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MODELING LATE ARCHAIC/LATE PREHISTORIC SETTLEMENT AND SUBSISTENCE IN THE SAN LUIS VALLEY, COLORADO

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ABSTRACT

Recent research by the Great Sand Dunes Eolian System Anthropological Project included the excavation of one thermal feature and two charcoal-stained anomalies associated with fire-cracked rock. All three features, found in the piñon-juniper zone, yielded radiocarbon dates associated with the early Late Archaic/Late Prehistoric transitional period. This paper explores two issues. First, what kind of prehistoric exploitation might these features represent? In particular, are the two shallow depressions the remains of ephemeral structures, or processing activities? Second, what do they indicate about the settlement system at the time? Evidence from the nearby Blanca Wildlife Refuge indicates a relatively intensive exploitation of the valley-bottom lacustrine zones during this transitional period. In contrast, these features located in the foothills may represent the seasonal occupation of the piñon-juniper belt by groups who regularly resided in the moister lacustrine areas.

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INTRODUCTION

Research during 2001 by the Great Sand Dunes Eolian System Anthropological Project recovered a wealth of archaeological data on the prehistoric and historic occupation of this unique geographic setting (Figure 1). As part of these efforts, one thermal feature and one charcoal stain feature on site 5AL639, and one charcoal stain on site 5AL640, were tested for subsurface information. Both sites are located in the piñon-juniper woodlands along the eastern margin of the San Luis Valley at an elevation of 2,536 m (Figures 2 and 3). Radiocarbon dates suggest an early Late Archaic/ Late Prehistoric (LA/LP) affiliation. This article describes and discusses the possible functions of these features. They are also used along with data from the Blanca Wildlife Refuge (Figure 2) to model the settlement system in the Closed Basin, the internally drained northern part of the San Luis Valley, and the use of the piñon-juniper zone during the LA/LP time period. This research is important because information on post-Paleoindian subsistence and settlement in the Closed Basin is limited.

THE FEATURES

In 2001 two adjacent sites with ground stone, flaked stone tools, and debitage, and nine features were identified in the piñon-juniper belt. The features consisted of charcoal-laden surface stains associated with fire-cracked rock. Three features were tested for subsurface integrity and to obtain carbon samples for dating. A testing protocol permitted only limited excavations immediately around each feature. Also, at the present time macrofloral and pollen analysis of samples collected from these features have not yet been conducted. The addition of such information in the future is likely to refine the following functional interpretations.

FIGURE 1. View of the Great Sand Dunes

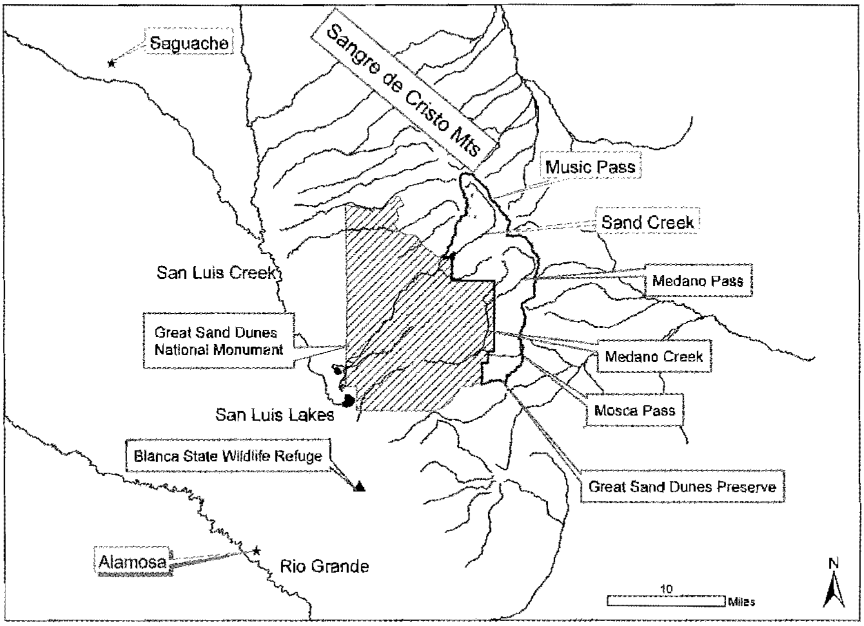

FIGURE 2. Great Sand Dunes Eolian System Anthropological Project study area with location of sites 5AL639 and 5AL640 and associated geographic features (Illustration by Wade Broadhead)

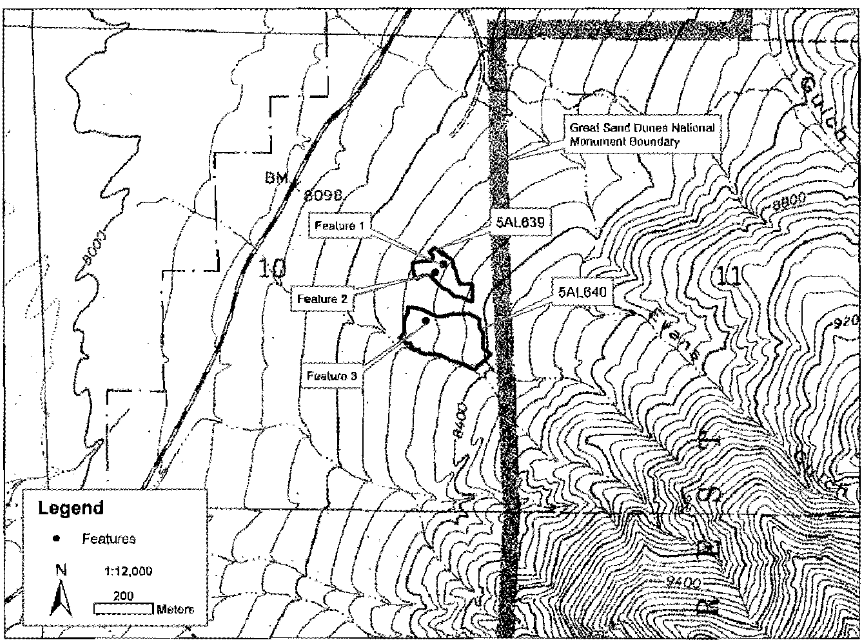

FIGURE 3. Topographic map showing sites 5AL639 and 5AL640 (adapted from USGS 7.5 minute quadrangle Zapata Ranch) (Illustration by Wade Broadhead)

Feature 1

Feature 1 is a thermal feature from site 5AL639 whose profile was partially exposed in a small rivulet. It had a slightly bell-shaped cavity with a rounded bottom, a diameter of 56 cm at the surface and a depth of 37 cm (Figures 4, 5, and 6). Fill consisted of fire-cracked rock, charcoal chunks, and a large piece of charred wood. It also had a possible clay lining 0.5 to 1.5 cm thick; this was especially visible on interior portions of the rim. It was unclear if the clay lining was intentionally applied during the feature's construction or the result of oxidation during use. The only artifact directly associated with the feature was a red quartzite flake found beside it on the surface. Excavation was extended an additional 2 m to the north encountering sterile non-stained soil about 2 to 3 cm below the surface.

This thermal feature appears to have been an isolated, or ancillary open-air feature. No adjacent charcoal stains or stone configurations were found indicating its provenience inside a structure.[1] Furthermore, the formal integrity of the feature indicates investment inconsistent with brief occupation.

Feature 1 was probably related to food preparation. Obvious possibilities include roasting meats and baking plant seed or root dough into breads. Given its location, Feature 1 also could have been used for piñon processing. Ethnographic reports indicate that nearly mature piñon cones were often harvested and pit roasted until they opened, allowing the nuts to be shaken out easily (Madsen 1986). For Feature 1, this explanation is problematic because it does not contain charred cones and/or hulls similar to piñon roasting features found in the Great Basin (Bettinger 1982; Tuohy 1979). Also, it seems more likely that piñon roasting would be done in larger, more expedient facilities than Feature 1.

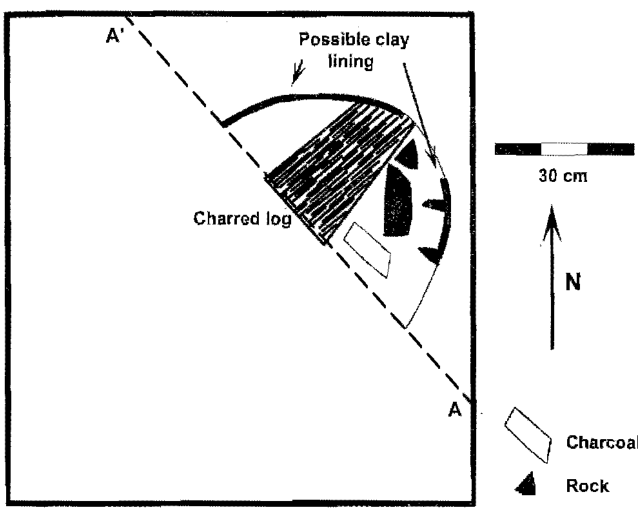

FIGURE 4. Feature 1 plan view (Illustration by Heather Mrzlack)

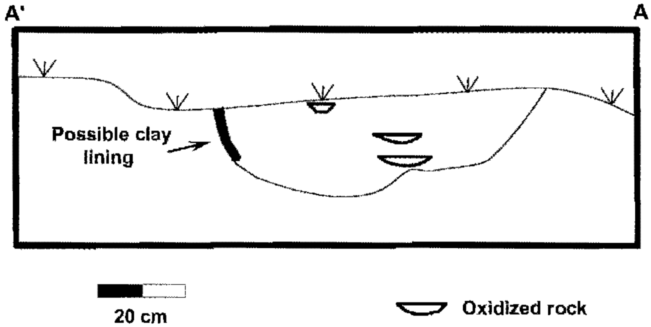

FIGURE 5. Feature 1 profile (Illustration by Heather Mrzlack)

FIGURE 6. Feature 1 during excavation

Feature 2

The Feature 2 charcoal stain was located 47 m northeast of Feature 1. A four-meter trench excavated across the feature revealed a shallow basin-shaped feature approximately 3.0 m in length and nearly 30 cm in depth (Figures 7 and 8). This depth is considered a minimum because erosion may have truncated some of the feature. Fill in the bottom of the basin consisted of dark gray charcoal-laden soil, fragments of fire-cracked rock, and 17 flakes of quartzite (N = 11), chert (N = 5), and obsidian (N = 1). No discernable features were identified inside or along the rim of the depression although time constraints did not permit complete excavation of Feature 2. A possible chunk of oxidized clay similar to that lining Feature 1 was found near the bottom of the depression. The basin surface was noticeably compact in spots.

There are at least four reasons we believe Feature 2 is cultural. First, the dark stained charcoal-laden fill was localized. Second, this dark soil was 10 cm or more in thickness; it is difficult to imagine such a thick localized deposit resulting from natural causes. Natural fires would be expected to produce relatively thin lenses of ash. Third, the feature's basin shape suggests it was intentionally excavated. Moreover, the fill appears to truncate the natural soil strata (Figure 8), a trait which indicates intentional excavation (Pool et al. 2003). Finally, it contained artifacts, albeit in limited quantity.

The function of Feature 2 remains unclear. Based on its general morphological characteristics, it might represent a shallow pit structure but it lacks internal features such as a hearth, post molds, and storage pits. Morphological characteristics alone represent rather weak support for such an interpretation (Pool et al. 2003). Shallow pit depressions have been interpreted as possible structures at many Archaic sites in the intermountain west but they are generally less ambiguous and contain associated features (Euler and Stiger 1981; Harrell et al. 1997; Hoefer III 1987; Metcalf and Black 1991; Rood 1998; Smith 2003; Stiger 1981, 1986). Similar shallow basins lacking internal features found in the Great Basin, however, have been interpreted as ephemeral windbreak structures indicative of short-term warm weather occupations (Kelly 2001:293). Like Feature 1, Feature 2 also might

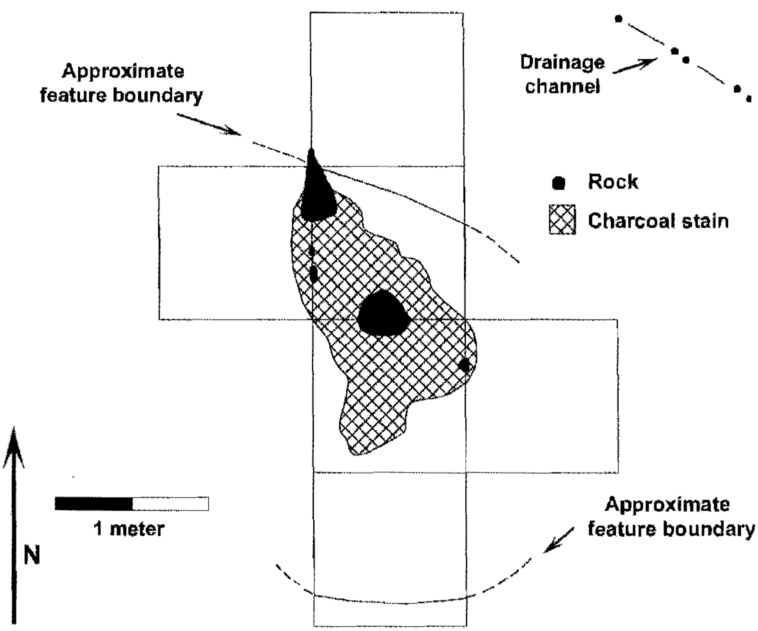

FIGURE 7. Feature 2 plan view (Illustration by Heather Mrzlack)

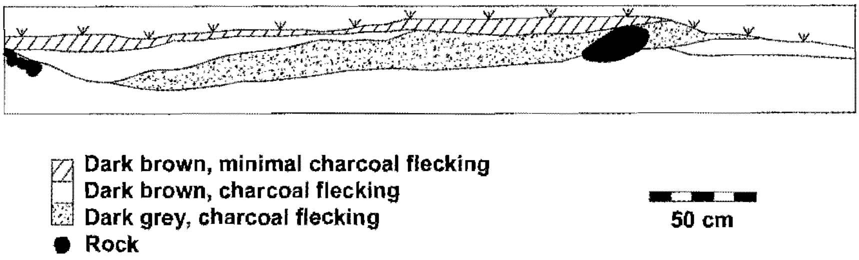

FIGURE 8. Feature 2 profile (Illustration by Heather Mrzlack)

have been used for roasting piñon cones. Its fair-sized basin shape filled with charcoal-laden soil is consistent with this suggestion but it too lacks charred piñon hulls and/or cones.

Feature 3

Feature 3 was found on 5AL640, located about 175 m south of Feature 2. This feature was a charcoal-stained deposit associated with an obsidian overshot flake eroding out of a shallow drainage. The excavation of a three-meter trench running north of the drainage exposed dark-stained soil with charcoal flecking about 20 cm in depth (Figures 9 and 10). The south end of the trench had a haphazard cluster of fire-cracked rock with a higher frequency of charcoal flecking than immediately adjacent deposits. Consequently, the stones may represent a hearth but a total lack of formal shape

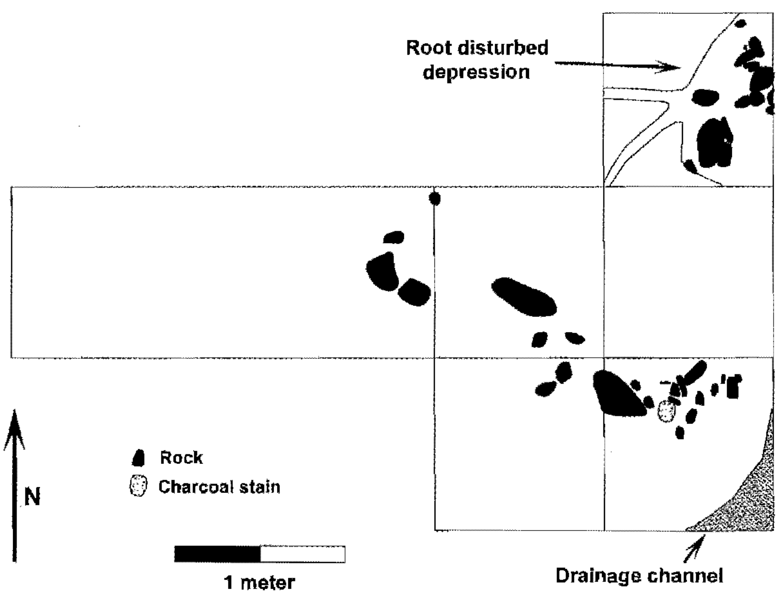

FIGURE 9. Feature 3 plan view (Illustration by Heather Mrzlack)

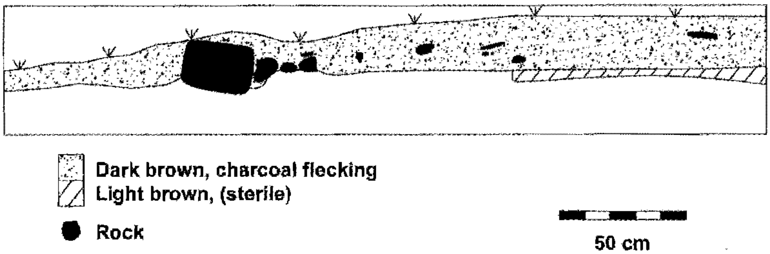

FIGURE 10. Feature 3 profile (Illustration by Heather Mrzlack)

suggests otherwise. Soils at the north end of the trench were slightly lighter although in the eastern margin a dark stained "pit" of deposits with chunks of charcoal dipped to a depth of 35 cm. This deposit contained fire-cracked rock and several large stones apparently altered by root growth. Excavation west of the trench revealed progressively thinner stained soils fading completely about 3.5 m to 4 m away.

Eight bone fragments were recovered in the deposits of Feature 3. Seven of them are probably from artiodactyls such as deer or elk; one is probably a wild galliform femur from a turkey or grouse (Kim Fariello, personal communication 2003). Seven of the fragments were burned but they did not have signs of butchering. In addition to the obsidian flake on the surface, four flakes of chert, three ground stone fragments, and one metal fragment also were recovered in Feature 3.[2] One ground stone mano fragment was found resting at the same level as the stones constituting the possible hearth feature.

The function of Feature 3 is the most uncertain of all. Unlike Feature 2, its overall profile is not suggestive of a shallow informal structure. The "pit" with charcoal chunks in the north part of the trench appears to have been affected by root activity. This evidence might indicate that Feature 3 was naturally derived from the burning of a large root bole. The associated artifacts, however, do not support this interpretation. Alternatively, the bone fragments might indicate that it was an extremely informal meat-roasting pit. Finally, it also could have been used to roast piñon cones but like the other features it contains no charred hulls and/or cones.

DISCUSSION AND IMPLICATIONS

One interesting result of our study was that all three features dated to the early Late Archaic/Late Prehistoric transition for the San Luis Valley (Martorano et al. 1999:116). The dates fall between 190 B.C. and A.D. 300 (Table 1). The temporal affiliation of these features is even more significant considering they yielded the only dates associated with this period among nine radiocarbon samples recovered from eight sites tested in 2001. Furthermore, they were found on the only tested sites located in the open piñon-juniper woodland. Acknowledging the limitations of the data, we use these features to propose a model for the LA/LP period use of the piñon-juniper belt.

TABLE 1. Radiocarbon dates from features

Site	Operation	Date
5AL639	A (hearth)	2080 B. P. ± 60 (190-70 B.C.)
5AL639	B (depression)	1730 B. P. ± 60 (A.D. 160-280)
5AL640	C (anomaly)	1720 B. P. ± 70 (A.D. 160-300)
5AL80	n/a	1670 B. P. ± 55 (A.D. 225-335)

Even if the specific functions of Features 1, 2, and 3 are unclear, they indicate occupations longer than brief logistical forays; this is especially true for Feature 1 considering its formal characteristics. A short-term residential occupation for harvest of specific resource(s) seems most likely. The flake debitage from 5AL639 and 5AL640 also support this hypothesis (Andrews 2002). Most flakes from these sites are relatively large non-cortex bearing artifacts that do not reflect the final shaping and edge maintenance of formal tools. Such items would have been effective expedient tools for many activities.

Visits to the piñon-juniper belt would have permitted the harvest of numerous seasonally available plant and animal resources. What is worth considering, however, is what resource would have motivated short-term occupations involving moderate investments in occupational facilities like Features 1, 2, and 3? A wide variety of foods were undoubtedly exploited when this area was occupied.[3] The decision to relocate on a residential scale, however, tends to indicate a resource that could be intensively exploited for multi-day periods.

Piñon nuts may have represented such a resource (Figure 11). There are at least three good reasons why piñon nuts would encourage harvests at short-term residential levels of intensity. First, the location of piñon stands is predictable and periodic logistical forays through such areas would have permitted group members to monitor the quality and maturity of different stands, thereby allowing them to identify which ones were optimal during any given year. Second, piñon nuts are highly nutritious containing as much as 5000 kcal/kg (Madsen 1986:table 1). Estimates suggest that even a moderately productive piñon stand can allow a single forager to collect 6,728 kcal over an eight-hour period (Kelly 2001:41). This can be compared with a relatively good crop of Indian ricegrass (*Orizopsis hymenoides*) that will only yield 3,136 kcal in the same amount of time. Third, and perhaps most importantly for a forager, piñon nuts can be easily stored for winter consumption.

Although Features 1, 2, and 3 contain no direct evidence of piñon nut exploitation, this does not preclude the possibility that they were used for this purpose. A lack of direct evidence could relate to factors of preservation, or perhaps features with such evidence have yet to be found. Two indirect lines of evidence often used to infer piñon nut exploitation include the location of sites in piñon-juniper woodland, and the ubiquitous presence of ground stone artifacts, especially slab milling stones (Madsen 1986).

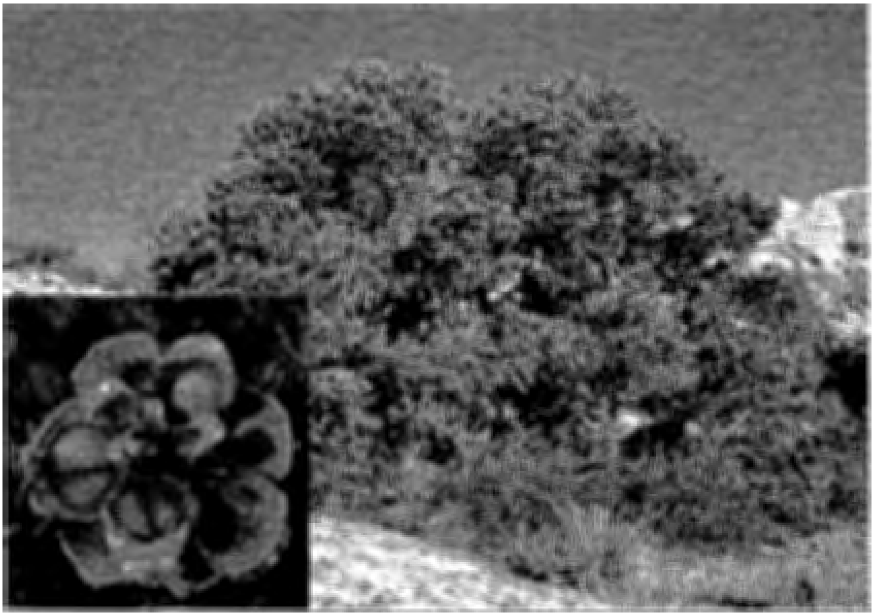

FIGURE 11. Piñon pine and piñon cone with nuts (inset)

Many Great Basin groups used thin slab milling stones to crack the piñon hulls in order to remove the nuts (Madsen 1986:29). The sites discussed here are certainly located in the piñon-juniper belt, and they collectively have a relatively high frequency of slab metate (N = 12) and mano (N = 23) implements. Clearly the ground stone tools might have been used to process other resources. We hope pending amino acid tests on several of these artifacts will help clarify their function.

Short-term residence in the piñon-juniper belt primarily for piñon nuts would point to a late August to early October occupation depending on when cones matured. This is a good time for visiting this zone because the weather is still relatively warm and other storable autumn resources such as chokecherry, currant, gooseberry, and serviceberry are also available. The isolated nature of Feature 1 and the absence of a hearth associated with Feature 2, *if* it was a structure, may be significant. A lack of substantial living structures with internal hearths is consistent with a warm weather occupation. To be sure, the close but not immediate proximity of Features 1 and 2 suggests that they may have been behaviorally associated. Moreover, the features are situated in open topographic settings that would not have provided any natural shelter from the elements. This too tends to indicate a warm weather occupation.

We are not suggesting that the piñon-juniper belt was used only during the LA/LP transition. Presently, however, evidence of substantial archaeological features in this zone only date to this period. This may mean that the use of the piñon-juniper belt during other periods was primarily logistical rather than short-term residential. It also may reflect the point in time when piñon stands became well established. This date generally coincides with the period when piñon pine became a viable resource in the Great Basin (Kelly 2001; Madsen 1986:23). At this point, however, a lack of direct evidence for piñon exploitation suggests that these features may have related to the short-term occupation of this environmental zone primarily for other resources; indeed, they may represent occupation for a wide range of resources available simultaneously.

Data from elsewhere in the Closed Basin may indicate from where the people who used the piñon-juniper belt during the LA/LP transition came. About 10 km to the southwest of the Great Sand Dunes is the Blanca Wildlife Refuge (Figures 2 and 12). This area is interesting because it has yielded the only other LA/LP radiocarbon date from the Closed Basin. In 1976 test excavations in the Refuge at site 5AL80 uncovered an impressive midden 50 cm in thickness filled with cracked cobbles; charcoal; and fish (90.6 percent), mammal (5.3 percent), and bird bone (4 percent; Jones 1977:38). A carbon sample from the midden was dated to A.D. 280 ± 55 years (Table 1) (Jones 1977:28).

Contents of the 5AL80 midden also suggested that a large lake covered much of the Closed Basin at this time. The deposit contained the remains of buffalofish (*Ictiobus spp.*), a species whose survival would have required water nearly 4 m deep (Jones 1977:45). Using this depth as a reference, present day topography indicates the existence of a large irregular

FIGURE 12. Landscape near Blanca Wildlife Refuge

body of water with numerous islands and peninsulas. This ecological setting probably was an extremely rich lacustrine environment. The proposed lakeshore also shows that 91 percent of the 134 archaeological sites identified in the Blanca Wildlife Refuge (Dick 1975) would have been located on dry land. If contemporaneous, the number and size of these sites would indicate that the lake was the focus of a relatively intensive, perhaps semi-sedentary prehistoric occupation.

Consequently, it is reasonable to suggest that Features 1, 2, and 3 might reflect seasonal harvest of foothill resources by groups who spent a good portion of the year residing at the lake. Closed Basin adaptations undoubtedly varied according to fluctuations in the availability of lake and marsh resources over time (Martorano et al. 1999:118). We suggest that the presence of these resources may have lowered the mobility of prehistoric groups in the area by becoming an important focus of exploitation. Similar Archaic adaptations of populations tied to lacustrine settings have been suggested for areas of the Great Basin (Aikens 1970; Hemphill et al. 2000; Janetski 1986; Janetski and Madsen 1990; Jennings 1964).

Kelly (2001) has recently developed a model for the Stillwater Marsh in the Carson Desert of Nevada that may be particularly appropriate for understanding the Closed Basin LA/LP occupation in the San Luis Valley. The Stillwater Marsh was a rich lacustrine environment between 1000 B.C. and A.D. 1000 (Kelly 2001:63). Although there is no clear evidence of year-round sedentism, Kelly (2001:290-296) suggests that the inhabitants of the area were probably "tethered" to the marsh. Resources there were relatively abundant but optimal foraging scenarios indicate that seasonal forays to the uplands for foods such as piñon and bighorn sheep were likely. The marsh lands were important for gathering and storing resources, and for wintering where fish and emergency foods like cattail roots were available year-round (Kelly 2001:52-62). During the spring, summer, and fall, however, various roots, seeds, and mammals probably prompted logistical and residential forays to the uplands.

Knowledge of the archaeological record and diachronic environmental change is more complete for the Carson Desert than the San Luis Valley Closed Basin. Nevertheless, it too might have been the focus of a similar manner of upland, or foothill, exploitation by people primarily tied to the ancient Closed Basin lake. Overall, temporary residential retreats to the piñon-juniper belt would have been comfortable and convenient. Although Features 1, 2, and 3 were not located adjacent to permanent water, a spring on 5AL640 represented an easily accessible source less than 400 m from all three features. Periodic returns to lakeside residences to cache piñon nuts also would have been relatively easy. Using a walking rate of 3 km/hour (Kelly 2001:53), the round trip journey including time to store collected resources probably would have taken less than eight hours.[4] Moreover, moving to the piñon-juniper belt would have provided respite from the insect-infested misery associated with living in a lacustrine setting in late summer-early fall.

CONCLUSIONS

This article has summarized the data from three features dating to the LA/LP transition at the Great Sand Dunes National Monument and Preserve. The features were found in the piñon-juniper belt and they indicate a short-term residential exploitation of this environmental zone. They may represent the occupation of this zone primarily for the harvest of piñon nuts although other resources also were available. If well established by the LA/LP transition, piñon nuts may have promoted multi-day occupations requiring a need for short-term living features such as hearths and ephemeral processing facilities. Evidence suggests that at least some of the sites in the nearby Blanca Wildlife Refuge also dated to the LA/LP transition. These sites, situated adjacent to the resource-rich Closed Basin lake, may have been the focus of a semi-sedentary occupation. We have suggested that the features we excavated may represent the late summer/early fall exploitation of the piñon-juniper belt by groups tethered to the ancient lakeshore.

There are at least two general lines of inquiry that must be pursued to test the hypotheses proposed here. First, more features in the piñon-juniper belt need to be investigated. This is necessary to establish the predominant temporal affiliation of the features reflecting short-term residential occupations, to determine the time of year when people were there, and to search for more direct evidence of what resources were being exploited. Besides seeking more evidence of piñon exploitation, an important future research objective should be determining when piñon stands became well-established, economically viable resources in the San Luis Valley.

Second, more investigation of the ancient lake is necessary for dating its existence and the occupation of sites along its shoreline. These objectives will contribute information on the post-Paleoindian climatic sequence, something that is badly needed if we are to understand how settlement and subsistence in the area played out over time. Excavation and more thorough survey of this area also may permit estimates of Closed Basin population size when the lake was present.

Some researchers have suggested that the Archaic period adaptations in the Colorado mountains primarily consisted of highly mobile foraging strategies (Guthrie et al. 1984). A growing body of evidence, however, indicates that adaptive strategies during this long period of time were probably more variable (Hoefer III 1987). The LA/LP occupation of the Closed Basin may represent one example of a less mobile system of settlement and subsistence (Martorano et al. 1999:118). This interpretation supports an earlier suggestion by Alan Reed (1981) that the San Luis Valley may have been culturally distinct from other intermountain regions of Colorado, at least during that period of time.

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NOTES

[1] Higher ground to the east of Feature 1 could conceal archaeological data associated with it although we seriously doubt it was inside a structure.

[2] Both sites 5AL639 and 5AL640 had historic components. We maintain that the metal fragment found in Feature 3 is intrusive since the majority of associated artifacts are prehistoric and it is radiocarbon dated to the LA/LP transition.

[3] Modern day floral resources in the piñon-juniper belt that were probably available for harvest prehistorically include currant (berries for food and medicine), gooseberry (berries for food), chokecherry (berries for food, stem/bark for tea), skunkbrush (fruit for food and beverage), snowberry (berries for food), prickly pear (fruit and pads for food and medicine), sego lily (root for food), mountain mahogany (twigs/leaves for medicine), lambsquarter (seeds and leaves for food), beeweed (leaves and flowers for food), sand verbena (total plant for medicine), salsify (root for food, juice for medicine/gum), and juniper (leaves and berries for medicine) (Craighead et al. 1963; Harrington 1967; Moore 1979; Tilford 1997).

[4] At a leisurely rate of 3 km/hour (Kelly 2001:53), a 10 km journey would take 3.3 hours. A round trip, therefore, would take 6.6 hours ($3.3 \times 2 = 6.6$) assuming the return takes the same amount of time. This leaves 1.4 hours for caching collected foods if one's schedule is roughly based on 8 hours of activity.