MUSEUM OF NEW MEXICO
OFFICE OF ARCHAEOLOGICAL STUDIES

THE MERRILL SITE (LA 104890): EXCAVATION OF A MULTICOMPONENT SITE IN QUAY COUNTY, NEW MEXICO

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ADMINISTRATIVE SUMMARY

Between October 20 and November 19, 1999, the Museum of New Mexico's Office of Archaeological Studies excavated LA 104890 (the Merrill site) for the New Mexico State Highway and Transportation Department (NMSHTD). Excavations at LA 104980 were part of the Archaeological Sites Stabilization and Protection Project (ASSAPP) funded by the Enhancement Program of the Intermodel Surface Transportation Act of 1991 through the NMSHTD. The site is located on state land administered by the New Mexico State Highway Department and acquired from private sources. This project utilized state and federal funds provided by the NMSHTD. This report describes the excavations at LA 104890.

LA 104890 is a multicomponent site. The first component comprises a long-term site occupation dating to the Middle Archaic period. A short-term activity area associated with the transitional Late Archaic-Jornada Mogollon comprised the second component present at the site. The third component is comprised of a historic hearth. Specialized artifact and sample analyses provided detailed information with which to interpret the artifacts in light of research questions proposed in the data recovery plan.

MNM Project 41.596
ASSAPP, NM 156-The Merrill Site
State Excavation Permit No. SE-147.

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INTRODUCTION

As part of the ASSAPP study, funded by the New Mexico State Highway and Transportation Department (NMSHTD), a limited testing program was conducted at the archaeological site of LA 104890, located within the existing right-of-way of NM 156 in Quay County, New Mexico (Fig. 1). Excavation was conducted under State Archaeological Excavation Permit No. SE-147. Peter Yoshio Bullock was project director, assisted by Byron Hamilton. Yvonne R. Oakes served as principal investigator. Faunal analysis was conducted by Nancy Akins, ceramic analysis by C. Dean Wilson., and macrobotanical samples were analyzed by Mollie Toll and Pam McBride. Radiocarbon analysis (^{14}C) was conducted by Beta Analytic, Inc. Archaeomagnetic samples were analyzed at the Archaeomagnetic Dating Laboratory at the Museum of New Mexico. The report was edited by Robin Gould, graphics were drafted by Ann Noble.

Prior to conducting fieldwork, current listings of the *National Register of Historic Places,* the *State Register of Cultural Properties,* and the site files of the New Mexico Cultural Resource Information System were consulted. No properties listed on, or nominated to, or approved for submission to either inventory are located in the vicinity of LA 104890.

The site (LA 104890) was originally recorded as a hearth exposed in a low road cut, with an associated scatter of lithic artifacts within the NM 156 right-of-way. Limited testing later revealed the presence of a second hearth 40 cm above the first. After testing, the site was recommended for data recovery. The data recovery plan and subsequent archaeological data recovery efforts were proposed and performed by the Office of Archaeological Studies, Museum of New Mexico.

The site (LA 104890) is located on state land acquired from private sources and administered by the New Mexico State Highway and Transportation Department (NMSHTD). Site location data is included in Appendix 2 (removed from copies in general circulation).

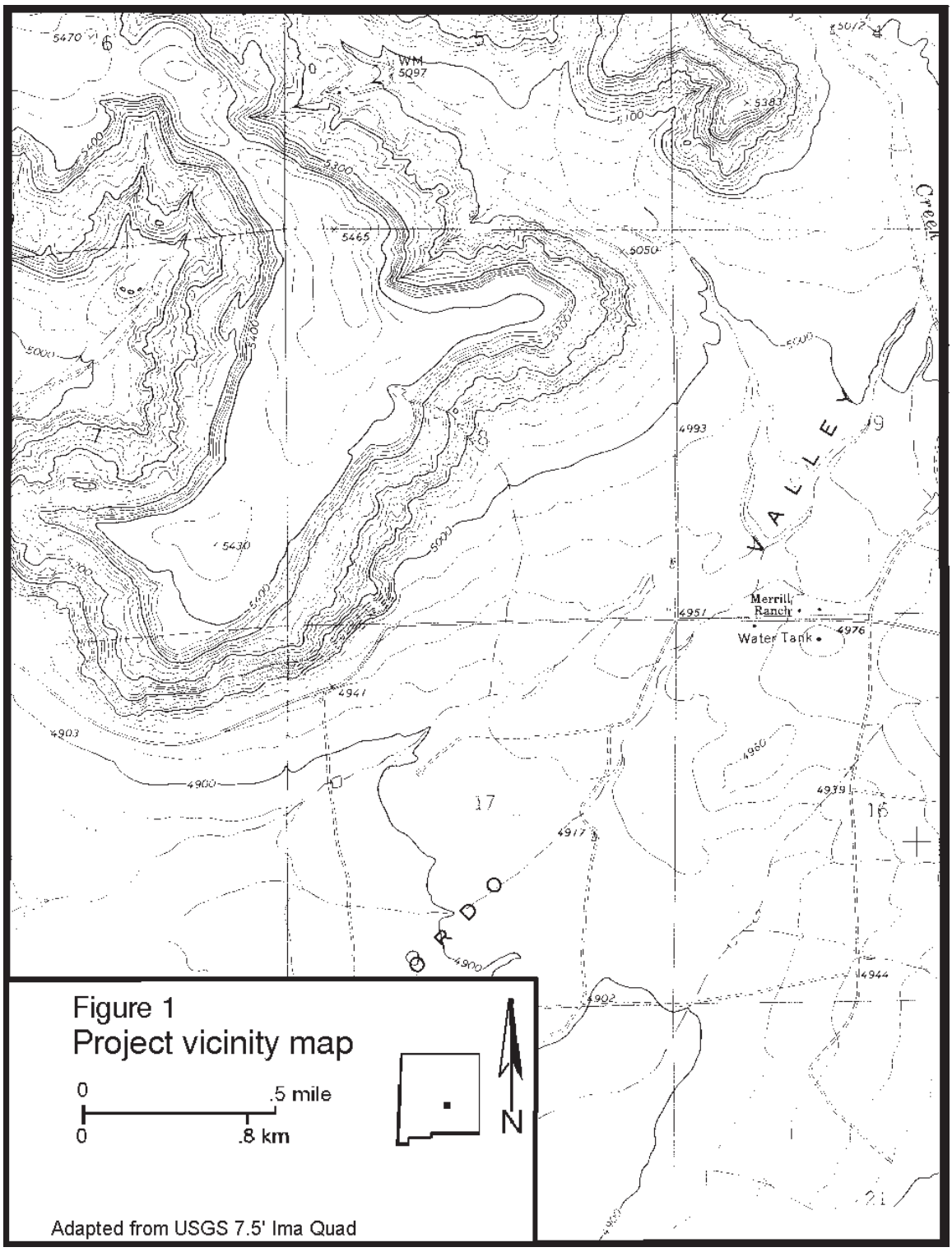
Figure 1
Project vicinity map
0
.5 mile
0
.8 km
N
Adapted from USGS 7.5' Ima Quad
Merrill Ranch
Water Tank
4976
4951
4993
5050
5100
5383
5465
5430
5470
5097
WM
4941
4903
4900
4917
4939
4944
4902
17
16
19
21
VALLEY
ROAD

ENVIRONMENT

The site locale is east of the Pecos River, below the escarpment and talus slope of Luciano Mesa, at the head of the Alamogordo Valley. Elevation of the site is 1,896.96 m (4,940 ft). This area east of Santa Rosa is primarily rolling mixed grassland. Occasional outcrops of exposed sandstone and shale occur, principally on the tops of ridges and on the exposed breaks of the mesas that form the edge of the caprock. The area supports a cover of mixed grasses, with either mesquite or juniper-parkland present in rocky areas and on the slopes of the caprock. Common invasive species include mesquite, cholla, and narrowleaf yucca.

GEOLOGY

Quay County forms part of the Great Plains physiographic province (Jelinek 1967:35). The terrain is characterized by broad plains dipping gradually eastward. In this region of the Southern Plains, this eastward dip ends where it comes into contact with the caprock of the Llano Estacado (Fenneman 1931).

The Pecos River is approximately 56 km (35.0 miles) to the west of LA 104980. This is a two-tiered canyon system comprising the oldest portion of the Pecos River Valley, predating the major course shift to the south of the middle Pecos River in the late Pleistocene (Jelinek 1967:5). This portion of the Pecos River Valley varies in width and is lined for most of its length by broken cliffs of the second river terrace, formed from sandstone of the Santa Rosa and Chinle Formations (Lucas et al. 1985:172-173). Away from the cliff edges, these Triassic sandstones are buried in most places by Pleistocene sands and gravels (Kues et al. 1985).

Processes of solution have promoted a karst topography along the Pecos Valley. Water acts on underlying beds of gypsum and limestone, causing the collapse of the surface sandstones and shales of the Santa Rosa Formation (Lucas et al. 1985:172). The resulting sinkholes feed surface runoff into the Pecos River and numerous springs and seeps are present along the Pecos River terraces (Levine and Mobley 1975:11).

In contrast, the caprock is comprised of deposits of Mesa Rica sandstone and Morrison Formation materials resting on the sedimentary deposits of the Oglalla Aquifer. The immediate site area is within the talus slope, or land fall zone, beneath the caprock, an area of fallen blocks of Mesa Rica sandstone.

One result of the Oglalla Aquifer's presence is a series of springs and seeps along the edge of the caprock. The heavy use of groundwater for irrigation and cattle tanks has resulted in the water table dropping an average of 2 m a year (Stone and McGurk 1985). Many water sources have ceased to flow because of this heavy usage. In the area of LA 104890, Alamogordo Creek was a perennial stream as recently as 1950 (Hudson 1978). Currently water in Alamogordo Creek is limited to rainfall-dependent seasonal water flow (Davis 1989).

Soils within the project area are characteristic of the Haplargids-Torriorthents-Calcirorthids association. Widely distributed, this association is dominated by gently rolling or undulating topography with widely spaced small steep escarpments, buttes, and rocky outcrops. This soil association is characterized by a thin brown to reddish brown noncalcareous fine loam topsoil, usually underlain by a light reddish brown or pink limey loam. Soils are deep, and formed of generally medium to fine alluvial and eolian sediments. These soils tend to be susceptible to erosion where vegetation cover is depleted or removed, with gullies and arroyo cutting frequently taking place. Areas of this soil association are usually utilized as rangeland, primarily supporting mixed grasses and mesquite (Maker et al. 1974:67-68).

Soils of the Camborthids-Calciorthids association dominate the southern portion of the proj-

ect area located within the Alamogordo drainage. The topography of this association is varied, ranging from level or gently sloping broad valley areas, to steep escarpments and breaks. Soils are characterized by moderate to deep alluvial deposits. Topsoils are generally light brown to light reddish brown fine sandy loan. Subsoils are a reddish brown calcareous sandy loam containing a weak lime zone. These soils are moderately to highly susceptible to erosion. Gullies are common within valley bottoms. This association is used as rangeland, with variable vegetation coverage (primarily mixed grasses) resulting in a highly variable use capability (Maker et al. 1974:70-71).

Climate

The climate of the project area is typical of eastern New Mexico. This climate is characterized as steppe or desert grassland (Castetter 1956:256, Fig.1). The project area is mixed juniper parkland-mixed grassland. During the Pleistocene, this area is likely to have been mixed deciduous-pine woodland (Brunswig 1992:11-13). Also at this time Sabal palms (with a current range extending from northern Mexico into south Texas) were common as far north as Santa Fe and the Panhandle of Oklahoma (Axelrod 1985). Major change occurred about 8,000 years ago in connection with melting icecaps. Seasons became more extreme, with greater seasonal swings in temperature. Winters became colder and summers became hotter. Although the amount of available moisture appears to have fluctuated repeatedly through the Archaic period, the overall trend for the region has been toward a generally dryer regime with a summer-dominated rain pattern (Sebastian and Larralde 1989:16, Fig. 1.9). In this area of New Mexico most precipitation occurs in the form of summer showers, with winter snow providing lesser amounts of precipitation (Tuan et al. 1973:24, Fig. 6). Annual precipitation in Santa Rosa averages 35 cm (13.8 inches) (Gabin and Lesperance 1977:148-149; Tuan et al. 1973:18, fig. 2). The average number of frost-free days totals 200 (Tuan et al. 1973:87, fig. 38). South to southwesterly winds averaging 10 miles an hour are prevalent throughout the year (Maker et al. 1974:6-7).

Flora and Fauna

The close presence of the Llano Estacado officially puts the site area within the Grassland Biome (Castetter 1956:256, fig. 1). In reality, the project area is in an area of mixing between the Woodland Biome and the Mixed Grass Biome. Vegetation differences in this area are the result of soil and geological types of formation rather than climatic variation. Within the general project area, juniper parkland is present in the rocky breaks along the sides of Luciano Mesa, in areas of rocky and gravelly knolls, rough broken areas, and north-facing slopes where grasses are poorly developed. The Mixed Grassland Biome exhibits a uniform physiography and vegetative character, with differences in relative vegetation composition resulting from climatic, topographic, and soil variation (Castetter 1956:266). Grassland is present in the Alamogordo Valley, in areas of medium to fine soils penetrable by grass root systems (Castetter 1956:271). In this area ,the Mixed Grassland Biome is dominated by short grass prairie climax vegetation (Levine and Mobley 1975:3). Grasses common to the project area include little bluestem, blue grama, sideoats grama, and sand dropseed. Snakeweed, cholla, and mesquite are common shrubs (Maker et al. 1974:67).

Faunal populations vary according to their habitats and local climatic and geological variations. These habitats tend to correspond with local plant communities. The number of plant communities in proximity to the project area suggests a range of faunal occurrence greater than that characteristic for any single specific vegetation zone. Faunal species characteristic for the project area include jackrabbit, cottontail rabbit, prairie dog, and assorted small rodents such as mice, ground squirrels, and gophers. Larger faunal species common to the area include antelope, badger, and coyote. Deer and bobcat are also characteristic but less common species occurring in the

area. Historically, bison were also common in the Southern Plains adjacent to the Pecos River Valley (Levine and Mobley 1975:16-17).

CULTURAL RESOURCES OVERVIEW

A detailed reconstruction of the cultural history of east-central New Mexico is beyond the scope of this report. Regional summaries are available for the area (Harlan et al. 1986; Levine and Mobley 1975). Brief summaries of the area's cultural history for the components present at the Merrill site follow.

Archaic Period

The Archaic occupation of the upper Pecos River Valley appears to have lasted until quite late. Levine and Mobley (1975) define the Archaic occupation of northeastern New Mexico as lasting from 5000 B.C. until about A.D. 1000. A local chronology has not been developed for this area of New Mexico. Projectile points in eastern New Mexico have been identified under a number of different schemes, including those of the Oshara Tradition (Irwin-Williams 1973) and chronologies used in central and western Texas (Johnson 1967; Suhm and Jelks 1962).

The Archaic period is best defined in western New Mexico where it is generally referred to as the Oshara Tradition (Irwin-Williams 1973). This period is distinguished by distinctive projectile points and lithic artifact scatters, including grinding implements, fire-cracked rock, and a lack of ceramics. Archaic subsistence adaptions are based on a highly mobile broad-based economy characterized by a combination of seasonally scheduled hunting and gathering activities. The Oshara Tradition is divided into five phases: Jay (5500-4800 B.C.), Bajada (4800-3200 B.C.), San Jose (3200-1800 B.C.), Armijo (1800-800 B.C.), and En Medio (800 B.C.-A.D. 400)(Irwin-Williams 1973). Although centered in the northwestern area of New Mexico, Oshara Tradition projectile points do occur as isolated occurrences as far east as the project area.

A sequence of projectile points for central and western Texas was developed by Johnson (1967) based on stratified sites yielding radiocarbon dates. This sequence is divided into five overlapping periods: Period I (8350-4800 B.C.) characterized by Luna and Plainview projectile points; Period II (6810-1315 B.C.) characterized by Early Barbed, Pandale, Nolan, Travis, and Bulverde projectile points; Period III (4850 B.C.-A.D. 110) characterized by Shumla, Almagre, Langtry, Pedernales, and Montell projectile points; Period IV (350 B.C.-A.D. 1245) characterized by Ensor, Frio, Darl, Figuero, and Godley projectile points; and Period V (A.D. 50-1710) characterized by Scallorn, Livermore, Bonham, and Perdiz projectile points. In a number of cases the same projectile point morphologies have been given different names based on location. Additional chronologies, including a localized sequence for the lower Pecos River Valley, have also recently been developed (Shelly 1994).

Pueblo Period

Evidence of Puebloan use of the Santa Rosa area is abundant, although no Pueblo sites with residential architecture have been recorded. The closest recorded pueblos to the area are located in Pintada Canyon, approximately 32 km (20 miles) to the west of Santa Rosa. The Puebloan sites at Pintada appear to date from A.D. 1200 to 1400. Ceramic assemblages are dominated by Chupadero Black-on-white and brown utilitarian wares (Stuart and Gauthier 1981). Pueblo ceramics are found in association with open-air sites, lithic artifact scatters, and rockshelters along the Pecos River, side canyons, and along some main arroyos. The occasional occurrence of other ceramic types indicates both regional trade and possible use of the area by Pueblo groups from the Glorieta Mesa and Galisteo Basin areas. Sites associated with Puebloan use of the Pecos River Valley have been recorded for the western side of the Pecos River some distance downstream from

the Los Esteros Lake area (Levine and Mobley 1975).

Jornada Mogollon ceramics also occur in the Santa Rosa area, with a number of possible Jornada Mogollon sites recorded (Harlan et al. 1986:42; Levine and Mobley 1975). None of the sites recorded for the Santa Rosa area are known to have structures present, although they are recorded to the south (Corley 1965), in the area of Ft. Sumner (Jelinek 1967:119-124).

A local pueblo traditional sequence is documented for the middle Pecos River Valley by Jelinek (1967). This tradition seems to develop in the late A.D. 800s out of the Jornada Mogollon. Anasazi, or Anasazi-derived ceramics appear in the middle Pecos River Valley after A.D. 900 with the development of the Mesita Negra phase (Jelinek 1967:64-65). The presence of these structural sites suggests the gradual spread of a sedentary subsistence adaptation based on maize agriculture to the east from the centers of both the Mogollon and Anasazi traditions. The eastern limits of this probable marginal area appear to have been the Pecos Valley (Jelinek 1967:145-147). These developmental sequences continue until the termination of the Crosby phase in the lower middle Pecos Valley between A.D. 1250 and 1300, and the termination of the late McKenzie phase in the upper middle Pecos Valley about A.D. 1300 (Jelinek 1967:65-67). The general site area continued to be used sporadically by Pueblo Indians from the Galisteo Basin and the Pecos region until European contact.

Plains Indian Groups

Both Kiowa and southern Athapaskan groups appear to have moved into the eastern portion of New Mexico during the late protohistoric period. Apachean sites are scattered throughout southeastern New Mexico as well as the Central Plains, and may date anywhere from the late 1400s to the late 1800s (Harlan et al. 1986:52).

Shoshonean-speaking Comanches moved to the Southern Plains about 1700-1715. Most other Native American groups were driven from the area by these horse-mounted buffalo hunters, except for the closely politically allied Kiowas. Extermination of the buffalo herds combined with American military campaigns removed the Comanches, Kiowas, and other “Plains Indian” groups from the Southern Plains by 1875 (Schemer 1981). Sites identified as possibly Apache, Comanche, or other “Plains Indian” have been identified north of the project area at Los Esteros Lake (Levine and Mobley 1975).

Hispanic Occupation

The Hispanic presence on the Eastern Plains of New Mexico was minor prior to the American era. The presence of mobile and potentially hostile Apache, and later, Comanche and Kiowa Indians, prevented Hispanic settlement along the upper Pecos until after the arrival of American control in the 1850s. By 1860, 16 Hispanic settlements had been built on Pecos River land grants (Harlan et al 1986:58), primarily from the Anton Chico Land Grant north. The Agua Negra Land Grant was formalized in 1865 by Don Celso Baca, with the ranch settlement of Agua Negra Chiquita later becoming the settlement of Santa Rosa. By the 1880s Hispanic settlements were well established at Pintada on Pintada Arroyo, and at Puerto de Luna on the Pecos River. Farming was concentrated along the Pecos River and major drainages, but the main economic thrust of the Hispanic population was sheep raising. Sheep raising in the area of Santa Rosa was dominated by two major sheep ranches, the Agua Verde and the Juan de Dios, until the collapse of sheep prices in the 1920s ruined most of the sheep raisers (Harlan et al. 1986:58).

Racial tensions became apparent in the Pecos Valley as Anglo-American settlers, primarily from Texas, moved into the area after the late 1860s. A Texan-Hispano conflict, generated by the Texas War of Independence from Mexico, was exacerbated by the fact that Texans tended to be

cattle ranchers while the Hispanics tended to raise sheep. This mutual dislike occasionally degenerated into violence and conflict. However, the different settlement patterns of the two groups tended to lesson this propensity for conflict. The Hispanic settlements were primarily located in the Pecos River and Canadian River floodplains, while the Anglo-Americans tended to settle in dispersed ranches away from the river (Harlan et al. 1986:57-58).

Anglo-American Period

An American presence became established in the eastern part of New Mexico with the construction of Forts Union, Sumner, and Stanton in the early 1860s (Levine and Mobley 1975). However, Anglo-American settlement in the Eastern Plains of New Mexico did not occur to any great extent until after the American Civil War.

Texas cattle ranchers began moving into the area in the mid-1860s. Some of the first to arrive were Charles Goodnight and Oliver Loving who brought a heard of cattle to Ft. Sumner in 1866. The Loving-Goodnight Trail they opened eventually ran from Cheyenne, Wyoming, south through eastern New Mexico to Belknap, Texas (Harlan et al. 1986:59). A second herd of cattle was brought to Ft. Sumner from Paris, Texas, by John Chisum that same year (1866). Essentially the first Anglo-American settler to the middle Pecos Valley, Chisum eventually controlled a ranch 100 miles wide, stretching for 150 miles along the Pecos River (Broster 1983:13-14).

In time, a number of dispersed ranches were established, despite the hostile relations between the settlers and the resident Plains Indians. The occurrence of regional "vernacular" architectural styles of some of these early ranch structures aids in their dating. One Texas vernacular style, the "dog-trot" house, was comprised of two rows of rooms separated by a covered breezeway. Construction of Texas "dog-trot" houses in the Southern Plains was limited to a period from the 1860s to the early 1880s, when increased economic and political integration of the area with the rest of the United States resulted in this form being replaced by Victorian styles. A classic "dog-trot" house, the Jones-Howard Ranch, has been recorded to the southwest of the project area on San Juan de Dios Arroyo.

Settlement of the area increased rapidly after 1875, with the final defeat of the Comanches and Kiowas and their removal to Oklahoma. This increase in settlement also saw increased friction between the Anglo-American and Hispanic populations. A combination of drought and severe winters in 1887 and 1889, with declining cattle prices, ultimately destroyed the great cattle empires of the Plains (Harlan et al. 1986:57-58).

The Rock Island and Pacific Railway reached Tucumcari in 1902. This joined the El Paso and Rio Grande Railroad at Santa Rosa in 1902, linking the Plains to both Albuquerque and to cities in the Midwest. Homesteading farmers followed the railroad into the area. This part of New Mexico was soon known for the dryland farming of wheat, sorghum, and pinto beans. Tucumcari, Santa Rosa, Portales, and Clovis were all eastern New Mexico railroad towns that prospered as shipping points for livestock and produce (Harlan et al. 1986:59).

Many of the farms in the area continued until the "dustbowl" days of the 1930s. Drought, combined with the economic slump of the Great Depression, forced many of the small landowners to sell their land (Harlan et al. 1986:60). Most of the area around both Santa Rosa and Tucumcari reverted back to cattle ranching in the 1940s, an activity that continues today. Cattle raised around Tucumcari are now shipped by truck to Clovis where they are loaded onto trains, or are shipped by truck directly to Amarillo.

DATA RECOVERY RESEARCH ORIENTATION AND GOALS

This section provides the orientation and goals or expectations for the research that guided the data recovery effort. It is primarily derived from the recovery plan for the Merrill site (LA 104890), developed by Bullock (1999). In accordance with the data recovery plan, a number of specific goals were pursued at this site.

The small amount of previous research in the general area east of the upper Pecos River has focused on differences in short-term resource procurement strategies between cultural groups as well as site identification and dating. These questions remained as the primary lines of inquiry at the Merrill site (LA 104890).

Originally LA 104890 (the Merrill site) was believed to represent a single cultural component. Subsequent rerecording and testing of the site showed it contained a number of cultural components, representing a number of cultural affiliations. It was then felt that this use of the general area by a number of cultural groups represented different activities, or use of the landscape, depending on the culture represented. For this reason, research focused on questions of cultural affiliation, site structure, and resource procurement. The presence of a number of cultural components should enable comparisons to be made regarding differences and similarities in land-use patterns through time. This could reflect on a similar subsistence approach shared by various cultural groups operating within this single ecotone (Bullock 1997). Excavation proved this was indeed the case with two of the three components at LA 104890.

The focus of the data recovery efforts was therefore to examine LA 104890 as an example of a resource procurement area, and then compare changes through time in site structure at the cultural level.

With this in mind, the data recovery effort for LA 104890 focused on identification and resource utilization issues. These were identified as site cultural identification, a determination of site activities and their relationship to site structure, and an assessment of how LA 104890 fits into the resource utilization and procurement activities pursued on the Eastern Plains of New Mexico. The goals and expectations of the data recovery effort were as follows:

1. *Cultural affiliation and its application in the determination of site utilization and structure is dependent on an ability to assign the sites an cultural affiliation. This is usually accomplished through the use of diagnostic artifacts or ceramics. However it has been demonstrated (Bullock 1996) that a site's cultural affiliation can sometimes be determined when diagnostic artifacts are absent.*

The lithic assemblages associated with each of the sites' two components were analyzed. When diagnostic artifacts were absent, special attention was given to four "marker" attributes. Specifically, the ratio of debitage to tools (including utilized debitage), and the percentages of flakes, cores, and bifaces within each assemblage was monitored. If diagnostic artifacts were not present in these assemblages, focus of study was two trends that occur through time. This is an increase in both the ratio of debitage to tools and the percentage of flakes within each assemblage, coupled with a corresponding decrease in the percentages of both cores and bifaces.

Radiocarbon samples (^{14}C), were collected from two of the three features excavated at LA 104890. In addition, one feature was able to provide an archaeomagnetic sample for dating. These may enable the precise dating of the sites, and serve as a means of cross-checking the results of the lithic analysis.

Flotation samples collected from two features at LA 104890 will aid in the determination of site structure at the cultural component level. Comparison of these samples may also reveal

changes that occur in site structure through time.

The ceramic assemblage from LA 104890 was analyzed to produce data that will identify local pottery. This was accomplished through the study of tempers present and through petrographic analysis. Both local and intrusive pottery may also be identified on the basis of paste, surface finish, and design elements. The frequencies of intrusive ceramic types through time should provide information about the regional social and economic organization.

The ceramic assemblage from LA 104890, when compared with assemblages from other Jornada Mogollon sites in the upper Pecos River, Santa Rosa area enabled the establishment of relative site dates between sites within the Jornada Mogollon culture. Regional cultural change within the Jornada Mogollon may be documented in this way.

2. *Site structure can be postulated based on the range of activities that were pursued at this locale by each component. On-site activities at LA 104890 can be understood through a determination of the location and function of site features, and their relationship to site function. Feature function can be determined through the description of the feature, and the analysis of the associated artifacts and other material. Any relationship between site function and cultural affiliation may be gained through comparison of these sites once cultural affiliation is known.*

Excavation of cultural features and deposits may yield faunal and macrobotanical remains. These remains were analyzed for anatomical portion, age, condition, and frequency to determine dietary information.

Pollen and macrobotanical samples enabled us to infer plant utilization and consumption. Pollen analysis also reveals information about the general prehistoric environment, including the favorability of agricultural conditions. The types of grinding implements present may also correspond to the sorts of gathered or cultivated foodstuffs.

Nonlocal lithic materials could provide information about the social and economic organization. The presence of lithic materials that have specific source areas may confirm or supplement the data obtained from the petrographic study of the pottery.

3. *Differences in resource procurement may reflect discrete populations or different cultures. However, this may also be an indication of cultural change through time.*

Changes in subsistence and settlement patterns on both the eastern New Mexican plains and Pecos Valley should be apparent through a comparison of known sites and their distribution through time and space. A combination of ceramically derived relative site dates and more precise radiocarbon (^{14}C) dates, will allow the seriation of sites in this area by age. This should make apparent any developmental resource procurement patterns present within the cultures represented.

EXCAVATION METHODS

The first goal of the excavation was to collect surface artifacts within the right-of-way. This was accomplished by setting up a 1-by-1-m grid system across the right-of-way. A site datum was established as 0N/0E with an arbitrary elevation of 1.00 m. Grid numbers were assigned the southwest corner of each unit. Each grid unit was examined for artifacts, which were bagged by grid. Surface artifacts were collected and bagged by grid number for the total site area within the existing right-of-way.

Following the surface collection, the area of each recorded surface artifact concentration was surface stripped of overburden in an effort to locate subsurface features and deposits. This overburden layer (Stratum 1) averaged 10 cm in thickness, and away from any features or cultural deposits, was located directly over culturally sterile clay.

Once a feature or structure was defined, half of the fill was removed to reveal the interior stratigraphy. The stratigraphy, and the feature, were profiled, photographed, and described on field journal forms. The remaining fill was removed by cultural strata.

All of the dirt excavated at LA 104890 was sifted through 1/4-inch screen mesh. Artifacts were collected in paper bags that were labeled with vertical and horizontal provenience information. Samples were taken from contexts that appeared likely to yield the most data on feature function and age. Feature and site fill were described on field journal forms and grid forms. The forms included excavated depth in centimeters below site datum, information about soil color and texture, and artifact types and density. Soil colors were described using Munsell color notation.

After excavation was completed, the site was mapped with a transit and stadia rod, including the limit of the excavation and cultural features. After mapping, the excavation area was backfilled.

STRATIGRAPHY

Excavation defined five strata at LA 104890. These were assigned consecutive numbers at the site level that were used in the excavation notes and site and feature drawings. Two intact cultural strata were found at this site. Both strata were connected with cultural components, and both were limited in area. A third (later) cultural component was represented by the base of a single feature associated with a now-gone most recent soil stratum.

Stratum 1 is a tan, fine, silty loam, 8 cm in thickness. Eolian in origin, this material is present as a topsoil layer at LA 104890, and supports a thick growth of sod. No artifacts were present in Stratum 1, although recent roadside trash did occur within this layer.

Stratum 2 is a brown, fine textured silty soil. This stratum has a depth of 5 cm. Artifacts and flecks of charcoal are present. This cultural deposit is restricted to an area south and southeast of the large boulder defining the site locale. Feature 1, a hearth, was originally believed to be associated with this material. This was subsequently found to be associated with a now-removed upper stratum.

Stratum 3 is a fine tan silty soil of eolian origin. Culturally sterile, this material averages 40 cm in thickness, and extends across the entire site area. In areas where Stratum 2 is not present this material is directly below Stratum 1.

A fine gray sooty soil forms Stratum 4. Containing artifacts, flecks of charcoal, and some clay, this material is present in a small restricted area directly south and southeast of the boulder at LA 104890. Stratum 4 is 5 cm thick. Two cultural features are associated with this deposit, a hearth and a possible warming pit (Features 2 and 3).

Stratum 5 is a reddish brown silty clay. Culturally sterile, this stratum also contains flecks of

caliche. Stratum 5 is directly beneath Stratum 4. In excavated areas where Stratum 4 is not present, Stratum 5 is directly beneath Stratum 3.

SITE DESCRIPTION

The Merrill site (LA 104890) is located 35 miles east of Santa Rosa within the upper valley of Alamogordo Creek in Quay County. The site is at the base of the caprock, at the edge of the landfall zone on the north side of NM 156. The site area is within the right-of-way, at the southern base of a large block of Mesa Rica sandstone. The site area is level, but not flat, on a slight south-facing slope (Fig. 2). LA 104890 is a burned rock and lithic artifact scatter that measures 4-by-16 m, an area of 64 sq m. Forty artifacts were collected from the surface of this area (0.63 artifacts per sq m). All of the site is within the existing right-of-way, although portions of the site have been removed by scraping connected with earlier routine highway maintenance (Fig. 3). Three cultural components are present at LA 104890. These are each composed of a cultural feature, a cultural deposit, or both (Fig. 4).

COMPONENT 1

Component 1 is the latest of the two components present at LA 104890. This component consists of the base of a small hearth. (Fig. 5).

Feature 1, Hearth

One feature, a hearth, is present within Component 1 (Fig. 6). Feature 1 is a small bowl-shaped hearth southwest of the large boulder. It measures 18-by-21 cm, covers an area of 0.37 sq cm, and is 6 cm deep. The feature is circular in shape, with walls that curve inward toward the bottom, and has a rounded base. A charcoal-stained eroded area suggested the presence of this feature.

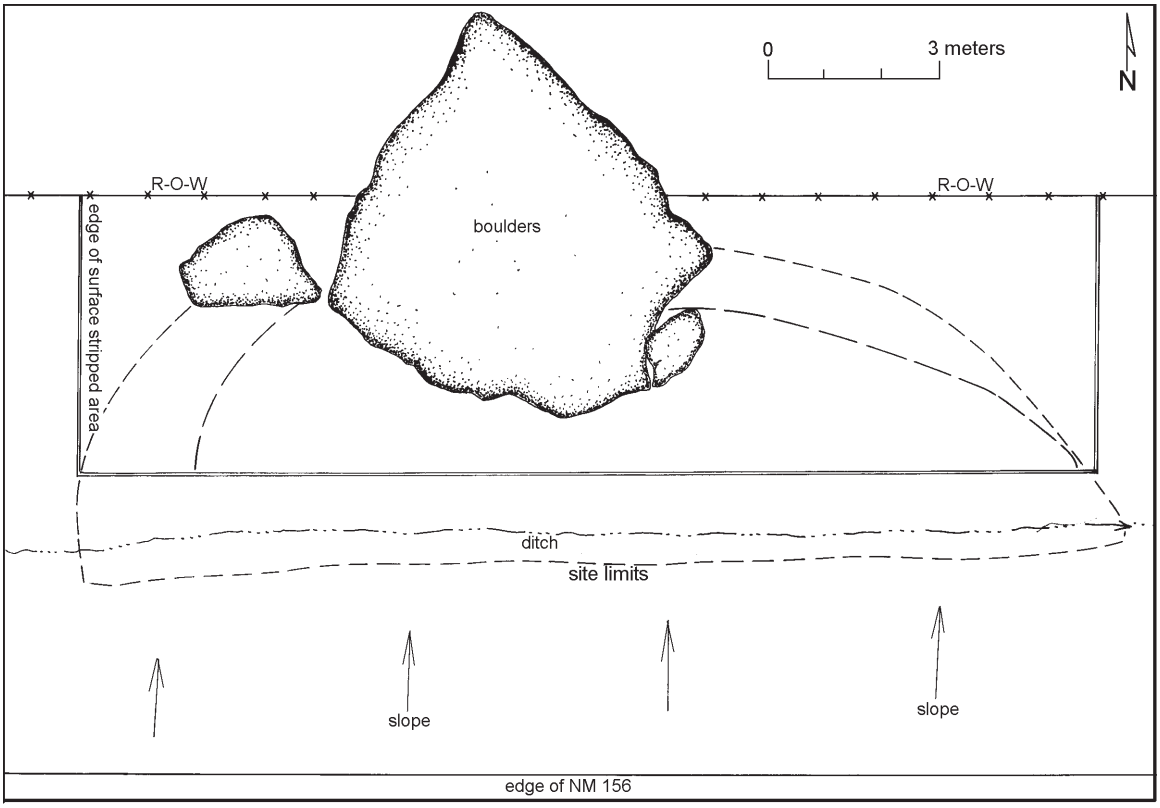

Figure 2. The Merrill site.

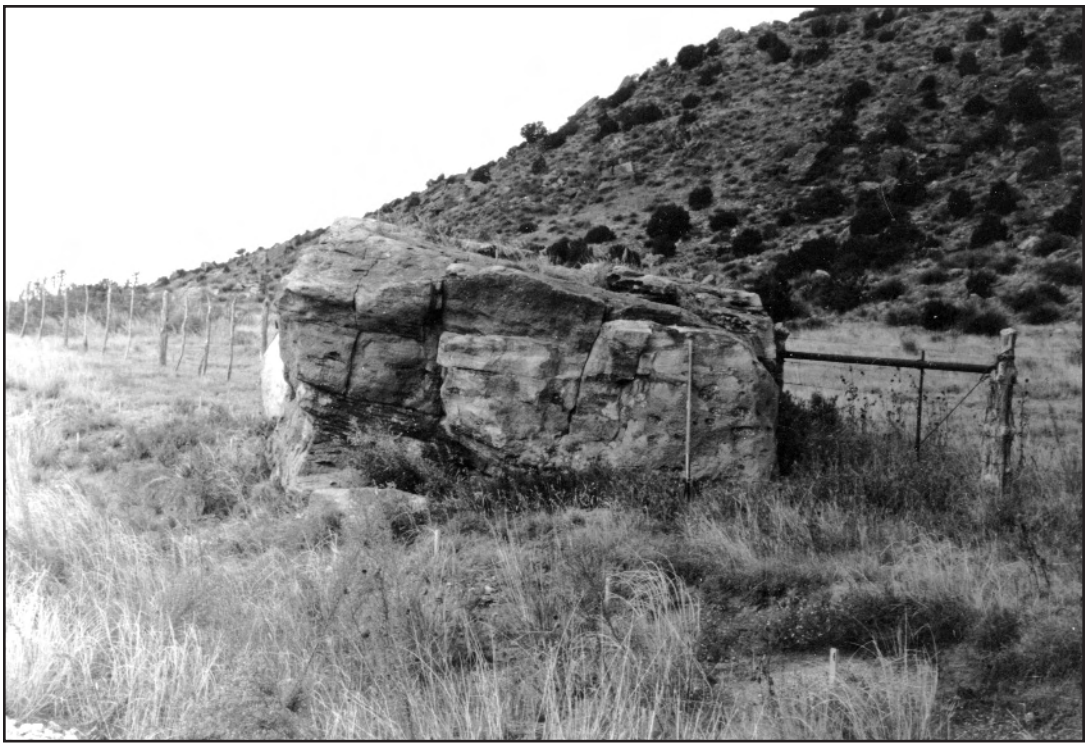

Figure 3. LA 104890 prior to excavation (looking northwest).

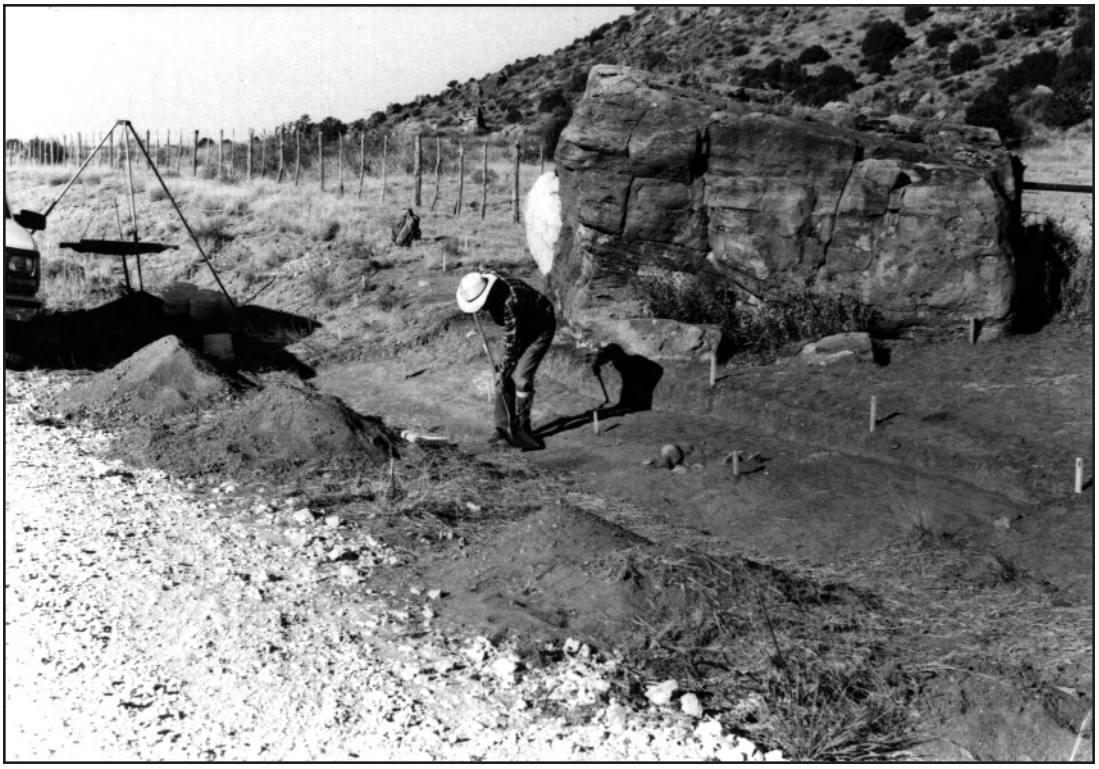

Figure 4. LA 104890 during excavation (looking northwest).

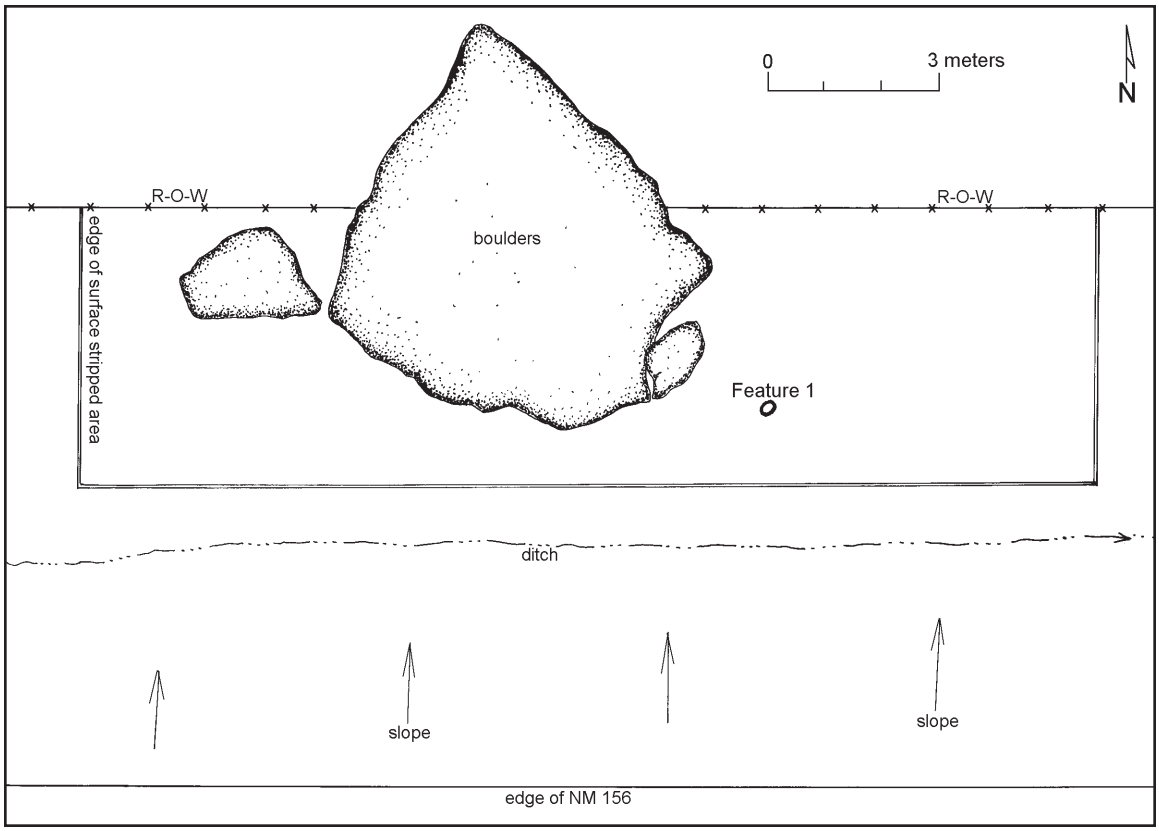

Figure 5. Component 1, historic component.

Figure 6. Component 1 (historic), Feature 1, hearth. (Note: schedule board LA number is incorrect.)

Once the feature was defined, half of the fill was removed in a single arbitrary level. The resulting profile of the feature was drawn, revealing a single layer of feature fill. The remaining fill was removed by stratigraphic layer.

Stratum 1, the only layer of fill, is a fine gray, charcoal-stained deposit of eolian soil. Large quantities of charcoal are present within this material.

Feature 1 is a small hearth, constructed as a shallow pit dug into the ground. The shallow nature of this feature suggests that upper portions of it had been removed by high maintenance. Its simple construction and single layer of fill suggests that Feature 1 was used for only a short period of time. This feature was originally believed to be associated with the cultural deposit representing Component 2. However, two methods of dating proved this was not the case. No cultural deposit or use surface was found associated with Feature 1.

Component 2

This component is present south of the boulder and extends to both the southeast and southwest over an area of 43 sq m (Fig. 7). Portions of this component were removed by earlier routine highway maintenance. Working outward from the stain, a total of 79 sq m was surface stripped to a depth of 8 cm, exposing the top of the cultural deposit.

The presence of a cultural deposit and large number of artifacts associated with this feature is characteristic of long-term site use. This suggests that the site area of this component was once more extensive, and that features (since removed by NM 156), were probably present as part of Component 2. The base of the associated cultural deposit (Stratum 2) probably indicates the original ground surface. Artifacts within this deposit numbered 323, or 7.5 per sq m.

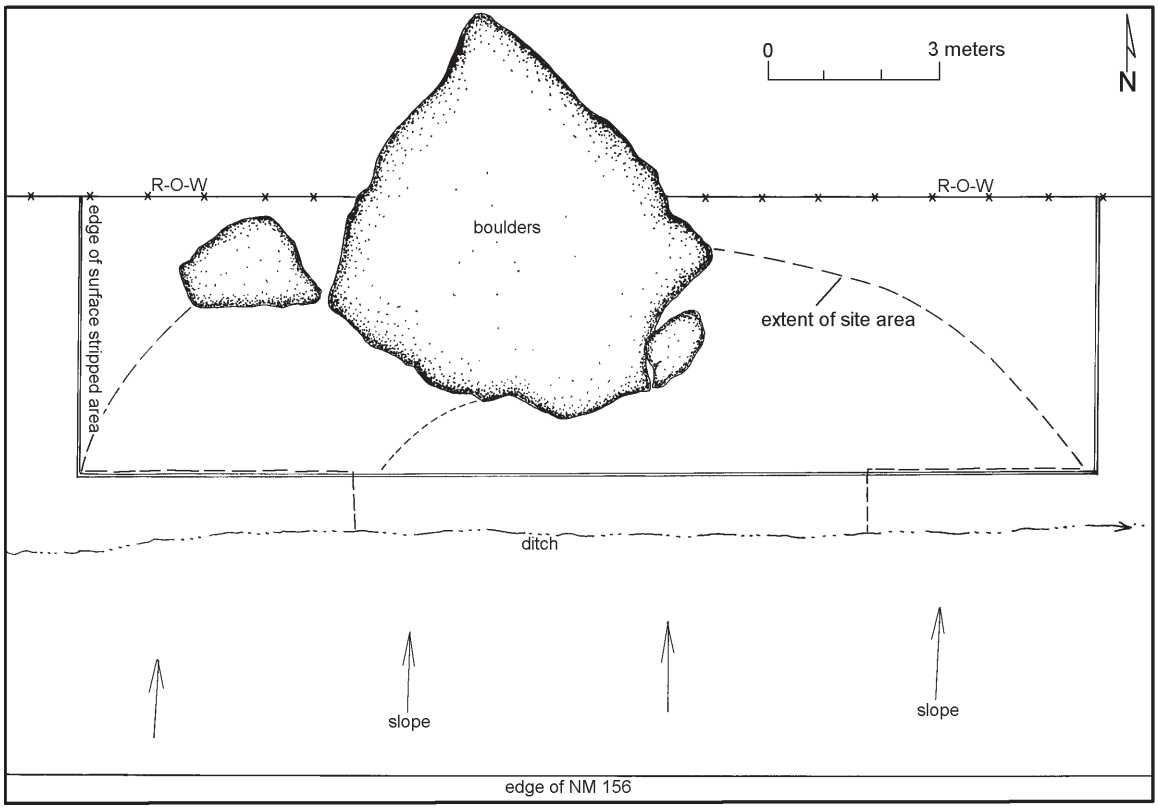

Figure 7. Component 2, transitional Late Archaic-early Jornada Mogollon component.

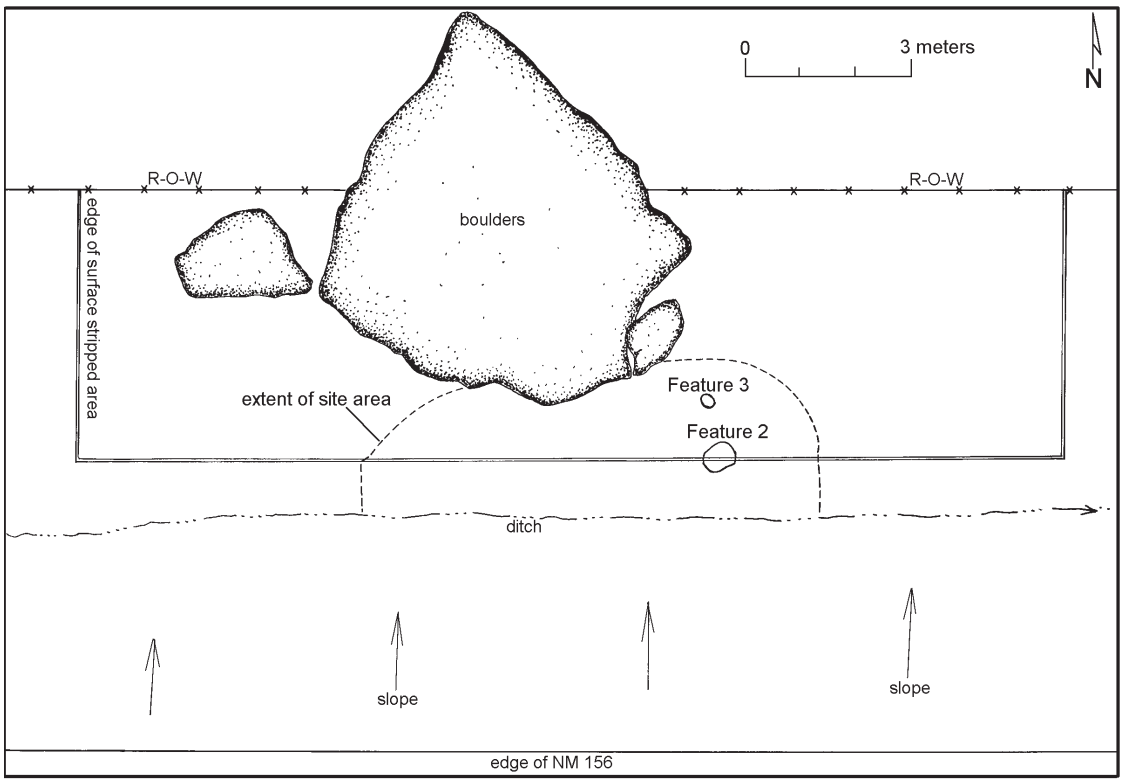

Figure 8. Component 3, Middle Archaic component.

COMPONENT 3

Component 3 is 40 cm below Component 2 in the same area south and southeast of the boulder (Fig. 8). This component area, composed of two features and an associated cultural deposit measures 3-by- 7 m, an area of 21 sq m. All of Component 3 is within the existing right-of-way. As with Component 2, portions of this unit were probably removed by earlier routine highway maintenance. Artifacts within this component numbered 366, or 17.4 per sq m.

Feature 2, Hearth

Feature 2 is a large cobble-lined hearth (Fig. 9). It measures 0.56 m by 0.72 m, covers an area of 0.40 sq m, and is 18 cm deep. This feature is oval in shape, with rock-lined walls that slope inward toward the bottom of the feature, which is uneven. Protruding fire-cracked rock suggested the presence of a feature at this depth, in this locale. Working outward from this area of rock, a total of 21 sq m were excavated to a depth of 45 cm, exposing Feature 2, as well as the associated Feature 3 and cultural deposit. Once this feature was defined it was excavated in the same manner as Feature 1. Half the fill was removed in an arbitrary level. The resulting profile revealed a single stratum of material within the feature.

Stratum 1 was a fine, silty, charcoal-stained soil. Large quantities of charcoal and fire-cracked rock were both present within the fill of Feature 2. The rock lining of the feature was heavily burned to a rich red color, indicating intense burning within the hearth.

Feature 2 is a cobble-lined hearth. It was constructed by digging a shallow pit in the ground. While the soil was still soft, both whole and broken cobbles were pressed into the interior sides of the hole, lining it. Additional pieces of rock were stacked round the lip of the hole four high, giving it an added height of 12 cm above the original ground surface. This served to extend the walls,

Figure 9. Component 3, Middle Archaic, Feature 2, stone-lined hearth. (Note: LA number on schedule board is incorrect.)

increasing the feature's depth. A portion of the south side of this feature had been removed earlier by routine ditch maintenance. The evidence of intense burning suggests that this feature was used a number of times. The single homogeneous layer of fill however indicates it was emptied between use episodes.

Feature 3, Warming Pit

Feature 3 is a small shallow pit associated with Feature 2, and is positioned 8 m to the northwest (Fig. 10). This feature measures 6-by-8 cm, has an area of 48 sq cm, and a depth of 6 cm. The unlined walls showed no evidence of burning. The presence of burned rock suggested the existence of this feature.

Once the feature was defined, half of the fill was removed in an arbitrary level. The resulting profile revealed that a single stratum of fill was present within the feature.

Stratum 1 was an alluvial mixture of sand and clay. Charcoal flecks were present in small quantities. Burned rock made up a majority of the feature's fill. This was stacked four pieces deep within the feature. A large quarter fragment of a basin metate covered the top of Feature 3.

Feature 3 is a shallow pit, oval in shape with vertical walls and a flat base. It was constructed by digging a small hole directly into the ground. There is no evidence of the feature having been lined with either rock or clay. After its construction, the hole was filled with burned rock. Although it was found filled with pieces of burned rock, there was nothing to indicate burning took place within the feature itself. The shallow depth of this feature, combined with the presence of burned rock and small amounts of charcoal within the feature's fill suggests it may have served as a warming pit. Warming pits served as slow cooking areas not requiring the presence of fire, and are common in Archaic sites (Shelley 1994).

No associated work surface connected with Features 2 and 3 was found, although a cultural

Figure 10. Component 3, Middle Archaic, Feature 3, warming pit. (Note: LA number on schedule board is incorrect.)

deposit was present. This has been referred to earlier as Stratum 4, a gray sooty soil deposit containing artifacts. The well-developed cultural deposit and features are indicative of long-term site use connected with Component 3. This also suggests that additional features connected with this component were positioned further to the south, and were removed by earlier highway maintenance.

SITE DATING

Dating the components at the Merrill site (LA 104890) was based on the combined results from a number of dating techniques. Both archaeomagnetic dating and radiocarbon dating (^{14}C) were successfully implemented at this site with regard to one of the components. It has also been possible to determine relative dates for each component based on the artifact assemblages and feature construction techniques. This combination of relative and absolute dating should help correct for the shortcomings of each dating technique. Radiocarbon dates in particular have a tendency to be older than the sites dated because of the added age of the wood itself, what has come to be known as the "old wood" problem. In contrast, relative dates generated from artifact assemblages tend to "float" in time unless anchored to more absolute dates. At LA 104890 although both methods of dating were used, they could not be successfully applied to the same components.

Dendrochronology can give a precise date based on the tree rings from specific species of trees, recovered from an archaeological context. The lack of wood fragments from the Merrill site made the application of dendrochronology as a dating technique impossible.

Archaeomagnetic dating is based on the presence of iron in the soil. Released by heat, these particles line up on magnetic north and remained fixed once they cool down. By measuring the angle present, and comparing it to the route of the wandering North Pole, a precise date can technically be obtained for any area of burned earth (such as a hearth). Although a number of thermal features such as hearths and warming pits were present at the Merrill site (LA 104890), only one of the features exhibited the degree of intense heating (or oxidation) in a recoverable sampling situation, necessary for archaeomagnetic dating to be effective. For this reason, only one archaeomagnetic sample was collected from this site. This sample gave us a date for Feature 1 (originally believed to be transitional Late Archaic-eastern Jornada Mogollon) in the mid-1800s, proving it represented a third, later component at the site.

Precise dating of archaeological structures or features can also be achieved through the use of radiocarbon dates. This dating technique is based on measurements of the amounts of specific types of radioactive carbon isotopes within organic material. A burned wood sample was collected from only one of the three features found at LA 104890 (Feature 1). This was subjected to radiocarbon dating by Beta Analytic, Inc. and yielded a calibrated date of 130 ± 60 B.P. (or a conventional date of A.D.1870). This date supports and reinforces the archaeomagnetic date for this feature, and is further proof that Feature 1 represents a third, later component at this site. The possible "old wood' problem that results in dates that are older than expected does not seem to have been a problem with this sample.

Relative dates for the cultural components at LA 104890 can also be obtained by the presence of diagnostic artifacts. Although no artifacts were found associated with the latest component, represented by Feature 1, relative dates for the two earlier components were obtained through comparison of their lithic artifact assemblages, as well as by the presence or absence of ceramics.

A single ceramic sherd was recovered from Component 2 at LA 104980. This was originally believed to be a piece of Jornada Brown Ware. Petrographic analysis proved that this was not the case. Analysis by Hill (this volume), proved that this was a piece of Rio Grande Glaze Ware dating from the fourteenth century to 1680. This makes the sherd too recent for Component 2 and too old for Component 1, and suggests it is either an isolated occurrence connected with yet another period of site use or was curated during the occupation of Component 1.

Relative dates can also be obtained for sites through the dating of additional diagnostic artifacts, such as projectile point types. Two projectile points and two point fragments were recovered at LA 104890 (Fig. 11). Three (one point and two fragments) were associated with Component 2, and one projectile point was associated with Component 3. The Component 2 projectile points

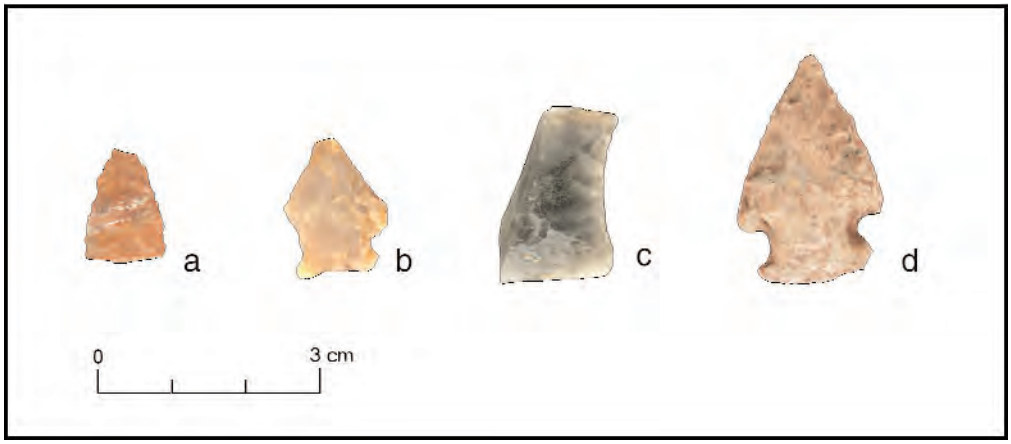

Figure 11. Projectile points from LA 104890; (a) unidentified fragment, Component 2, transitional Late Archaic-early Jornada Mogollon, (b) En Medio point, (c) intrusive Paleoindian fragment, possibly Plainview, (d) Marshall point.

included one En Medio point, common to transitional Late Archaic-early eastern Jornada Mogollon sites. The other two projectile points associated with Component 2 are fragments. One is unidentifiable. The other is the base of a late Paleoindian point which was possibly curated during the occupation of Component 2. The projectile point found associated with Component 3 is a Middle Archaic dart point of the Marshall type.

In summary, LA 104890 was found to contain three distinctive components. Component 1 (comprised of a single hearth, Feature 1), was dated to the mid-1800s based on both archaeomagnetic and radiocarbon (^{14}C) dating. Component 2 was found to date to the transitional Late Archaic-early Jornada Mogollon period, based on diagnostic artifacts. Component 3 dates to the Middle Archaic period, based on the presence of both diagnostic artifacts, as well as the two diagnostic features (Features 2 and 3).

LA 104890 CERAMIC ANALYSIS

C. Dean Wilson

Pottery from LA 104890 was limited to a single very small (0.5 g) body sherd. It exhibited light brown surfaces and was polished on both sides. Because it was a body sherd it was not assigned to a specific form category. Paste was dark brown, and temper consisted of a fine light-colored angular rock. Based on this combination of characteristics, this sherd was initally classified as a Plain brown ware. Petrographic analysis, however (see Hill this volume), indicates the presence of an angite monzonite, similar to that found in Rio Grande Glaze Wares. Thus, it appears to have derived from a glaze ware vessel, that could date anywhere from the fourteenth to the beginning of the eighteenth century, and may have been traded to mobile groups known to have resided in this area during the protohistoric and historic periods.

PETROGRAPHIC ANALYSIS OF THE SHERD FROM LA 104890

David V. Hill

A single plain brown sherd was recovered from LA 104890. Petrographic analysis was conducted in order to identify the type of temper used in the vessel and to suggest a potential source of the ceramic temper.

Methodology

The sherd was analyzed by the author using a Nikon Optiphot-2 petrographic microscope. The sizes of natural inclusions and tempering agents were described in terms of the Wentworth Scale, a standard method for characterizing particle sizes in sedimentology. These sizes were derived from measuring a series of grains using a graduated reticle built into one of the microscope's optics. The percentage of inclusions in the ceramics were estimated using comparative charts (Matthew et al. 1991; Terry and Chillingar 1955). Studies have been conducted regarding the reproducibility of determinations using these charts (Mason 1995).

Analysis of the Ceramic Sample

The paste of this sherd is a very dark orange-brown color. The paste contains about 20 percent rock fragments and mineral grains derived from a crushed intrusive igneous rock. The rock fragments range in size from very fine to medium-sized. The igneous rock fragments have been reduced to a small size, so that the original texture of the rock could not be identified. Based on the composition of the minerals present, the tempering agent is classified as an augite monzonite. The rock is characterized by equal proportions of alkali feldspar and plagioclase. The plagioclase and alkali feldspar grains are slightly colored, with a few of the alkali feldspars slightly altered through seritization. Sparse black cubes of magnetite, euthedral augite, and brown biotite are present in the rock fragments.

The augite paste of this sherd resembles that of Rio Grande Glaze Wares produced in the Galisteo Basin (Kidder and Shepard 1936). Outcrops of augite monzonite are known from the Galisteo Basin near the Pueblo of San Marcos (Disbrow and Stoff 1957; Warren 1979). Augite laitite and augite monzonite were used for tempering glazed vessels from the fourteenth century until the abandonment of the Galisteo Basin during the Pueblo Revolt of 1680 (Kessell 1987; Warren 1979).

LITHIC ARTIFACT ANALYSIS

Lithic artifact analysis was accomplished with two basic goals in mind. The first goal was to provide a descriptive summary of the lithic artifacts from each of the two components, which contained artifacts. The second goal was to provide information that could be used to address the general research problems outlined in the data recovery plan for the two earlier components at LA 104890.

The descriptive lithic artifact analysis attempted to identify patterns in prehistoric artifact production and use. Interpretation of each component is based on the perceived differences between the cultural entities represented. This is based on the fundamental assumption that all lithic assemblages reflect the desire to satisfy two needs. One need is the production of flakes that can be utilized without further modification as expedient tools. The other need is for material that can be further modified into formal specialized tools. These needs are balanced differently by cultures, based on the primary thrust of their form of subsistence.

For Component 2, a transitional Late Archaic-early Jornada Mogollon occupation, this would be the need for the production of lithic flakes that can be utilized either as expedient tools, or further modified into more formal specialized tools. This would have occurred alongside of the production of tools based on biface technology, reflecting the transitional nature of the culture between two technologies.

This is in contrast to the interpretation of Component 3, which follows a biface-based technology common to Archaic sites. Here the goal is the production of specific tools, with explicit distinctions made between tools and waste, and modified tools are common.

It has been argued that expedient tools, flakes utilized with little or no modification, are the result of material abundance on residential sites. However, they may also represent a convenient, flake-based, domestic lithic technology (Abbott et al. 1996).

The existence of formal tools such as projectile points, drills, etc., within an assemblage, implies design directed toward specific tasks or activities. Early stages of both formal tool manufacture and expedient flake production produce flakes that are indistinguishable from each other. The waste flakes produced in the later stages of formal tool production however, are distinctive biface thinning flakes.

Distinctive resharpening, or rejuvenation flakes are a common by-product of tool maintenance and reuse. Their presence is an indication of these specific activities occurring on a site.

The presence of nonlocal, or exotic, materials can be used to postulate spheres of social and economic interaction. Conversely, an absence of nonlocal lithic material may reflect the isolation of a population or community.

The research design developed for this site focused on the identification of site activities, as a manner of inferring site function. These lithic artifact assemblages can indicate a range of activities that may have taken place at this site. Different activities can be inferred through the presence of different artifact types and their frequencies.

Analytical Methods

The guidelines and format of the Office of Archaeological Studies *Standardized Lithic Artifact Analysis: Attributes and Variable Code List* (OAS 1994a), were followed in the analysis of lithic artifacts from the Red Lake Tank sites. Definitions used in lithic analysis are also included in this volume. The following attributes were included in analysis.

Material Type. Codes for material types are for general material groups unless the material is unquestionably from a recognized source. For example, although a wide range of chert occurs on

these sites, all were classified as “chert.” If a specimen was of a specifically named chert (such as Washington Pass chert), it was coded by the specific name.

Morphology (Artifact Type). This is the characterization of artifacts by form.

Portion. Portion represents that part of the artifact present. Flakes and tools can be whole or fragmentary. Angular debris and cores are whole by definition.

Dorsal Cortex. Cortex is estimated to the nearest 10-percent increment. For flakes this is the cortex on the dorsal surface. Cortex on the platform was not included. For other morphological types the percentage of cortex on all surfaces is estimated and added together.

Flake Platform. Flake platform is recorded for whole and proximal flakes. Some lateral flakes also have their platforms recorded, if the platform is still present. Either the morphology of the impact area prior to flake removal or extreme modifications of the impact area caused by the actual flake removal is coded.

Size. Artifact size is recorded in millimeters.

Function. Function describes and characterizes artifact form.

Analytical Results

The lithic artifact assemblages for the earlier Merrill site components vary in size. This may reflect both cultural affiliation and site type, and demonstrates both how these components vary and how site use changes through time.

Material Selection

The lithic materials used for tools reflects material selection at the cultural level. Although both of the two artifact assemblages are dominated by local materials, with small amounts of nonlocal material also present, the range of utilized materials varies considerably by component. More materials are represented by the assemblage from the earlier Component 3 then are present in the later Component 2.

Component 2. The 323 lithic artifacts recovered from Component 2 are comprised of six different materials: chert, Alibates, siltstone, quartzite, quartzitic sandstone, and obsidian (Table 1). Locally available materials were the most common in the lithic assemblage from Component 2. Chert is the most common material present at this site, making up 49.8 percent of the assemblage, with quartzitic sandstone the second most common at 41.8 percent. Nonlocal exotic materials were also present in smaller amounts. Three pieces (0.9 percent) of Alibates dolimite were present, as were two pieces of obsidian (0.6 percent).

Component 3. Component 3 (Middle Archaic) was the larger of the two lithic artifact assemblages recovered from LA 104890, at 366 artifacts (Table 2). Although the three most common materials are the same as in Component 2 (chert, quatzitic sandstone, and siltstone), a wider range of materials are present. The majority of the material used is quartzitic sandstone (45 percent), followed by chert (44.3 percent). Small amounts of nonlocal Alibates dolomite (1.1 percent) and obsidian (0.5 percent) are also present in the Component 3 assemblage.

Of the materials present within the two components, only two are nonlocal (Lovelace 1972; Banks 1990). Alibates dolomite is found in the area of the Canadian River Valley in the Texas Panhandle, roughly 100 km (60 miles) north of the Merrill site. Visually, the obsidian recovered from LA 116503 resembles Jemez obsidian from the Jemez Mountains northeast of Santa Fe. Both Jemez and Polvadera obsidian are known from sites in the Pecos Valley (Shackley 1995).

Material Cortex

Material use serves as an indication of human decision-making processes with regard to the suitability of materials (Young and Bonnichsen 1985:128). The presence within a site area of either tested material, or of substantial numbers of core flakes exhibiting dorsal cortex, can thus be presumed to illustrate the manner in which this material suitability is determined.

Component 2. The Component 2 assemblage contains large numbers of both chert and quartzitic sandstone flakes exhibiting dorsal cortex (Table 3). This indicates that the reduction of both materials took place during this period of site use. There is evidence for the flaking of other materials at LA 104890 during the Component 2 occupation; however this is primarily limited to the small-scale flaking of siltstone. Of the lithic artifact total for Component 2, fully 72.4 percent lack any dorsal cortex. This suggest that any lithic material suitability testing was conducted, except in the case of both chert and quartzitic sandstone, at a different, unknown locale.

Component 3. A pattern of material reduction similar to that exhibited in Component 2 is present in the Component 3 assemblage at LA 104890 (Table 4). Chert is present as flakes exhibiting varying amounts of dorsal cortex, suggesting that this material was being utilized for the manufacturing of tools. To a lesser degree this is also true for quartzitic sandstone. The main difference in the assemblages is in the third slightly flaked material: siltstone was flaked at Component 2, but not in Component 3. Silicified wood was flaked during Component 3, but is not even present in the later Component 2. Of the lithic artifact total, 72.7 percent lack any dorsal cortex. This suggests that most lithic material suitability testing was conducted, except in the case of chert, quartzitic sandstone, and silicified wood, at another, unknown location prior to its use at LA 104890 in Component 2.

Artifact Morphology

Component 2

Core flakes make up the major portion of this assemblage at 96 percent. Biface thinning flakes comprise 1.5 percent, bifaces 1.2 percent, and cores 1.2 percent of the total.

Component 3

Core flakes make up the largest category of artifacts in Component 3, forming 95.4 percent of the total assemblage. The second largest category is comprised of cores, although this is only 2.2 percent of the assemblage. Biface thinning flakes are present at 1.4 percent, bifaces at 0.6 percent, and hammerstones at 0.5 percent.

The high percentage of core flakes can represent either core reduction, or the manufacturing of flakes for use as expedient tools. Core flakes are present in all material types occurring within both components at LA 104890. This range of occurrence suggests that the creation of core flakes for use as expedient tools was taking place. This form of convenient disposable lithic technology is characteristic of Puebloan sites (Akins and Bullock 1992; Neusius 1988). However, only among chert and quartzitic sandstone artifacts in this assemblage is there the range of cortex occurrence that might indicate core reduction. This suggests that tool maintenance (resharpening and reedging) rather than production was the main activity generating these core flakes.

Flake Portion. Numbers of distal and proximal flake portions within an assemblage can be an indication of either core reduction or tramping by livestock. An extremely high percentage of distal fragments suggests breakage took place during core reduction. Numbers of distal and proximal fragments that are roughly equal are believed to represent breakage caused by livestock

TABLE 1. LA 104890 COMPONENT 2 ARTIFACT MORPHOLOGY BY MATERIAL TYPE

N Column%	Chert	Alibates	Siltstone	Quartzite	Quartzitic Sandstone	Obsidian	Total
Core flake	153	2	19	4	132		310
	95.0%	66.7%	100.0%	100.0%	98.5%		96.0%
Biface thinning flake	1	1			2	1	5
	.6%	33.3%			1.5%	50.0%	1.5%
Biface (third phase)	3					1	4
	1.9%					50.0%	1.2%
Bidirectional core	1						1
	.6%						.3%
Multidirectional core	3						3
	1.9%						.9%
Total	161	3	19	4	134	2	323
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 2. LA 104890 COMPONENT 3 ARTIFACT MORPHOLOGY BY MATERIAL TYPE

	Chert	Alibates	Rhyolite	Siltstone	Quartzite	Quartzitic Sandstone	Obsidian	Silicified wood	Total
Core flake	150	4	1	17	1	160	2	14	349
	92.6%	100.0%	100.0%	100.0%	100.0%	97.0%	100.0%	100.0%	95.4%
Biface thinning flake	3					2			5
	1.9%					1.2%			1.4%
Biface (second phase)	1								1
	.6%								.3%
Biface (third phase)	1								1
	.6%								.3%
Bidirectional core						1			1
						.6%			.3%
Multidirectional core	6					1			7
	3.7%					.6%			1.9%
Hammerstone flake	1					1			2
	.6%					.6%			.5%
Total	162	4	1	17	1	165	2	14	366
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

(Moore 1996), as are high percentages of proximal fragments.

Component 2

The Component 2 flake assemblage is primarily composed of whole flakes, with a small number of proximal, medial, and lateral fragment also present (Table 5).

Component 3

The flake assemblage from Component 3 is overwhelmingly composed of whole core flakes. There are slightly more proximal than distal fragments also present in the Component 3 assemblage (Table 6).

Flake Platform Type. Flake platforms are the remnants of the core or tool from which the flake was struck. Platform types provide information on the level of core reduction technology pursued at a particular site. Cortical platforms are those that contain cortex material, thus repre-

TABLE 3. LA 104890 COMPONENT 2 PERCENT OF DORSAL CORTEX BY MATERIAL TYPE

Cortex	Chert	Alibates	Siltstone	Quartzite	Quartzitic Sandstone	Obsidian	Total
0	118 73.3%	3 100.0%	9 47.4%	2 50.0%	100 74.6%	2 100.0%	234 72.4%
10	7 4.3%		3 15.8%		7 5.2%		17 5.3%
20	4 2.5%		2 10.5%		5 3.7%		11 3.4%
30	7 4.3%				7 5.2%		14 4.3%
40	3 1.9%				5 3.7%		8 2.5%
50	4 2.5%						4 1.2%
60	3 1.9%		1 5.3%		2 1.5%		6 1.9%
70	5 3.1%		2 10.5%		3 2.2%		10 3.1%
80	7 4.3%		1 5.3%	1 25.0%	2 1.5%		11 3.4%
90	1 .6%		1 5.3%		2 1.5%		4 1.2%
100	2 1.2%			1 25.0%	1 .7%		4 1.2%
Total	161 100.0%	3 100.0%	19 100.0%	4 100.0%	134 100.0%	2 100.0%	323 100.0%

senting early-stage reduction. Single-facet platforms can occur at any stage of reduction. Multiple-facet platforms represent late-stage core or biface reduction (Moore 1994).

Component 2

Five types of platforms were present in the Component 2 assemblage. Single-faceted platforms make up the largest category in Component 2 at 86.3 percent (Table 7). Cortical platforms have the second highest occurrence (9.8 percent). Multifaceted and crushed platforms are present in similar amounts, 1.6 percent and 1.9 percent, respectively. This suggests mid-range reduction occurred during Component 2.

Component 3

Platform types are shown in Table 8. Patterns of common platform occurrence are similar to those found in Component 2 with the same five types of platforms present. Single-facet platforms are by far the largest category present at 87.9 percent. Flakes exhibiting cortical platforms comprise 6.2 percent of the total. Other types of platforms and platform conditions were present in smaller amounts. Flakes where the platform was crushed totaled 2.8 percent of the assemblage. Flakes where the platform was absent made up 1.7 percent. Multiple-faceted platforms were present on 1.4 percent of the assemblage. As we observed with Component 2, mid-range lithic reduction took

TABLE 4. LA 104890 COMPONENT 3 PERCENT OF DORSAL CORTEX BY MATERIAL TYPE

Cortex	Chert	Alibates	Rhyolite	Siltstone	Quartzite	Quartzitic Sandstone	Obsidian	Silicified Wood	Total
0	114 70.4%	4 100.0%	1 100.0%	15 88.2%		143 86.7%	2 100.0%	9 64.3%	288 78.7%
10	3 1.9%					2 1.2%		1 7.1%	6 1.6%
20	9 5.6%					1 .6%			10 2.7%
30	7 4.3%					3 1.8%			10 2.7%
40	6 3.7%					1 .6%		1 7.1%	8 2.2%
50	3 1.9%					1 .6%			4 1.1%
60	3 1.9%					3 1.8%		1 7.1%	7 1.9%
70	3 1.9%					3 1.8%		1 7.1%	7 1.9%
80	10 6.2%			1 5.9%	1 100.0%	3 1.8%			15 4.1%
90				1 5.9%		4 2.4%		1 7.1%	6 1.6%
100	4 2.5%					1 .6%			5 1.4%
Total	162 100.0%	4 100.0%	1 100.0%	17 100.0%	1 100.0%	165 100.0%	2 100.0%	14 100.0%	366 100.0%

place during Component 3.

Tools

Component 2. The lithic assemblage for Component 2 totals 323 artifacts. Of this total, 19.2 percent (62) are tools (Table 9). Utilized debitage used as expedient tools make up the largest single category of this total, comprising 71.0 percent (n=44).

Among formal tools, scrapers occur in the highest numbers. Combined, both side scrapers and end scrapers number seven, or 11.3 percent. Projectile points, gravers, and spokeshaves are all present as 4.8 percent of the formal tool total. Two knives (3.2 percent) make up the rest of the formal tools recovered in Component 2.

Three projectile points were found in Component 2 (Fig. 11). These were analyzed and assigned to temporal categories. One of these points is a transitional Late Archaic-Formative (Jornada Mogollon) side-notched, chert, arrow point of this period (Carmichael 1986). The presence of this point is not surprising given the occurrence of brown ware ceramics in this region of New Mexico.

The second projectile point is the proximal, or base, fragment of a late Paleoindian dart point. Made of Jemez-like obsidian, this point exhibits both fluting and edge grinding. It is possible that this is a Plainview point, but the portion is too short for any identification beyond late Paleoindian, to be made with any confidence.

TABLE 5. LA 104890 COMPONENT 2 FLAKE TYPE BY FLAKE PORTION

	Whole	Proximal	Medial	Lateral	Total
Core Flake	297 98.7%	10 100.0%	1 50.0%	2 100.0%	310 98.4%
Biface Thinning Flakes	4 1.5%		1 50.0%		5 1.6%
Total	301 100.0%	10 100.0%	2 100.0%	2 100.0%	315 100.0%

The third projectile point recovered from Component 2 is a distal (or tip) fragment made of chert. This point fragment is too small to be identified.

Component 3. The lithic artifact assemblage from Component 3 totals 366 items. Tools comprise 28.1 percent (n=103) of this total (Table 10). The largest category of tools in Component 3 is utilized debitage at 63.1 percent of this total (n=65).

Formal tools are present in this component in a wide range of types. The large number of for-

TABLE 6. LA 104890 COMPONENT 3 FLAKE TYPE BY FLAKE PORTION

	Whole	Proximal	Distal	Total
Core flake	337 98.0%	7 100.0%	5 100.0%	349 98.0%
Biface thinning flake	5 1.5%			5 1.4%
Hammerstone flake	2 .6%			2 .6%
Total	344 100.0%	7 100.0%	5 100.0%	356 100.0%

mal tools is dominated by gravers. These number 13, are made of five materials, and make up 12.6 percent of the total tool assemblage. Other commonly occurring formal tools include scrapers (both end scrapers and side scrapers), also at 12.6 percent. Six spokeshaves are present at 5.8 percent. Knives comprise 1.9 percent (n=2). Other formal tools present as single occurrences include a hammerstone, chopper, drill, and a projectile point.

A single projectile point was recovered in Component 3. This was analyzed and assigned to a temporal category. This projectile point is a Late Archaic side-notched dart point of the Marshall type (Carmichael 1986).

Material Texture

While material selection may depend on local availability, studies have shown different material textural preferences exist for prehistoric Puebloan and Archaic groups (Elyea and Eschman 1985:246).

While utilized debitage occurs in the widest variety of materials, the tendency is for projectile points and bifaces to be made of finer textured material than most of the other artifacts. This suggests that formal tools are made of material that will enhance their specialized functions (Bleed 1985). An ability to have a sharp edge is valued in materials such as obsidian, silicified wood, and chert, for projectile points and bifaces. Materials such as quartzite, quartzitic sandstone, and chert,

TABLE 7. LA 104890 COMPONENT 2 FLAKE TYPE BY PLATFORM TYPE

Flake Type	Absent	Cortical	Single-faceted	Multi-faceted	Crushed	Total
Core flake	1 100%	31 100.0%	272 100%		6 100.0%	310 98.4%
Biface thinning flake				5 100.0%		5 1.6%
Total	1	31	272	5	6	315
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 8. LA 104890 COMPONENT 3 FLAKE TYPE BY PLATFORM TYPE

Flake Type	Absent	Cortical	Single-faceted	Multifaceted	Crushed	Total
Core flake	6 100.0%	21 95.5%	312 99.7%		10 100.0%	349 98.0%
Biface thinning flake				5 100.0%		5 1.4%
Hammerstone flake		1 4.5%	1 .3%			2 .6%
Total	6 100.0%	22 100.0%	313 100.0%	5 100.0%	10 100.0%	356 100.0%

are utilized where durability is valued, such as scrapers and choppers. A greater variety of materials are acceptable as utilized debitage, where the main value of the artifacts may be availability and convenience.

Component 2. The range of materials utilized in Component 2 reflects their occurrence locally. The most common local materials, chert and quartzitic sandstone, are the materials used for the widest range of tool types. This is true for both formal tools and utilized debitage. This suggests that material availability was more important than material type.

Component 3. Material occurrence is somewhat different for Component 3. Material use in this assemblage to some extent also follows local material availability. However, there is a wider range of materials utilized for formal tools. Formal tools are constructed primarily from finer-grained materials including chert, silicified wood, obsidian, and a fine-grained quartzitic sandstone. As we have seen, scrapers and gravers dominate the formal tool assemblage. While a majority of these tools are made from finer grained materials, they occur in all material categories.

DISCUSSION

The presence of bifaces, and their percentage within an assemblage, has been used by Kelly (1988:721-723), to differentiate between types of sites. Biface production should take place at residential sites, indicated by the presence of large numbers of bifaces and biface thinning flakes. In contrast, logistical camps and resource procurement areas should have few biface thinning flakes, but large percentages of resharpening flakes and biface fragments.

The frequency of biface thinning flakes are low in these assemblages, as we would expect for

TABLE 9. LA 104890 COMPONENT 2 ARTIFACT FUNCTION BY MATERIAL TYPE

Function	Chert	Alibates	Siltstone	Quartzitic Sandstone	Obsidian	Total
Utilized debitage	23 71.9%	1 100.0%	3 60.0%	16 72.7%	1 50.0%	44 71.0%
Graver	2 6.3%			1 4.5%		3 4.8%
Spokeshave	1 3.1%			2 9.1%		3 4.8%
Scraper, end	1 3.1%			1 4.5%		2 3.2%
Scraper, side	2 6.3%		2 40.0%	1 4.5%		5 8.1%
Knife	1 3.1%			1 4.5%		2 3.2%
Projectile point	2 6.3%				1 50.0%	3 4.8%
Total	32 100.0%	1 100.0%	5 100.0%	22 100.0%	2 100.0%	62 100.0%

logistic or resource procurement sites. This pattern remains constant through time, suggesting similar use of the area by both the Middle Archaic (Component 3) and the later transitional Late Archaic-early Jornada Mogollon (Component 2) peoples.

The differing percentages of formal to expedient tools within the two lithic artifact assemblages reflects the shift through time in subsistence emphasis of the two cultures (Akins and Bullock 1992). This perceived shift is part of a pattern of trends found to occur. This pattern includes an increase in both the debitage to tool ratio and in the total percentage of flakes within an assemblage, coupled with a decrease in the percentage of both cores and bifaces (Bullock 1996).

Both of these trends are evident at LA 104890. The percentage of flakes within the two component assemblages increases, but only slightly from 97.2 percent in Component 3 to 97.5 percent in Component 2. The expected increase in the debitage to tool ratio does occur, raising from 3.5:1 in Component 3, to 5.2:1 in Component 2. In contrast, the percentages of both bifaces and cores should decrease. Bifaces comprise 0.6 percent of Component 3, but actually increase to 1.2 percent in Component 2. Cores however decrease as we would expect, from 2.2 percent in Component 3 down to 1.2 percent in Component 2.

All of the expected temporally based patterns occur between these two assemblages with the exception of percentage of bifaces. This result may be a by-product of skewed sampling caused by the partially intact nature of the site.

Gross interpretations can be made of possible activities represented by a sites' tool kit of utilized artifacts (Parry and Christenson 1987). Bidirectional wear is traditionally considered an indication of cutting and slicing, while unidirectional wear is thought to indicate scraping. Experiments conducted by Brose (1975), and Vaughan (1985) show that wear patterns are unreliable indicators of use (Moore 1996). However, it should be possible to determine, however roughly, the types of activities pursued at this site (Christenson 1987:77).

Projectile points exhibiting wear indicate that hunting took place at LA 104890. Whole points and point tips suggest the processing of game. Conversely, the lack of point bases suggests that rehafting did not take place at LA 104890 during occupation by either component. The

TABLE 10. LA 104890 COMPONENT 3 ARTIFACT FUNCTION BY MATERIAL TYPE

Function	Chert	Alibates	Siltstone	Quartzite	Quartzitic Sandstone	Obsidian	Silicified Wood	Total
Utilized debitage	34 70.8%	2 66.7%	1 50.0%		27 62.8%		1 25.0%	65 63.1%
Hammerstone					1 2.3%			1 1.0%
Chopper			1 50.0%					1 1.0%
Drill					1 2.3%			1 1.0%
Graver	5 10.4%	1 33.3%			4 9.3%	1 50.0%	2 50.0%	13 12.6%
Spokeshave	2 4.2%				3 7.0%	1 50.0%		6 5.8%
Scraper, end	2 4.2%			1 100.0%	4 9.3%			7 6.8%
Scraper, side	3 6.3%				2 4.7%		1 25.0%	6 5.8%
Knife	1 2.1%				1 2.3%			2 1.9%
Projectile point	1 2.1%							1 1.0%
Total	48 100.0%	3 100.0%	2 100.0%	1 100.0%	43 100.0%	2 100.0%	4 100.0%	103 100.0%

Paleoindian point base is not relevant since, from its context, it appears to have been collected and brought to the site at a later date, perhaps as a talisman.

The similarities of these two assemblages indicate that similar activities were conducted at LA 104890 during both periods of site use. The presence of the knives and scrapers suggests that animal butchering and processing and leather processing was carried out at this site. Gravers are used in the processing of either bone or wood. Their occurrence in combination with scrapers and knives suggests that in both components they were used to process bone. However, spokeshaves are specialized tools usually associated with woodworking. The combination of gravers and spokeshaves could indicate woodworking took place during both components. The presence of the hammerstone in the Component 3 assemblage may be related to the striking of flakes to use as expedient tools. Although it could have also been used to sharpen (pit) the surfaces of ground stone tools.

The main difference between these components appears to be one of degree or intensity of site use. The range of tool types occurring within each component are typical for similar sites in the region (Rogers 1987). One main difference, however, is that tool types that occur in each component, are represented in higher numbers within the earlier Component 3 than in Component 2. The earlier component (Component 3) also contains a wider range of tool types than the later Component 2. The range of activities represented are indicative of both a longer period of site use and more complex group composition during Component 3.

Many of the expedient flake tools utilized in these assemblages could have also functioned in a similar manner as formal tools. They may, however, represent different unknown activities, such

as the processing of vegetal foodstuffs. These expedient tools could be the result of unplanned actions or the repairing of clothing or equipment.

Projectile points were present in both components at LA 104890. Component 2 contained three projectile points, one of which was helpful in assigning this component to the transitional Late Archaic-early Formative (Jornada Mogollon) period. This projectile point is a chert, early Formative type common to this period in southern New Mexico (Carmichael 1986). The second of the projectile points from Component 2 is a late Paleoindian point base. This fragment could possibly be a Plainview type. Made of what visually appears to be Jemez obsidian, this projectile point fragment is so short that it cannot be identified to a specific type with complete confidence. This projectile point is clearly out of context on this site, suggesting that it was brought in at a later date. Projectile points from earlier periods have commonly been collected by many Indian groups for use as charms or talismans. The third projectile point from Component 2 is a point tip. Made of chert, this fragment is too small to identify by type.

One projectile point came from Component 3. This is a Marshall point dating from the Middle Archaic into the transitional Late Archaic-Formative period. Made of chert, this is a corner-notched point type common to eastern and southern New Mexico (Carmichael 1986).

Two of the points are whole. The other is a distal fragment. Whole points and point fragments are likely to be recovered from animals killed by arrows or darts. The Paleoindian point fragment is not considered here because it is presumed to be out of its original context.

Analysis of the lithic artifacts from LA 104890 shows that an expedient core-flake technology was utilized by the sites' inhabitants. This took place during both occupational episodes, and in both cases served to supplement the specialized tool use that was taking place. This was especially true in the later occupation (Component 2), with its increased use of expedient tools. Any initial core reduction is limited to locally occurring materials. Little tool manufacturing was carried out during either occupation, as indicated by the small number of biface thinning flakes. There is no evidence that the biface-reduction technology, related to the manufacture of specialized tools utilized at LA 104890, took place at this locale.

Assemblages from excavated Puebloan sites tend to reflect an expedient lithic technology, with flakes produced for use as short-term, disposable tools (Vierra et al. 1993). Formal tools, other than projectile points are rare (Larralde 1994; Vierra et al. 1993). Bifacial reduction is generally associated with Archaic and Basketmaker II or other early Puebloan sites (Moore 1996), and seems to have been replaced by expedient flaking as part of the general cultural shift to a sedentary agricultural lifestyle. This shift seems to have taken place at a later period among the Jornada Mogollon, especially the eastern Jornada Mogollon, than among groups such as the Mogollon and Anasazi.

At LA 104890 we observe this subsistence shift through the differences in the lithic artifact assemblages of two of the site's three components. The earliest component (Component 3) is a Middle Archaic assemblage. The later component (Component 2), while not quite developed into the Jornada Mogollon, reflects the shift toward that sedentary agricultural lifestyle.

This assemblage suggests both components at LA 104890 had populations with a long-established lithic tradition based on bifacial reduction that was supplemented with expedient core reduction and flake tool use. However, by the later component (Component 2) emphasis was shifting away from formal tool use and more toward the use of expedient flakes.

Nonlocal material is sparse within either component at LA 104890, and is limited in both cases to Alibates dolomite and obsidian. The presence of this nonlocal material indicates at least a degree of long-distance procurement or trade, suggesting that these sites functioned as part of a larger exchange and communications system.

GROUND STONE ARTIFACT ANALYSIS

Ground stone artifacts were associated with both of the earlier components at the Merrill site. Two ground stone artifacts were found with Component 2, and seven ground stone artifacts were recovered with Component 3.

Analytical Methods

Attributes chosen for analysis reflected the desire to achieve the greatest return of useful information within the available time frame. The guidelines and format followed the Office of Archaeological Studies *Standardized Ground Stone Artifact Analysis: A Manual for the Office of Archaeological Studies* (OAS 1994b).

Analytical Results

Component 2

Two ground stone artifacts were recovered from Component 2 at LA 104890. Both of these pieces of ground stone are mano fragments. These artifacts were recovered from two separate proveniences on the site, and represent part of the general trash scatter associated with Component 2.

Manos. Both mano fragments collected from Component 2 are made of a fine-grained sandstone. Each fragment is small, making it impossible to determine its original whole form. Both fragments exhibit a single grinding surface. Each mano fragment exhibits heavy red oxidation on all surfaces. This indicates that these artifacts were subjected to intense heat in a fire, either as structural portions of a hearth or roasting pit, or in some other activity involving the use of hot rocks (such as cooking) (Schlanger 1991).

Metates. No metate or metate fragments were recovered at LA 104890 associated with Component 2.

Component 3

Seven ground stone artifacts were found in Component 3 at LA 104890. Of this total, five are mano fragments and two are metate fragments. All of these artifacts are associated with Features 2 and 3.

Manos. Three mano fragments were found just outside of Feature 2, a stone-lined hearth. Two additional mano fragments were found within Feature 3, a warming pit.

One mano fragment associated with Feature 2 is fine-grained sandstone. This is an edge fragment, with a single grinding surface. The other two mano fragments are portions of the same mano. Made of coarse-grained sandstone, these are also edge fragments that have a single grinding surface. It is impossible to determine the original configuration of these manos from the small size of the fragments. All of these mano fragments are heavily burned and oxidized.

Two mano fragments were found within Feature 3, a warming pit. Both of these fragments are made of fine-grained sandstone. One fragment is approximately half of a one-handed mano. This mano has two grinding surfaces, each of which is heavily worn and relatively flat. The edge of this mano exhibits evidence of having been shaped by pecking prior to its use for grinding. Both of the grinding surfaces extend only slightly up the edge of the mano, indicating that this mano was used with a basin metate. This piece of ground stone is heavily oxidized, having been subjected to intense heat. The second mano fragment has a single grinding surface. Because this is an interior

fragment, it is impossible to determine the original form of this mano. Unlike all of the other mano fragments recovered at LA 104890, this piece of ground stone is only slightly oxidized.

Metates. Two metate fragments were recovered from Component 3 at LA 104890. One metate fragment was found just outside of Feature 2. This is an edge fragment of a very shallow basin metate. Flaking is present along the outside edge, indicating that the stone was shaped prior to use. One of the other broken edges exhibits battering, showing that it was used as a hammerstone sometime after the metate was broken. This piece of ground stone is slightly oxidized from burning.

The second metate fragment was found covering the opening of Feature 3. This is approximately a one-quarter portion of a shallow basin metate. Made of a coarse-grained sandstone, this metate has two well-used grinding surfaces. The outside edge of the artifact is heavily flaked and pitted, indicating that the stone was shaped prior to its use as a metate. Both grinding surfaces also show evidence of having been rejuvenated, or resharpened, by pecking. This metate is heavily oxidized from burning.

Discussion

Although small, the ground stone assemblages from the two earlier components at LA 104890 provide important information on both the degree of plant use and the related activities pursued at the site during each cultural period represented. The presence of ground stone artifacts in Component 2 (a short-term use area) and Component 3 (a long-term seasonal use area), show that the processing of plant material had taken place during both periods that the site area was utilized.

One-handed manos and basin metates are the major elements of a grinding technology oriented toward the efficient processing of wild seed (Bartlett 1933; Lancaster 1986), although as specialized tools they are also used in the processing of insects (Sutton 1988). These artifacts are portable, but are usually found in archaeological contexts that show they were either outside of structures, or in sheltered areas (Schlanger 1991). The occurrence of ground stone at LA 104890 seems to be such a case. Although both mano and metate fragments are present, they all occur in within the context of outdoor use areas. In Component 2 they occur within the trash deposit. In contrast, the ground stone artifacts in Component 3 are both within the trash deposit area adjacent to Feature 2, as well as curated within Feature 3.

Basin metates are often found on sites that have no evidence of structures, indicating that their place of use was not always associated with habitation areas. The metate fragments found at LA 104890 are evidence that possibly seed processing occurred at the site. The short-term nature of site use during Component 2 therefore could have focused on seed collection and processing. The processing of insects for food is less likely to take place at the area of collection than at a camp site (Sutton 1988). The presence of a hearth with the metate at LA 104890 thus makes the processing of insects, as well as seeds, a possibility because of the possible combination of heating and grinding (Sutton 1988). A similar period and range of site use is suggested for Component 3.

Manos and metates had to be resharpened frequently. Bartlett (1933) suggested this had to be done every five days when the tools were in constant use. The resharpening was done by pecking the grinding surface with a hammerstone or core to rejuvenate the grinding surface. This resharpening was responsible for most of the wear on these ground stone tools. Manos had to be resharpened more frequently, and had to be replaced more frequently than metates (Wright 1990).

Many of the mano and metate fragments from LA 104890 are heat spalls. Common forms of breakage, heat spalls, occur when stone is subjected to intense heat. Differentiation in heating causes breaks to occur in the stone (Shelley 1983). When these artifacts are broken they may be discarded immediately, stored for future use, or utilized in some other manner (Schlanger 1991). Stone artifacts are commonly reused on prehistoric sites, quite often in hearths or roasting pits.

They are used both as structural elements, and for hot stone roasting and boiling.

Only one of the ground stone artifacts from LA 104890 shows any indication of secondary wear, indicating that most were not used later for other purposes, such as the grinding of clays or paints, or for the shaping of beads. The one reused piece of ground stone exhibits battering, suggesting it was used as a hammerstone.

Schlanger (1991) has found that there is a correlation between the locations of mano and metate fragments and length of site occupation. Broken mano and metate fragments only occur in fill and trash deposits when the site occupations or structures last longer than the use-life of these tools. The broken artifacts are usually first delegated to a floor surface. Through time these artifacts accumulate, and are then "transformed" into trash and removed from the structure to designated trash locations (midden areas, fill, sheet trash, etc).

In the case of LA 104890 all of the ground stone artifacts from Component 2 made the transition to trash status. However in the case of Component 3, although the ground stone artifacts found near Feature 2 had reached trash status, the ground stone artifacts present within Feature 3 (the warming pit) had not. The mano fragments would appear ambiguous were it not for the large metate fragment covering the feature. This suggests that these pieces of stone were being curated for possible later use.

In this case the metate fragment found at the site was placed over the top of the hearth. This is an action analogous to secondary use, making the use-life of the ground stone artifact longer than the length of the site's occupation. Not only does this fit Schlanger's 1991 model, but it is a further indication that LA 104890's Component 3 was a short-term use area.

Basin metates and one-handed manos, designed for the efficient grinding of wild seed (Bartlett 1933; Wright 1990), continue as a presence on Puebloan sites after agricultural intensification as specialized tools (Phagan 1986; Shelley 1983), despite the developed dependence on maize. Although these tools were often utilized in the processing of insects into meal (Sutton 1988), their main use remained the processing of wild seed. This continued use was particularly developed in areas of marginal agriculture, such as the Jornada Mogollon. During the transitional Late Archaic-Jornada Mogollon period the presence of one-handed manos and basin metates are indicative of the large role played by gathering.

FAUNAL REMAINS

A total of 10 pieces of bone and two pieces of freshwater mussel shell were recovered at LA 104890. Virtually all of the recovered bones are fragmentary bones of medium to large mammals. The fragmentary nature of at least some of the bone makes its identification to a specific species problematic. Most of this bone could be from deer or antelope based on the thickness of the bone. The fragmentary nature of the bone is likely the result of a combination of extensive processing and poor preservation.

Analytical Methods

Bone from LA 104890 was analyzed, and the variables recorded, through a modified form of the OAS faunal recording format. It was analyzed by cultural component.

Taxonomic identifications were made as specific as possible using the OAS comparative faunal collections. Because of limitations within this collection, some identification at the species level is often not possible. When a piece of bone could not be identified to species or even family, a range of indeterminate categories was used to identify the size of the animal involved and note whether it was mammal, bird, or indeterminate. Each bone was counted only once, even when it was broken into a number of pieces during excavation or laboratory processing.

Taxa

The taxa found, common name or indication of the size of the animals, number of elements, and comments on condition are given by cultural component in Table 11. The fragmentary nature of both assemblages makes it difficult to determine the minimum number of individuals (MNI). It is possible that some bone represents no more than a single individual of each species represented.

Component 2

A majority of the bone recovered from Component 2 at LA 104890 could not be identified to the kind of animal, only to the size of animal represented. Seven pieces of bone were recovered from Component 2. The largest category of bone from this component is medium to large mammal or artiodactyl (three pieces or 42.9 percent). This is most likely to be either deer or pronghorn. The second largest category of bone from Component 2 is large mammal (two pieces or 28.5 percent). One piece of bone was from a very large artiodactyl (possibly bison or cattle). A single bone was identified to a specific species. This was a phalanx from a mature bobcat.

The bone from this component probably represents sheet trash across the site area. The eroded and pitted nature of the bone indicated that it is not of recent origin. It is possible that some of this bone is historic from recent roadside trash, due to the shallow nature of this component. The one possible bison bone fragment could just as easily be from a cow, since it is both in much better physical condition than the other bone from this component and is from a disturbed portion of the site.

Component 3

Three pieces of bone and two of freshwater mussel shell were found at LA 104890 in Component 3. Two of the three pieces of bone could not be identified to the kind of animal, and are classified simply as medium to large mammal. The third piece of bone is from a large canid (dog or wolf).

TABLE 11. FAUNA RECOVERED FROM LA 104890, THE MERRILL SITE

Provenience	Taxon	Description	Comments
Disturbed			
FS 14 0N 6E surface strip	medium to large mammal	long bone shaft fragment; mature	slightly polished; rounded
	cf. large artiodactyl; size of *Bos/Bison*	left rib shaft fragment from near proximal end; mature	slightly polished; exfoliated
Component 2			
FS 24 1N 14E Level 1	medium artiodactyl; size of deer or pronghorn	femur, proximal epiphysis fragment; young adult	surface mostly eroded away
FS 33 0N 11E Level 2	large mammal	rib shaft fragment, mature	dry burn, black interior, brown exterior; polished
FS 41 1S 8E Level 1	medium to large artiodactyl	premolar or molar enamel fragment; mature	heavily pitted
FS 54 1N 3E Level 1	large mammal	rib shaft fragment; mature	heavily pitted
FS 64 1N 0E Level 1	*Felis rufus* (bobcat)	phalanx 1; mostly complete; mature	heavily pitted
Component 3			
FS 47 0N 5E Level 1	medium to large mammal	long bone shaft fragment; mature	calcined
FS 55 0N 9E Level 3	medium to large mammal	long bone shaft fragment ;mature	heavily pitted and exfoliated
FS 62 1N 9E Level 1	large canid (wolf or large dog)	right calcaneus - distal half; mature	heavily pitted and checked
FS 65 1 N 10E Level 2	*Cyrtonaias tampicoensis (Pecos pearly mussel)*	left bivalve fragment; tooth portion	
	Unionidae (freshwater mussel)	bivalve fragment	

Although both pieces of shell are from freshwater mussels, only one could be identified to the species level. This was the tooth valve portion of a Pecos pearly mussel shell.

This small assemblage of bone and shell formed part of the Component 3 sheet trash associated with Features 2 and 3. All of the bone from Component 3 is heavily eroded and pitted, indicating it is not of recent origin.

DISCUSSION

A number of conclusions can be drawn from the faunal assemblage from LA 104890, despite its small sizes. Environmental alteration of the recovered bone is, for the most part, heavy. Most of the bone is pitted, exfoliated, or both, while only the bone from the disturbed provenience is polished and possible historic (or recent). This suggests that few if any of the bone was left exposed to the elements for any appreciable length of time.

Little evidence of processing is present on any of the recovered bone, but this may be a by-product of poor preservation. The occurrence of this bone within each component in sheet trash suggests that despite the apparent lack of processing marks, the bone is the by-product of animal

procurement. This also suggest that at least some processing took place during both periods of site use. It also suggests that more processing may have occurred than is evident from the faunal record. Of interest is the similarity of the faunal assemblages, despite the cultural differences of the two components they represent at LA 104890. Virtually all of the bone is from medium to large mammals, most likely deer or pronghorn. Both of these species regularly occur in the general site area. This suggests a similar use of the area during both occupations. The possible presence of bison could represent an opportunistic kill, as could the bobcat and possible wolf. The freshwater mussel shell indicates direct contact with the Pecos River Valley (approximately 35 miles to the west).

CONCLUSIONS

The data recovery efforts at the Merrill site (LA 104890) focused on the cultural affiliations represented by each of the three site components, and the resulting differences in site structure, subsistence, and resource procurement. Radiocarbon and archaeomagnetic samples were used in combination with lithic artifact and ceramic data to aid in the determination of cultural affiliation at the component level. The range of site activities and the relationship to site function was based on artifact, pollen, and macrobotanical analyses. Subsistence and resource procurement patterns in the site area were examined by inferences derived from the assembled data sets.

Although the precise dating of the Merrill site was not one of the primary goals of the research design (Bullock 1997), it was hoped that precise dates would aid in the assessment of site use-life, population movements, settlement patterns, and community organization. In fact, precise dating revealed the presence of a third unexpected later component (Component 1).

The range of occupations represented at the Merrill site fits into the regional pattern evident in the work at Los Esteros Reservoir, 35 miles to the northwest of the site area. Except for a Paleoindian occupation, Shelberg and Akins (1987) found little evidence of regional utilization prior to the Late Archaic in the Los Esteros area. The presence of a Middle Archaic component at LA 104890 suggests a population shift away from the Pecos River may have occurred during that period.

Cultural Affiliation

The cultural affiliation of LA 104890 is based on the presence of diagnostic artifacts. This is a multicomponent site in which three components are represented. Component 1, dating to the historic mid A.D. 1800s and the latest of the three components, cannot be assigned a cultural affiliation due to the lack of artifacts associated with the single dated feature.

Component 2 is assigned to the transitional Late Archaic-early eastern Jornada Mogollon period. Superficially, the artifact assemblage could be assigned to the Late Archaic period. However the presence an early Formative projectile point suggests that this component dates to the transitional Late Archaic-early eastern Jornada Mogollon, a cultural presence common in this area as far north as the Canadian River (Levine and Mobley 1975).

Component 3, the oldest of the three components present, is assigned to the Middle Archaic based on the presence of the rock-lined hearth (a feature type common in the Middle Archaic), and the Marshall projectile point (a common Middle Archaic type).

Site Structure

Site structure can be determined for a site based on the range and types of activities that may have been conducted within a specific locale. On-site activities can be deduced from the locations and functions of site features. Descriptive information on features, combined with analysis of the associated artifacts and other cultural material can assist in determining feature type.

Component 1, superficially at least, appears to be limited to a single-use episode. Macrobotanical data from the contents of the hearth are limited, with few charred plant remains associated with the feature. Although this could be a result of poor preservation, it could also suggest that the feature was not used in association with plant materials. Since the few charred plant remains that are present in the fill of this feature are from naturally occurring local species, they may have been there prior to the hearth being used. However, due to the small intact portion of the component, few conclusions are possible.

Component 2 represents intensive short-term use of the site area. A number of activities are indicated for Component 2 based on the artifact assemblage. The range of activities suggest use of LA 104890 during this period as a short-term procurement area, possibly as a hunting camp.

From the artifact assemblage we have evidence of sex-specific tasks taking place at LA 104890 by both men and women. These tasks include hunting, butchering, and hide processing of large animals. The recovered manos indicate the processing of either insects or grass-seed. This suggests site use by a small group comprised of one or more families.

Site location at LA 104890 would have facilitated hunting success by providing a position that combined location at the foot of the talus slope below the escarpment with a location overlooking the then-permanent water source of Alamogordo Creek. Occupants of LA 104890 would have been in a position to both observe and intercept game moving between the rough wooded escarpment and the available water.

Short-term site use is suggested by the lack of hearths and other features associated with this component. However, it is possible that any features associated with this period of site use were located further to the south and were removed by construction of NM 156.

The lithic artifact assemblage from LA 104890 indicates a number of activities connected with hunting. The presence of projectile points, scrapers, and knives suggests the processing of game and hides. This is confirmed by the occurrence of bone. Virtually all of the bone recovered from Component 2 is from large mammals (possibly deer or pronghorn). These activities also include a short, or single incident of tool-related stone chipping. The presence of exotic (nonlocal) lithic material (obsidian and alibates dolimite) demonstrates that the group utilizing the site had contacts with other areas, or with people who had access to these materials.

The processing of plant material during Component 2 is indicated by the presence of manos at LA 104890. That this processing was taking place in a short-term use area suggests it was probably connected with the gathering of locally or seasonally available wild grass seed (Lancaster 1984). The processing, through grinding, of insects as food cannot be discounted, however (Sutton 1988).

Component 3, in contrast, represents long-term site use by one or more family groups. The features (hearth and warming pit) when combined with the present sheet trash, indicate long-term (probably seasonal) site occupation. Based on the artifact assemblage present we know that the same range of activities pursued later during Component 2 site use is present during Component 3. These also include hunting and game processing, as well as the grinding of grass seed or insects.

Macrobotanical samples were collected from the features present in Component 3. These studies focused on the identification of plant remains, and their significance with regard to economic and subsistence practices. Unfortunately, no plant remains were recovered from any of the samples.

As with Component 2, site location is probably the direct result of the presence at Alamogordo Creek of a permanent water source to the south combined with the rough broken landscape of the escarpment and talus slope directly to the north.

Long-term occupation of LA 104890 during Component 3 is indicated by the presence of features (both a rock-lined hearth and a warming pit), as well as the presence of sheet trash. This site use may have also been seasonal, although there is nothing in the artifact assemblage to actually prove this.

As a long-term (possibly seasonal) habitation site, evidence for a greater number of activities should be present in Component 3 than in the later Component 2 with its shorter duration of use. This is not to suggest that all activities represented had an equal degree of focus for the site population. Through use of the archaeological data at LA 104890 two activities stand out in importance; (1) the hunting and processing of large mammals (deer or pronghorn), and (2) the processing of wild plant seeds.

Site activities can be investigated through analysis of the artifacts present. Evidence for the hunting and processing of large mammals (either deer or pronghorn), at least to a limited degree, is present in the faunal remains at LA 116503. The number of processing-related tools, such as scrapers and gravers (used to split bone), indicates that, at the very least, secondary processing and possibly hide processing may have taken place at the site.

While it is possible that any processing may have involved other materials such as plant products, the faunal evidence indicates that processing of large mammals could have been one of the main foci of activity at this locale.

The second major activity pursued during Component 3 is the processing of seeds. This is indicated by the presence of both one-handed manos and basin metates. Both of these types of artifacts have been shown to relate to the processing of wild seeds (Lancaster 1984).

Although wild grass seed is usually considered the main item gathered in this area, both acorns and possibly mesquite beans are added possibilities. As there was a permanent water source during the occupation of LA 104890, other plant seeds or fruits could have also been available in the immediate area of Alamogordo Creek. The opportunistic collecting and processing of insects, which historically utilized basin metates (Sutton 1988), also cannot be ruled out. The occurrence of ground stone artifacts in trash deposits is indicative of repeated site use, as are the trash deposits themselves.

Lithic artifacts are another method of identifying activities that may have been pursued at LA 104890 during Component 3. Specific forms of flakes are produced by different lithic material reduction strategies. For Archaic cultures, lithic tool production is based on biface reduction and the construction of specialized formal tools. Formal tools are produced for specific functions, although their use may not be limited to a single action. Lithic tools wear during use. Although attempts to show forms of wear to be task-specific have proved inconclusive (Brose 1975; Moore 1996), general interpretations of the range of activities represented by the lithic assemblage are possible.

Bifacial reduction usually results in large numbers of both biface flakes and formal tools present within the artifact assemblage. This is not the case in Component 3, where there is little evidence that tool production was taking place at the site. It is important to note that this conclusion may be a byproduct of a portion of the site having been removed during road construction of NM 156.

As with Component 2, the question of the formal tools recovered during Component 3 suggests a corresponding emphasis on hunting-based specialized activities. These included not only hunting, but also possible game butchering. While gravers are known to be used for wood as well as bone, gravers associated with large mammals (deer or pronghorn) at LA 116503 suggests that they were used in processing bone. Gravers are used to cut a groove in a bone, allowing it to be split. This action was done both to obtain the marrow and also as part of the utilization process of the bone itself.

The condition of the projectile points recovered from LA 104890 is also characteristic of hunting. Recovered whole projectile points are usually considered evidence of hunting success with the points considered to have been recovered from game.

Both cutting and scraping are represented in the lithic artifact assemblage. Animal processing is likely, based on the existence of scrapers and knives. This includes the processing of bone (as indicated by the gravers) and the possible processing of leather.

Limited knapping of lithic materials took place at LA 104890 during Component 3, at least in the portion of the site that was excavated. What stone knapping that did occur was most likely connected with the maintenance, not the production of tools. Tool production was probably centered at a different locale, possibly another village location. If tool production did occur during Component 3, it was not within the project limits.

The processing of locally available plant material based on the site location near an area of permanent water (including the use of reeds, willow, etc), may have also taken place. However, no evidence of any riparian plant species was found in the collected macrobotanical samples. The macrobontanical samples were a disappointment since they contained only the seeds of noncultural, noneconomic plant species.

Faunal remains represent another avenue for studying possible activities represented at LA 104890 during Component 3. The presence of faunal remains indicates types and forms of faunal consumption. Those recovered from Component 3 (as with the later Component 2) are primarily large mammal (deer or pronghorn). There is little evidence of evidence of faunal processing; however, this may be due to its poor preservation. The lack of bone from other species, while possibly also a result of poor preservation, could be a further indication of site specialization associated with the hunting of deer and/or pronghorn. The other species in the assemblage may represent opportunistic kills. Low bone frequencies in sheet trash deposits can result from both natural and cultural factors. Sheet trash deposits are subject to erosional and deteriorational forces, and to trampling and scavenging by wild animals and cattle. At LA 104890 however, more defined midden areas may have been removed by the construction of NM 156.

Freshwater mussel shell is also present in Component 3 at LA 104890, but limited to the sheet trash on the site. Freshwater mussels are a common food source in the general site area. The Pecos River was the closest place where they have occurred historically (Wiseman 1985). Their presence at LA 104890 indicates that wild foods were gathered at least as far away from the site as the Pecos River (48 km). It is also possible, however, that mussels occurred in Alamogordo Creek when it was a permanent water source.

The features and artifacts present in Component 3 at LA 104890 are evidence for a Middle Archaic long-term (possibly seasonal) procurement site. Analysis of the artifact assemblages and structural features indicate that subsistence was probably based on hunting and the gathering wild plants. Additional activities involved in the maintenance of a community can probably be assumed to have taken place. These would include the needed construction for shelter and repairing of clothing and equipment.

Resource Procurement

Component 1 resource procurement is limited to the use of locally collected juniper that was utilized as fuel. Although other plants were represented within the hearth associated with this component, they were not cultural or economic species, and appear to have been present prior to hearth use.

Component 2 at LA 104890 is a short-term use area. Short-term use areas are usually associated with resource procurement. They can be connected with hunting, the gathering of wild plant material, the collection of raw materials, and even the gathering of pigments and clays (Adams 1978). These sites vary in size and tend to transcend both time and cultural affiliation (Ellis 1988; Leslie 1979: Oakes 1985).

Short-term procurement areas are a common occurrence among both the Late Archaic and the eastern Jornada Mogollon (Leslie 1979; Oakes 1985). These sites are usually associated with the task-specific gathering of plant foodstuffs (Oakes 1985). This type of site occurs in the general area at a much greater frequency than habitation sites (Leslie 1979; Whalen 1979; Wiseman 1996).

Small short-term resource procurement areas associated with the gathering of wild plants are a common feature in Puebloan culture historically, where wild foodstuffs were utilized to supplement diets despite the cultivation of domesticated crops (Ellis 1988). This is true for both wild foodstuffs, as well as plant material collected for other purposes such as grass or reeds for basketry, medicinal plants, and plant material used for dyes or pigments (White 1962).

In most cases the collecting of wild plants took place as a day trip, or at most a trip of several days, from the village (White 1962). The location of LA 104890 on the eastern plains suggests that the people of Component 2 were operating out of a base camp in the general area. This would probably be a longer-occupied seasonal camp similar to what was present at LA 104890 during the earlier Component 3. This is also indicated by the small size of the site, in comparison with the more common large gathering locales (Oakes 1985). The exact location of any related settlement during this period of site use however remains unknown. The focus at LA 104890 on the gathering of wild grass seeds, would put the site seasonally in the summer or fall.

The lithic artifacts may also be an indication of the gender of the site's inhabitants. The lithic tools that were recovered are all tools associated with the hunting and processing of game. Large game (deer or pronghorn) are indicated in Component 2 by the presence of bone. Typically among the Pueblos the hunting of large game is a male activity, while the processing of game is associated with women (except in cases where the processing takes place away from the camp or habitation) (White 1962). The combination of lithic tools used in animal processing and ground stone suggests that the inhabitants of LA 116504 during Component 2 were a mixed group of both men and women.

The faunal remains from Component 2 are another source of information on resource procurement at the site. The remains are limited to a few fragments of bone, primarily from large mammals (deer or pronghorn). While these could not be identified at the species level due to their poor preservation, they could represent successful hunting in the general site area.

During Component 2, LA 104890 may have served as a short-term camp site associated with both hunting and gathering. The processing of both wild seeds and large game could both be actively pursued at the same site. It is therefore logical that bands would travel out from the seasonal village to gather wild seeds and hunt, perhaps staying away for several days or a week at a time. During the Component 2 transitional Late Archaic-early Jornada Mogollon period , LA 104890 could represent the short-term procurement area, or camp site, of just such a group.

Component 3 exhibits evidence for the same range of activities as the later Component 2. Differences between Components 2 and 3 involve more of a length of occupation. While the hunting of deer or pronghorn may have served as one focus of activity during Component 3, a second focus was the gathering of locally available wild seeds. The ground stone artifacts at LA 04890 during Component 3 indicates that this was most likely, but not limited to grass seeds, such as Indian Rice grass. Oakes (1985) found similar evidence for the specialized large-scale gathering of a specific wild foodstuff (in this case acorns) in her work in southeastern New Mexico at Hackberry Lake.

Rabbits, insects, and other available plants may have further supplemented the diet of the site's population, however there is no evidence for it. None of the usual evidence for broad-based hunting and gathering that would be present at a permanent habitation site is present at LA 104890 during Component 3. This is especially apparent, given the site's location adjacent to the enriched, oasis-type environment of a permanent or semipermanent water source. However, given the same range of actives in combination with the presence of features does suggest longer-term use of the site during this period than during the later Component 2.

The same range of hunting and processing-related activities are present in Component 3 as we've seen in Component 2. The faunal assemblage is also similar, principally connected with large mammals (deer or pronghorn). However there is the added presence of mussel shell, which suggests use of the Pecos River by this Middle Archaic group, that is, unless mussels were previously present in Alamogordo Creek. The presence of exotic (nonlocal) lithic material indicates contacts with other areas and populations.

Unfortunately, macrobotanical samples from this component were of no help in identifying plant species that may have been utilized during the Component 3 occupation of LA 104890.

The hearth and warming pit, as well as the ground stone artifacts, indicate the presence of women during this period of site use and suggest a larger presence within the group than shown in Component 2. This is evidence for longer term site use than that exhibited during later use of LA 104890.

Discussion

The site is in a protected area beneath the escarpment and talus slope of the caprock. It is also at the top of a long open slope leading down to the wooded strip of land bordering Alamogordo Creek. This put people utilizing LA 104890 in a perfect position to watch the approach of game (such as pronghorn) or enemies on the plains, and to intercept deer or other animals moving between the wooded rough talus slopes and the water source.

This prime hunting locale seems to have been a major aspect of site use during both of the earlier periods of site occupation, the Middle Archaic (Component 3) and the transitional Late Archaic-early Jornada Mogollon period. Its also probable that this ability to view the surrounding countryside (for whatever purpose) contributed to site use during the historic period (Component 1). Thus, we have similar use of LA 104890 by three different cultural groups through time. The same resources are exploited in a similar manner by at least two of these groups, with differences being primarily in duration and intensity.

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