s. "Aggregation occurred only in particular areas at very specific times (Wilshusen and Ortman 1999:373). Not surprisingly, none of the MAPL sites is large enough to be classified as a village.

#### Multiple residence

A multiple residence is defined as a large hamlet that was occupied by two to nine households. It has multiple contemporary pithouses or roomblocks (i.e. domiciles) and is assumed to have functioned as a domicile for two or more residential groups. Multiple-residence hamlets became more a more common settlement pattern in the mid-late 800s. Sites LA27092, LA79076, 5LP378, and 5DL2 are well defined multiple residences.

#### Single residence

A single residence is defined as a small hamlet that functioned as a domicile for one or two residential groups. The household(s) may have consisted of a family or extended family unit. Habitation sites usually have one pithouse, one or more surface rooms, an outdoor work area, and a midden deposit. With its origin during the Pueblo I period,"The unit-type pueblo holds the germ of Pueblo I architecture," (Wilshusen 1999:219). Occasionally, single residential hamlets have two or more pithouses because they have two or more components of construction and reuse (Wilshusen 1999:216). This was the case at 5LP379, which contained two pithouses that were built and occupied at different times. Although the layout of small hamlets varies somewhat, they are usually oriented on a north-south or northwest-southeast axis. In addition, Pueblo I residential sites in the east portion of the project area may or may not contain surface structures (all of the MAPL residential sites did). Sites 5LP203, 5LP515, LA80321 and 5MT5478 are typical mid-Pueblo I single residences.

#### Public Architecture

Public architecture functions as a form of social integration. "If one accepts that "monuments" are an important means of reminding people about their histories, then it is reasonable to gather together features such as rock art, great kivas, and shrines," (Wilshusen 1999:219). Great kivas are a form of monumental architecture that may have served one or more villages or community clusters. These oversized pithouses (greater than 10 m in diameter) first appear during the Pueblo I period. They have postholes, floor vaults, and altar/*paho* locations, but few other features, artifacts, or evidence of domestic activities. Because of this, great kivas are believed to have functioned in ceremonial or social contexts. Rock art can be interpreted as public imagery that informs on history, land tenure, and social identity (Wilshusen 1999:221). No public architecture from the Pueblo I period has been encountered in the project area. A great kiva was reported to have been excavated on Blue Mesa by Gladwin, but the exact location of this feature is not presently known.

#### Farmsteads/fieldhouses

This site type first appears in the Basketmaker III period (Reed 2000) and was likely associated with land tenure. These sites would have been occupied during the growing season and have provided shelter for people planting, tending, or harvesting agricultural fields. They usually consist of a single room structure located within a few kilometers of residential sites. Although no Pueblo I fieldhouses have been encountered along the pipeline corridor, a nearby site, 5LP1096 in Bodo Canyon, contained a single, isolated surface room that is interpreted as a fieldhouse (Fuller 1988a:225).

#### Limited activity areas/nonresidential sites

These nonresidential site types include artifact scatters with features and artifact scatters without features (excepting artifact concentrations). Both site types were likely associated with specialized, logistically mobile tasks undertaken away from the site, such as resource procurement and processing. Often, specific ecological zones such as riparian areas were targeted for hunting and gathering activities. "It is likely that these sites

represent the intensity of occupational activities all throughout this area, rather than being discrete activity areas that are separate from the main Puebloan occupation of this area," (Wilshusen et al. 2000:130). Site LA80320, which is located less than 2 km from LA10720 and LA27092 and contains an ephemeral outdoor activity area with a hearth, is a good example of a limited activity area.

### Project Area Sites

Using Wilshusen's classification, the project area sites were placed into one of the six site types. As shown in Table 4-9, most of the Pueblo I sites are known or suspected single residence sites.

Table 4-9. Project Area Sites as Typed by Wilshusen's Classification

| Site No. | Site Type |
|---|---|
| LA80320 | limited activity/nonresidential |
| LA27092 | multiple residence |
| LA79076 | multiple residence |
| 5LP378 | multiple residence |
| 5DL2 | multiple residence |
| LA10720 | single residence? |
| 5LP379 | single residence |
| LA80321 | single residence |
| 5LP203 | single residence |
| 5LP515 | single residence |
| 5MT5478 | single residence |
| 5MT5453 | single residence? |
| 5MT5503 | single residence? |
| 5DL291 | single residence? |

### Summary

Archaeological survey and excavation data show that habitations are the most common Pueblo I site type. "Single- and multiple-residence hamlets make up 81% (3,667) of the known total number of Pueblo I sites in southwestern Colorado" (Wilshusen 1999:215). A small Pueblo I hamlet typically contained one or two pithouses, surface rooms, and midden deposit. Since Pueblo I pithouses functioned as primary dwellings, these structures are thought to be better indicators of both residency and site population than surface architecture. Based on available floor space, a pithouse was probably occupied by one or two households. Each household likely consisted of a nuclear or extended family with 4 to 7 people (Wilshusen 1991).

Thirteen of the Pueblo I sites contained pithouses and were therefore classified as habitations. Nine of these are known or suspected to be single residences. The remaining four are multiple residences. Each MAPL habitation, then, was probably occupied by 1 or 2 households, or 8-14 people. Site 5DL2 may have been occupied by three households. The fourteenth site was a limited activity location.

## LENGTH OF SITE OCCUPATION

### Introduction

As was shown above in the *Site Type* section, all but one of the sites were classified as habitations occupied by 1-3 households. Two questions arise from this statement: Were these sites year-round residences? For how long were these sites inhabited?

In the following discussion, two models will be used to classify the length of occupation of the MAPL Pueblo I sites: the Kent (1992) model and a sherd weight model (Varien and Potter 1997).

### Kent Model

The Kent model, which is based on ethnographic research, assesses site variation in order to classify group mobility. This model assumes that the Anasazi were not entirely sedentary, living in substantial, primary residential sites during the winter and dispersing into seasonal, less substantial sites during the warm seasons (Firor et al. 1998:310). Residential sites, then, can be divided into two types: primary residences and seasonal habitations. †"Each of the two residential types may have been characterized by various combinations of long or short anticipated occupation, as well as long or short actual occupation," (Firor et al. 1998:310). Table 4-10 presents the various combinations, which have been assigned group numbers according to mobility patterns.

Table 4-10. Possible Mobility Patterns (from Firor et al. 1998:311).

| Residence type | Anticipated Occupation | Actual Occupation | Group Number |
|---|---|---|---|
| Primary | Long | Long | 1 |
| Primary | Long | Short | 2 |
| Primary | Short | Long | 3 |
| Primary | Short | Short | 4 |
| Seasonal | Long | Long | 5 |
| Seasonal | Long | Short | 6 |
| Seasonal | Short | Long | 7 |
| Seasonal | Short | Short | 8 |

According to the Kent model, site variation is directly related to the length of time that a group intends to stay at a site. So, when a group anticipates long-term occupation, more labor is invested in construction, diverse items and resources are brought to the site, and activity areas tend to be well defined. Thus, the definition of sites as long-term habitations is based on architecture, artifacts, and site structure (Firor et al. 1998:314). Conversely, a short-term occupation site will exhibit less substantial architecture, a limited artifact assemblage, and less formal spatial organization. In the Kent model, attributes of site structure, architecture, and material culture are used to define both the planned and actual length of site occupation. As shown in Table 4-11, these characteristics include site size, deep pithouses, and the presence of a midden, storage loci, milling bins, turkey remains, ornaments, non-local artifacts, and the percentage of

flaked stone tools. The final attribute, the ceramic abundance index, is derived by dividing the total number of sherds by the number of formal ceramic types (i.e. Bluff Black-on-red as opposed to Early Pueblo grayware).

Table 4-11. Expected Site Attributes by Mobility Group (from Firor et al. 1998:312)

| Variable | G 1 | G 2 | G 3 | G 4 | G 5 | G 6 | G 7 | G 8 |
|---|---|---|---|---|---|---|---|---|
| Site Size | large | small | large | small | med.-large | med.-small | med. | small |
| Deep Pithouse | X | X | X | X | | | | |
| Midden | X | X | X | X | | | | |
| Formal Storage | X | X | | | X | X | | |
| Milling Bin | X | X | | | X | X | | |
| Flaked Stone Tools (%) | low | mod. | low | high | mod. | mod. | high-mod. | high |
| Turkey Bone | X | X | | | X | | | |
| Trade Item | X | X | ? | | X | | | |
| Ornament | X | X | X | | X | | ? | |
| Ceramic Abundance Index | high | mod.-low | mod.-low | low | mod. | low | high | low |

In applying the Kent model to the MAPL sites, we are somewhat stymied by the fact that none of the sites has been completely excavated. In addition, the structures at 5MT5503 were only tested, yielding a small artifact sample; none of the structural elements have been investigated at LA102720; and there are unexcavated pithouse(s) at 5LP378 and 5MT5453. Nevertheless, in every case, several site attributes have been defined to the extent to suggest whether the sites represent anticipated versus actual long- or short-term occupations. Table 4-12 summarizes the attributes of the MAPL Pueblo I sites. Based on the listed attributes, sites are assigned to a mobility group. Some of these mobility assignments are tentative, but represent a "best guess" based on defined attributes. Note that LA80320 is not included in the discussion because it is not a residential site.

Based on the Kent model, all of the included Pueblo I components are classified as primary, year-round residences. Six of the components (46%) are classified as Group 1, primary residential, long anticipated/long actual habitation sites (see Table 4-15). Four of the sites (31%) are classified as Group 2, primary residential, long anticipated/short actual habitation sites. The three remaining sites (23%) are tentatively assigned to Group 4, primary residential, short anticipated/short actual habitation sites. Thus Pueblo I residential patterns along the MAPL pipeline corridor are characterized by primary residences. That nearly half of the sites were intended to be long-term residences and were actually occupied for long periods attests to the agricultural and economic success of the inhabitants. It is also interesting that three of the four probable Group 2 sites are located in the Durango area; perhaps the marginal nature of farming conditions in this locale had forced the occupants to prematurely abandon these sites. The three Group 4 sites in Montezuma County may represent permanent, year-round homesteads located in the vicinity of agricultural fields. Certainly the mobility patterns suggest that intensive farming had been conducted in proximity to all of the MAPL residences (Firor et al. 1998).

### Sherd Weight Model

Longer length of occupation is expected to result in greater numbers of discarded or broken items. One calculation uses sherd weight to determine the estimated length of site occupation. Developed by Varien and Potter, this equation assumes an average breakage/discard rate of 6,654 grams of ceramics per year (Varien and Potter 1997). We have used sites 5LP203 and 5LP515 for these calculations because the sites are undisturbed and as single residences the data sets are comparable. Tables 4-13 and 4-14 depict the actual and extrapolated sherd weights as well as the estimated length of occupation for these sites.

Table 4-13. Sherd Weight Data for 5LP203

| Site number | 5LP203 |
|---|---|
| Excavated pithouse sherd weight | 8,737 grams |
| Midden sherd weight | 1,635 grams +/- 45 grams |
| Percent of midden excavated | 10 percent |
| Extrapolated midden sherd weight | 16,350 grams +/- 4,500 grams |
| Roomblock sherd weight | 4,390 grams +/- 227 grams |
| Percent of roomblock excavated | 70 percent |
| Extrapolated roomblock sherd weight | 6,271 grams +/- 324 grams |
| Cobble Apron sherd weight | 630 grams +/- 35 grams |
| Percent of cobble apron excavated | 30 percent |
| Extrapolated cobble apron sherd weight | 2,100 grams +/- 117 grams |
| Extrapolated total site sherd weight | 33,458 grams +/- 4941 grams |
| Estimated length of occupation | 5 years +/- 9 months |

Table 4-12. Summary of Pueblo I Component Attributes

| | LA 10720 | LA 27092 | LA 79076 | LA 80321 | 5LP 203 | 5LP 378 | 5LP 379 | 5LP 515 | 5MT 5453 | 5MT 5503 | 5MT 5478 | 5DL 291 | 5DL 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size Site (sq. m) | 7,083 | 9,778 | | | 7,156 | | | 4,417 | 5,000 | 5,600 | | | |
| Pithouses | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Max. pithouse depth | ? | 2.25 | 0.94 | 2.28 | 2.20 | 3.30 | 2.50 | 2.50 | ? | 1.75 | 0.50 | ? | 1.95 |
| No. of surface rooms | ? | 4 | 2 | 3 | ? | 5 | 2 | 1+ | 4 | 1? | 1 | 1? | 10 |
| Midden | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | ? | ? | ? | ? | ? |
| Formal storage loci | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | ? | Yes | Yes | Yes |
| Milling bins | ? | No | No | Yes | No | No | No | No | No | No | No | No | Yes |
| Flaked lithic tools | 6% | 10% | 8% | 10% | 14% | 15% | 12% | 15% | 17% | 0 | 41% | 18% | 22% |
| Turkey remains | Yes | Yes | Yes | No | Yes | No | Yes | Yes | ? | ? | ? | ? | ? |
| Trade items | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | No | Yes | Yes | Yes |
| Ornaments | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | Yes |
| Ceramic rough abundance index | 415 | 192 | 236 | 146 | 216 | 663 | 390 | 123 | 123 | 23 | 79 | 298 | 643 |
| Assigned mobility group | 1? | 1 | 1 | 1 | 2 | 2? | 1 | 2 | 4? | 4? | 4? | 2? | 1 |

Table 4-14. Sherd Weight Data for 5LP515

| Site number | 5LP515 |
|---|---|
| Excavated pithouse sherd weight | 3,336 grams |
| Excavated room sherd weight | 86 grams |
| Excavated ramada sherd weight | 148 grams |
| Midden sherd weight | 2,626 grams +/- 48 grams |
| Percent of midden excavated | 3 percent |
| Extrapolated midden sherd weight | 87,533 grams +/- 16,000 grams |
| Roomblock sherd weight | 5,448 grams +/- 188 grams |
| Percent of roomblock excavated | 60 percent |
| Extrapolated roomblock sherd weight | 9,080 grams +/- 313 grams |
| Extrapolated total site sherd weight | 100,183 grams +/- 16,313 grams |
| Estimated length of occupation | 15 years +/- 2 years 5 months |

Based on these calculations, 5LP203 was occupied for 5 years +/- 9 months and 5LP515 was occupied for 15 years +/- 2 years and 5 months, or roughly three times as long. Certainly 5LP515 has a larger midden, a well-defined cultural stratum, and at least two surface structures, as opposed to the small midden, barely visible cultural stratum and undefinable surface architecture at 5LP203. Since the pithouse was well built, perhaps the abandonment of 5LP203 was hastened by the death of the individual who was placed on the floor of the pithouse.

### Conclusion

Both sites have been classified as Kent's mobility Group 2 (long anticipated/short actual occupation). However, while the sherd weight data from 5LP203 are consistent with the Group 2 assignment, the sherd weight data suggest that 5LP515 may have actually been a long-term occupation, or mobility Group 1.

## TECHNOLOGY

Several significant technological changes were implemented throughout the eastern and western areas during the Pueblo I period. These included refinements in ceramic manufacture, the more effective use of ground stone, and improved farming techniques. Harder pastes and better paints and slips were introduced into ceramic production, while large, two-hand manos, trough metates, and milling bins enabled corn to be processed more efficiently. Extensive water control and diversion systems were also developed during the Pueblo I era. While dry land fields had previously been situated on open mesa tops, water control systems allowed the Pueblo I farmers to exploit additional microenvironments such as drainages and alluvial fans. Fieldhouses became more common, particularly at large settlements where fields were located some distance from residences. "Pueblo I also appears to be a time of the increasing intensification of agricultural production and storage," (Wilshusen and Wilson 1995:73). Perhaps this agricultural intensity was directly related to technological change.

### Lithic Technology

The Pueblo I sites in the east and west share similar lithic technologies: the lithic assemblages are dominated by tools associated with agricultural products processing. Simple expedient flake tools dominate the flaked lithic assemblages and extensive input tools dominate the ground lithic assemblages.

#### Flaked Lithics

The debitage data from the recent MAPL and El Paso projects illustrates the importance of expedient flake technology used by the Pueblo I people. Figure 4-18 presents a bar graph comparing the percentages of cortical, partially cortical, noncortical, and biface thinning flakes for the Pueblo I and Archaic sites on these two projects. As can be seen from this graph, the Pueblo I sites are relatively consistent in their percentages, but differ drastically from the Archaic sites where biface technology was more important.

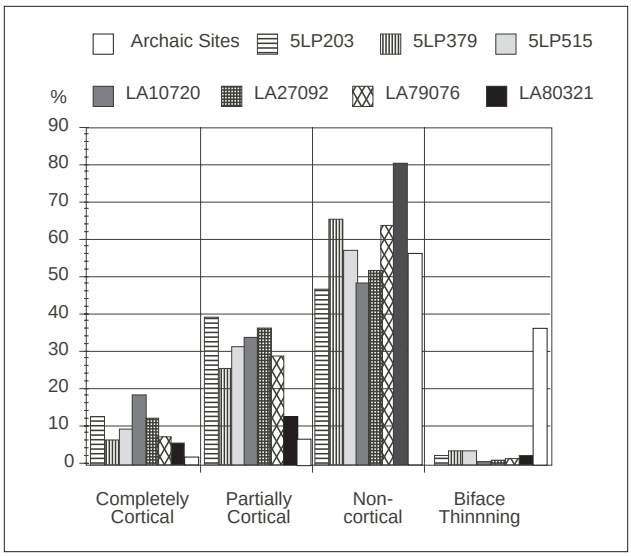



*Figure 4-18. Debitage types from Pueblo I project area sites.*

The presence of projectile points, nicely-made bifaces, and drills on the Pueblo I sites indicates that biface technology was not unknown to the Pueblo I people. Figure 4-19 compares the percentages of these "formal" tools to all tools, and the percentages of biface thinning flakes to all debitage flakes. This figure shows an interesting relationship: the formal tools represent a much higher percentage of tools than the debitage needed to produce them. While this statistic could be skewed slightly by differential lithic recovery (large non-biface flakes are more likely to be collected when all the sediments are not screened), it is believed to represent a pattern on Pueblo I sites where formal flaked lithic tools are often produced in areas other than habitation sites. This pattern is often seen in the lithic material assemblage where the material observed in the manufacture of the

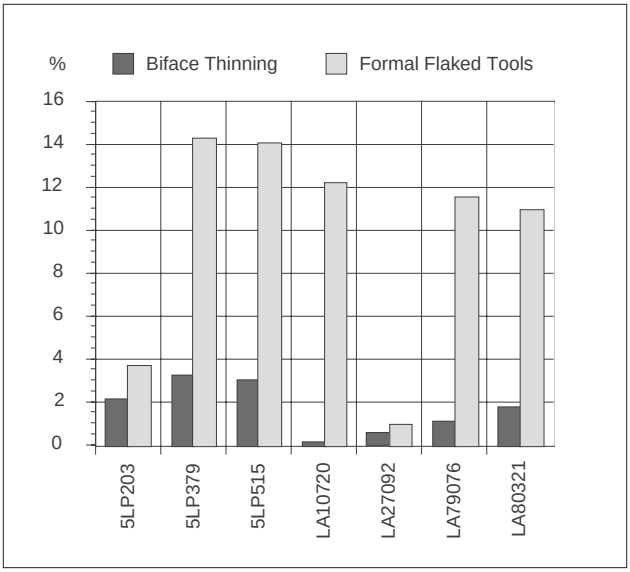



*Figure 4-19. Bar graph illustrating percentages of biface thinning flakes and formal tools in Pueblo I flaked lithic assemblages.*

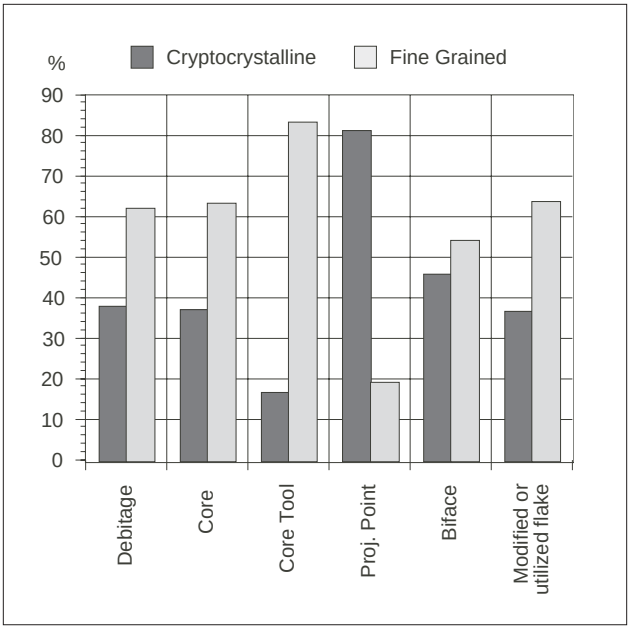



*Figure 4-20. Bar graph comparing lithic materials to tool types in Pueblo I flaked lithic assemblages.*

formal lithic tools is not present within the debitage assemblage. The higher percentage of tools could also be a result of collection of formal lithic tools by the Pueblo I people from earlier sites: at least three of the projectile points from 5LP379 are Archaic-style projectile points.

A study of lithic assemblages from surface contexts in Ridges Basin (Lizotte 1995) suggest that the Pueblo I farmers in the Durango area maintained an emphasis on hunting technology in their lithic assemblage. The debitage data from the Durango sites does not seem to support this study, suggesting rather that expedient flake technology was the primary focus of lithic reduction at these sites. The presence the high percentage of projectile points and bifaces on two of the sites in the Durango area does suggest that hunting was integral in the subsistence of the Durango Pueblo I people.

The Pueblo people produced most of their expedient tools with fine-grained materials such as quartzites, siltstones, and mudstones and produced most of their formal tools with crypotcrystalline materials such as cherts, chalcedony, and obsidian (see Figure 4-20). The preference for coarser grained materials for expedient tool production may be related to a desire to have tools with more durable edges in addition to the fact that these materials are more readily available.

## Non-flaked Lithics

The groundstone assemblages suggest a heavy utilization of corn agriculture in the Pueblo I diet and a heavy investment in the technology to process corn. Metates, the majority of which are trough-type, are common on these sites and two-hand manos which are used in these metates are more common than one-hand biscuit type manos. Hammerstones used to roughen and shape the surface of grinding implements are common artifacts in the assemblages.

Graphs illustrating the ratio of two-hand to one-hand manos and percentage of metates in the assemblages illustrate some interesting trends. Frequencies of two-hand to one-hand manos have been used as a proxie for agricultural intensification (Phagan 1988; Lipe 1999:421). In the Dolores Area, the frequencies during the early Pueblo I ranged from 1.5-2.5:1, but increased to 8:1 by late Pueblo I. As can see from Figure 4-21, the mostly middle Pueblo I sites along the MAPL corridor ranged from 2-3.5:1, fitting the pattern seen in the Dolores area well. The highest ratio of two-hand to one-hand manos is seen in the Durango area, suggesting that corn agriculture might have played a larger role here than in the other areas.

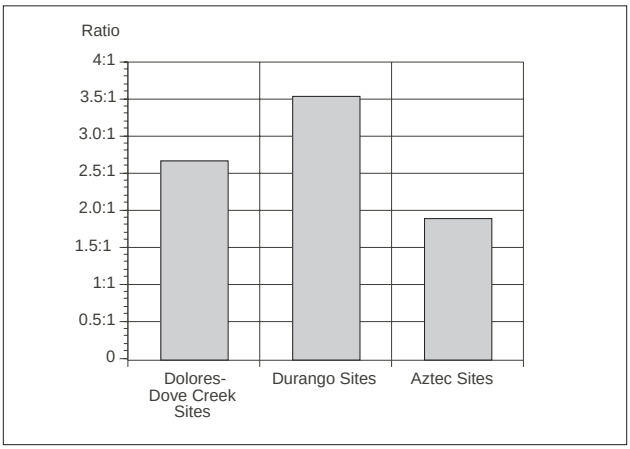



*Figure 4-21. Bar graph illustrating the ratio of two-hand to one-hand manos in project area Pueblo I sites.*

Figure 4-22 presents a graph of the percentage of metates to all other lithic artifacts. Like the mano data, the metate data from the Durango area sites suggest that corn agriculture might have played a larger role here than in other areas. The percentage is a bit lower in the Aztec area and significantly lower in the Dolores-Dove Creek area. The reason for the low percentage from the Dolores-Dove Creek sites is not well-understood but might partially be a result of sampling error due to the disturbance to these sites by agricultural activities.

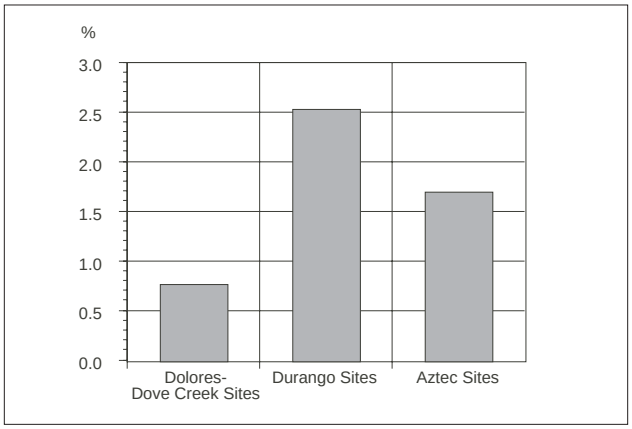



*Figure 4-22. Bar graph illustrating percentage of metates to other lithic artifacts in project area Pueblo I sites.*

## Ceramic Technology

Ceramic technology improved in several ways during the Pueblo I period. Pastes became harder, resulting in more durable vessels, white ware decoration and line work became more refined, new vessel forms such ladles appeared, and fillets, the precursor to corrugation, were applied to the necks of gray ware jars. Paul Reed has suggested that some of these technological improvements may have been related to the increasing importance of beans in the Pueblo I diet; cooking beans is a lengthy process that requires well-built utility vessels (Reed 2001: personal communication).

Typical Pueblo I vessel forms consist of utility ware jars, serving bowls, ollas for storage, multipurpose pitchers, seed jars, effigies, and cloudblowers (pipes) (see Figure 4-23). Less common are ceramic ladles, pot lids/stoppers, miniature vessels, and beads. Because they served such utilitarian functions as cooking and storage, jars are nearly always gray wares. Bowls, which were used for serving and short-term or nonperishable item storage, are usually white or red wares, although polished gray bowls are occasionally present in the Pueblo I ceramic assemblages. Gray ware ollas, which have restricted openings and large volume, were used for storage, especially of liquids such as water. The function of effigies is unclear; these items may have been children's toys, whimsical creations, or ceremonial. Likewise, the pipes may have been used for social or religious activities. Evidence of ceramic manufacture includes 74 unfired clay pellets in Structure 2 at 5LP379 and several unfired ceramic fillets in Room 7 at 5DL2.

### Ceramic Clay and Temper *by Lori Reed*

With the examination of clays and tempers for the MAPL Pueblo I assemblages, including oxidation and petrographic analyses, the data set offers an opportunity to compare raw material use from Durango to Aztec along the Animas River valley. Also, comparison of the MAPL Pueblo I data with other Upper San Juan data sets having oxidation or petrographic studies will contribute to establishing and interpreting a more regional pattern of resource use and technological change.

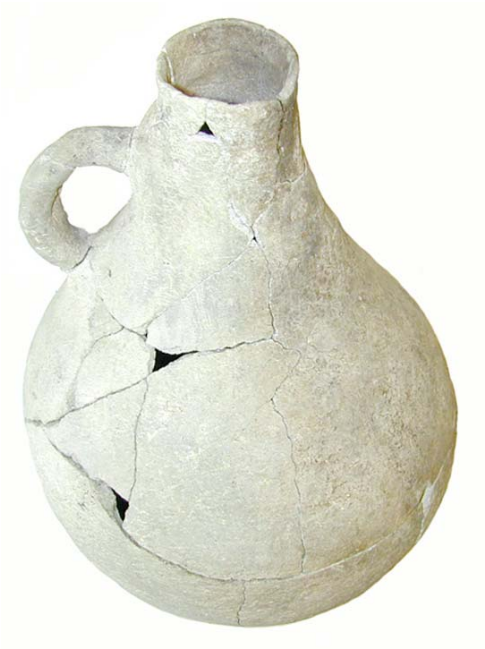
As discussed briefly in each of the site ceramic sections, the occurrence of both diorite-tempered and granitic sand-tempered ceramics at most of the MAPL sites is interpreted as probable local production of both Northern and Upper San Juan tradition pottery. With the exception of LA 10720, Northern San Juan ceramics range between 28 and 61 percent of the Durango assemblages and between 37 and 86 percent of the New Mexico assemblages. The variation in the occurrence of Northern San Juan ceramics may be indicative of population movements from west of the La Plata Mountains into the Animas River valley. Given the low number of Northern San Juan ceramics from 5LP203 and LA 10720, the two earliest Pueblo I sites, it is possible that these sites represent occupations dating just before substantial Northern San Juan populations began moving east and south. In terms of changes in local pottery technology, potters from west of the La Plata Mountains would have been more accustomed to making pots with crushed rock (diorite) temper. Given the availability of diorite cobbles in the Animas River, Northern San Juan migrants could have maintained their traditional ceramic recipe along side Upper San Juan potters who used granitic sand temper.

It is not unusual for potters to produce dual ceramic traditions. In Cove/Redrock Valley, Arizona, for example, Hensler and Rohrer (1999) excavated a Basketmaker III kiln that contained vessels having sand, trachyte, or crushed rock temper. Also, sherds classified as Northern San Juan typically have crushed diorite or diorite porphyry temper, but may also have crushed sandstone temper (Breternitz et al. 1974). Variation in ceramic technology and its application to identification of cultural groups may be difficult in cases such as these. Resulting limitations in ceramic typology often obscure variation, producing normative interpretations of prehistoric culture (see Cordell and Plog 1979). For the MAPL Pueblo I assemblages, variation in tempering material is a critical attribute that may correlate with population movements, resulting in both Upper San Juan and Northern San Juan tradition potters working with local materials in the Animas River valley.

Although crushing river cobbles for temper may seem an

221.22.1

Piedra Black-on-white bowl



221.5.1

Chapin Gray pitcher

221.10.1

Rosa Black-on-white bowl

221.18.1/253.3.1

Rosa Brown jar


221.26.1

Rosa Brown tri-stemmed pipe


*Figure 4-23. Photographs of typical Pueblo I vessels from LA27092. Note: all vessels shown at same scale except the Rosa Brown pipe, which is shown at twice the scale to show exterior details.*

arduous task, replication and sourcing studies for the Totah Archaeological Project Field School (Ben Bellarado, personal communication July, 2001) indicate that most river cobbles may be easily crushed. Once the hard, river worn exterior surface is broken (with only a few strikes from another cobble), the interior rock is crumbly and easily crushed into temper-sized particles. Based on the petrographic analysis of sherds from the MAPL assemblages, the crushed rock material that was identified as either andesite/diorite or crushed rock during the low-power microscope analysis is actually diorite with variable mafic minerals possibly indicative of source location. Given that the Ute Mountain area is the only diorite porphyry source in the immediate project area with significant amounts of altered hornblende, dioritic tempers that lack augite and contain altered hornblende may be from this area (Ekren and Houser 1965). Dioritic temper lacking hornblende, but contain primarily augite, most likely originate from the La Plata Mountains, Glade Mountain, or the Mount Wilson/Dolores Peak areas (Bromfield and Conrad 1963; Professor Richard Gonzales, Department of Geology, Fort Lewis College, personal communication 2001; Haynes et al. 1972; Shawe et al. 1961). Augite-rich diorite rocks also are available as river gravels in both the Animas and La Plata Rivers. Further field reconnaissance and systematic classification of river cobbles from the Animas and La Plata drainages using petrography is warranted. As indicated by the petrographic analysis, the augite-rich diorite material in the Pueblo I sherds from the Animas River valley is distinctively different from the diorite porphyry in Basketmaker III and Pueblo II ceramics from MAPL sites in the Dolores/Cortez area. Thus, Northern San Juan series vessels from the Animas River valley are potentially local products using local clays and crushed diorite cobbles. More data in the form of sherd and raw material samples are necessary to further support this supposition.

As shown in Figure 4-24, the temper mineralogy for the MAPL assemblages is variable with distinct clusters of mineral components within the greater combined category of crushed rock/andesite/diorite identified during the low-power microscope examination. Carpenter's (2000) examination of the geologic literature for the Upper and Northern San Juan areas and petrographic analysis of MAPL ceramics suggests that two types of diorite are present in the MAPL assemblages. The first is an augite diorite that is commonly available in the La Plata Mountains (Dr. Richard Gonzales, Department of Geology, Fort Lewis College, personal communication, March 2001) and probably occurs in both the Animas and La Plata Rivers as gravel. The second is diorite porphyry rich in hornblende and hornblende altered to magnetite, sericite, or chlorite. Diorite porphyry appears to be abundant in the Ute Mountain area.

Although the petrographic sample is small, the distribution of temper material shown in Figure 4-24 and the geologic information for the Ute and La Plata Mountains suggest that there is potential for identifying local production areas of a diorite-tempered pottery

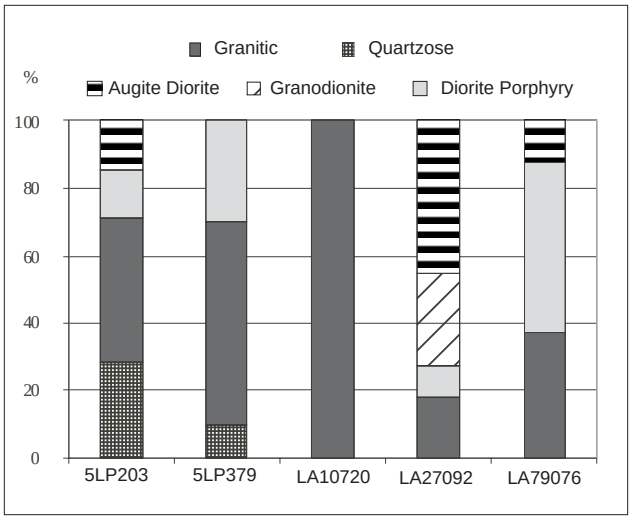



*Figure 4-24. Distribution of temper mineralogy for Pueblo I MAPL assemblages based on petrographic analysis of sherd pastes.*

tradition. At the largest scale, classification of diorite porphyry as a Ute Mountain area resource versus augite diorite as a La Plata Mountain area resource may be possible. If LA 10720 is any indication of early Pueblo I ceramic production in the lower Animas Valley, assemblages dominated by granitic temper and lacking crushed diorite may be indicative of a brief temporal span prior to the spread of crushed rock technology or Northern San Juan people to the south as postulated by Wilshusen and Ortman (1999).

Granite appears to occur more in MAPL sherds from La Plata County in Colorado and San Juan County in New Mexico than from areas to the west. Since granite is more prevalent in the La Plata Mountains than in any other area near the MAPL project area (Oppelt 2000), it follows that more granitic-tempered sherds occur in both these counties. Although diorite porphyry temper occurs in assemblages from all counties (Montezuma, La Plata, and San Juan), granite does not. It is clearly lacking in the Montezuma County sherds representing Basketmaker III through Pueblo III time periods. Given that these two temper types co-occur, the distribution of granitic-tempered sherds and dioritic-tempered sherds in this area may suggest that pots were not heavily traded. Assuming that the MAPL samples are representative, the lack of granitic temper in sherds from Montezuma County may indicate that granite-tempered pottery was either not desirable or that people in this area simply made their own pottery without importing pots from the Animas and La Plata River valleys. If these people did indeed make their own pots, then we would not expect to see many granitic tempered sherds from sites in this part of Montezuma County. The overwhelming presence of hornblende-bearing diorite porphyry in the sherds from Montezuma County may support this theory given the closest source of igneous rock are the nearby Ute Mountains. With more research and analysis we may be able to establish trends that link granitic temper to

augite-pyribole1-bearing diorite porphyry tempers. If a link exists, then we may be able to indirectly source pyroxene-bearing dioritic tempers that co-occur with granitic tempers to the La Plata Mountains area and drainages to the south.

The amounts of granitic lithic fragments, quartz, plagioclase, and potassium feldpsar of granitic tempered sherds from sites in the MAPL Project area as well as from other New Mexico sites were incorporated on a principal components analysis plot. Figure 4-25 shows that granitic sherds from sites within the Navajo Reservoir area (LA 55979 and LA 111061) and from sites to the south in the Counselors area (LA 16257 and LA 115767) plot primarily on the right side of the y-axis, whereas the granitic sherds from the MAPL Project plot primarily on the left side of the y-axis. Interestingly, granitic tempered sherds from a Mogollon site in southwestern New Mexico (LA 121210) (see Reed et al. 2000) plot with the MAPL sherds. Neither grouping is very tight, however, the non-MAPL sherds tend to form a tighter group. A scatter plot of the percentage of granite versus quartz was also prepared for these sherds (Figure 4-26). It shows that the MAPL sherds contain more granitic lithic fragments and less monomineralic quartz than the sherds outside the MAPL Project area. Given that the MAPL sherds contain more granitic lithic fragments, the granitic temper in these pots may have come from a temper source close to a granitic outcrop. Figures 4-25 and 4-26 may indicate that deteriorated granite close to a granite source was used to manufacture the MAPL pots, whereas granitic sand formed by erosion of granite-bearing sandstones was used to make pots outside the MAPL area. This distinction may be the closest we will ever come to sourcing granitic tempers.

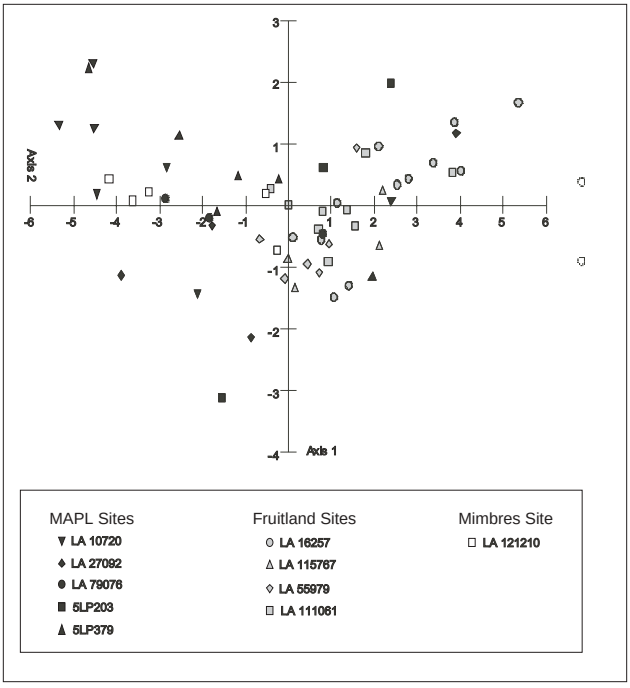



*Figure 4-25. Principal components analysis plot of granitic tempered sherds from sites in New Mexico and sites within MAPL project area.*

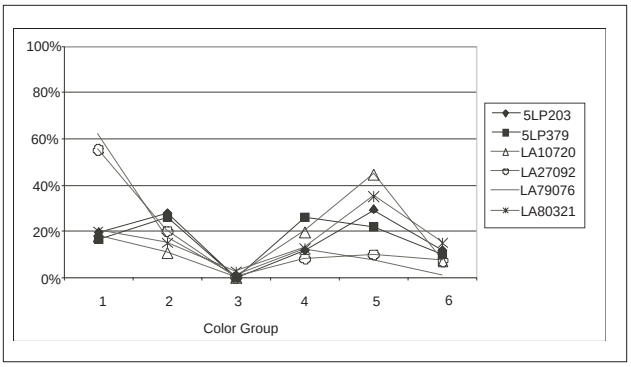



*Figure 4-26. Scatter plot showing granitic lithic fragments versus monomineralic quartz in sherds from New Mexico and MAPL project area.*

Examination of the MAPL oxidation data for the Pueblo I assemblages suggests variability in clay resource selection specific to certain areas. As shown in Figure 4-27, LA 27092 and LA 79076 have similar distributions of refired paste colors. These two sites have the highest percentages of buff-firing sherds, with almost 70 percent of each assemblage falling within buff colors 1 and 2. Given that LA 27092 and LA 79076 are relatively close to each other and occupied at roughly the same time, use of resources and clay outcrops were probably shared by potters from both sites. The same trend is suggested for the two Colorado sites, 5LP203 and 5LP379, in the Ridges Basin area. With the exception of slightly greater use of yellowish red (group 4) clays for 5LP379 ceramics, the distributions shown in Figure 4-25 are almost parallel. The remaining two sites, LA 10720 and LA 80321, have similar refired data sets with greater percentages of samples refiring to yellowish red colors. Further interpretation of these data is inhibited by the lack of raw material sourcing for the Animas River valley and surrounding areas. As a result, availability of buff and yellowish red-firing clays in the vicinity of the MAPL sites is unclear, making identification of local production signatures difficult.

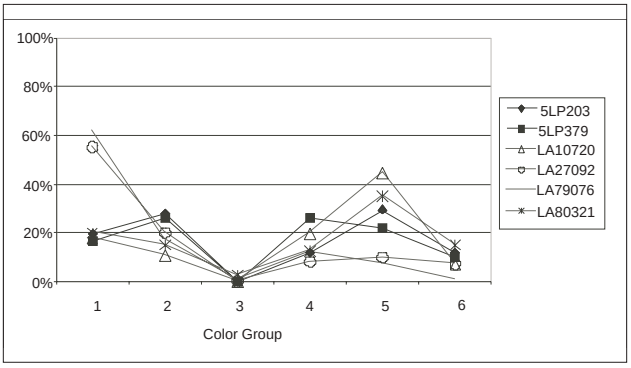



*Figure 4-27. Distribution of oxidized colors for Northern San Juan Gray Ware from MAPL Pueblo I sites.*

A comparison of oxidation data from MAPL and Fruitland sites to the east provides some insight into interpreting production locales. To produce the distribution graph shown in Figure 4-28, the MAPL data were grouped into a MAPL CO group (sites 5LP203 and 5LP379) and a MAPL NM group (sites LA 10720, LA 27092, LA 79076, and LA 80321). Added to these groups are LA 78838 (Langenfeld 1996), LA 66705 (Wilcox 1995), and LA 72968 (Reed and Goff 1998), comprising a Fruitland NM group of Pueblo I sites from the Navajo Reservoir area. To provide further insight into production, these three groups were further divided by ware category, resulting in a line graph showing the distribution of refired gray and white ware colors from each locational group.

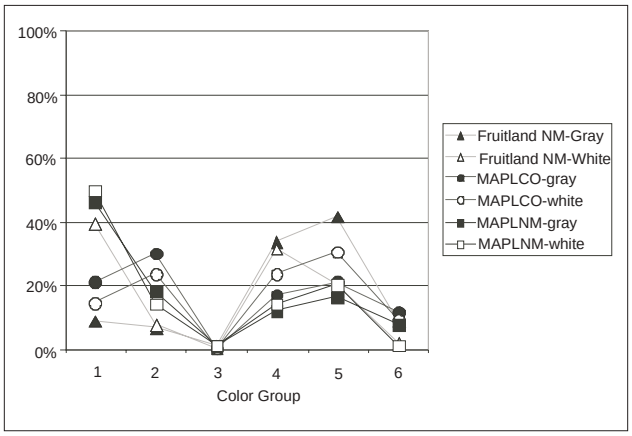



*Figure 4-28. Comparison of refired paste color distributions for gray and white ware from MAPL and Fruitland assemblages.*

Before discussing these data in the context of production choices, several caveats are noteworthy. First, there is a paucity of oxidation data for raw clays from the Animas River valley and east beyond Navajo Reservoir. As a result, little is known about the variability in clays resources from the area regarding refired color, geochemical signatures, or geologic formation exposures. Any interpretations of local production versus acquisition of ceramics produced elsewhere are subject to close scrutiny as more raw material data are collected for the area. Second, assumptions regarding local production derived from frequencies of ceramic types and refired paste colors (e.g., 80 percent of the gray ware assemblage is yellowish red-firing Rosa Gray prompting the assumption that this segment of the ceramics are local) are problematic. Frequently, the reasoning proves accurate such as in the case of 5MT5458 (a MAPL Basketmaker III site) for which refired paste colors are homogenously buff matching local clays sampled by DAP in the Dolores area (see Lucius 1981; Wilson et al. 1988). Alternatively, nonlocal wares may comprise the majority of an assemblage such as in the case of Chuska Gray Ware in Chaco Canyon assemblages (see Toll 2001), making blanket assumptions of local production erroneous.

Several trends in the refire data shown in Figure 4-28 may have implications for local production in the MAPL project area. First, the majority of MAPL NM sherds refired to buff colors, including both granitic and diorite-tempered sherds. The distribution of refired colors for white and gray ware from the MAPL NM sites follows an almost identical pattern, suggesting that potters did not discriminate among clays for utility versus decorated pots. Contrasting to this pattern, is the marked divergence of refired colors for gray versus white ware from the Fruitland NM sites. Gray ware from the Fruitland NM sites rarely refired to buff colors, but diorite-tempered white ware consistently refired to buff and granite-tempered white ware mostly refired to yellowish red. Given that diorite cobbles probably are most abundant in the Animas River drainage and buff-firing clays my be more readily available along the Animas River, it is possible that some if not all of the buff-firing white ware from the Fruitland NM sites originated from the Animas River valley and immediately adjacent areas. Petrographic data for diorite-tempered sherds from the Fruitland area is required to fully evaluate the type of diorite present and its correlation with specific clay resources. Along this same vein, an evaluation of the types and quantities of diorite present in the San Juan River running through the Fruitland area would be a useful comparison.

### Faunal Bone

In addition to meat protein and eggs, faunal animals yield hides and feathers for domestic use and bone for both tools and ornaments. The presence of turkey bone at several sites, fragments of eggshell at 5LP515 and LA10720 and the remains of two feather blankets at LA27092 are suggestive of turkey husbandry, while a substantial worked bone assemblage attests to the importance of bone tool technology. Of 3,155 pieces of faunal bone, 262 (8.3 percent) were modified for use as tools and ornaments. Figure 4-29 depicts selected worked bone tools and ornaments from the MAPL sites.

#### Tools

Composing 15% of the modified bone assemblage, tools (n=43) consist of awls (19), pointed bone tools (7), drills (3), pins (2), bow or stick drills (2), needles (2) pressure flakers (2), punches (2), scrapers (2), reamers (1), and matting tools (1). These tools were manufactured from large-sized mammal (23%), deer/elk (23%), deer/sheep/pronghorn (16%), Mule Deer (14%), jackrabbit (7%), dog/coyote (7%), Bighorn sheep (5%), and indeterminate (5%) bone elements. The taxonomic categories of deer/elk, deer/sheep/pronghorn (DSP), and Large-sized mammal (LAM) are used when manufacturing processes have obscured or removed identifying bone elements. The predominance of large-sized mammal bone (76%) in the worked tool assemblage indicates a preference for large, durable bone that could be used for a variety of manufacturing activities (Eztkorn 1993).


*Figure 4-29. Photographs of selected worked faunal bone tools and ornaments from MAPL Pueblo I sites.*

**Awls and Pointed Tools**

Like the modified bone assemblage from the Duckfoot site, the MAPL worked faunal sample is dominated by pointed bone tools and awls (Etzkorn 1993:184). Composing 60% of the MAPL bone implements, these sharpened perforating tools were likely used for such activities as punching holes through hides. The tools were made from Mule deer (5), Deer/elk (7), LAM (6), DSP (2), jackrabbit (3), *Canis* (2), and Bighorn sheep (1) bone. Pointed bone tools and awls are generally made by splitting a long bone longitudinally, then grinding or trimming the anterior and posterior diaphysis margins to produce a flattened, pointed, or oval shaped tip. Use wear typically includes longitudinal, rotational or diagonal striations, a high degree of polish on the tip and the exterior cortex, and blunted tips. These use wear patterns are produced by the twisting and piercing motions associated with awl use. The presence of high polish on the cortex of the bone indicates use on soft materials with low abrasive qualities such as leather.

**Bow or Stick Drills**

Bow or stick drills appear to have been used for starting fires. The two bow/stick drills were made of splinters from Deer/Elk and LAM bone. The manufacturing technique is similar to that of spiral fracture, but occasionally the bone was struck too hard by a hammerstone, resulting in a splinter with a point on one end. The bone splinter would have been hafted onto a handle for use. These bow or stick drills exhibit deep rotational and diagonal striations close to the tip and perpendicular to the long axis of the bone.

**Drills**

Other drills may have been used to make holes in bone, wood, ceramics, or other hard materials. One such use is beadmaking. The three MAPL drills were made from a DSP metapodial, a Deer/Elk metatarsal, and a Bighorn sheep metatarsal. These tools were manufactured by the split shaft method; grinding and trimming of the anterior and posterior margins produced flattened tips. Use wear patterns include closely spaced rotational striations and polish around the tips, as well as hinge fractures.

**Pins**

Composing 5% of the bone tools, pins may have been used as clothing fasteners. The two pins were made by grinding indeterminate bone elements from a LAM and a DSP into a cylindrical shape. Rotational striations and a high degree of polish suggest use on soft materials. Perhaps they had been used as clothing or hair fasteners.

**Needles**

The bone needles, also comprising 5% of the faunal tool assemblage, were manufactured similarly (from unidentifiable bones) and had been ground into a fine point at the distal end and drilled at the proximal end. "Unlike modern needles, which simultaneously pierce and sew, prehistoric bone needles are believed to have been used primarily to draw sinew or cordage through a preexisting hole created by another tool, such as an awl," (Eztkorn 1993:187).

### Reamer

The *Canis* reamer was made by spiral manufacture. High polish and intense use wear around the tip and fracture line are suggestive of use as a reamer on soft materials.

### Punches

The punches, which were made from LAM and DSP bone, exhibit both longitudinal and diagonal striations, blunted or missing tips, and highly polished cortexes. These attributes, especially the blunted tips, suggest that the tools were used in a forward thrusting motion on moderately hard materials.

### Pressure Flakers

The pressure flakers were made of DSP antler and do not exhibit discernable evidence of manufacture. Very slight battering and denting on and around the tip are indicative of the kind of use wear commonly associated with pressure flaking of lithic materials.

### Matting Tool

The matting tool was made of a split shaft Deer/Elk metatarsal. It exhibits moderately heavy use wear consisting of a large impact fracture at the tip of the tool, abundant diagonal and longitudinal striations around the tip, abundant diagonal striations along the interior/ posterior diaphysis margin, and a high degree of polish everywhere on the bone's surface except for the medullary cavity. The longitudinal striations and the impact fracture at the tip indicate a forward thrusting motion for the tool. The morphology and use wear patterns exhibited by this piece suggest use as a matting tool in basketry manufacture.

### Scrapers

The scrapers were made of LAM and Mule Deer bone. They were manufactured by splitting the long bone of a large mammal, then grinding down one end to form a spatulate, blade-like feature that was used for scraping. Use wear attributes include several scalar flake scars on the spatulate ends, which represent impact fractures and/or attrition associated with scraping (similar to use wear patterns observed on lithic scrapers). Abundant longitudinal, rotational, and cross-hatch-patterned striations on the exterior of the bone shafts indicate use as scrapers on soft materials such as hides or plant fibers.

## Ornaments

Ornaments (n=219) consist of tinklers (6), beads (195), and gaming pieces (18). Bone ornaments compose 84% of the worked faunal bone inventory. The ornaments are made of jackrabbit (80%), unidentified rabbit (10%), large-sized mammal (8%), turkey (1%), and unidentified (1%) bone. The dominance of rabbit bone in the ornamental modified bone assemblage may be related to the availability of these species as well as the suitability of this type of bone for ornament manufacture.

### Tinklers

The six tinklers were made from jackrabbit tibias by grinding off the proximal diaphysis, coring out the cancellous bone, and drilling a small hole below the distal epiphysis. It is thought that the tinklers were attached to clothing and worn while dancing.

### Beads

Beads are usually made by incising a line around the bone shaft, then snapping off the excess. The bead ends and cortex are frequently polished. One or more beads could have been threaded on a string and worn as decoration. Of the 195 beads, five can be classified as tubes because of their elongated shape. These five beads were made from turkey tibiotarsii (2), a jackrabbit radius (1), and unidentifiable bone elements (2). The other 190 beads were made from jackrabbit metatarsals (169) and unidentified rabbit metapodials (21); they are round, polished, and measure less than 1 cm long. The context of these 211 items, which included small pieces of cordage, suggested a single strand of bone beads.

### Gaming Pieces

"Gaming pieces are small, deliberately shaped pieces of bone with incised patterns on one or both sides," (Etzkorn 1993:186). All of the gaming pieces were made from indeterminate elements of large-sized mammals. Manufacture included shaping, polishing, and decorative incisions that were almost certainly related to the nature of the religious ceremony or game of chance for which the items were used.

## Textiles

In addition to food and medicine, plant resources provided the raw material for a variety of textiles. Textile forms included baskets, bags, mats, cordage, clothing, footwear, and blankets. Such items, however, rarely preserve on open sites except in burned, usually subterranean, contexts. The remains of several carbonized textiles were found in three burned pithouses at LA27092 and 5LP379 during the 1999 excavations. These partially complete items consist of four strands of fiber cordage, a looped bag in two fragments, six coiled baskets, four plaited sandals, one weft-twined sandal, remnants of two feather blankets, and a broom. The baskets are tentatively identified as two carrying baskets, an upright basket, a probable tray, a tray or upright basket, and a basket of unknown form. Figure 4-30 depicts several of these items.

Laurie Webster conducted the analysis of the MAPL textiles. The following descriptions are distilled from her textile report. Three of the cordage fragments were coarse 2s-Z yucca cords, while the fourth piece, also of yucca, was

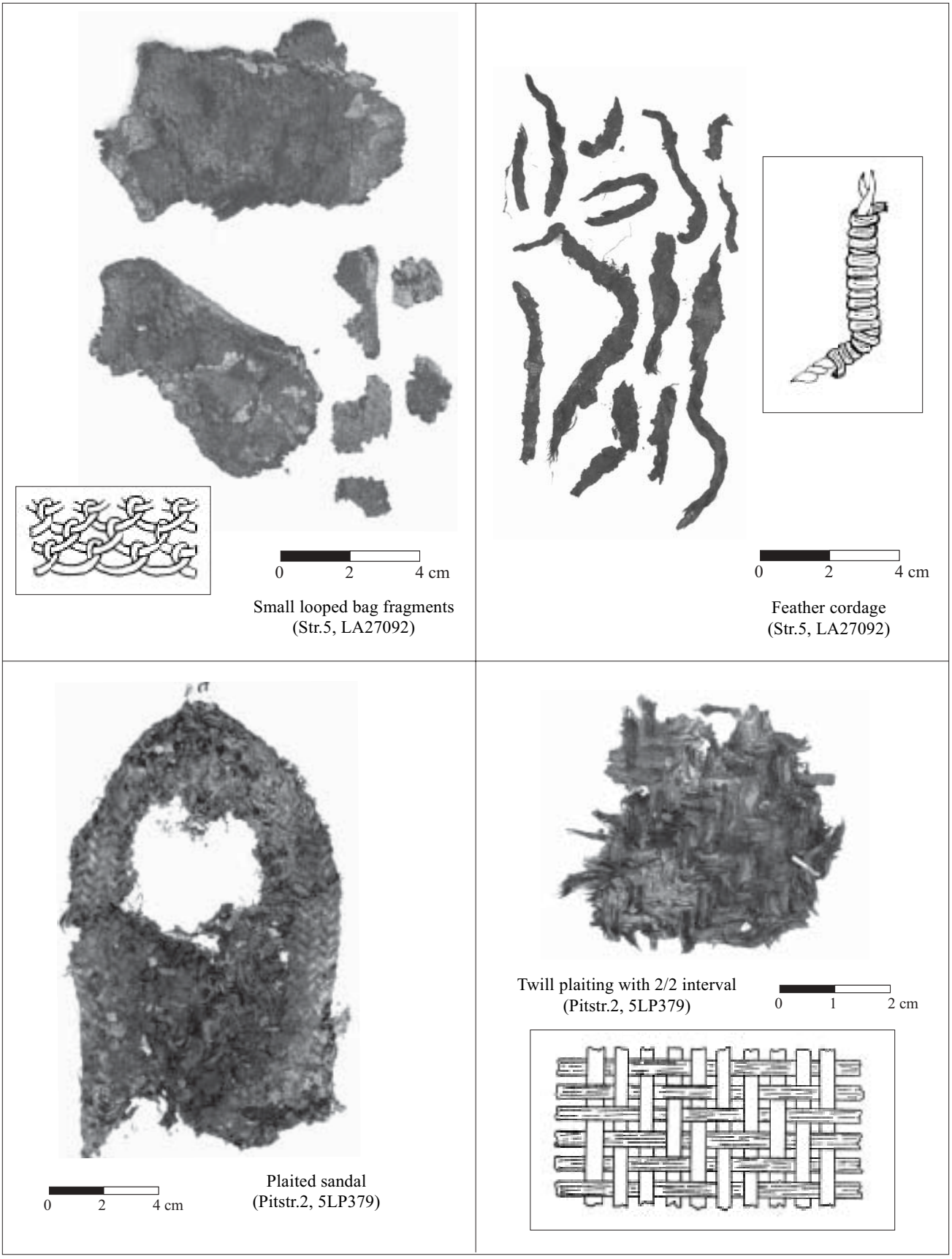



*Figure 4-30. Photographs and drawings of selected textiles from MAPL Pueblo I sites.*

finer-textured and strung through a bracelet made of shell and stone beads. The small looped bag was made of 2s-Z yucca fiber and may have held several bone and jet gaming pieces. The baskets are close-coiled with bunched, two-rod-and-bundle foundations and non-interlocking stitches. The rods are sumac and the bundles are yucca. The plaited sandals are made of unprocessed narrow leaf yucca leaves woven in 2/2 twill interlacing, or plaiting. The weft-twined sandal, a less common type, was made with coarse yucca warps (3z-S) and fine yucca wefts (2z-S). Raised geometric patterning is present on the underside of the sandal. The feather blankets were made of 2s-Z yarn made from yucca fiber and turkey feather quill wrappings. The broom was made from ponderosa pine needles wrapped with 2s-Z yucca fiber cordage.

These textiles were used in craft production, worn as footwear, utilized as containers for the storage of food and specialty items, kept people warm, and even functioned as cleaning implements. The diverse MAPL textile assemblage provides a tantalizing glimpse of perishable items that were commonly used but are seldom found.

## SUBSISTENCE

The Pueblo I people were primarily agriculturists, growing crops on mesa tops and in alluvial settings. However, artifactual and botanical remains from the MAPL sites suggests that the Pueblo I subsistence economy was actually broad-based, consisting of a mix of cultivated crops, domesticated animals, native plants, and wild game. As at other, contemporary sites in the region, agricultural products included corn, beans, and squash, while tame dogs and turkeys provided meat protein, feathers, and eggs. In addition, seeds and greens from various wild grasses, weedy annuals, and perennial plants were procured from nearby biotic communities to supplement the staple, maize. These native plants were evidently substantial components of the prehistoric diet, and although this cannot be proven, may have been particularly important during the warm season prior to the harvest of crops. Likewise, numerous animal resources, including large- and small-mammals, several types of birds, and even amphibians, were hunted, snared, or trapped for consumption.

Osteological analysis of the remains of two adults from 5LP203 and 5LP379 suggested that these people had been fairly healthy prior to their demise. Perhaps the overall good health of the site inhabitants was at least partially due to the practice of a broad-based subsistence economy. Likewise, analysis of adult skeletal populations from Bodo Canyon and the Duckfoot site suggested that those individuals had also been fairly healthy (Fuller 1988 and Lightfoot and Eztkorn 1993). These findings were similar to a Northern Arizona University study (Martin and Goodman 1995:26) of a very large burial population from Durango area sites, which concluded that the dental data suggest that the diet was varied and not reliant exclusively upon maize.

### Botanical resources

A wide array of carbonized edible plant remains was recovered from the Pueblo I sites along the MAPL pipeline corridor. In all, 38 economic taxa are represented, as depicted in Table 4-15. These plant elements were identified in 195 vegetal and flotation samples collected from various structure and feature contexts, including mixed floor fill deposits, hearths, vessels, food processing features, and storage pits. Generally, intramural contexts were better preserved and yielded larger numbers and varieties of charred plant remains, suggesting that most plant processing, preparation, and consumption had been conducted inside structures, especially pithouses.

Table 4-15. Charred Macrobotanical Remains from Pueblo I Sites along Pipeline Corridor

| *Genus species* | Common name(s) | Element |
|---|---|---|
| *Amaranthus* sp. | Pigweed | Seed |
| *Artemisia* sp. | Sagebrush | Achene |
| *Artemisia tridentata* | Big sagebrush | Achene |
| *Atriplex canescens* | Saltbush, orache | Seed |
| Cactaceae | Cactus family | Areole, spine |
| *Celtis* sp. | Hackberry | Seed |
| Cheno-am | Goosefoot-pigweed family | Seed |
| *Chenopodium* sp. | Goosefoot | Testa, seed |
| *Cleome* sp. | Beeweed | Seed |
| *Curcubita* sp. | Squash, pumpkin, gourd | Seed |
| *Cycloloma atriplicifolium* | Winged pigweed | Seed |
| *Descurainia* sp. | Tansy mustard | Seed |
| *Echinocereus* sp. | Hedgehog cactus | Seed |
| *Euphorbia* sp. | Spurge | Seed |
| Gramineae | Grass Family | Seed |
| *Helianthus* sp. | Sunflower | Pericarp, embryo, achene |
| *Juniperus sp* | Juniper | Seed, fruit |
| Leguminosa | Pea family | Seed |
| *Malvastrum sp* | Mallow | Seed |
| *Mentzelia albicaulis* | Stickleaf, Blazing star | Seed |
| *Nicotiana sp* | Tobacco | Seed |
| *Opuntia sp* | Prickly pears, chollas | Seed |
| *Oryzopsis hymenoides* | Indian ricegrass | Caryopsis, lemma/palea |
| *Phaseolus vulgaris* | Common Bean | Seed |
| *Physalis/ solanum sp* | Ground cherry, nightshade | Seed |
| *Pinus edulis* | Pinyon pine | Nutshell |
| *Platyopuntia sp* | Cholla? cactus | Seed |
| Poaceae *sp* | Grass family | Seed |
| *Portulaca* | Purslane | Seed |
| *Prunus virginianus* | Common chokecherry | Endocarp |
| *Rumex/ polygonum sp* | Dock/knotweed | Seed |
| *Salvia sp* | Sage | Seed |
| *Scirpus sp* | Tule or bulrush | Seed |
| *Sporobolus sp* | Dropseed grass | Caryopsis |
| *Stellaria sp* | Pinks | Seed |
| *Vaccinium sp* | Blueberry, huckleberry whortleberry | Seed |
| *Yucca baccata* | Banana leaf, Datil yucca | Seed, capsule |
| *Zea mays* | Corn, maize | Glume, cupule, kernel, rachis, embryo, ears |

Based on ubiquity,*Zea mays* (40%), *Chenopodium* (29%), *Descurainia* (15%), and Cheno-ams (14%) were the most commonly consumed plant resources at the MAPL sites. The common occurrence of corn suggests that farming was employed at or near these sites and that maize constituted an important component of the prehistoric diet. Other foods consisted of two species of cactus fruit (*Echinocereus* and *Platyopuntia*), and a melange of wild seeds, including *Sporobolus*, *Helianthus*, *Physalis solanum*, *Artemisia*, *Mentzelia*, *Polygonum*, *Yucca baccata*, and *Oryzopsis hymenoides*. Woody plant remains are not

included in this discussion because of their primary use as fuel. However, while *Juniperus* was undoubtedly a source of fuel wood, *Juniperus* fruits at several sites may indicate additional use as food. In addition, although only a few seeds of *Phaseolus* and *Curcubita sp.* were identified in the assemblage, their presence suggests cultivation of these species. Like *Pinus edulis* nuts, these seeds are large in comparison with those from other plants, which made them easy to recover if dropped. Therefore, such plant species may be underrepresented in archaeological contexts (Matthews 1988a).

Plant resources in the pinyon-juniper biotic zone mature from late spring into fall. Based on availability, different taxa were gathered for greens or their seeds harvested at various times and in several ecological zones throughout the growing season. For example, *Amaranthus*, *Chenopodium*, and *Cleome* are plant of "shifting" seasonality; their "seeds lie ready throughout the growing season to germinate when conditions are favorable," (Adams 1980:24). In addition, the seeds of *Descurainia* and *Mentzelia* mature in the late spring into early summer, while *Oryzopsis hymenoides* is mature in mid-summer, and Cheno-am, *Helianthus*, *Portulaca*, and *Zea mays* ripen in late summer into fall. *Sporobolus*, in contrast, does not drop its seeds and can therefore be collected into the winter months.

Several of these economic taxa, including *Amaranthus*, *Chenopodium*, *Cleome*, *Descurainia*, *Euphorbia*, *Helianthus*, *Mentzelia*, *Nicotiana*, and *Physalis* are considered to be "weedy species" or "pioneers" that thrive in disturbed contexts, such as fields and the areas surrounding sites. Pioneers "benefit from human activity which inadvertently perpetuates an early successional sere," (Matthews 1988a:403). Such plants could have been tolerated, or even encouraged, then opportunistically gathered as they ripened. Matthews terms several perennials, including *Opuntia*, *Yucca*, *Prunus virginianus*, and *Vaccinium*, "wild plants": "Wild plants, on the other hand, are usually perennials that do not necessarily benefit from human disturbance and tend to proliferate in an ecozone during the more advanced stages of succession as a vegetation community approaches a climax condition," (Matthews 1988a:403). In addition, woody species such as *Atriplex*, *Artemisia*, *Juniperus, and Pinus edulis* may have been used for seeds, fuel, or even fiber.

Notably, nearly all of the edible plant remains from the MAPL assemblage consist of seeds and seed parts. These seeds were probably lost during processing (parching) or cooking activities, or possibly discarded as refuse. Seeds were usually parched or dried prior to consumption or storage. This process killed insect larvae and reduced moisture content in order to discourage mold and fungal growth. "Seeds were commonly parched using shallow sherd trays or parching baskets and live coals," (Huckell 2001: personal communication). When seeds are parched, the internal starch expands, launching seeds into the air. Recovery is difficult because most wild seeds are tiny. Seeds can be cooked in gruel or stew, or ground with one-hand manos and basin metates to make cakes or mush.

Maize was processed somewhat differently. Green corn could be roasted in a large extramural pit, then either consumed or stored. Or, corn might be left standing in the fields until mature. Air-drying either in or on roofs was yet another method of preparing corn for long-term storage. Ethnographically, dried corn was usually left on the cob and stacked for storage. Dried corn could be reconstituted and eaten as hominy. More commonly, however, the corn was ground and eaten in stew, gruel, cakes, or even made into piki bread, as evidenced by the presence of six well-polished comal/piki stones at 5LP379. Based on the large numbers of trough metates and two-hand manos found in the pithouses, corn grinding was generally an intramural activity. However, milling bins were not commonly used during this period; only a few slab metates were recovered and only one milling bin has been excavated, and that was located in the 850s pithouse at LA80321.

While the Pueblo I people also consumed the greens of young plants as potherbs, these plant parts rarely preserve. However, particulate charcoal in a pollen wash taken from a vessel from LA27092 included "many leaf fragments with well-defined guard cells and stomata" (Gish 2000). Although the analyst was unable to identify what plant species was represented, the remains are certainly suggestive of green processing or storage. Plants that may have been consumed as "potherbs" include *Descurainia*, *Amaranthus*, *Cleome*, *Chenopodium*, and *Portulaca*.

In addition, plants are used medicinally and in religious ceremonies. Ethnographically, *Nicotiana* was smoked for curative and ceremonial purposes. The presence of *Nicotiana* seeds at several sites may possibly indicate that this plant had been cultivated. Additional evidence for smoking of tobacco is the presence of pipes located on several of the Pueblo I sites.

Comparison of the MAPL plant remains with the macrobotanical assemblage with those from the Duckfoot site (Adams 1993), Bodo Canyon (Matthews 1988a), and Dolores Archaeological Project (Matthews 1985) reveals strong parallels between the four data sets (Table 4-16). In compiling this data, an attempt was made not to include woody plants unless the plants had other uses other than for tools or fuel. Thus, such taxa as *Juniperus* and *Rhus aromatica*, which produce berries, and *Pinus edulis* and *Quercus gambeii*, which yield nuts and acorns, are included. In addition, the stems of *Ephedra* can be made into tea, while *Artemisia* achenes are edible and were possibly consumed during lean times. Represented in the four assemblages are *Zea mays* and *Phaseolus vulgaris*, as well as Cheno-am, *Physalis/solanum* sp., *Juniperus* sp., *Pinus edulis*, *Artemisia* sp., *Helianthus* sp., *Descurainia* sp., *Mentzelia* sp., and *Yucca* sp. Taxa present only in the MAPL assemblage include *Platyopuntia* and *Cycloloma atriplicifolium*, each with one occurrence at LA27092, as well as *Vaccinium* sp.,

*Stellaria* sp., and *Euphorbia* sp., which were only identified in the 5DL2 assemblage. Based on the overall similarity of the four assemblages, economic plant use was quite consistent throughout region.

Table 4-16. Comparative Botanical Assemblages from Four Projects

| Taxa | MAPL | Adams 1993 | Matthews 1988a | Matthews 1985 |
|---|---|---|---|---|
| *Amaranthus sp.*(Pigweed) | X | | X | X |
| *Artemisia sp.* (Sagebrush) | X | X | X | X |
| *Atriplex sp.* (Saltbush) | X | X | | X |
| *Celtis sp.* (Hackberry) | X | | | |
| *Cercocarpus montanus* (Alderleaf mountain mahogany) | | | | X |
| *Chenopodium sp.* (Goosefoot) | X | | X | X |
| Cheno-am (Pigweed/goosefoot family) | X | X | X | X |
| *Cleome* (Beeweed) | X | | X | X |
| *Curcubita sp.* (Squash, gourd) | X | | | X |
| *Chysothamnus sp.* (Rabbitbrush) | | | | X |
| *Cycloloma atriplicifolium* (Winged pigweed) | X | | | |
| *Dalea sp.* (Indigobush) | | | | X |
| *Descurainia sp.* (Tansy mustard) | X | X | X | X |
| *Echinocereus* (Hedgehog cactus) | X | X | | |
| *Ephedra sp.* (Mormon tea) | | | | X |
| *Erigonum/polygonum sp.* (Dock/wild buckwheat) | X | | X | X |
| *Euphorbia sp.* (Spurge) | X | | | |
| *Galium sp.* (Madder) | | X | | |
| *Helianthus sp.* (Sunflower) | X | X | X | X |
| *Iva sp.* (Sump weed) | | | X | X |
| *Juniperus sp.* (Juniper) | X | X | X | X |
| *Mahonia repens* Oregon grape | | | | X |
| *Malvastrum sp.* (Mallow) | X | X | | X |
| *Mentzelia sp.* (Stickleaf) | X | X | X | X |
| *Nicotiana sp.* (Tobacco) | X | | X | X |
| *Opuntia sp.(*Prickly pear cactus) | X | X | X | |
| *Oryzopsis hymenoides* (Indian ricegrass) | X | X | | X |
| *Penstemon sp.*(Penstemon) | | | | X |
| *Peraphyllum/Amelanchier sp.* (Squaw apple/service berry) | | X | | X |
| *Phaseolus vulgaris* (Common bean) | X | X | X | X |
| *Phragmites sp* (Reed grass) | | X | X | X |
| *Physalis/solanum sp.* (Ground cherry/nightshade) | X | X | X | X |
| *Pinus edulis* (Pinyon pine) | X | X | X | X |
| *Platyopuntia* (Cholla cactus) | X | | | |
| *Portulaca* (Purslane) | X | X | X | X |
| *Prunus virginianus* (Chokecherry) | X | | X | X |
| *Quercus gambelii* (Oak) | | | | X |
| *Rhus aromatica* (Squawbush) | | X | X | X |
| *Scirpus sp.* (Tule, bulrush) | X | X | | X |
| *Sphaeralcea* (Globemallow) | | | X | X |
| *Sporobolus sp.* (Dropseed grass) | X | | | |
| *Stellaria sp.* (Pinks) | X | | | |
| *Vaccinium sp.* (blueberry, huckleberry) | X | | | |
| *Verbena sp.* (Verbena) | | | | X |
| *Yucca sp.* (Yucca) | | | | X |
| *Yucca baccata* (Banana leaf, Datil yucca) | X | X | X | |
| *Zea mays* (Corn or maize) | X | X | X | X |

The mano and metate data presented above (Figures 4-21 and 4-22) suggested that corn agriculture may have played a larger role in the subsistence of the Durango area Pueblo I. To see how the macrobotanical data correlate with the groundstone data, a graph was created to illustrate the ubiquity of cultigens from samples collected from Pueblo I sites in the Aztec, Durango, and Dolores-Dove Creek areas (see Figure 4-31). Significantly, the ubiquity data is nearly exactly the same as the metate and mano data, with Durango containing the highest percentage of cultigens, followed by Aztec, then by the Dolores-Dove Creek area.


*Figure 4-31. Bar graph illustrating percent ubiquity of corn, beans and squash at sites in Aztec, Durango and Dolores-Dove Creek areas.*

### Faunal Resources

The Pueblo I people hunted a variety of domesticated and wild animals for protein from meat, hides, feathers, and quills for domestic use, and bone for tools. Thirty-one taxonomic categories of fauna were recovered from the Pueblo I project area sites. Based on the minimum number of individuals, the most commonly exploited species was cottontail rabbit, followed by jackrabbit, mule deer, turkey, woodrat, and prairie dog (see Figure 4-32). Less common were pocket gopher, dog/coyote, ground, and mouse, as well as several species of small mammals, birds, and amphibians. The dominance of small to medium-sized mammals, particularly rabbits or *lagomorphs*, in the MAPL faunal assemblage is consistent with assemblages from other Pueblo I sites in the region (Neusius 1986; Akins 1988a; Walker 1993). The presence of numerous small-sized animals may be indicative of a garden hunting strategy, whereby game are opportunistically trapped or snared in agricultural plots. Not only is this a method of obtaining necessary protein from meat, but it also reduces damage to the crops (Walker 1993).

A graph of quantities of the minimum number of individuals by animal size was created to see if there were regional differences in the species hunted for the Pueblo I sites along the MAPL corridor. As can be seen from Figure 4-31, there is not a significant difference in the distribution of the animals between the Aztec and Durango areas (data from the Dolores-Dove Creek sites was not in comparable format). The Durango sites contain slightly higher proportions of large mammals (Deer/Elk/or Mountain Sheep) but the difference is probably not statistically significant.

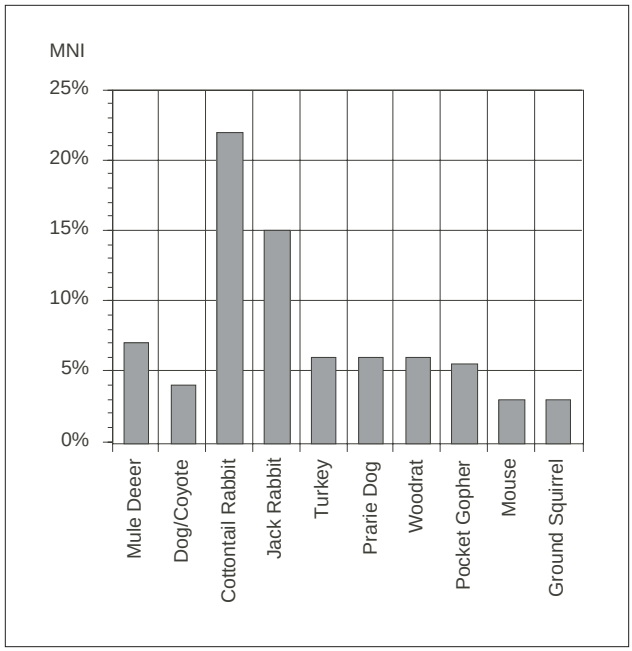



*Figure 4-32. Bar graph showing relative percentages of Minimum Number of Individuals by species for Pueblo I sites.*

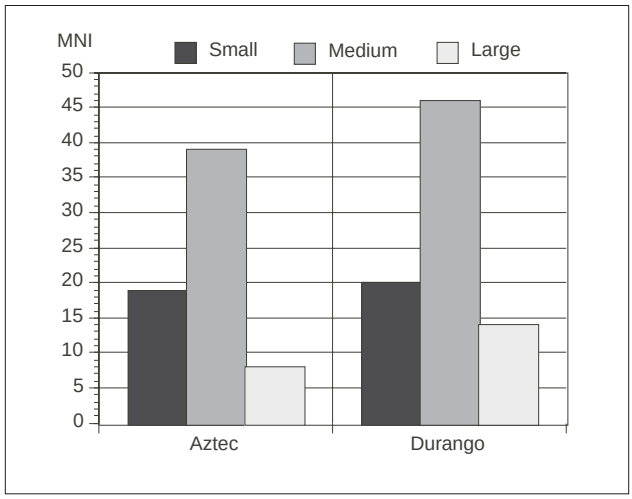



*Figure 4-33. Bar graph illustrating Minimum Number of Individuals (MNI) by animal size group from Aztec and Durango area sites.*

Table 4-17 depicts taxa recovered from the Dolores River Valley (Neusius 1986), the Duckfoot Site (Walker 1993), and Durango/Bodo Canyon (Akins 1988a) in comparison with the MAPL assemblage. The comparative data sets are strikingly similar to the MAPL sample, suggesting that Pueblo I faunal resource subsistence strategies were fairly consistent throughout the project area. Notably, the faunal assemblages from Bodo Canyon and the Dolores River Valley are more varied than the assemblages from the Aztec and Duckfoot sites. The diversity of game species in the upland biotic settings near Bodo Canyon and the Dolores River Valley likely encouraged the practice of a broad-based hunting strategy. Likewise, the absence of high-elevation taxa such as snowshoe hare, marmot, bear, and bighorn sheep in the Duckfoot and Aztec assemblages indicates that such species were probably not locally available.

Table 4-17. Comparative Pueblo I Faunal Assemblages from Four Projects

| Taxon | MAPL | Neusius 1986 | Walker 1993 | Akins 1988 | Comments (from Walker 1993) |
|---|---|---|---|---|---|
| Snake | | X | X | | Non-cultural? |
| Large Raptor | X | | X | | Rare, ceremonial? |
| Turkey | X | X | X | X | Not kept at site |
| Grouse | X | X | X | X | Rare, food source |
| Thrush | | | X | | Rare, non-cult. |
| Robin | X | X | X | | Rare, food source |
| Dove | | X | X | | Non-cultural? |
| Ground squirrel | X | X | X | | Food source? |
| Prairie dog | X | X | X | X | Food source |
| Pocket Gopher | X | X | X | | Non-cultural? |
| Jackrabbit | X | X | X | X | Imp. Food source |
| Cottontail rabbit | X | X | X | X | Imp. Food source |
| Snowshoe hare | | X | | X | Food source |
| Marmot | X | X | | X | Food source |
| Porcupine | X | X | | X | Rare |
| Kangaroo rat | X | X | X | | Rare |
| Mouse | X | X | X | | Food source? |
| Fox | X | X | X | | Rare |
| Woodrat | X | X | X | | Non-cultural? |
| Dog/coyote | X | X | X | X | Food source |
| Domestic dog | | X | X | X | Food source |
| Bobcat | X | X | X | | Cultural? |
| Mule deer | X | X | X | X | Large % modified |
| Bear | X | | | X | Rare |
| Bighorn sheep | X | X | | X | Rare |

The four comparative faunal assemblages contain the remains of two prehistorically domesticated species, turkeys and dogs. Based on the presence of eggshell at 5LP515, turkey feather blankets at 5LP379 and LA27092, and a *possible* holding pen at LA80321, turkeys appear to have been raised on at least some of the MAPL sites. At Bodo Canyon, turkeys appeared to have been raised primarily for their feathers (Akins 1988a). Turkeys were probably not raised at the Duckfoot site, based on the paucity of remains (Walker 1993). The Dolores assemblage, alternately, did provide good evidence of turkey husbandry (Neusius 1986). Likewise, *Canis*, a taxonometric category that includes dogs, coyotes, and wolves, is present in the four data sets. Although the remains of domestic dogs were identified in the Duckfoot, Bodo Canyon, and Dolores faunal assemblages, the MAPL analyst did not feel that he could confidently distinguish dog from coyote. However, based on the presence of dog in the three comparative assemblages, it is very possible that at least some of the MAPL *Canis* bone was from domestic pets. Whether dog or coyote, the presence of butchering marks, charring, and modification led all of the analysts to conclude that at least some of these animals had been consumed.

The comparative faunal assemblages also contain a variety of burrowing animals. Burrowing taxa include rabbit, snake, ground squirrel, marmot, prairie dog, pocket gopher, wood rat, and mouse. While rabbit was an important prehistoric food source, the presence of the other burrowing species in the archaeological record can

be difficult to interpret, particularly when the bone is unburned. The context from which the bone was recovered then, provides indirect evidence of cultural modification or food use. When faunal remains are found in post-abandonment deposits, the animal may have been intrusive; alternately, floor and hearth contexts are suggestive of cultural significance (Walker 1993). Based on the context of the MAPL faunal bone assemblage, all of these tunneling species (except for snake, which was not present) were likely consumed; however, at least some of the individual animals had intruded into the sites after abandonment.

Tallying percentages of burned bone allows inferences about faunal cooking, processing, and discard methods. As can be seen from Figure 4-34, there are large variations in the percentages of burned bone recovered from the MAPL Pueblo I sites. The Aztec assemblages had 20-30% burned bone, while two of the three Durango assemblages had less than 5% burned bone. The third Durango site contained a high incidence of burned bone but the burning is probably not the result of cooking or processing but rather a result of the burned contexts where most of the bone was retrieved. The higher incidence of burned bone at the Aztec sites might indicate a more intensive processing of materials at these sites. The lower incidence of burned bone at the Durango sites might suggest that the Pueblo I people did not need to process their faunal material as intensively due to the availability of abundant game.

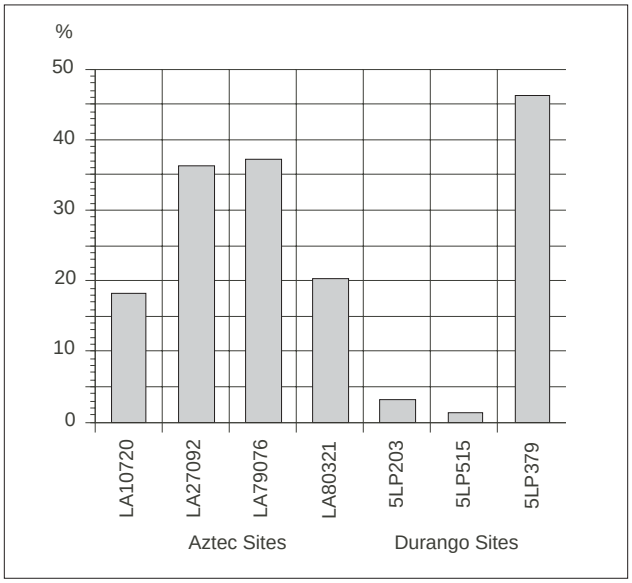



*Figure 4-34. Bar graph illustrating percentages of burned faunal bone in sites from Aztec and Durango areas.*

## SEASONALITY

Defining the seasonality of prehistoric sites can provide the basis for assigning site function. Unfortunately, however, the botanical assemblages of archaeological sites do not generally provide much evidence either for or against winter occupation. Nevertheless, since the seeds of edible plants can be stored for long periods of time, winter occupation should not be ruled out (Lightfoot and Eztkorn 1993:218).

Based on the presence of well-built pithouses, ample storage facilities, and the spring through fall use of plant resources, all but one (LA80320) of the Pueblo I sites appear to have been year-round residences. Insufficient data were available to assign season(s) of occupation to the limited activity site LA80320.

## EXTRA-REGIONAL RELATIONSHIPS

Although the Anasazi were sedentary, the presence of various trade goods and exotic items on the MAPL Pueblo I sites is indicative of extra-regional trading relationships with other cultural groups. Trade goods are usually luxury or specialty items that cannot be procured locally. These nonlocal items are usually present in small quantities at habitation sites. The MAPL non-local artifact assemblage includes red ware ceramics from southeast Utah, obsidian from the Jemez Mountains of New Mexico, and Narbona Pass chert from the Chuska Mountains along the New Mexico/Arizona border. In addition, there is marine shell from the Gulf of California, at least one piece of turquoise from the San Luis Valley in south-central Colorado, and other turquoise probably from the Cerillos, New Mexico area, malachite (unknown source), and Utah wonderstone from Kanab, Utah. Table 4-18 shows the occurrence of these materials on the MAPL sites and Figure 4-35 is a map depicting the regional sources of these trade items.

### Lithics

The vast majority of lithic materials used in the everyday life of the Pueblo I were procured within a close distance to their homes. However, a few of the tools or ornaments used by the Pueblo I people were made of materials that required long trips to the source or trading with other groups.

#### Obsidian

One easily identifiable non-local material is obsidian. It was found on over 50% of the Pueblo I sites, with the sites in the Aztec area containing the most obsidian artifacts. A partial reason for the increased frequency of obsidian in the Aztec area is the proximity to an obsidian source, the Jemez Mountains. All the obsidian subjected to X-ray flouresence tests on the MAPL project from Pueblo I contexts were from the Jemez Mountains with all but one sample from Polvadera Peak source.

Table 4-18. Occurrence of Trade Goods at Pueblo I Sites along Pipeline Corridor

| Site No. | Redwares | Obsidian | Narbona Pass chert | Marine shell | Turquoise | Malachite | Wonderstone |
|---|---|---|---|---|---|---|---|
| LA10720 | X | X | X | | | | |
| LA80320 | | | | | | | |
| LA27092 | X | X | X | X | | | |
| LA79076 | X | X | | | X | | |
| LA80321 | X | X | | | | X | |
| 5LP203 | X | | | | | | |
| 5LP378 | X | | X | | | | |
| 5LP379 | X | X | X | X | X | | |
| 5LP515 | X | X | | X | X | | |
| 5MT5453 | | | | | | | |
| 5MT5503 | | | | | | | |
| 5MT5478 | X | X | | | | | |
| 5DL2 | X | X | X | | | | X |
| 5DL291 | X | | | | | | |
| Ubiquity | 78% | 57% | 35% | 21% | 21% | 7% | 7% |

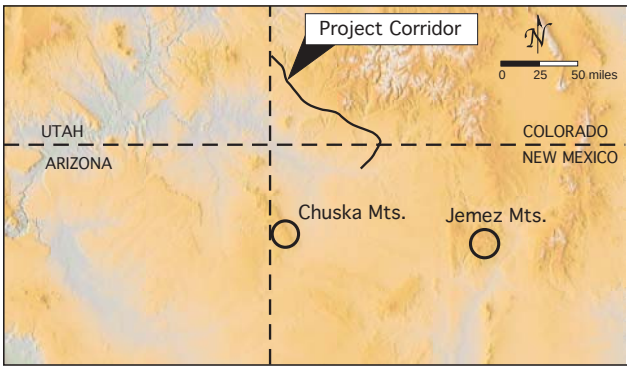



*Figure 4-35. Plan map showing regional sources of trade items at Pueblo I sites.*

### Narbona Pass Chert

Another identified non-local material, Narbona Pass chert, was found in the assemblage at 35 % of the sites. It is a distinctive, pink to salmon-colored cryptocrystalline material that outcrops in the Chuska Mountains to the southwest of the project area.

### Other Non-local Lithics

Other identified non-local materials found at the sites are turquoise, malachite, and Utah wonderstone. Turquoise found at LA79076 was probably from the Villa Grove Mine in the San Luis Valley of Colorado (Haynes 1993). Malachite found at LA80321 is of unknown origin: it was chemically compared to rocks from a Lisbon Valley Utah mine but did not correlate well that source. Utah wonderstone is a colorfully striped, fine-grained sandstone that is found in the Kanab area.

## Shell

Exotic shell assemblage indicates that the Pueblo I time period indicates that the people were part of a long-range trading network that reached as far as the Gulf of California. The exotic shell assemblage includes *Olivella dama*, *Glycymeris*, and indeterminate gastropod. These marine species are native to Gulf of California, which lies several hundred miles to the soutwest.

## Ceramics

Typical of many Pueblo I sites on the Colorado Plateau, evidence for nonlocal ceramics is sparse in the MAPL assemblages. For the most part, extensive regional trade networks in pottery did not emerge until the early Pueblo II period, by which time the Upper San Juan area was essentially abandoned.

### Redware Ceramics

For the MAPL assemblages, the presence San Juan Red Ware indicates interaction with red ware producing communities in southeast Utah, either through direct contact or down-the-line exchange and gift giving. San Juan Red Ware is one the most consistently common trade ware items identified in Pueblo I and early Pueblo II assemblages throughout the San Juan Basin (e.g., Reed and Hensler 1998; ZedeÒo 1994). Hegmon et al. (1995) indicate that San Juan Red Ware was produced exclusively in southeastern Utah, probably specifically for export out of the region. A graph of the frequency of redware assemblage from the MAPL sites illustrates how the prevelance of redware assemblage is related to the distance from the manufacture source in southeast Utah (Figure 4-36). Being closest to southeastern Utah, sites in the Dolores-Dove Creek area have the highest frequency of redware.

Evidence from Pueblo I sites for MAPL indicate that redwares were not exclusively in southeastern Utah and that there was a trade in locally-produced red and brownwares. One site, LA10720, located in the Aztec area produced a sand-tempered Abajo Red-on-orange sherd that was probably locally produced in the Animas Valley. In addition, Dolores Valley produced McPhee Black-on-red and McPhee Red were found both in the Dove Creek sites as well on one site in both the Durango and Aztec areas.

### Diorite Porphyry-Tempered Ceramics

Petrographic data also indicates that diorite porphyry-tempered ceramics from the Animas River locality sites were probably produced in the Dolores and Cortez areas.

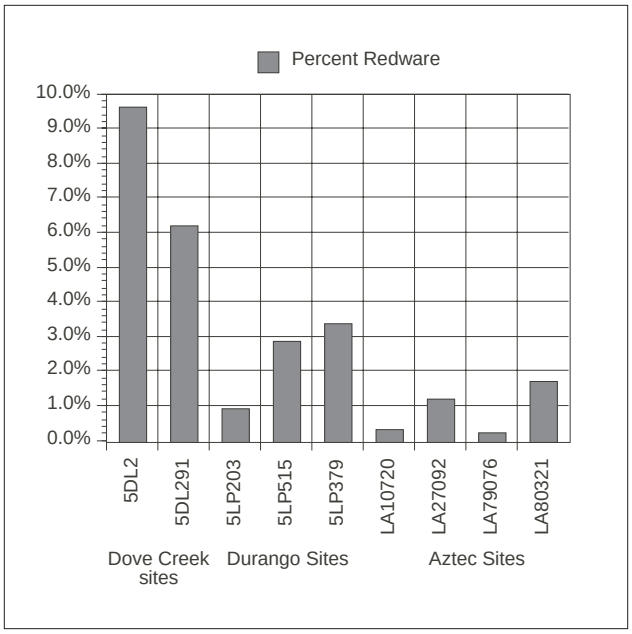



*Figure 4-36. Bar graph showing frequency of redware ceramics at project area sites.*

The remaining diorite-tempered sherds from the Pueblo I sites are likely local products using crushed augite diorite cobbles from the Animas River. As a result, some of the "crushed-rock-tempered" pottery from the MAPL Pueblo I sites was imported, but are not easily recognized without detailed microscopic and petrographic analyses. With the petrographic data obtained from the MAPL assemblages, recognition of differences between augite diorite and diorite porphyry is possible for future projects by applying the petrographic descriptions to ceramic pastes examined with a low-power microscope.

### Other Non-local Ceramics

As discussed previously, identification of nonlocal ceramics will be greatly enhanced by a large scale sourcing study of clays, tempers, and ceramics from the greater Animas River valley area. It is likely that evidence for nonlocal ceramic originating from the Upper San Juan area to the east is obscured in the MAPL assemblages by the availability of granitic material to potters in the Animas River area. This observation is probably true for both the MAPL New Mexico and Colorado sites for which granitic-tempered ceramics are abundant.

## SETTLEMENT PATTERNS

The Pueblo I people in the project area settled where they did for both economic and social reasons. Economically, the people settled where land with agricultural potential was available, where rainfall or snowfall was sufficient for dryland production, and where the growing season was long enough for crop maturation. Socially, the people settled in communities where contact could be maintained with their neighbors and where the people could be involved with the rich social life of the times.

### Aztec Area Sites

#### Economic

Four of the five Aztec area sites are located in the vicinity of Mud Creek, a tributary drainage to Hart Creek, and the Animas River (see Figure 4-37). They are situated on the mesas and slopes approximately half way between the Animas Valley and the ridgeline that separates the Pump Canyon drainage from the Animas River Drainage. Located at an average elevation of 6260 feet, this area receives approximately 12 to 14 inches of annual precipitation and is the rough ecotonal break between a vegetation community dominated by sagebrush and a community dominated by pinyon-juniper. Normally, it is assumed that 14 inches of moisture a year is the minimum required for corn agriculture (Peterson 1988:11), but this area contains a sandy soil with a clay substrate where available moisture is trapped by the sand and concentrated in drainage areas. The finding of large stores of corn in the roof at LA27092 is a testament to the corn production potential of this area.

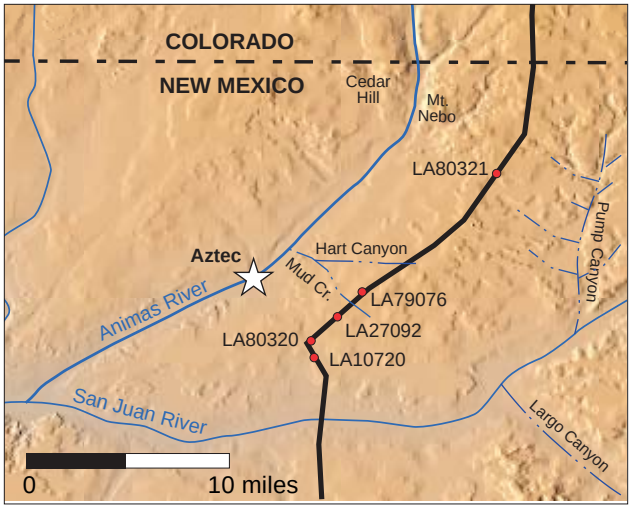



*Figure 4-37. Map showing location of Aztec area sites.*

The remaining Aztec area site (LA80321) is located north of the Hart Canyon at an elevation of 6700 feet near the ridgeline separating the Animas and Pump Canyon drainages. This site is situated at the head of a tributary canyon to Pump Canyon on a alluvial fan. Greater than 14 inches of precipitation a year supports a dense pinyon-juniper woodland on the slopes and mesas near the site and tall sagebrush on the alluvial fan. This moisture also percolates through the porous bedrock and eventually emerges at the contact with shale deposits in the many springs which are present in the vicinity of the site.

Social

In the Aztec area, the Mud Creek sites appear to form a loosely aggregated community. Based on excavations and surface inspection these sites were created by groups of one or two households during the first half of the ninth century. Based on limited survey data these sites are located within a kilometer of each other and are not associated with a larger village site. As discussed in previous sections, this community may have been home to people who may have been from two cultural groups.

This settlement pattern is similar to settlement pattern seen elsewhere in the eastern area, where… "Dispersed hamlets remained the main settlement pattern in the early 800s, with only a few large villages breaking this pattern," (Wilshusen 1999:225). On Francis Mesa to the east of the project area, the sites were found closely spaced (separated by 245m in the largest cluster) along the main ridgelines. The sites cluster in areas surrounding sagebrush meadows, candidates for agricultural fields (Wilshusen et al. 2000:145). Hogan et al (1990:5-51) suggest that settlement during this period "… is associated with a land-extensive agricultural strategy, in which fields are planted near the residence and in a variety of microenvironments some distance from the residence."

In the Aztec area, one Pueblo I site was located north of the Mud Creek community and dates (850-870) to a period later than the Mud Creek community. LA80321 is isolated along the MAPL corridor but may have been part of a dispersed community. One other possible contemporaneous Pueblo I settlement, Beanie Pockets, is located not far to the east of LA80321 (Hovesak, personal communication).

**Durango Area Sites**

Economic

The Durango sites are located on or at the base of Blue Mesa or in Ridges Basin (see Figure 4-38). Blue Mesa is a remnant Pliestocene terrace on the west side of the Animas River Valley. It is a finger mesa joined at its north end to Smelter Mountain and is bordered by the narrow Basin Creek Valley on its west and broad Animas Creek Valley on its east. The underlying bedrock deposits of the mesa are covered with a layer of pleistocene gravels and then a thick deposit of red loess. This red loess is very suitable for dryland farming. The one site located in Ridges Basin is located on colluvial/alluvial soils derived from the nearby shale outcrops that is considered marginal for agricultural purposes.

Cold-air drainage is a major concern in the Durango area where cold air drops into the valley from the nearby mountains every night. Blue Mesa is an island of nighttime warmth among valleys of cold nighttime air. The site located in Ridges Basin is in an area hypothesized as a cold air pool (Fuller 1988:376) but its located at the mouth of the Basin might allow it to be a little bit warmer as a result of a phenomenon called a "warm air peninsula" effect (Peterson and Clay 1985:42-44 and Fuller 1988:375).

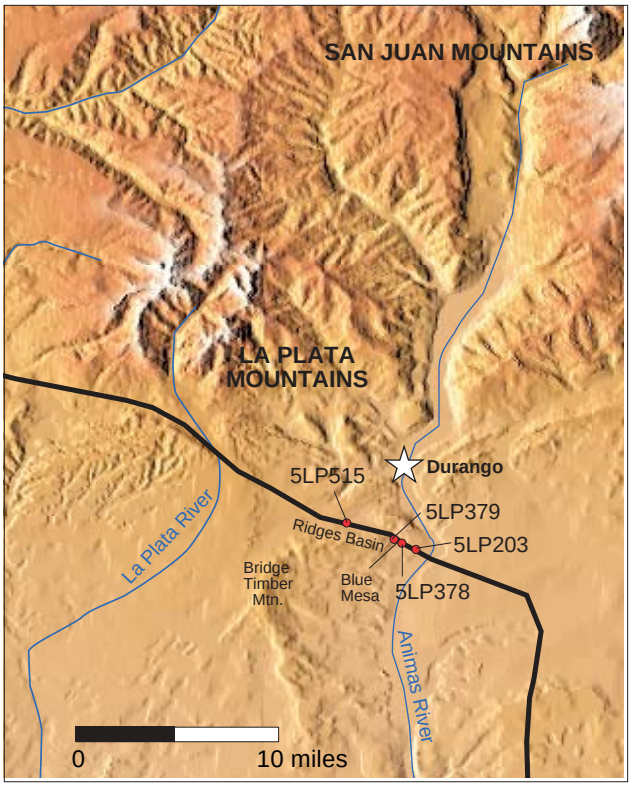



*Figure 4-38. Map showing location of Durango area sites.*

Social

In the Durango area, most of the excavated sites appear to be associated with the Blue Mesa Pueblo I Community. If all the roomblocks identified for the Blue Mesa Community are roughly contemporaneous, it is perhaps the largest community in the southwest prior to Pueblo IV times (Wilshusen et al 2000:154). This community consists of 63 roomblocks within 366 acres. Located within this community cluster on previous surveys (Hibbets 1975 and Fuller 1988) were 11 oversized roomblocks and one oversized pitstructure.

Sites 5LP378 and 5LP379 were directly associated with the Blue Mesa Community, and site 5LP203 (although located at the base of the mesa) was also probably part of the community. Evidence from these sites suggest that the community was composed of clustered but partially isolated jacal roomblocks with one or two pithouse habitations. These habitations were built between 780 and 830 and possibly were not all contemporaneous.

Site 5LP515 was probably part of a community based in Ridges Basin, although the site is east of any identified site clusters in the basin (Fuller 1988; Smiley 1997). Site 5LP515 is located on the east side of Ridges Basin where

Basin Creek constricts into a canyon drains the Basin to the east. The terrain between 5LP515 and Blue Mesa is steep and there are few, if any, places for habitation in this canyon. Approximately 1.75 miles to the east of 5LP515 the canyon turns to the south at the western edge of Blue Mesa. The settlement of 5LP515 might have been chosen so that the inhabitants had access to both the Ridges Basin community and the Blue Mesa community.

### Dolores Area Sites

Economic

The Dolores area sites are located at the head of Leavell and Hartman Draws, just south of the Big Bend in the Dolores River (see Figure 4-39). Located at an average elevation of 7040 feet, these sites receive close to 16 inches of year of precipitation. Like the sites on Blue Mesa, these sites are located on a red loess soils. These are very fertile soils which even today support dryland agriculture. The sites are protect from cold-air drainage by the Dolores Valley to the north and the canyons to the south. They are located on a generally south-sloping terrain and as a result, probably enjoy a long growing season.

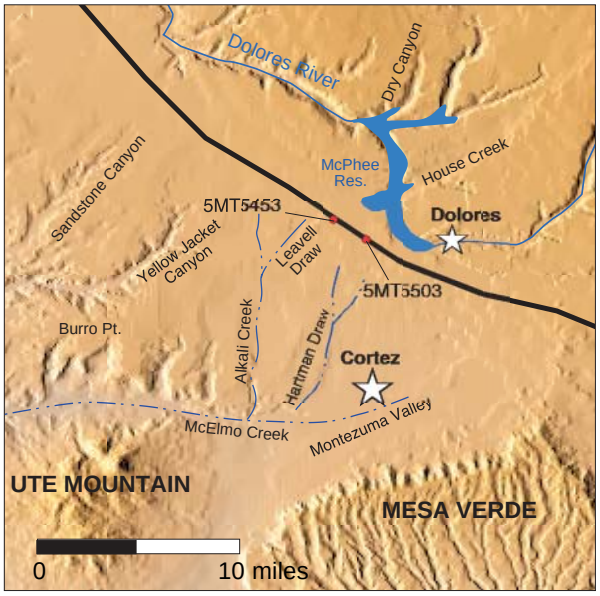



*Figure 4-39. Map showing location of Dolores area sites.*

Social

The Dolores area sites are located in what is believed to be a dispersed community between the larger communities that formed in the Dolores River Valley and in Hartman Draw. The exact nature of this community is unknown as there have been few surveys in the area other the MAPL survey. What is known is that in a 5-mile section, three Pueblo I sites have been located along the MAPL corridor in the Dolores area: 5MT5453, 5MT5503, and 5MT5497. The former two have been discussed above and consist of single habitation sites. The third site is a much larger site containing an oversized roomblock and the space in the plaza area for several pitstructures.

### Dove Creek Area Sites

Economic

The Dove Creek area sites are located at the head of Cahone Canyon near the drainage divide with the Dolores River Valley (see Figure 4-40). They are situated at the first place northwest of the Dolores area where both (1) easy access can be gained to the Dolores River Valley, and (2) large tracts of good agricultural land at a low enough elevation are found adjacent to the Dolores River Valley. Located at an average elevation of 6820 feet these sites receive between 14 to 16 inches of precipitation a year. This moisture, the expanses of deep loess soils of the area, and the channels that the adjacent canyons form to wisk away cold air drainage combine to make this area an excellent place for dryland farming.

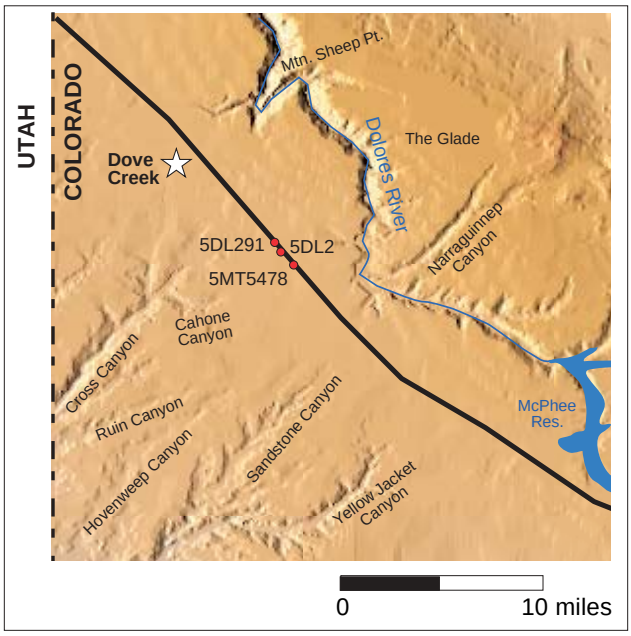



*Figure 4-40. Map showing location of Dove Creek area sites.*

Social

The Dove Creek area sites are located in a dispersed community at the head of Cahone Canyon. Like the Dolores community, the exact nature of this community is unknown as there have only been a few surveys in the area. What is known (based on conversations with local farmers) is that quite a few small sites, and at least one large potentially contemporaneous site, are scattered on the ridge tops of the agriculture fields in this area (D. Fosnot, personal communication). The community may also be associated with a Pueblo I community on the south side of Cahone Canyon less than 10 miles to the west. It was here that Martin excavated a large outdoor Pueblo I great kiva and a large Pueblo I roomblock (Martin 1939).

## SOCIAL ORGANIZATION

### Households

#### Definition

The household is the basic identifying social unit of the Pueblo I population, forming the foundation of social organization. A household is a commensal unit defined simply as "people who eat together," (Vierra 2001:personal communication). Of course, the typical Pueblo I household occupying a residential site may well have consisted of a biologically related, nuclear, or possibly, extended family. "Because the sites are interpreted as long term habitations and evidence considerable richness in material culture, it is likely that nuclear families are represented," (Firor et al. 1998:344).

Households are interpreted as self-sustaining groups that are assumed to have supported themselves by growing crops, hunting game, and gathering additional resources. These households were likely closely affiliated with other households on the site and socially affiliated with the occupants of nearby (or even far away) sites *via* kinship or clan group. Based on ethnographic data, Lightfoot estimated a household to be composed of 4-7 individuals.

#### Identification

To estimate how many households occupy a site, we must look at the how the space was used on the sites. During the Dolores Archaeological Project, it was estimated that each surface room suite (front row habitation unit and rear storage areas) was occupied by a household and that pithouses were shared by the households behind the pithouse. However, in a detailed analysis of the Pueblo I Duckfoot Site, Lightfoot (1992:247) showed that households occupied entire architectural suites: pithouse and a variety of domestic and storage rooms. As a result of this study, it appears that surface habitation units are not a good indicator of household size but rather the number of pithouses is a good estimate of the number of households occupying the site.

Based on the large size, evidence of feature use, and diverse artifact assemblages, the 14 investigated Pueblo I pithouses are all interpreted as domiciles and as loci of households. However, before inferring how many households occupied the MAPL sites, we need to take into account pithouse contemporaneity and length of occupation. This is because, "...it appears that there is relative continuity in the occupation of multiple residential sites from one component of occupation to another during this time period," (Wilshusen et al. 2000:145). In other words, if a site was occupied for a lengthy period of time it is possible that two pithouses on the site may not represent two contemporaneous households but rather two sequential occupation of the site by a single household.

### Project Sites

Table 4-19 shows the numbers of pithouses and inferred households at the MAPL Pueblo I sites. Although no pithouses have been definitely defined at LA10720, the presence of an extensive midden deposit and roomblock (unexcavated) suggests that the site represents a multiple residence. No households are inferred for site LA80320, which probably does not contain any residential structures. The two pithouses at LA27092 were clearly contemporaneous (built in 816 and 817) and thus indicative of multiple (two or more) households. Two households may have also occupied LA79076; the two pithouses were constructed in 807-808 and 820 and thus their occupations may have overlapped. Site LA80321, which contained a single pithouse and a surface habitation structure, is interpreted as a single habitation.

Table 4-19. Numbers of Inferred Households at MAPL Pueblo I Sites

| Site Number | Number of pithouses | Contemporary pithouses? | Inferred no. of households |
|---|---|---|---|
| LA10720 | ? | ? | Possibly multiple (2?) |
| LA80320 | 0 | N.A. | 0 (nonresidential) |
| LA27092 | 2 | Yes | 2 |
| LA79076 | 2 | Yes | 2 |
| LA80321 | 1 | No | 1 |
| 5LP203 | 1 | No | 1 |
| 5LP378 | 2 | ? | 1-2 |
| 5LP379 | 2 | No | 1-2 |
| 5LP515 | 1 | No | 1 |
| 5MT5453 | 1? | No | 1 |
| 5MT5503 | 1 | No | 1 |
| 5MT5478 | 1 | No | 1 |
| 5DL2 | 3 | Yes and No | 2 |
| 5DL291 | ? | ? | 1-2? |

#### Multiple-Pithouse Sites

One pithouse has been excavated at 5LP378; and a second pithouse was located by augering. Since little is known about the second pithouse, it is hard to evaluate whether the pithouses were contemporaneously or sequentially occupied. The second unexcavated pithouse appeared to be spatially related to the excavated surface rooms which yielded a date of 782. The excavated pithouse yielded dates of 799+ indicating that this pithouse was possibly built 17 years later than the excavated surface rooms and by association the second unexcavated pithouse.

At 5LP379, two pithouses were located. Both of these pithouses were burned intensely at abandonment and neither of them contained midden fill. The earliest pithouse was built in 808 and remodeled in 816. The second pithouse was built in 831. While twenty-three years is a long time for a pithouse roof to last, the evidence of remodeling in 816, the abandonment modes, and the absence of trash in the fill from a latter component suggests that both pithouses might have been occupied at the same time in the 830's.

At 5DL2, three pithouses were located. Two of the pithouses were built side by side in the plaza area and the third was built in the fill of one of the other pithouses. Although there is limited dendrochronological data, the spacing of the pithouses and the large size of the surface roomblock suggests that the two pithouses were contemporaneously occupied. Both of these pithouses appear to have had planned abandonments. Based on this data it is suggested that during the first occupation this site was occupied by two households. Sometime after abandonment, one of the pithouses was partially re-excavated and a smaller pithouse was built within it. Perhaps, at the same time the other pithouse had a small trash deposit place in the fill. This second occupation was probably by a single household, and given the small size of the third pithouse, the household was probably composed of few members.

### Single-Pithouse Sites

Sites 5LP203, 5LP515, 5MT5453, and 5MT5478 all contained a single pithouse and are presumed to have been occupied by a single household. Too little data is available on site 5DL291 to make an informed decision on the number of households at this site. However, based on the excavation of three structures and the intensity of the midden, it can be inferred that the site was occupied by at least a single household.

### Summary

In summary, the Pueblo I sites along the MAPL corridor were occupied by one or two households at a time. Almost half of these sites could have been occupied by more than one household at a time. This is stands in sharp contrast to the Basketmaker III sites were the vast majority of the sites are single household habitations. This represents a change in residential social organization. Now, instead of the residences being occupied by a nuclear family or a small extended family they are often occupied by two presumably related household groups. Interestingly, some of the multiple household sites have a time lag between the original settlement and the growth of the settlement. This time lag ranges between 12-23 years. One could easily imagine a scenario, where the site is established by a young extended family and when the offspring grow to maturity, the residence is enlarged to take in a new family formed by one of the offspring. If the Pueblos were matrilocal, like many of the modern Pueblos, it is possible that the sites were expanded to accommodate a new family formed by a daughter, her spouse, and their offspring.