COLORADO PREHISTORY:

A CONTEXT FOR THE ARKANSAS RIVER BASIN

Christian J. Zier and Stephen M. Kalasz

with contributions by

Mary W. Painter, Mark Mitchell, Amy Holmes, and Michael McFaul

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COLORADO COUNCIL OF PROFESSIONAL ARCHAEOLOGISTS
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http://www.coloradoarchaeologists.org

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FOREWORD

The Colorado Historical Society is pleased to support the publication of the Prehistory of Colorado series. This set of volumes fills a vital need for background material that synthesizes our gray literature and provides contexts for evaluating new discoveries in our State:

Colorado Prehistory: A Context for the Arkansas River Basin, by Christian J. Zier and Stephen M. Kalasz.

Colorado Prehistory: A Context for the Northern Colorado River Basin, by Alan D. Reed and Michael D. Metcalf.

Colorado Prehistory: A Context for the Platte River Basin, by Kevin Gilmore, Marcia Tate, Mark Chenault, Bonnie Clark, Terri McBride, and Margaret Wood.

Colorado Prehistory: A Context for the Rio Grande Basin, by Marilyn A. Martorano, Ted Hoefer III, Margaret (Pegi) A. Jodry, Vince Spero, and Melissa L. Taylor.

Colorado Prehistory: A Context for the Southern Colorado River Basin, by Crow Canyon Archaeological Center.

We commend the Colorado Council of Professional Archaeologists (CCPA) for completing this project, just as they were instrumental in beginning the regional research design series published by our Office of Archaeology and Historic Preservation in 1984. The past fifteen years have seen an explosive growth in information about our shared past, and the turning of the millennium gives a symbolic opportunity to reassess our understanding of ancient Colorado.

A grant from the State Historical Fund enabled the CCPA to undertake this project, and all volume authors donated great amounts of their professional time during the two-year course of this project. These individuals and their businesses have made investments in knowledge. We are grateful to them for their efforts and for sharing what they have learned. The CCPA grant advisory board, consisting of Sandra Karhu (Chair), William Killam, Steven Lekson, Gordon Tucker, Douglas Scott, and Margaret Van Ness, guided the development of the project. Susan Chandler served as project manager. A large committee of CCPA members offered peer review—namely, Dan Jepson, OD Hand, Melissa Connor, Marilynn Mueller, Pete Gleichman, Doug Bamforth, Bob Brunswig, Jeff Eighmy, Martin Weimer, Mark Stiger, Bruce Jones, Joanne Sanfillipo, Kevin Black, Todd McMahon, Betty LeFree, Steve Lekson, and Al Kane.

Within the Colorado Historical Society, Margaret Van Ness advised CCPA on project planning; Kevin Black and Todd McMahon served as peer reviewers; and Julie Watson and Jay Norejko offered helpful comments on drafts. This series of five volumes provides a new platform for understanding the long and complex history of Colorado. Improved knowledge about the complexity of past lifeways can help us to appreciate our common human heritage. We look forward to continuing partnership in our shared quest for discovery!

Susan Collins
State Archaeologist
Deputy State Historic Preservation Officer

Georgianna Contiguglia
President, Colorado Historical Society
State Historic Preservation Officer

CONTRIBUTORS

Christian J. Zier, President and Director of Centennial Archaeology, Inc. in Fort Collins, Colorado, holds a Ph.D. in anthropology from the University of Colorado-Boulder. He has conducted archaeological research in the western and central U.S. and El Salvador and paleontological fieldwork in North Africa. He has participated in surveys and excavations throughout southeastern Colorado, including the Fort Carson Military Reservation, the Pinon Canyon Maneuver Site, and the Bucci Ranch in Huerfano County.

Stephen M. Kalasz, Staff Archaeologist for Centennial Archaeology, Inc., holds an M.A. in anthropology from Northern Arizona University. He has worked extensively in the western High Plains - Southern Rocky Mountains region with a research emphasis on eastern Colorado. His southeastern Colorado experience consists of extensive survey and excavation work at Fort Carson, Pinon Canyon, and elsewhere, and includes master's thesis research into the temporal and spatial patterning of Late Prehistoric architecture in the Taylor Arroyo basin, Pinon Canyon.

Mary W. Painter, Staff Archaeologist for Centennial Archaeology, Inc., holds an M.A. in anthropology from Colorado State University. She has participated in archaeological research in the western High Plains, Southern Rocky Mountains, and elsewhere in the western and central U.S. In southeastern Colorado, she has engaged in fieldwork at Fort Carson and also contributed to National Register of Historic Places multiple property documentations and the basewide Cultural Resource Management Plan for that facility.

Mark Mitchell is Zone Archaeologist for the USDA Forest Service - Comanche and Cimarron National Grasslands, based in La Junta, Colorado. He holds an M.A. in anthropology from the University of Colorado-Denver. His southeastern Colorado interests include ceramics, rock art, and exchange systems and cultural frontiers. His master's thesis examines social and economic interactions between the Sopris phase of southeastern Colorado and Valdez phase of north-central New Mexico.

Michael McFaul is owner of LaRamie Soils Service in Laramie, Wyoming, where he serves as Principal Geoarchaeologist. He holds an M.S. in pedology/geomorphology from the University of Wyoming and has directed geomorphic and geoarchaeological projects throughout much of the U.S. as well as China. In southeastern Colorado he has undertaken geoarchaeological research at Pinon Canyon, the Sand Creek Massacre Site, and in Lorencito Canyon west of Trinidad.

Amy Holmes is Senior Geoarchaeologist for LaRamie Soils Service. She holds an M.A. in anthropology from Washington State University and has worked as both an archaeologist and geomorphologist throughout the western and central U.S. She has participated in several geoarchaeological investigations on the western High Plains, including the ongoing study of the Sand Creek Massacre Site in eastern Colorado.

Chapter 1

INTRODUCTION

Christian J. Zier

BACKGROUND AND STATEMENT OF PURPOSE

This document and four parallel volumes, which collectively cover the entire state of Colorado, have been prepared by various organizations under contract to the Colorado Council of Professional Archaeologists (CCPA). The respective regions addressed by the five documents are defined according to hydrologic criteria and coincide with the four major drainage basins within the state: Colorado River, Rio Grande, South Platte River, and Arkansas River. The headwaters of these four great rivers occur within the state on the Continental Divide. Because of the sheer size of the area, and also due to various cultural considerations, the Colorado River watershed has been divided into upper (northern) and lower (southern) regions, and thus five rather than four documents have been generated (Figure 1-1). These documents are referred to as contexts, defined as "those patterns, themes, or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within prehistory or history is made clear ... the core premise is that resources, properties, or happenings in history do not occur in a vacuum but rather are part of larger trends or patterns" (U.S. Department of Interior n.d.:7).

A series of regional historic and prehistoric contexts was published by the Colorado Historical Society in 1984. A single document, *Colorado Plains Prehistoric Context* (Eighmy 1984), covered all of eastern Colorado east of the foothills, while another, *Colorado Mountains Prehistoric Context* (Guthrie et al. 1984), covered all high-elevation areas of central and western Colorado. The Arkansas River watershed region that is addressed by the present volume is carved out of these two earlier context areas. The previous contexts synthesized the prehistory and archaeological databases of their respective regions as they were understood at the time, and provided firm foundations for site evaluation and management planning. However, they have grown badly out of date. Thousands of prehistoric sites have been recorded throughout the state since 1984 and many have been excavated. Further, the theoretical underpinnings of archaeological research have evolved, and the manner in which sites are regarded-how they are evaluated and how they are studied-has changed accordingly.

The Arkansas River drainage basin within the state of Colorado encompasses an area of approximately 28,200 square miles, or just over one-fourth of the state. Within this vast district are more than 9,000 known prehistoric cultural resources representing 11,000 years or more of human occupation. When one considers that approximately 1.5 percent of the region has been subjected to professional archaeological scrutiny in the form of intensive inventory, it is not unreasonable to assume that a half million sites occur within its boundaries-and this may be taken as a minimum figure. Production of the context for this drainage basin will accomplish the two principal objectives of synthesizing the large volume of site and project data for the context area, and providing guidance for site evaluation and management. Additionally, the document will provide a procedural framework for future investigations that accounts for gaps in the present database.

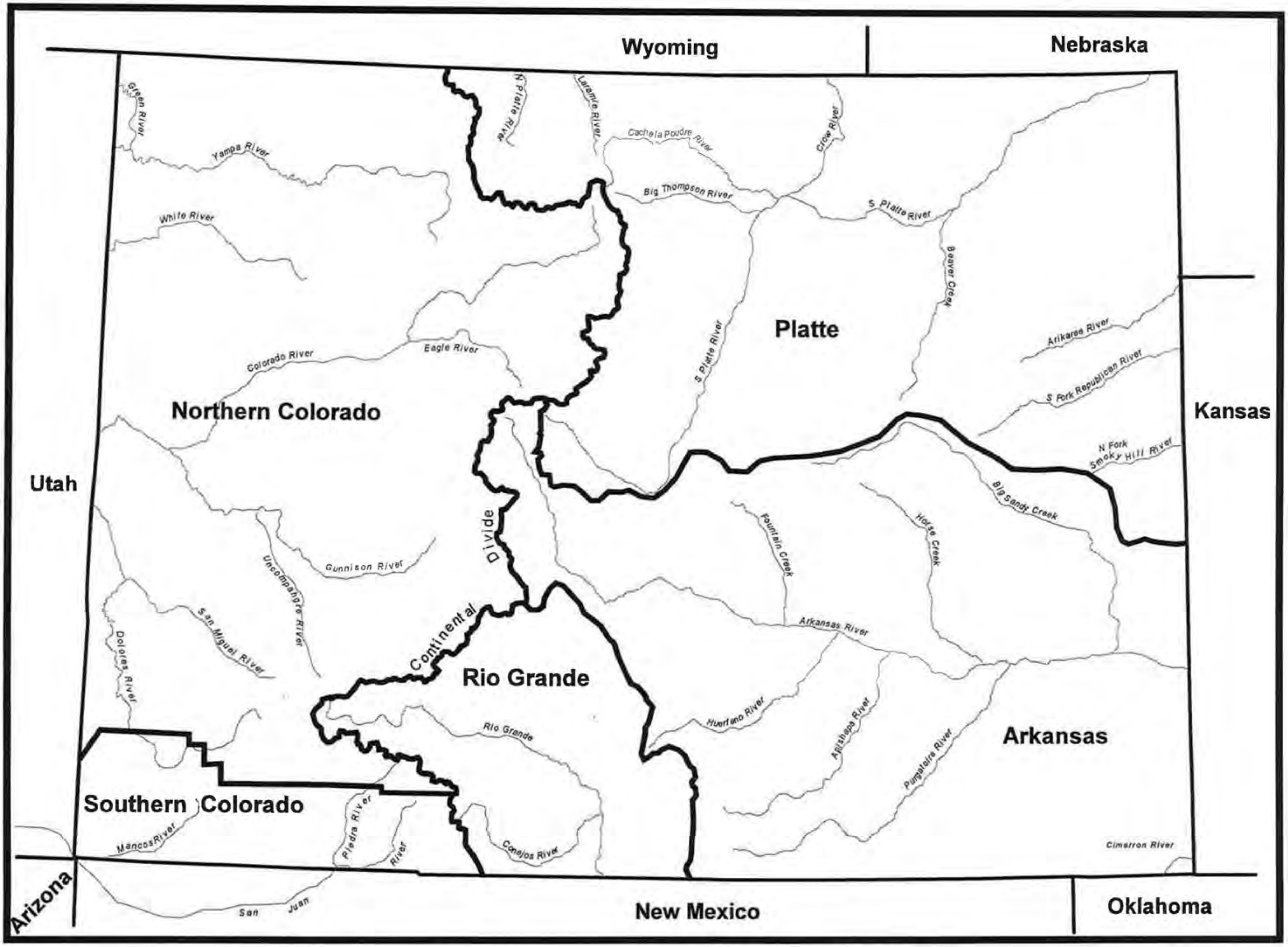


Figure 1-1. Map of Colorado showing prehistoric context area boundaries.

DEFINITION OF STUDY AREA

The Arkansas River context study area coincides approximately with the southeastern quadrant of the state of Colorado (Figure 1-1). The southern and eastern boundaries are political and therefore, from anthropological and ecological perspectives, arbitrary; they follow the borders between Colorado and the states of New Mexico, Oklahoma, and Kansas. The three other major watersheds of Colorado lie adjacent to the Arkansas River context area, and the study area boundaries to the north and west are defined by drainage divides. The South Platte River basin is to the north, separated from the Arkansas River basin by the Palmer Divide. The northwestern corner of the study area borders on the upper Colorado River watershed and is separated from it by the Sawatch Range. To the west, beyond the Sangre de Cristo Mountains and the Culebra Range, lies the basin of the Rio Grande.

The study area encompasses all of 13 counties (Baca, Bent, Chaffee, Crowley, Custer, Fremont, Huerfano, Kiowa, Lake, Las Animas, Otero, Prowers, Pueblo) and parts of 10 others (Cheyenne, Costilla, Douglas, Elbert, El Paso, Kit Carson, Lincoln, Park, Saguache, Teller). The only portion of the area that is highly urbanized is the Colorado Springs-Pueblo vicinity, which constitutes the southernmost extension of the Front Range urban corridor. Most of the remainder of the region is rural, and much of it is largely unpopulated even today. Thus, while representing 27 percent of the total area of the state of Colorado, the context region at present is home to fewer than 22 percent of the state's inhabitants.

INFORMATION SOURCES

The information used to assemble the Arkansas River context was compiled from two principal sources. The first source was the comprehensive cultural resource database of the Colorado Office of Archaeology and Historic Preservation (OAHP) at the Colorado Historical Society, Denver. Multiple queries were made for specific types of information deemed essential to the process, for example, all recorded sites with associated radiometric dates; all test excavated and fully excavated sites; all sites associated with ceramics; all sites associated with maize, etc. Following preliminary screening of printouts, individual site forms were examined at the OAHP and additional information was recorded, as needed, in tabular format. Database reliability is largely a function of project vintage. Site and project records at OAHP resulting from undertakings that have occurred within the past 10 years are complete, and information in the database is comprehensive and accurate. Information in the database for actions more than 10 years old is less reliable, and for actions 20 years old or beyond is spotty. These inconsistencies tend to reflect changes in the quality of work that has occurred historically within the context region. By and large, the quality of reporting has improved dramatically over the past several decades.

The second major information source consisted of published and unpublished literature pertaining to the prehistory of the context area. Many unpublished technical reports, which constitute the bulk of the literature about the area (the so-called "gray literature), were already on file at the library of Centennial Archaeology, Inc. in Fort Collins; most of the remainder were examined at the OAHP. Journal articles were accessed at the Centennial office, at OAHP, and at various libraries including the Western History Department of the Denver Public Library and the Colorado State University (CSU) Library. Archaeological data from outside the context area proper were also examined, generally through publications and technical reports, to fill gaps in the Arkansas drainage basin prehistoric sequence (particularly earlier occupational stages), to enable examination of geographically broad cultural processes, and to allow comparison and contrast between and among archaeological phenomena in the region.

The radiometric date database for the context area was constructed using the "Colorado Absolute Date Synthesis" (Rayne 1997) as a starting point. Each date was verified by returning to the original literature source, and in some cases the reporting archaeologists were consulted personally.

Several federal and state agencies were contacted regarding past consultations about Native American traditional cultural properties and areas of religious or cultural significance. These agencies included the U.S. Army Corps of Engineers (ACOE) (Albuquerque, New Mexico), Bureau of Reclamation (BOR) (Denver), U.S. Fish and Wildlife Service (Denver), Bureau of Land Management (BLM)-Royal Gorge Resource Area (Canon City), USDA Forest Service-Pike/San Isabel National Forests (Pueblo), USDA Forest Service-Comanche/Cimarron National Grassland (La Junta), U.S. Army Fort Carson Military Reservation (Fort Carson)-Directorate of Environmental Compliance and Management (Colorado), National Park Service (NPS)-Midwest Archeological Center (Lincoln, Nebraska), and Colorado Department of Transportation (CDOT)-Office of Environmental Services (Denver).

Numerous individuals were contacted directly for information or opinions regarding specific topics pertinent to the context. Principal among them were Jane L. Anderson, William R. Arbogast, Kevin D. Black, Richard F. Carrillo, Jeffrey L. Eighmy, Daniel A. Jepson, Christopher Lintz, and Margaret A. Van Ness. Comments on a draft context manuscript provided by four reviewers led to revisions and additions which strengthened the document considerably. These reviewers were Melissa Connor, O D Hand, Daniel A. Jepson, and Marilynn A. Mueller.

Chapter 2

ENVIRONMENTAL SETTING

Mary W. Painter, Amy Holmes, Michael McFaul, and Christian J. Zier

PHYSIOGRAPHY

The Arkansas River context area covers parts of two physiographic provinces (Figure 2-1). The western margin, which takes up approximately one-fifth of the entire study area, falls within the southeast portion of the Southern Rocky Mountains province (Fenneman 1931; Thornbury 1965:287). The area encompasses the eastern slopes of the Sawatch, northern Sangre de Cristo, and Culebra ranges (Culebra being a local name for a portion of the Sangre de Cristos), the western slope of the Mosquito Range, the southern end of the Rampart Range (considered an extension of the Front Range) including Pikes Peak, and all of the Wet Mountains. Of the 54 peaks in Colorado that rise above 4267 m (14,000 ft), 17 occur in this area and include Mount Elbert, which at 4399 m (14,433 ft) is the highest geographic point in the state. As one travels eastward, the high peaks, mountain valleys, and steep canyons of the Southern Rockies give way variably along a north/south axis first to foothills and then to high open plains that suddenly dominate the landscape in all directions. In southeastern Colorado, at some point between degrading mountain and aggrading plain, a broadly apparent but locally indistinct topographic transition occurs marking the eastern end of the Southern Rocky Mountain province and the western beginning of the Great Plains physiographic province that extends across eastern Colorado and beyond.

Portions of three sections of the Great Plains province occur in southeastern Colorado (Benedict 1991; Campbell 1969a; Clark 1996; Mitchell 1997; Thornbury 1965). The Colorado Piedmont section is distinct from other adjoining Great Plains sections in that the Tertiary mantle still blanketing those sections has been stripped away by the Arkansas and South Platte rivers and their tributaries throughout the course of Quaternary erosion-deposition-stability (EDS) cycles (Morrison 1987:170). Perhaps surprising to some, the Colorado Piedmont is lower than the High Plains section to the east by as much as 450 m (1476 ft) at the foot of the Rockies to less than 75 m (246 ft) at its eastern edge. Elevations of the Piedmont range from 1524 m (5000 ft) near the mountains, to 2134 m (7000 ft) along the Palmer Divide on the north, to 1219 m (4000 ft) on the east (Thornbury 1965:312).

The High Plains section of the Great Plains province does not appear in southeastern Colorado until well to the east at the edge of the Colorado Piedmont, where it is first manifested as a higher scarp and flat plain extending eastward out of the state (Thornbury 1965:312). Its higher elevation owes to the fact that the Tertiary fluvial cover has remained intact.

The northern boundary of the Raton section joins the southern boundary of the Colorado Piedmont section south of the Arkansas River. Only about one-third of this subsection occurs in southeastern Colorado. The remainder extends south into New Mexico with a small portion penetrating the northwest corner of the Oklahoma panhandle. Thornbury (1965:313-314) describes this highest section of the Great Plains as "a group of plateaus and mesas in advanced stages of dissection." Like the Piedmont, this section also lacks a Tertiary cover but stands higher due to Pleistocene volcanic activity that resulted in widespread blanketing of the area by lava flows. The Raton section is divided into three subsections: the Park Plateau, the Raton Mesa Group, and the Chaquaqua Plateau. The Chaquaqua Plateau is subsumed under the proper name

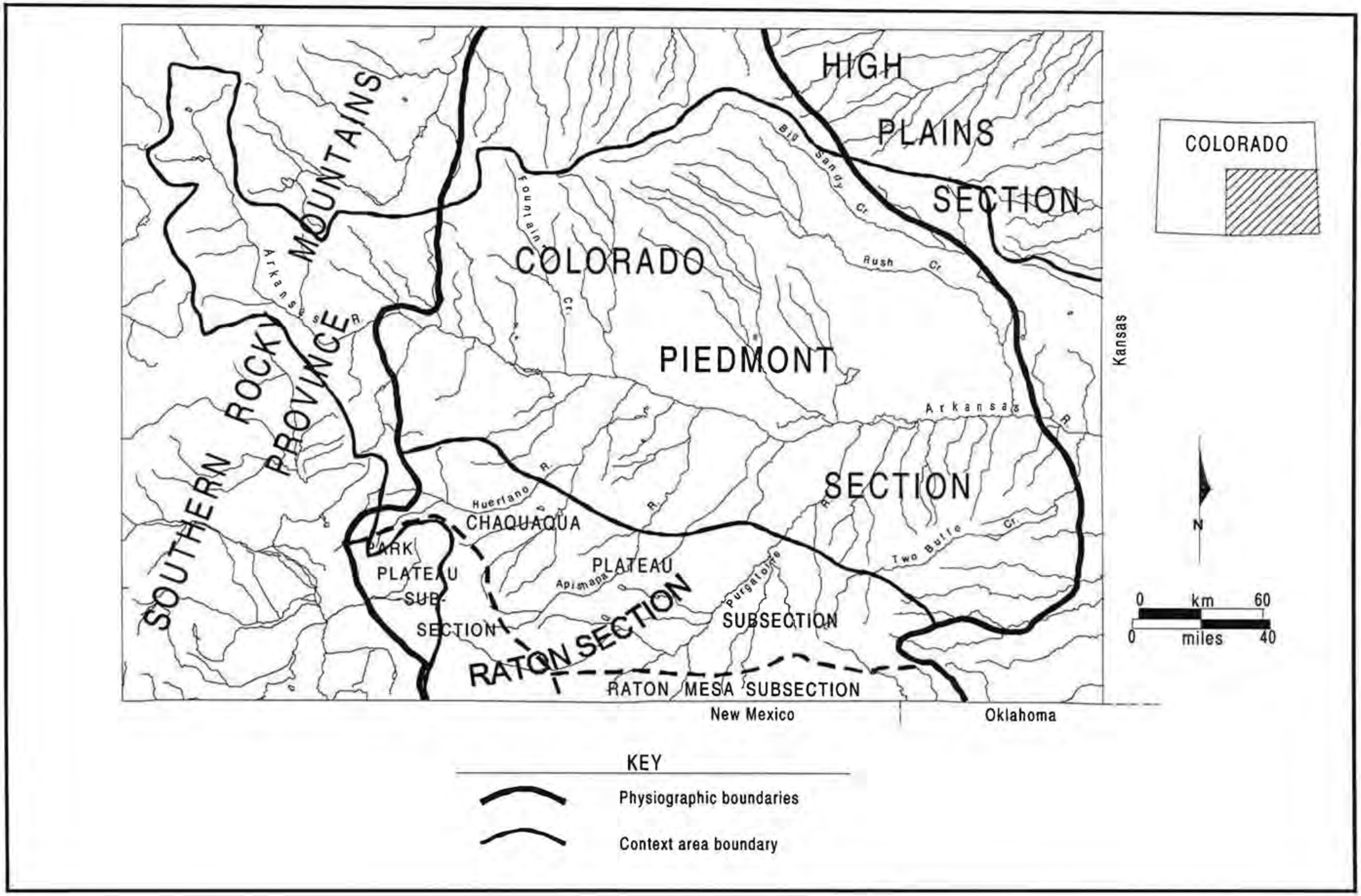


Figure 2-1. Map of Arkansas River context area showing major physiographic subdivisions.

for the subsection, the Las Vegas Plateau, a parallel plateau split from the Chaquaqua Plateau by the Raton Mesa Group and which is actually located in New Mexico. The northern half of the Park Plateau is in Colorado. It is located at the base of the Culebra Range and is drained by the upper Purgatoire, Apishapa, Huerfano, and Cucharas rivers. This subsection includes the Spanish Peaks that originated as two volcanos but have since been reduced to remnant volcanic stocks with exposed volcanic dikes radiating outward in all directions, sometimes for distances of up to 40 km (25 mi) (Thornbury 1965:315). Elevations of this plateau area range from 3048 m (10,000 ft) on the west to 2134 m (7000 ft) on the east, with the Spanish Peaks rising to about 3962 m (13,000 ft).

The Raton Mesa Group is a series of mesas extending eastward from the Park Plateau and passing south of Trinidad. These mesas straddle the border between Colorado and New Mexico. The subsection exits Colorado in the vicinity of the Oklahoma panhandle. The irregular flow of lavas across this area during the Pleistocene subsequently resulted in erosional patterning that left resistant, basalt-capped areas standing as the characteristic, flat-topped mesas seen today (Clark 1996:4; Thornbury 1965:313). In Colorado one of the highest of this series is Raton Mesa, to the east of which lie Mesa de Maya and other less prominent formations. Elevations in the area range from 1524 m (5000 ft) to 2896 m (9500 ft). The mesas are drained northward by tributaries of the Purgatoire River, with some mesas on the east also draining south into the Cimarron River.

The third subsection of the Raton section consists of two parallel plateaus that are separated from each other by the Raton Mesa Group (Campbell 1969a). The southern plateau is the Las Vegas Plateau, located entirely in New Mexico. The northern plateau is located in southeastern Colorado and is known as the Chaquaqua Plateau. It extends eastward from the Park Plateau and is bounded on the north by the Colorado Piedmont section south of the Arkansas River and on the east by the High Plains section of the Great Plains physiographic province. Although it stands lower than the other two subsections, it is still elevated above the Colorado Piedmont. Campbell (1969a:27) describes four topographic features that characterize the Chaquaqua Plateau: mesas, steppes, canyons, and rivers/plains. Draining north and east from the Park Plateau, the Purgatoire River cuts deeply and widely across the Chaquaqua Plateau until it is manifested as a broad flood plain. Other streams draining northeasterly to the Arkansas River in this subsection include the St. Charles, Huerfano, and Apishapa rivers (Campbell 1969a:27)

HYDROLOGY

The upper Arkansas River drainage basin encompasses the entire southeast quadrant of Colorado. The headwaters of the Arkansas emanate from snowmelt and direct rainwater runoff issuing from the Sawatch and Mosquito ranges in the vicinity of Tennessee Park northwest of Leadville. From these beginnings near the highest point in Colorado, the river courses southeast past Salida, at which point it takes a more direct easterly course as it passes Canon City, Pueblo, Rocky Ford, La Junta, and Las Animas. At river mile 315, it exits Colorado just east of Holly near the state's lowest geographic point (1021 m [3350 ft]) and continues across three more states before emptying into the Mississippi River. Within the first 200 km (125 mi), the Arkansas River is a true mountain stream that drops 1524 vertical meters (5000 feet), accumulating a force powerful enough to have carved the 365-meter-deep (1200 ft), 13-kilometer-long (8 mi) Royal Gorge through Precambrian rock west of Canon City (Rennicke 1985:21). The marked reduction in gradient from 8 m/km (42 ft/mi) west of Canon City to 1.7 m/km (9 ft/mi) east of Canon City results in the Arkansas taking on a more plainslike character as it loops across the Colorado Piedmont and enters the High Plains (Nadler 1978:53; Rennicke 1985:21).

The tributaries of the Arkansas consist of lesser rivers, numerous permanent and intermittent streams, and arroyos. As a rule, most streams entering the Arkansas above Salida are perennial mountain streams and those below Salida are usually intermittent in nature. Depending on water availability, a perennial stream may change to intermittent once it leaves the mountains and before it reaches the Arkansas. Some of the larger tributaries draining into the Arkansas from the south, listed here from west to east, are the St. Charles, Huerfano, Cucharas (via the Huerfano), and Purgatoire rivers. A 24-kilometer-long (15 mi) section of the Cimarron River, which has headwaters in northern New Mexico and joins the Arkansas in northern Oklahoma, penetrates the extreme southeast corner of the state. In Colorado, the Cimarron is fed by several local intermittent drainages and two perennial streams, Carrizo and Tecolote creeks, that head in the Raton section in the vicinity of Mesa de Maya and Tecolote Mesa (Clark 1996:2). North of the Arkansas some of the streams that directly join the Arkansas in the upper reaches are Cottonwood, Currant, Fourmile, and Eightmile creeks. Principal streams that head on the Palmer Divide are Jimmy Camp, Fountain, Black Squirrel, Rush, and Big Sandy creeks. The first three join Monument Creek south of Colorado Springs or flow directly into the Arkansas. Farther east Rush Creek flows into the Big Sandy, which joins the Arkansas east of Lamar.

Nadler (1978) conducted a study of historical river metamorphoses along certain sections of the South Platte and Arkansas rivers in Colorado. The results of the study are instructive for those pursuing archaeology in the area. Little is known about the Arkansas River prior to 1871, which is the earliest date for the emergence of reliable descriptions and maps of the river. Since about 1880, the river has undergone marked changes in depth, width, and sinuosity. These changes are due in part to the introduction of irrigation and transmountain diversion of Colorado River Basin water to the Arkansas. These practices resulted in a higher water table and perennial stream flow where formerly the river would sometimes run dry in its eastern reaches by late summer. Although the water table was higher, irrigation and the construction of John Martin Dam decreased the discharge of water and sediment, and this coupled with droughts after 1900 led to morphologic changes in the river. As the river changed to a perennial stream, the vegetation became more dense, invading channels in dry years and leading to infill, the redistribution of sediments, and a progressive alteration of the flood plain. This brief scenario, describing hydrologic events that have occurred on the Arkansas over just the past 120 years, might serve as a cautionary tale when attempting to draw conclusions regarding use of the area by prehistoric human populations.

PRESENT CLIMATE

Because of its distance from large bodies of water, Colorado has a continental climate that tends to be dry year-round and results in hot summers and cold winters. Major air masses moving down from Canada (Polar Continental), east from the Pacific Ocean (Polar Pacific, sometimes Tropical Pacific), and northwest from the Gulf of Mexico (sometimes tropical) variously converge over the state, interacting with each other along fronts while being acted upon by local controls of latitude, continental position, elevation, topography, and seasonally dominant storm-track positions (Siemer 1977:1). Virtually all aspects of the varied landscapes and extreme topographic relief that characterize the state as a whole occur within the boundaries of the Arkansas River context area. The total topographic relief, from the top of Mount Elbert to the eastern border near Holly, exceeds 3350 m (11,000 ft) and forces any climatic analysis to be viewed initially from an elevational perspective.

Solar radiation is the primary influence on temperature in Colorado, but movements of cold and warm air masses are also important. Average daily air temperatures vary with the seasons and with elevation and can even change drastically at a given location in the space of a few hours. In general, winter temperatures are affected less than summer temperatures by increased elevation. Normally, air is cooler at higher levels of atmosphere, although temperature inversions (warm over cool) sometimes occur. Ground inversions are not uncommon in mountain valleys during the winter when the air is still. Daily average high and low temperatures in the basin for the months of January and July are reported by Siemer (1977:20) for three elevational zones and are reproduced below. The average length of the growing season is also presented here but should only be associated generally with temperatures because not all data may have come from the same weather stations.

Below 6000 ft: Average January high is 46°F and the average low is 14°F; the average July high is 92° F and the average low is 61°F. The average length of the growing season is 159 days, or just over 5 months.

Between 6000 ft and 8000 ft: Average January high is 45°F and the average low is 15°F; the average July high is 85°F and the average low is 56°F. The average length of the growing season is 132 days, or 4 to 4½ months.

Above 8000 ft: Average January high is 32°F and the average low is 4°F; the average July high is 76°F and the average low is 44°F. The average growing season is 57 days, or approximately 2 months.

Continental position, elevation, and topography influence the amount and timing of precipitation. Generally speaking, precipitation increases with elevation but departures from this rule are not uncommon in the state. Within the rain shadow of the mountain barrier, downslope air is drier and downslope warming increases the water-holding capacity of the air. In the upper Arkansas drainage, the rain shadow effect also occurs on the east side of the Sawatch Range in the area between Buena Vista and Salida. This area is much drier than might be expected if elevation alone is considered.

Precipitation in the area may come in the form of rain, hail, or snow (Strahler and Strahler 1984:516). Heavy precipitation is rare in southeastern Colorado but extremes do occur. In June of 1965 in the vicinity of Monument north of Colorado Springs, 38 cm (14 inches) of rain fell in a 24-hour period (Hansen et al. 1978:46). At the opposite end of the scale, in the same vicinity, during one unspecified year Colorado Springs received less than 15 cm (6 inches) of rain (Hansen et al. 1978:50). Average precipitation levels across the study area are affected by elevation. At elevations at or below 1830 m (6000 ft), precipitation for one year averages 34 cm (12.5 inches) and snowfall averages 66 cm (26 inches). Between 1830 m and 2440 m (6000-8000 ft), precipitation averages 38 cm (15 inches) per year and snowfall averages 149 cm (59 inches). At or above 2440 m (8000 ft), the precipitation average is 41 cm (16.2 inches) and snowfall averages 241 cm (95 inches). In the eastern plains of the Arkansas drainage, precipitation totals are highest (ca. 5 cm [2 inches] per month) in April and May, decline during June and rise somewhat in July and August before progressively and rapidly declining to less than 2.5 cm (1 inch) per month as fall approaches. Precipitation is similar in the eastern foothills, peaking at about 4.5 cm (1.75 inches) in May and again in August, but June is similar in dryness to the eastern plains. Precipitation in the upper Arkansas drainage basin peaks at ca. 4 cm (1.5 inches) in late April, declines to 2.5 cm (1 inch) in June, then rises significantly to more than 5 cm (2 inches) per month in July. Precipitation remains high in early August, then plunges in late August and September as autumn arrives.

Wind is an important environmental variable to consider when analyzing patterns of human activity and conditions affecting preservation of archaeological remains. Trees on the southeastern Colorado plains exhibit a tendency to lean northward, suggesting that prevailing winds come from the south (Gulf air) in this area. In general, the plains tend to be windier than the mountains. Limited data suggest that plains winds in the Arkansas drainage are strongest in April, and lower wind speeds prevail during summer and fall (Siemer 1977:12). During winter, closer to the mountains, warming can occur when chinook winds flowing down east-facing slopes are compressed and warmed, triggering snow melt and sometimes breaking vegetation dormancy.

Low relative humidity in Colorado is evidenced by the high frequency of cloudless days (about 70 percent). Seasonal changes in relative humidity are apparent, and humidity may actually be lower in winter when cold, dry Arctic air dominates as opposed to the moist, tropical Gulf or Pacific air of summer (Siemer 1977:35).

Palmer Divide separates the watersheds of the Arkansas and South Platte rivers. It is a relatively high upland divide that projects eastward from the mountains. At an altitude of 2286 m (7500 ft), this topographic feature is over 600 m (2000 ft) higher than either Denver or Colorado Springs and appears anomalous with respect to the familiar north/south trend of the Rockies and the otherwise clearly demarcated boundary between mountain and plain. Climatography maps graphically illustrate how this elevated portion of the Colorado Piedmont allows the eastward expansion of climatic conditions more often associated with the mountains to the west (Hansen et al. 1978). Orographic effects on air masses over this area result in delayed warming temperatures in the spring, suppressed summer temperatures below those of the lower plains to the north and south, and hastened cooling in the fall. Additionally, precipitation amounts are greater on the Palmer Divide than in adjacent areas.

FLORA AND FAUNA

Fitzgerald et al. (1994) have identified eight ecosystem types for Colorado based on plant communities, and have used this relatively simplistic construct as the functional setting for a discussion of Colorado mammals. The format provides a convenient framework for a brief discussion of biotic communities occupying the Arkansas River context area. All of the ecosystem types except semidesert shrublands are present in southeastern Colorado. However, the reader should bear in mind that areally restricted microenvironments also exist, and indeed have been documented for various specific locations in southeastern Colorado (Andrefsky 1990; Campbell 1969a; Clark 1996; von Ahlefeldt 1992). The following is a synopsis limited to vegetation and mammals of each of seven ecosystems and is taken from Fitzgerald et al. (1994:13-23).

Grassland Ecosystem

This ecosystem, lying between 1220 m and 3050 m (4000-10,000 ft), comprises approximately 75 percent of the context area. Grassland vegetation dominates the landscape in the eastern half of the area and flows westward with little interruption from the western High Plains near the Kansas border across the Colorado Piedmont and Raton physiographic subsections. Elevation limits its advance near the base of Pikes Peak and at the foot of the Wet Mountains, but the grasslands sweep around on the south to continue a westward penetration into the Wet Mountain valley to the base of the Sangre de Cristo Mountains. Dominant plants include grasses such as blue grama, buffalograss, western wheatgrass, sand dropseed, sand bluestem, and needle-and-thread; sagebrush; yucca; and prickly pear cactus. Although broad areas may be covered by short grasses such as blue grama and buffalograss, mixed-grass prairies can become established where moisture is greater.

The open and relatively unprotected nature of the grasslands tends to limit mammalian habitation of this ecosystem to species that exhibit the ability to move quickly and/or to live underground. Mammals inhabiting the grasslands include shrew, eastern mole, western small-footed myotis bat, cottontail and jack rabbit, ground squirrel, prairie dog, pocket gopher, pocket mouse, coyote, swift and red foxes, bobcat, weasel, badger, skunk, mule and white-tailed deer, elk, and pronghorn.

Pinyon-Juniper Woodland Ecosystem

This vegetative community occurs within an elevational range of 1675 m to 2440 m (5500-8000 ft), and thus lies above grasslands and below montane shrublands. It constitutes about 7 percent of the context area. It is found in the upper portion of the drainage basin and along the southern end of the Rampart Range, and completely encircles the Wet Mountains. Isolated communities are also known to occur farther east in the vicinity of Mesa de Maya and across broad areas of the Chaquaqua Plateau both east and west of the lower Purgatoire River. Besides pinyon, dominant plants in this community include one-seed juniper, Rocky Mountain juniper or red cedar, blue grama, June-grass, Indian ricegrass, fescues, muhly, bluegrass, yucca, and prickly pear. On the Chaquaqua Plateau, pinyon-juniper woodlands exhibit mainly one-seed juniper with only limited pinyon pine.

Animal species diversity is high in Colorado pinyon-juniper woodlands, second only to that of riparian ecosystems. Mammals include cottontail and jack rabbit, squirrel, chipmunk, mouse, Mexican woodrat, various bats, porcupine, coyote, gray fox, weasel, badger, skunk, mountain lion, bobcat, mule deer, elk, and pronghorn.

Montane Shrublands Ecosystem

On the eastern slopes of the Rocky Mountains this ecosystem is established along a relatively narrow belt at the mountain front below the montane forests. The elevational range is 1675 m to 2590 m (5500-8500 ft). Topography is rocky and soils are coarse and well drained. This life zone, which makes up about 4 percent of the context area, is found in the vicinity of the Palmer Divide, encircling the flanks of the Wet Mountains above pinyon-juniper woodlands, and occupying a similar position on the eastern slope of the Culebra Range. Gambel oak and serviceberry are the dominant species, but others include skunkbrush, smooth sumac, wax currant, rabbitbrush, chokecherry, wild rose, needle-and-thread, blue and side-oats grama, western wheatgrass, and mountain muhly.

The rich and diverse montane shrubland ecosystem supports animals more typically associated with adjacent ecosystems and may be used as a winter refuge by some. The mammalian community includes, but is not limited to, shrew, bat, cottontail and jack rabbit, squirrel, chipmunk, prairie dog, northern pocket gopher, woodrat, mouse, vole, black bear, coyote, gray fox, ringtail, western spotted skunk, mountain lion, bobcat, bighorn sheep, mule deer, and elk.

Montane Forests Ecosystem

Montane forests blanket all mountain slopes within an elevational range of 1710 m to 2745 m (5600-9000 ft) in the Arkansas River drainage basin and are most extensive in the vicinity of the Rampart Range and along the Palmer Divide. This ecosystem comprises approximately 8 percent of the context area. Open ponderosa pine woodlands occupy drier, south-facing slopes, and dense stands of Douglas-fir claim steeper and moister slopes at higher elevations. Other dominant plants include quaking aspen, white fir, limber pine, Colorado blue spruce, lodgepole pine, wax currant, mountain maple, Arizona fescue, sulphur-flower, and kinnikinnik.

The dominant conifers of this ecosystem provide food and shelter for many mammals of the montane and the adjoining subalpine forests above. Mammals native to this ecosystem include several bat species, shrew, cottontail and jack rabbit, squirrel, chipmunk, woodrat, mouse, porcupine, coyote, red and gray foxes, black bear, weasel, various skunks, mountain lion, bobcat, bighorn sheep, elk, and mule deer.

Subalpine Forests Ecosystem

Steep slopes covered with dense stands of coniferous forest characterize this highest of Colorado's forested ecosystems, which occurs within an elevational range of 2740 m to 3475 m (9000-11,400 ft). This ecosystem accounts for about 3 percent of the context area. High winter precipitation falls as snow and is augmented by windblown snow from the open tundra above. The dense trees hold the snow in place and cold temperatures prevent significant melting until late spring. In the upper transition zone between the subalpine forest and treeless alpine tundra, severe and persistent winds result in stunted and twisted tree growth known as krummholz. This ecosystem occupies the high slopes and tops of the Wet Mountains, the upper slopes of Pikes Peak, and the high slopes of the Sangre de Cristo Mountains and the Sawatch, Mosquito, and Culebra ranges. Dominant plants are Engelmann spruce, subalpine fir, quaking aspen, bristlecone pine, limber pine, and lodgepole pine, myrtle blueberry, heart-leafed arnica, and Jacob's ladder.

Mammals living in this ecosystem exhibit various adaptive strategies including the use of runways under snow pack, hibernation, seasonal color change, and seasonal downslope migration. Species include shrew, bat, cottontail, snowshoe hare, squirrel, marmot, chipmunk, vole, coyote, red fox, black bear, marten, weasel, wolverine, skunk, mountain lion, lynx, bobcat, elk, mule deer, and bighorn sheep.

Alpine Tundra Ecosystem

This treeless environment above 3475 m (11,400 ft) is almost constantly swept by winds that in winter redistribute snowfall in patchy patterns over the open tundra, forming it into snowbeds in some places while sweeping other areas bare. Alpine tundra occurs in the project area atop Pikes Peak and at various points along the crest of the Sangre de Cristo Mountains and the Sawatch and Culebra ranges. The dry environment limits vegetative growth to sedges, short grasses, low-growing willow, and a wide variety of low-growing perennials. Many alpine tundra areas are commonly interspersed with broad, unvegetated expanses comprised of talus, massive rock outcrops, and other exposed and weathered rock formations. Weather at this altitude can be harsh at any time of year but especially during the long winters. Survival strategies of mammals living here are the same as those for the subalpine forest. In addition, species such as bighorn sheep take year-round advantage of exposed vegetation growing on windswept, snow-free ridges. Other mammals successfully exploiting this environment, either seasonally or on a year-round basis, include pika, shrew, squirrel, chipmunk, marmot, woodrat, various mice, vole, coyote, red fox, marten, weasel, skunk, mountain lion, lynx, elk, and mule deer.

Riparian Ecosystem

The riparian ecosystem occurs at all elevations up to timberline, and is easily recognized as lush ribbons of vegetation bordering waterways or appearing as islands of habitat next to ponds, lakes, and marshes. This ecosystem is seen in the context area mainly along the banks of the Arkansas River and its many tributaries; it makes up just 1 to 2 percent of the context area. On the Colorado Piedmont and High Plains, the Plains cottonwood usually dominates the plant community, in stark contrast to the surrounding grasslands. Willows, alders, and sedges dominate at higher elevations. Other riparian plant species include narrowleaf cottonwood, broad-leaved cat-tail, great bulrush, salt-grass, sand dropseed, river birch, and rushes. A favored setting for human settlement, riparian landscapes have been extensively altered in historic times by the introduction of non-native species such as tamarisk and Russian-olive.

Due to the varied resources it offers–cover, abundant food, travel routes, and water–the riparian system supports the richest and most varied mammal population of any ecosystem in

Colorado. The moist corridors have served as westward migration routes for eastern species such as eastern cottontail, fox squirrel, and white-tailed deer. At one time the northern river otter inhabited most of the major drainages of Colorado and its presence on the Arkansas River has been historically documented (Fitzgerald et al. 1994:363).

Discussion

The foregoing discussion of mammals that occupy the Arkansas River drainage is based on current information, and these data may not relate directly to prehistoric conditions. For example, historical evidence suggests that the natural range of the Rocky Mountain bighorn sheep may have been much greater than at present, perhaps extending onto the eastern plains in areas close to the foothills (Fitzgerald et al. 1994:409). The same is true for the mountain lion, although its range originally extended across all of Colorado and throughout the entire United States (Dixon 1990:711; Fitzgerald et al. 1994:368). The arrival of Euroamerican settlers in Colorado eventually led to profound pressures on some animal species. The near-extinction of the American bison is the best-known example. Bison once ranged over most of Colorado, including nearly all of the present study area. Their importance as a primary subsistence resource for Native American groups can in no way be underestimated. Almost always associated with grasslands, bison also inhabited mountain valleys and parks and even ranged onto alpine tundra. They also inhabited semidesert shrublands and pinyon-juniper woodlands (Fitzgerald et al. 1994:403). The vast herds of bison occupying the region were an important factor in the maintenance of the shortgrass prairie, the others being recurrent drought and fire. In the space of a half-century, between 1830 and 1880, the species was very nearly exterminated. The last native bison in Colorado was killed near Springfield in Baca County in 1897 (Fitzgerald et al. 1994:45).

The grizzly bear was once common throughout Colorado and the entire western United States but has been virtually extirpated from the state (Craighead and Mitchell 1990:515; Fitzgerald et al. 1994:323). The historic range of the gray wolf also includes all of Colorado, but this species is also considered to have been eliminated from the region. Prairie dogs have suffered severe diminutions in both range and numbers but are still common in parts of the context area.

In the interest of time and space, birds, reptiles, amphibians, fishes, and insects inhabiting southeastern Colorado were not selected for discussion. This intentional omission in no way diminishes their importance in the overall makeup of biotic communities and their potential role in the subsistence strategies of prehistoric human beings. The reader is referred to various competent sources for detailed information about these creatures. Some commonly available references include the following: for birds, Bailey and Neidrach (1965) and Kingery (1998); for reptiles and amphibians, Stebbins (1985) and Shaw and Campbell (1974); for fishes, Page and Burr (1991), Woodling (1980), and Behnke (1992); and for insects, Essig (1926).

QUATERNARY GEOMORPHOLOGY AND PEDOLOGY

The following is an annotated summary of the Quaternary geomorphology, pedology, and geoarchaeology for the Arkansas River Basin in Colorado. The discussion is organized according to three major physiographic subdivisions of the context area (above): Southern Rocky Mountains province, Colorado Piedmont section of the Great Plains province, and Raton section of the Great Plains province. Most of the discussion is centered on the Colorado Piedmont section because nearly all of the important studies of Quaternary geomorphology in the context area have occurred within its boundaries.

Southern Rocky Mountains Province

The archaeological significance of Quaternary deposits in the Southern Rocky Mountains is poorly understood, due primarily to the focus of previous studies on Pleistocene glacial chronologies and economic geology (Nelson and Shroba 1998; Van Alstine 1969). However, these studies do suggest that there are alluvial and colluvial deposits in the upper Arkansas River Basin that have the potential to yield buried cultural materials. Alluvial terrains are represented by abandoned flood plains of the Arkansas River. These terrains or terraces have yet to be identified and mapped, their height above the modern flood plain recorded, or their soil/sediment profiles described. The relative ages and types of soils are useful tools for reconstructing the Holocene history of the river basin (after Nelson and Shroba 1998). In turn, understanding the history of the drainage can assist in evaluating the potential of the terraces to yield buried archaeological materials.

Colorado Piedmont Section

A number of Holocene-aged eolian and alluvial deposits (Tweto 1979) are present in the Arkansas River Basin within the Colorado Piedmont. Several geoarchaeologists have described eolian deposits in this region (Holliday 1981; Madole 1994, 1995; McFaul and Reider 1990; Schuldenrein 1985). Holliday (1981) identified two cycles of eolian deposition along the Arkansas River in the John Martin Reservoir area (Figure 2-2). The first event occurred between 6,000 and 3,000 years before present (B.P.) and is characterized by soils with cambic horizons. A younger eolian event began after 3,000 years B.P. It is characterized by clusters of active dunes having soils with weak A horizons. Madole (1994, 1995) conducted extensive research on late Pleistocene- and Holocene-age eolian deposits in eastern Colorado and western Kansas and Nebraska. He identifies seven extensive areas of deposition in the Arkansas River Basin of which some occur along the Arkansas River, Big Sandy Creek, and Apishapa River (Figure 2-2). Each is believed to exhibit characteristic soils morphology.

Dunal Areas and Eolian Stratigraphy

According to Madole (1995), eolian deposits in eastern Colorado are composed of approximately 30 percent sand and 70 percent loess. The Big Sandy eolian area consists of a 2,430 km^2 (972 mi^2) area along Big Sandy and Rush creeks in east-central Colorado (see Figure 2-2). Eolian sediments in this area were derived from channel alluvium and deposited primarily on the southern margin of Big Sandy Creek. The Arkansas River eolian area begins about 50 km (31 mi) west of La Junta and follows the Arkansas River into southwestern Kansas. Sand deposits compose 570 km^2 (228 mi^2), primarily along the southern margin of the Arkansas River. Blowout dunes dominate the sand area and have an average thickness of 10 m (33 ft) (Voegeli and Hershey 1965). Lastly, the Apishapa eolian area consists of discontinuous locales of eolian deposits along the Apishapa River north of Trinidad and west of La Junta. These eolian sand deposits collectively cover 340 km^2 (136 mi^2), capping alluvial terraces of the Apishapa River. Based on soil formation and stratigraphic position, all of these eolian deposits are of late Pleistocene and/or Holocene age. With the exception of several episodes of soil formation, eolian deposition has been continuous in these areas since the late Pleistocene.

Madole (1995) identifies three eolian stratigraphic units of sand and three units of loess in eastern Colorado. The sand units include a late Pleistocene/early Holocene "lower unit," a "middle unit" that spans most of the Holocene and dates between 8,000 and 1,000 years ago, and a late Holocene "upper unit." The loess sequence is not well dated in eastern Colorado (Madole 1995). Based on stratigraphic position and soil development, the oldest loess unit dates in the

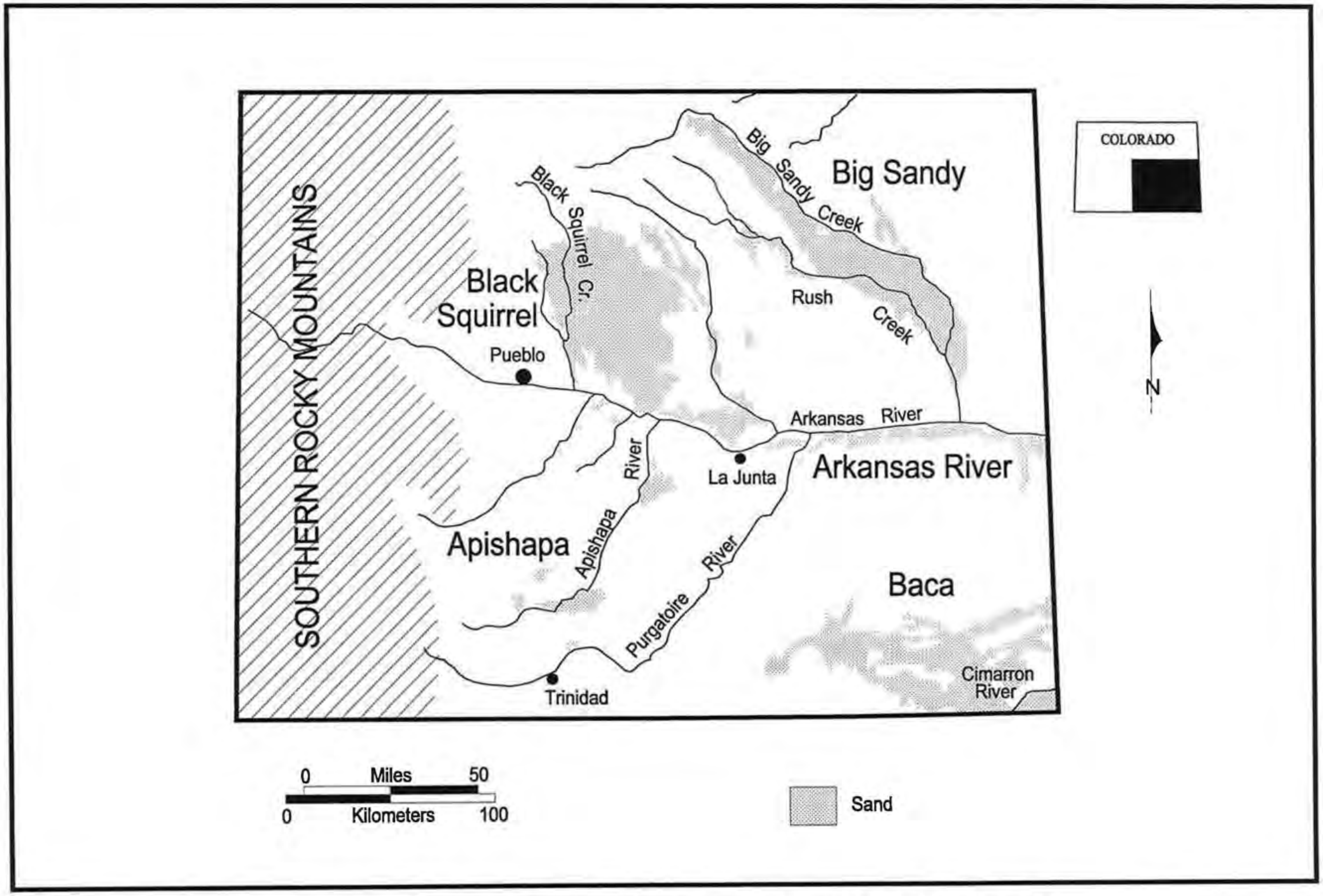


Figure 2-2. Eolian areas of eastern Colorado (modified from Madole 1995:Figure 6).

middle to late Pleistocene, the second unit correlates with the late Pleistocene Peoria Loess, and the youngest loess is Holocene in age.

The lower sand unit is composed of sand sheet bed forms and is the most laterally extensive eolian deposit in eastern Colorado. Based on stratigraphic relationships and the presence of Paleoindian artifacts within this stratum, this sand dates to late Pleistocene/early Holocene (Madole 1995). Deposition of this unit began prior to 11,000 B.P.-perhaps as early as 22,500 B.P.- and ceased soon after 9,000 B.P. (Madole 1995). Also, this lower eolian unit overlies the 10,650 B.P. Kersey terrace of the South Platte River in northeastern Colorado (McFaul et al. 1999). Strongly developed soils there typically exhibit A/Bt/Bk/C profiles. The middle eolian sand unit is dominated by parabolic dunes exhibiting weaker soil development. These soils commonly exhibit A/Bw/C profiles. Based on relative ages of the lower and upper sand units, the middle unit was deposited between 8,000 and 1,000 B.P. Madole (1995) suggests that the middle stratigraphic unit is the result of multiple early through late Holocene eolian events. The youngest eolian unit is characterized by weak soil development (i.e., A/C or A/Bw/C profiles), compound parabolic dunes with sharp dune crests, a topographically rough surface, and common blowout dunes. This late eolian unit composes almost all of the Arkansas River sand area (Madole 1995; see Figure 2-2). Paleosols and archaeological deposits indicate that deposition of the late unit began soon after 1,000 B.P. (Madole 1994, 1995).

Finally, loess deposits are thickest (i.e, 2.4-5.0 m [7.9-16.4 ft]) in northeastern Colorado, and become thinner (to ca. <1.2 m [3.9 ft]) as one as one moves southward toward the Arkansas River. Based on relative age dating of soil, Madole (1995) describes loess units of middle Pleistocene, late Pleistocene, and Holocene ages. The late Pleistocene loess, or Peoria Loess, is most commonly found on the surface. Soils developed in the Peoria typically have A/Bt/Bk/C profiles, and are not as well developed as the calcium carbonate-laden middle Pleistocene soils. This late Pleistocene loess contains soils that are similar in structure and development to soils of the same age in alluvial terrace deposits. Lastly, Holocene loess is similar to soils of the same age that formed in eolian sand. These soils are weakly developed (e.g., Entisols) with A/AC/C or A/C profiles (Madole 1995).

Most of the eolian deposits in the Colorado Piedmont are late Pleistocene and Holocene, and thus they have the potential to yield buried archaeological materials. Archaeological components were recovered in the youngest eolian unit at the Friehaufs Hill site in northeastern Colorado. Late Prehistoric ceramics were associated with a dune paleosol with an age ranging between 940 and 1380 B.P. Upper Republican ceramics were recovered below this paleosol (Madole 1995).

Alluvial Stratigraphy

Geoarchaeological studies in the Arkansas River Basin through the Colorado Piedmont reviewed here include Turkey Canyon on Fort Carson (Madole 1990), the Pinon Canyon Maneuver Site, or PCMS (Schuldenrein 1985; McFaul and Reider 1990), and the John Martin Reservoir area (Holliday 1981) (Figure 2-3).

Turkey Canyon

Madole (1990) analyzed the geomorphology and late Pleistocene/Holocene alluvial deposits of an Arkansas River tributary, Turkey Creek. Turkey Creek drains the east flank of the southern Front Range and terminates in the Arkansas River just west of Pueblo, Colorado. Fortunately, alluvial deposits in the Turkey Canyon area contained radiocarbon-datable materials (e.g., detrital charcoal and buried soil humus) that were used in constructing a soil-stratigraphic

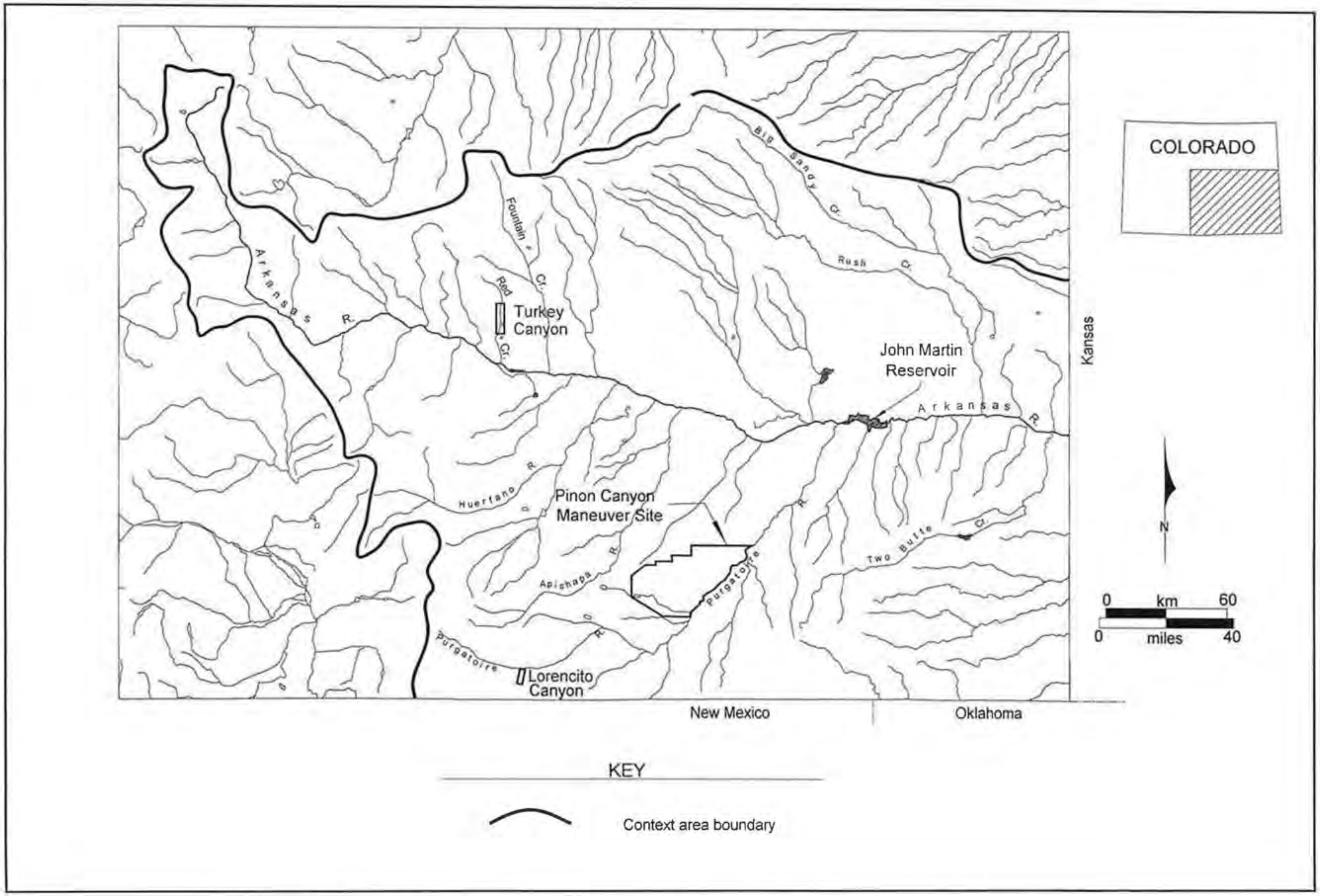


Figure 2-3. Map of Arkansas River context area showing alluvial stratigraphy study localities.

chronology for Turkey Canyon. First, Madole describes three alluvial terraces (Units 1-3; Figure 2-4). The oldest terrace, here referred to as T2 (Madole's Unit 1), consists of 0.5-1.0 m (1.6-3.3 ft) of gravel overlain by 2.5-3.0 m (8.2-9.8 ft) of poorly sorted, silty sand. A weak soil consisting only of an A/C profile formed at the top of this unit. T2 was deposited sometime between 12,000 and 6,000 B.P., perhaps as a result of intensified summer monsoonal activity (Madole 1990). However, T2 deposits at nearby Recon John Shelter yielded ages of 4050 ± 120 B.P. and 4400 ± 80 B.P. (Zier 1989).

The large difference in the ages suggested for the T2 terrace indicate that more stratigraphic work is needed to refine the age limits of this deposit. A younger unit, referred to here as T1 (Madole's Unit 2) and composed of well-sorted pink sand overlain by massive brown calcareous sand, was also observed. A paleosol in the pink sand at Recon John Shelter yielded an age range of 2000-1000 B.P. (Zier 1989). A weak soil was observed at the surface of this terrace, suggesting a short period of landscape stability. Finally, the flood plain (T0; Unit 3) consists of 2- to 3-meter-thick deposits of poorly sorted, gravelly alluvium (see Figure 2-4). Based on the lack of soil development and the absence of tree growth on the flood plain, these sediments date to less than 150 years in age (Madole 1990).

Pinon Canyon Maneuver Site

McFaul and Reider (1990) reconstructed more than 13,000 years of alluvial and eolian history at the PCMS along the middle reach of the Purgatoire River (see Figure 2-3). Two episodes of eolian deposition and four periods of alluvial deposition were identified. The oldest alluvial deposit is the Coder terrace (T2), identified along several ephemeral drainages within the PCMS. Deposition of this cobble-dominated alluvium began prior to ca. 13,000 B.P. and ended by about 8450 B.P. (see Figure 2-4). An eolian event as well as the development of the Lee soil on the alluvial and eolian sediments occurred between 13,000 and 11,000 B.P. The Lee soil is a buried Bt horizon with Stage II carbonates (Gile et al. 1966). A second eolian event began around 8000 B.P. and ended ca. 4500 B.P. Deposition of the Sant terrace (T1) commenced at 4500 B.P. A paleosol (Ross soil) subsequently formed within these alluvial sediments. This paleosol was buried by alluvium dating between 2750 and 2450 B.P. In turn, a paleosol formed in this alluvium (Gary soil), and it, too, was then buried by alluvium that dates between 1450 and 950 B.P. Thus, these two buried paleosols are a useful tool in identifying the T1 terrace.

The alluvial and eolian deposits in the PCMS have the potential to produce buried archaeological deposits. The earliest alluvial and eolian sediments (i.e., 13,000-11,000 B.P.) could contain Paleoindian artifacts. The subsequent eolian deposits and alluvial terraces may yield buried Early to Late Archaic cultural components. Additionally, the buried paleosols in the T1 terrace provide stratigraphic markers that are useful when interpreting the age of archaeological deposits.

John Martin Reservoir

Holliday (1981) describes the late Quaternary deposits for the John Martin Reservoir area along the Arkansas River near Las Animas (see Figure 2-3). He identifies two major types of late Quaternary sediments: Arkansas River alluvial terraces and eolian deposits. The oldest terrace is the Caddoa terrace. It is a strath terrace consisting of well-rounded quartzite, sandstone, and igneous cobbles that exhibit Stage I calcium carbonate accumulation (Gile et al. 1966) (see Figure 2-4). The Caddoa terrace is approximately 7 m (23 ft) above the modern flood plain. No absolute age exists for the creation of the Caddoa terrace, but Holliday (1981) suggests that terrace abandonment occurred around 17,000 B.P. Next, the Hospital terrace is approximately 4 m (13 ft) above the flood plain. The Hospital terrace fill is composed of a fining-upward sequence of

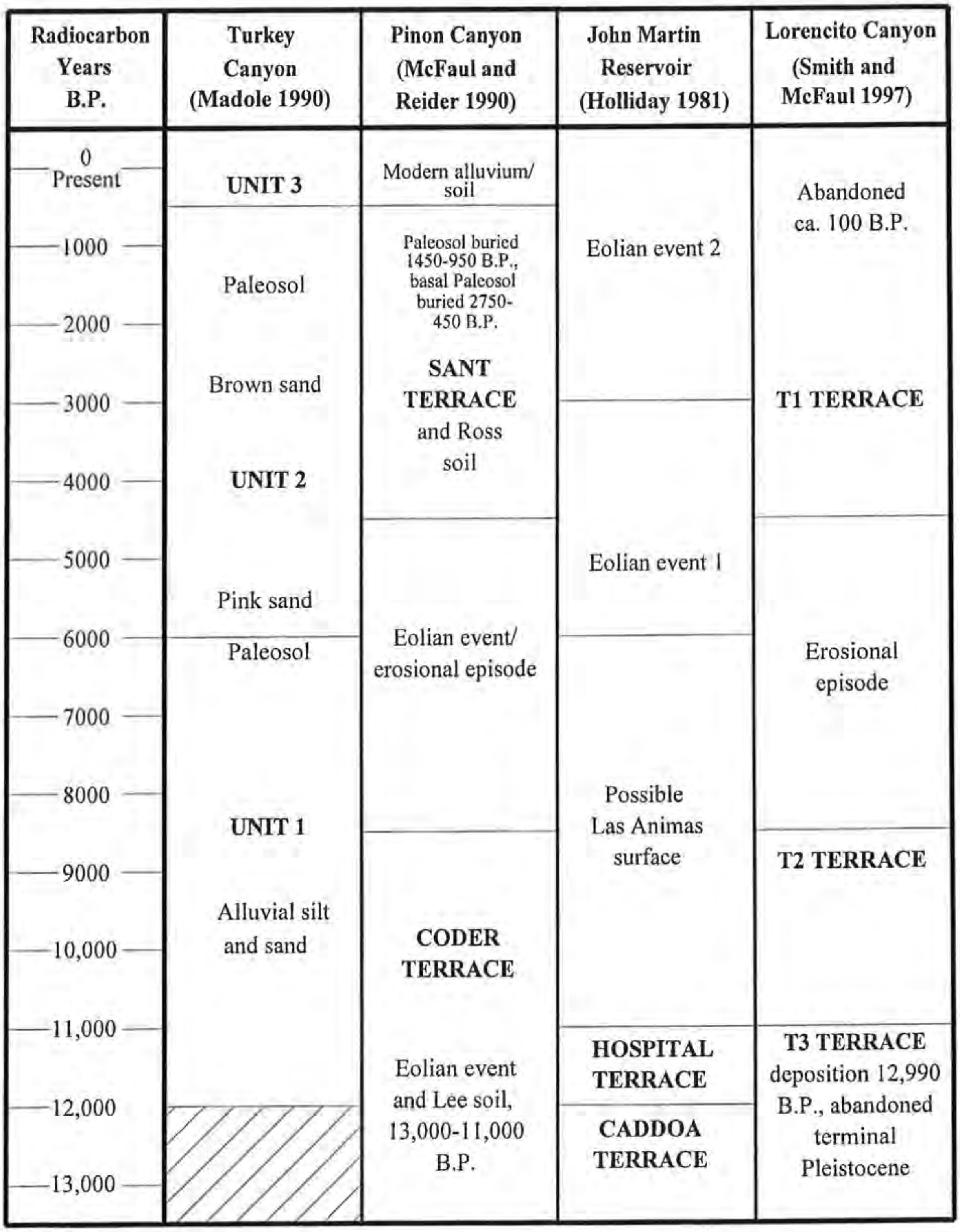


Figure 2-4. Stratigraphic sequences for alluvial geomorphology study locales.

alluvial gravel and sand, sand, and silt loam. Holliday (1981) notes that buried Bw horizons with strong ped structure and Bk horizons (Stage I-II; Gile et al. 1966) are present in the Hospital terrace fill. Finally, the Las Animas surface is the modern flood plain of the Arkansas River. Holliday (1981) identifies two eolian events in the John Martin Reservoir area. The first event occurred between 6000 and 3000 B.P., and the most recent eolian event began after 3000 B.P. (see Figure 2-4).

Most of the terrace deposits and all eolian sediments in the John Martin Reservoir area have the potential to contain buried cultural materials. Based on the age of the Caddoa terrace, it is unlikely that nonintrusive buried archaeological materials would be found in its fill. The Hospital terrace has the potential to contain Early to Late Archaic components. Finally, the early eolian deposits could contain Early and Middle Archaic cultural deposits, and the younger deposit could contain Middle Archaic and younger cultural components.

Raton Section/Park Plateau Subsection

Smith and McFaul (1997) describe the geoarchaeology and landscape evolution of Lorencito Canyon in the upper Purgatoire River drainage basin (see Figure 2-3). They identify three alluvial terraces (T3, T2, T1), colluvial deposits, and alluvial fans with potential to yield buried archaeological deposits. Evolution of the canyon began with the formation of a strath terrace (T3) sometime during the middle to late Pleistocene (see Figure 2-4). This surface is correlated with the Louviers terrace of the South Platte River (Scott 1963), and implies that the strath dates older than 12,990 B.P. The preservation of alluvial terrace T3 is limited, and its occurrence is confined to the confluence of Puertecito and Lorencito Canyons (Smith and McFaul 1997).

Creation of the T3 strath terrace was followed by a period of downcutting and the subsequent deposition of the T2 fill. This is believed to have occurred during the terminal Pleistocene/early Holocene transition (i.e., 11,000-10,000 B.P.). Deposition of T2 alluvium continued until about 8,000 B.P. A thick (1.92 m [6.3 ft]) mantle of loess caps alluvial terrace T2. Additionally, there is a gap in the depositional history of Lorencito Canyon between ca. 8450 and 4500 B.P. (see Figure 2-4). Finally, the deposition of alluvial terrace T1 began about 4500 B.P. T1 is the youngest alluvial deposit and is characterized by fining-upward overbank deposits and alluvial gravels. Two to three buried A horizons may be present in the terrace T1 fill. However, only a cumulic A horizon was observed in some areas. The timing of T1 abandonment and T0 deposition is not well dated, but it may correlate with the end of the so-called Little Ice Age, around 150 years ago.

The late Quaternary terrace deposits in Lorencito Canyon have the potential to yield buried cultural components. Paleoindian through Middle Archaic materials could be recovered from within T2, as well as from the loess deposit that caps the terrace. In fact, because of its cohesive properties, the loess deposit would be an ideal context for any in situ cultural components. Lastly, Middle Archaic to recent artifacts could occur in the T1 or T0 alluvial fills.

Discussion

The late Quaternary stratigraphic records show nearly 13,000 years of landscape evolution in the Arkansas River Basin in southeastern Colorado. Alluvial deposition occurred across the basin during the terminal Pleistocene/early Holocene period (e.g., 11,000-10,000 B.P). An eolian event in eastern Colorado also began at this time. There is a significant lack of published information on the late Quaternary stratigraphy of the Southern Rocky Mountains.

The stratigraphic records at Lorencito Canyon, PCMS, and John Martin Reservoir area show a shift from alluvial deposition to regimes favoring entrenchment and eolian deposition in the early and middle Holocene. At Lorencito and PCMS, erosional episodes began at 8000 B.P. and 8450 B.P., respectively. The stratigraphic sequence in the John Martin Reservoir area shows that an eolian sand unit was deposited 6,000 B.P. Turkey Canyon is the only anomaly, showing continual alluvial deposition throughout the Holocene. This may be the result of Turkey Canyon's proximity to the Southern Rocky Mountains. Increased runoff and sediment availability are common in such terrains and may have led to continuous alluvial deposition.

At ca. 4500 B.P., a return occurred to alluvial deposition at PCMS and Lorencito Canyon. With the exception of the John Martin Reservoir sequence, the other regional stratigraphic records also show alluviation and soil formation at this time. Eolian deposition dominates the middle and late Holocene at John Martin Reservoir. In the Turkey Canyon area, alluvial deposition and episodic soil formation continued through the middle and late Holocene. This period of alluvial deposition coincides with the Triple Lakes Glacial Advance in the Colorado Front Range between 5000 and 3000 B.P. (Benedict 1981, 1985). Finally, Madole (1994, 1995) notes an increase in eolian activity in eastern Colorado around 1000 B.P. This phenomenon is possibly an indication of the onset of increasingly arid conditions for this region. Eolian deposits younger than 100 B.P. are also common in the area, suggesting modern, semiarid conditions as well as the effects of plowing and livestock grazing.

PALEOCLIMATES

As is apparent from the foregoing discussion, paleoenvironmental information from the context area proper is sparse and has been derived mainly from plains and foothills investigations. Because of these deficiencies, the paleoclimatic reconstruction that follows is general, and to a large extent reflects extrapolation from adjacent regions. The discussion is organized by the cultural taxonomic units that have been applied to the context area (see explanation of dates and cultural content in subsequent sections of this document). Much of the information presented here about Late Pleistocene and earliest Holocene climates of eastern Colorado is drawn from a comprehensive synthesis of the subject by Brunswig (1992).

Pleistocene climatic conditions prevailed in the Pre-Clovis period, >11,500 B.P. During the Late Wisconsin (Pinedale) glacial maximum, ca. 18,000-15,000 B.P., average annual temperatures may have been 18°F to 27°F lower than those of today in eastern Colorado. While cold, the climate was extremely arid–perhaps 44 percent drier than conditions of the present. In the mountains, life zone boundaries were depressed by 500 m (1600 ft) or so, and tundra conditions existed in some areas just west of the mountain front. East of the mountains were grasslands interspersed with scattered boreal-type woodlands (Brunswig 1992:5-8; Leonard 1989; Elias 1986). This cold, dry environment is characterized by Stanford (1980:528-529; see also Brunswig 1992:7) as an ecosystem with a low carrying capacity.

Between 15,000 B.P. and the end of the Pre-Clovis period about 11,500 B.P., the climate of eastern Colorado warmed significantly but was still very cold, with average annual temperatures perhaps 16°F colder than those of the present. Life zone boundaries in the mountains were still depressed but probably not to the extent that they were prior to 15,000 B.P. Precipitation increased dramatically, with levels 10-25 percent higher than those of today. Eastern Colorado probably exhibited a mixture of open grassland and boreal woodlands, and the carrying capacity of the region–which after ca. 14,000 B.P. supported an array of Pleistocene megafaunal species–was vastly greater than that of the preceding millennia. Water tables were high and surface water abundant (Brunswig 1992:8-9).

Pleistocene climatic conditions began to ameliorate by 12,000 B.P., or just prior to the onset of the Clovis period (11,500-10,950 B.P.), and a prolonged warming and drying trend ensued. As glacial runoff ceased and precipitation rates were depressed, the vast system of late Pleistocene pluvial lakes that had developed in late Pre-Clovis times underwent significant changes. Water table levels were reduced and many lakes and ponds became seasonal (Johnson 1991:220-221; Stanford 1991:6-7). The cataclysmic terminal Pleistocene extinction process began but was not complete until sometime following the Clovis period, ca. 10,800-10,000 B.P. (Martin et al. 1985:25-27; Meltzer and Mead 1985:147-148, 165-166; Stafford 1990). In eastern Colorado the accelerated warming and drying resulted in an expansion of grasslands, and ultimately to a mix of tall- and shortgrass prairie with spruce/pine woodlands (Brunswig 1992:10-12).

The warming and drying trend that began around 12,000 B.P. and shaped the Clovis period continued through the course of the Folsom period (10,950-10,250 B.P.). The climate became increasingly seasonal with progressively warmer summers and, perhaps, colder winters. The climate was still moister than that of today but began to approach modern conditions by the end of the Folsom period (Martin et al. 1985:25-27; Brunswig 1992:12-14). The process of Pleistocene megafaunal extinctions was essentially complete; mammoth had almost certainly been extirpated by the end of Clovis times, and the horse, camel, and other forms soon followed, very likely in the earlier centuries of the Folsom period. While overall mammal species diversity was reduced, the numbers and geographical ranges of bison and pronghorn increased, perhaps dramatically, as range lands proliferated (Meltzer and Mead 1985:147-148, 165-166). Brunswig (1992:13) views eastern Colorado during the Folsom period as exhibiting a mixture of tall- and shortgrass prairie with deciduous woodlands along major streams such as the Arkansas River. While partially at odds with other paleoclimatic researchers, Stanford (1991:9-10) believes that, on the Southern Plains, the dry "Clovis pattern" eased somewhat around 10,900-10,800 B.P. and pluvial lake levels rose once again. It was this change, Stanford believes, that resulted in improved range lands and the marked increase in bison populations.

By early in the Plano period (10,250-7800 B.P.), essentially modern climatic conditions prevailed in North America. The trend toward increasing seasonality of climate that was well underway in the Folsom period culminated between 10,000 and 8000 B.P. (Martin et al. 1985:26). Brunswig (1992:15-19) believes that eastern Colorado by 10,000 B.P. or so had developed into a land of semiarid to arid shortgrass prairie with deciduous woodlands along the principal watercourses - a description that applies to the area today. The Pleistocene extinction process was largely complete by around 10,000 B.P., although occasional megafaunal species are known from early Plano period site assemblages. Bison continued to diminish in size throughout the course of the Plano period but undoubtedly increased in absolute numbers and enjoyed an expanded geographical range as grasslands proliferated (Meltzer and Mead 1985:165-166). Martin et al. (1985:27) observe that the shift to fully Holocene conditions lowered the potential for big game hunting across North America except in the Great Plains, where a "monoculture" of bison hunting developed. Following the close of the Pleistocene, the High Plains comprised an "unusually restrictive" ecosystem, "containing a relatively limited number of edible species of plants and animals...in which a highly specialized technology had to be developed..." (Bryan 1991:22-23). This development consisted of specialized hunting of bison, a relatively late Paleoindian phenomenon that Bryan views as the only means of maintaining occupation of the region while avoiding starvation.

The Early Archaic period (7800-5000 B.P.) may be broadly associated with the Altithermal climatic event. Originally conceived as a lengthy (ca. 2,500 years' duration) period of relatively hot and arid conditions over the western United States (Antevs 1955), the Altithermal has more recently been redefined in terms of episodic fluctuations in effective moisture and temperature. Largely on the basis of perceived changes in human population density throughout western North America in post-Paleoindian time, Benedict (1979) proposed the concept of an Altithermal comprised of two droughts, the first occurring between 7000 and 6500 B.P. and the second between 6000 and 5500 B.P. Benedict describes the Altithermal as "real, severe, more complex than generally envisioned..." and further believes that it was continental in scale. Benedict's thesis of a two-drought Altithermal has not been seriously challenged, although as he himself has noted, approaches to paleoenvironmental reconstruction lack the sort of temporal precision that allows discernment of short-term climatic change. Investigations of Early Archaic strata at Lubbock Lake on the Southern Plains, which yielded data totally independent from those of the Colorado mountains, tend to corroborate Benedict's notion that two distinct droughts occurred within the Altithermal (Johnson and Holliday 1986). However, the bracketing dates for inferred drought periods within the Altithermal at Lubbock Lake are given as 6400-5500 B.P. and 5000-4500 B.P. These dates are not "remarkably similar" to those of Benedict, as suggested by Johnson and Holliday (1986:44), and in fact are at odds with them in most respects.

Conditions in eastern Colorado during the Early Archaic period were at least as dry as those of the present, with shortgrass and sagebrush-yucca prairies dominating the Plains landscape. Brunswig (1992:18-19) regards the eastern Plains, foothills, and mountains of Colorado by the beginning of the Early Archaic as subjected to alternating cycles of dry-hot and cooler-wetter conditions. The biomass of plant and animal communities was substantially reduced in inverse proportion to levels of ecological stress, for plants and animals (including humans) alike.

The Middle Archaic period (5000-3000 B.P.) is widely viewed as a time when regional climates reverted to more mesic conditions, with somewhat depressed temperatures and elevated rainfall levels in comparison with the Early Archaic/Altithermal (see discussion in Jepson et al. 1994:8). Faunal and floral data from Middle Archaic deposits in southeastern Colorado rockshelters indicate very strongly that an essentially modern climate prevailed during this time (Zier 1989; Zier and Kalasz 1991; Kalasz et al. 1993). However, it should not be assumed that uniform conditions existed throughout the course of the Middle Archaic period. Geomorphic studies within the context area suggest–although not all are in agreement–that eolian deposition continued until ca. 4500 B.P. (McFaul and Reider 1990; Smith and McFaul 1997). Studies of eolian deposition and soil formation in the South Platte basin of northeastern Colorado strongly indicate that climatic fluctuations occurred after the termination of the Altithermal episode, and that dry intervals characterized by activation of sand dunes and sheets are a part of the eastern Colorado Holocene climatic record (Forman and Maat 1990; Forman et al. 1992; Jepson et al. 1994:7-8). Forman et al. (1992) believe that dune activation occurred within the 4800-1000 B.P. range, which encompasses not only the Middle Archaic but also the Late Archaic period. Madole (1995) also acknowledges a high degree of Holocene eolian activity in eastern Colorado but cautions that additional age determinations and other data will be required before definitive statements can be made about the timing of episodic dune activation in the area.

Paleoenvironmental data from within and near the context area do not indicate that major climatic changes occurred during the Late Archaic period (3000-1850 B.P.). The essentially modern faunal and floral assemblages of Middle Archaic archaeological sites in the region are unchanged in the Late Archaic, except that species lists are longer, due probably to the more intensive records of habitation and use at certain sites (Zier 1989; Kalasz et al. 1993). The geomorphic records for various localities within the Arkansas River Basin do not fully corroborate one another with respect to the issue of paleoclimates. As noted previously, in northeastern Colorado, Forman and Maat (1990; Forman et al. 1992) believe that a period of dune activation took place between ca. 4800 and 1000 B.P., a lengthy interval that encompasses the entire Late Archaic period. Eolian activity would be indicative of relatively arid conditions. Data from John Martin Reservoir near Las Animas also allow for the possibility of eolian movement during the

Late Archaic, although chronological controls are generally absent (Holliday 1981). Elsewhere in southeastern Colorado, however, geomorphic data indicate that regimes of alluvial (rather than eolian) deposition and attendant soil development- suggestive of climatic stability-prevailed after ca. 4500 B.P. and continued through and beyond the Late Archaic period (McFaul and Reider 1990; Smith and McFaul 1997).

No dramatic environmental changes are evident in the geomorphic or archaeological records of the region during the transition to the Late Prehistoric stage (< A.D. 100). Eastern Colorado during the first millennium A.D. was probably somewhat cooler and wetter than at present although departures from modern conditions were not at all dramatic, as essentially modern floral and faunal communities were in place (Euler et al. 1979; Hall 1982; Hall and Lintz 1984; Zier 1989:308-309). Summers were wetter and cloudier than at present and probably cooler as well, and the likelihood of wet spring and fall snowstorms increased (Olyphant 1985). A depositional environment was prevalent, as suggested by the alluvial geomorphology at several localities around the context area (Smith and McFaul 1997; McFaul and Reider 1990; Zier 1989; previous subsection).

There is evidence that progressively xeric conditions affected eastern Colorado and particularly the adjacent Southern Plains sometime after ca. A.D. 1000, although the timing of such climatic deterioration is in doubt (Lintz 1984). It has been suggested that widespread drought conditions documented for the greater Southwest during the thirteenth and fourteenth centuries (Dean and Robinson 1976) affected the Southern Plains as well (Zier et al. 1997:II-38). For example, on the basis of cut-fill sequences and other lines of evidence from the lower Purgatoire River region, Schuldenrein (1985) believes that southeastern Colorado closely resembles the Southwest in terms of overall geomorphic history. Stress-inducing xeric conditions were apparently severe enough that the plains portion of the Arkansas River context area was largely abandoned by human populations sometime between A.D. 1400 and 1500 (Zier et al. 1997:II-38). Archaeological evidence of the consequences of drought conditions is widespread on the Southern Plains (e.g., Lintz 1984). A reversal in climatic conditions occurred at ca. A.D. 1650 with the onset of the so-called Little Ice Age (or Neo-boreal) episode. This period of substantially cooler and moister conditions endured until ca. A.D. 1850, at which time the relatively xeric climate of the present day became established (Zier et al. 1997:II-37; Baerreis and Bryson 1965; Lintz 1984).

Chapter 3

HISTORY OF ARCHAEOLOGICAL INVESTIGATIONS

Christian J. Zier

The narrative that follows is specific to the Arkansas River context area, with only minimal acknowledgment of developments outside the context area. For more general histories of Colorado archaeology at both the professional and avocational levels the reader is referred to Cassells (1992, 1997) and Ooton (1992).

EARLY INVESTIGATIONS: PRE-1949

Three early investigations in the western Great Plains region that includes much of the Arkansas River context area became landmark studies in their time and are still regarded today as seminal works in the field of Paleoindian archaeology. These investigations consisted of excavations at the Folsom site in northwestern New Mexico and the Dent and Lindenmeier sites in northern Colorado. These sites lie outside the context area, with two to the north (Dent, Lindenmeier) and one to the south (Folsom). However, they profoundly influenced the manner in which archaeologists of the day perceived early human habitation of the greater plains region, and are worthy of mention here. The Folsom site, exposed in an arroyo near the small New Mexico town of the same name (about 24 km [15 mi] south of the Colorado border and thus very close to the context area), was excavated between 1926 and 1928 by J. D. Figgins of the Colorado Museum of Natural History (CMNH). The site provided the first North American evidence of an indisputable association between manufactured stone tools and now-extinct Pleistocene mammals, specifically bison (Anderson 1975; Figgins 1927; Wormington 1957). A few years later, in 1932, mammoth bones were found eroding from a bank in a railroad cut at the Dent depot in Weld County, near the confluence of the South Platte and Big Thompson rivers. Excavations at the locality, named the Dent site, were initiated that same year by Regis College of Denver and subsequently handed over to Figgins of the CMNH. Work continued into the following year. The Dent site yielded several large spear points, later named Clovis points, in direct association with bones that were among the remains of about 12 mammoths. This demonstrated, human-mammoth connection predated similar discoveries at Blackwater Draw, New Mexico by several years (Cassells 1997:58-64; Figgins 1933; Wormington 1957). The Lindenmeier site, located in northern Larimer County near the Wyoming border, was actually found in 1924–two years prior to the Folsom site discovery–but was not professionally excavated until the following decade. Between 1934 and 1940 the Smithsonian Institution conducted extensive excavations at the site, exposing a campsite of Folsom age (Roberts 1935a, 1935b, 1935c, 1936a, 1936b, 1936c, 1937a, 1937b, 1938, 1940, 1941; Wilmsen and Roberts 1978). Located on private land and largely inaccessible to archaeologists for the last half-century, the locality is still regarded as one of the most important Paleoindian sites on the continent.

The earliest professional investigations of the Arkansas River context area were initiated in the 1930s. However, it is clear from the numerous artifact collections described by archaeologists during that time (e.g., Figgins 1935; Renaud 1932a, 1933) that ranchers, farmers, and amateur archaeologists were in many cases already well acquainted with certain aspects of the area's prehistory. These often massive collections indicate that some individuals had more than a passing interest in collecting, and specific settings such as sand "blowouts" were known to be especially productive of projectile points. If evidence from other areas of the state–for example, the Magic Mountain site vicinity near Golden–can be applied generally to the Arkansas River context area, it is likely that nonprofessional collecting and perhaps even excavation of archaeological sites was taking place as early as the 1870s or 1880s (Kalasz and Shields 1997:7-8).

In 1930, E. B. Renaud of the University of Denver (DU) initiated a research program in eastern Colorado that would ultimately span 17 years. Renaud's work was apparently inspired by a field trip that he led in 1929 for the CMNH to sites in extreme northeastern New Mexico and the Oklahoma panhandle (Renaud 1937a, 1947). The earliest of Renaud's eastern Colorado explorations, which he referred to as "expeditions," were partially underwritten by the CMNH and the Smithsonian Institution. It is unclear from Renaud's writings if that funding extended beyond 1930. It is also uncertain whether fieldwork was actually undertaken during each of the years stretching from 1930 to 1946, although work at some level can be documented for most of those years. The most ambitious explorations seem to have occurred in the years prior to 1935, with the level of work dropping off after that time. Eastern Colorado was the main focus of Renaud's research but he explored widely in adjacent areas as well, particularly eastern New Mexico, the Oklahoma panhandle, and southern Wyoming. Renaud was assisted by his students from DU. While it is plain from the geographical as well as the topical scope of his investigations that Renaud was a man of great energy and ambition, anecdotal evidence suggests that the "dirty work" was generally left to others (Cassells 1997:311).

Much of Renaud's work was of a reconnaissance nature, and he relied heavily on landowners and other knowledgeable local persons to show him the locations of sites. He surface collected frequently and also excavated, but apparently less often. And, he was a prolific writer, describing his wanderings and proffering his many views on the prehistoric inhabitants of the region in a lengthy series of monographs and articles, most of which were published by DU and in *Southwestern Lore* (Renaud 1931, 1932b, 1933, 1935, 1936, 1937b, 1937c, 1941, 1942a, 1942b, 1942c, 1943, 1947, 1952; Renaud and Chatin 1943; see also Renaud 1932a). Renaud identified a long series of "districts" in southeastern Colorado and neighboring areas, and in doing so recognized those regions where archaeological sites were most concentrated or at least most visible. He was particularly interested in rock art, rockshelters, and stone alignments. His districts were never well defined in geographical terms, and districts designated in later publications routinely overlapped or cross-cut those identified previously. No fewer than 15 districts (depending on one's system of accounting) were identified over the years in the Arkansas context area: Colorado Springs-Pueblo (later regarded as separate districts), Apishapa (later referred to as Apishapa Canyon), Las Animas, Trinidad-La Junta, Lamar, Mesa de Mayo (sic), Turkey Creek, Canon City, Fowler (later divided into Fowler North and Fowler South), La Veta, Salida, Beulah, Aroya, Campo, and Kim.

At the hands of later generations of archaeologists, Renaud has been an object of criticism sometimes bordering on ridicule. The reasons are numerous and some are not without basis in fact. Renaud roamed widely but did not investigate most topics in great detail, appearing to many as something of a dilettante. His lack of formal training in anthropology and archaeology certainly affected the quality of his work. A native of France, he established himself initially as an instructor in romance languages and only later developed an interest in archaeology (Cassells 1997:311-312). His comparisons of High Plains archaeological phenomena with Old World traits were particularly irrelevant. His constantly shifting methodologies for designating districts, sites, and artifacts (e.g., he used multiple site numbering systems, often giving a single site as many as three numbers) have caused considerable confusion among later archaeologists who have tried to retrace his work (see Downing 1981:6-7). A 40 percent random sample inventory of Renaud's DU collections by Downing (1981) demonstrates that a great many artifacts amassed by Renaud, including a majority of the projectile points, are missing. Based on an informant's comments, Downing (1981:9, 17) suggests that the artifacts may have disappeared during Renaud's last years at the university. There is anecdotal evidence to suggest that he sometimes gave away artifacts as favors, for example to helpful landowners, although this notion has not been proven. Nevertheless, Renaud's contributions to southeastern Colorado archaeology were enormous. He documented more than 1,000 sites in eastern Colorado, the great majority in the Arkansas drainage basin. He first called professional attention to the rich Late Prehistoric legacy of the region, provided venues for description of private collections, and offered the first comprehensive artifact descriptions and interpretations, particularly of ceramics and projectile points. Although much of his site information is hopelessly confusing, his architectural illustrations are of a high quality and have proven to be useful to subsequent researchers (Van Ness et al. 1990; Zier and Kalasz 1985). Perhaps most importantly, he inspired others such as Frank H. H. Roberts, Jr. to embark on careers in archaeology, and he initiated a tradition of southeastern Colorado research that continued at DU into the 1980s.

Other investigations in the context area during the 1930s hardly compare in scope to those of Renaud. Early in the decade, Warren King Moorhead of Phillips Academy in Andover, Massachusetts published a book entitled *Archaeology of the Arkansas River Valley* (Moorhead 1931). Based on one "expedition," two reconnaissance trips, and much secondary information, the volume was aimed at the whole of the Arkansas River Basin but in fact emphasized the central and eastern portions. The book does give general recognition to post-Archaic manifestations of the High Plains portion of the drainage basin, particularly those exhibiting architecture, that were variously labeled Apishapa, Antelope Creek, and Panhandle by later researchers. Moorhead mentioned briefly the presence of stone alignment sites in the Canon City area, using descriptions provided by a local informant. He concluded that "there is considerable archaeological material of importance in the upper Arkansas..." (Moorhead 1931:117). Later in the decade, Jesse M. Figgins described Paleoindian projectile points from several eastern Colorado counties including Cheyenne County along the northern boundary of the context area (Figgins 1935). Myra Wyeth Latham, in an article in *The Colorado Magazine* article, offered a highly romanticized account of a private field trip into the Purgatoire Canyon south of La Junta, during which rock art, shelters, stone enclosure sites, and bedrock metates were observed (Latham 1937).

The decade of the 1940s was, prior to the 1949 expedition described in the following section, fairly quiet. The only archaeological work of note was conducted by Robert M. Tatum and Norman W. Dondelinger in Las Animas County and described in a series of short articles published in *Southwestern Lore* and elsewhere (Dondelinger and Tatum 1942; Tatum 1942, 1944a, 1944b, 1946, 1947; Tatum and Dondelinger 1944, 1945). Tatum appears to have been the driving force behind the work. His affiliation as claimed in the various articles was the U.S. Naval Academy, beginning in 1942; however, he does also mention having attended the University of Minnesota in 1943. Dondelinger at the time was head of the Natural Science Department at Trinidad State Junior College (TSJC). It is uncertain if either had received formal training in archaeology. Their investigations to a large extent consisted of conducting reconnaissance surveys, documenting sites already known to local residents, and describing private artifact collections. More than 50 sites located along the Apishapa River and both the upper and lower stretches of the Purgatoire River were noted, and the variability in site types and artifact assemblages briefly described. Tatum and Dondelinger also described partial excavation of several structures at a large stone enclosure site on the Apishapa River. Referred to as "Stonehenge" by Tatum (1947:33) because it was so called by locals at the time, the locality was later named the Cramer site and excavated thoroughly in the mid-1980s by James H. Gunnerson (1989). Tatum and Dondelinger (1945:12) make occasional reference to other "excavations" that were continuing in the region at the time but it is uncertain if this work was their own or that of others. They make it clear, however, that nonprofessionals were very actively digging and surface collecting throughout Las Animas County, which they regarded as a serious threat to archaeological sites.

Little else appears in the literature prior to 1949. H. H. Robb (1942) published an abstract of a paper presented to a Colorado Archaeological Society (CAS) meeting in which he described briefly the excavation of a rockshelter in northern Las Animas County called Rocky Ford Cave. This stratified site yielded a variety of artifacts. Additional work was apparently planned, but nothing further was reported. No information about a site by this name is available in the comprehensive files of the Colorado OAHP. An obscure reference in Dick's (1953) compendium of Colorado archaeological literature indicates that a site was also excavated along the Purgatoire River in Otero County, probably in the early 1940s (Gebhard 1943). No information about this work is on file at the Colorado OAHP.

ACADEMIC STUDIES AND EARLY CRM ARCHAEOLOGY: 1949-1978

The year 1949 marked the beginning of a new era in southeastern Colorado archaeology. The pace of research over the succeeding two and one-half decades would far exceed that of earlier times but pales by comparison with the most recent era that leads up to the present. The period 1949-1978 was dominated by university-based studies, often of a multiyear nature. Some were field schools, conducted with the intention of educating undergraduate students in basic archaeological techniques, others were centered around graduate-level thesis and dissertation research, and still others are best described as pure research. This period also witnessed the beginnings of so-called cultural resource management (CRM) archaeology, as federal regulatory and land-managing agencies struggled to ensure that various large-scale development projects in the area were in compliance with a spate of new historic preservation statutes. These investigations, too, were undertaken by academic institutions, in most cases the schools that had already established a research presence in the region. Because of the heavy emphasis on academic studies during this period, the description of work that follows is organized by institution to the extent possible. Important investigations during this period are shown in Figure 3-1.

The 1949 High Plains Columbia Expedition to Colorado is one of the truly enigmatic projects in Colorado's long history of archaeological research (see also Lintz's [1999] comprehensive description of the undertaking and related events). The project was conceived by Columbia University student and Colorado native Haldon Chase and was inspired by Chase's professor at Columbia, William Duncan Strong. The objective was to find and excavate early Apache sites, although the failure of Chase and his field assistants, Bob Stigler and Ferdinand Okada, to locate suitable sites led to a broadening of the project's scope and, ultimately, to excavations at the Snake Blakeslee site (Chase 1949), at a nearby cave, and at Trinchera Cave east of Trinidad. Early in the summer of 1949, Chase's party conducted extensive reconnaissances throughout eastern Colorado, which Chase resumed late in the summer following almost two months of excavations. Chase often relied (as Renaud had done years earlier) on the knowledge of local informants. Especially useful to Chase were ranchers Richard and Willard Louden of Las Animas County. Lintz (1999), in his summary and synthesis of the Columbia expedition, notes that the project essentially fell apart in the winter of 1949-1950, when Chase decided not to continue graduate studies at Columbia. Plans for a joint project in 1950 involving both Columbia and TSJC were suspended. Meanwhile, Chase and his assistants labored on a planned publication about the Snake Blakeslee site excavations, but the manuscript was never completed, and Stigler and Okada soon turned their attention to their own graduate studies.

Haldon Chase had formed a relationship with TSJC shortly after his arrival in southeastern Colorado and he now sought their support for another season of fieldwork. Under the auspices of the 1950 Trinidad State College High Plains Expedition, Chase and his wife, Gin, conducted additional excavations at Snake Blakeslee and then went on to other sites, including Trinchera Cave, where rather cursory excavations were undertaken. Chase's interest in southeastern Colorado archaeology seems to have dissipated rather quickly after the 1950 field season, and he

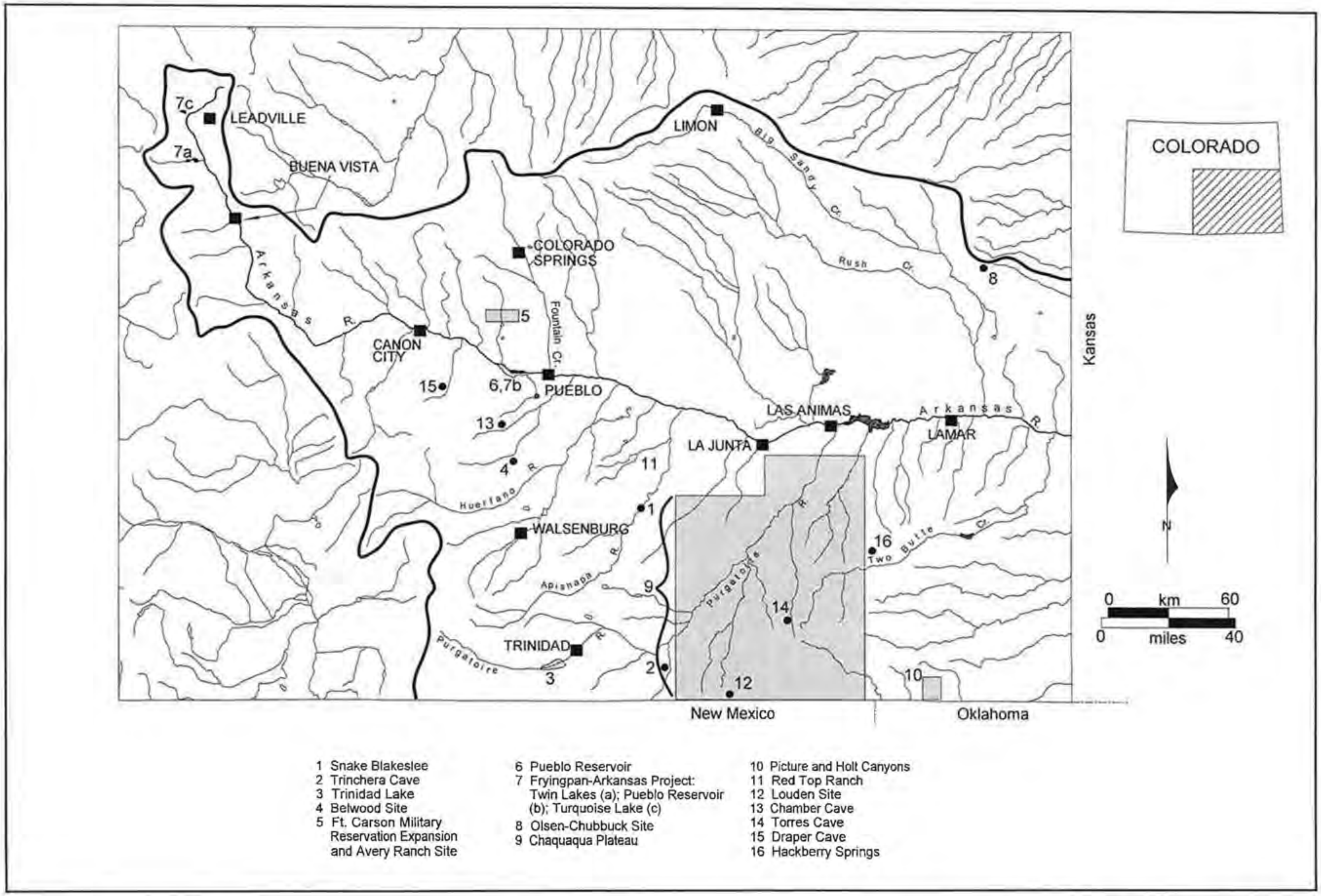


Figure 3-1. Map of Arkansas River context area showing locations of major archaeological projects and excavated sites, 1949 - 1978.

spent considerable time on projects out of the state and out of the country. He did return to Colorado in the winter of 1951-1952 and made an attempt to synthesize his work from the two previous years, presenting a paper on the subject in 1952 (Chase 1952). During the summer of that year, using a small grant from TSJC, Chase conducted excavations at a "Sopris" site along the Purgatoire River near Trinidad, within the area of the flood pool of present-day Trinidad Lake. This project was never reported by Chase, although Lintz (1999) notes that the work did provide the basis for several public presentations (e.g., Dick 1954, 1963). Chase was given a faculty position of a year's duration at the college in the fall of 1952 and left when the appointment expired. His career in archaeology apparently ended at this time, and he moved away from Colorado permanently.

Herbert W. Dick succeeded Haldon Chase at TSJC in 1953 or 1954 (sources disagree on this date) and remained at that institution until 1962. Dick conducted extensive excavations at Trinchera Cave during the summers of 1954, 1955, and 1956 in a cooperative effort with the Harvard Botanical Museum. A rich and diverse assemblage of archaeological materials, including abundant perishable remains, was retrieved in the course of this work. However, Dick made little effort to report his investigations. Trinchera Cave was visited by a succession of archaeological field schools, professional and amateur field trips, and illegal pot hunters over the course of the two decades following Dick's work. In 1974 University of Wyoming graduate student Caryl Wood Simpson, supported with funding provided by TSJC and utilizing mainly high school student volunteers as field crew, conducted further excavations at Trinchera Cave. In a master's thesis Simpson (1976) described her own work and attempted a grander synthesis of the archaeology of the site, using Dick's original field notes in combination with an examination (but not reanalysis) of his collections at TSJC. The thesis includes a lengthy catalog of Dick's collections.

While at TSJC, Dick also worked at Trinidad Lake, excavating portions of sites 5LA1411, 5LA1413, and 5LA1416. Late in his tenure at the college he conducted the first comprehensive survey of the reservoir flood pool (Dick 1963). Unfortunately, as was the case with Trinchera Cave, Dick reported little of his excavation work (see reviews by Dore [1993:11] and Wood and Bair [1980:1-3]).

Work at Trinidad Lake by TSJC became something of a tradition during the 1960s and early 1970s. All investigations through 1974 were supported by the NPS. Galen Baker replaced Dick in 1962 and between that time and 1966 conducted excavations at six sites including the three investigated earlier by Dick. Baker was replaced by Edwin Guilinger in 1966, who in the subsequent two years excavated parts of four sites. Very little work by either of these archaeologists was reported (although see Baker [1967]). Stephen K. Ireland was employed by the college beginning in 1968 and in the following year began fieldwork at Trinidad Lake. He conducted excavations at several sites and also performed inventories, the latter including a complete resurvey of the reservoir flood pool. Perhaps most importantly, Ireland made a concerted effort to analyze and report the work of his three predecessors. The legacy of his tenure at Trinidad State Junior College, which ended in 1974, is a lengthy series of technical reports describing all aspects of the archaeology of the Trinidad Lake area as it was understood at the time (Ireland 1970, 1971, 1973a, 1973b, 1974a, 1974b, 1974c, 1974d; Ireland and Wood 1973). The work of Ireland's successor at the college, Gerald A. Bair, began in 1975 and was performed under contract with the ACOE. Bair conducted extensive excavations at sites 5LA1211 and 5LA1416 in 1975, 1976, and 1977, and in the latter year oversaw another resurvey of the reservoir area (Hand et al. 1977). The excavation report not only described Bair's excavations but also synthesized earlier studies and refined the Late Prehistoric cultural chronology of the immediate project area. The report was completed by Bair's successor at TSJC, Caryl Wood, after Bair's departure in 1980

(Wood and Bair 1980). A reassessment of surviving sites in the Trinidad Lake area was recently conducted by the Office of Contract Archeology, University of New Mexico (Dore 1993).

Personnel at DU remained active in southeastern Colorado during this period, training students in field schools at various locations (e.g., Withers 1954). The most significant work occurred during the field seasons of 1950, 1951, and 1952 when a field party under the direction of Arnold M. Withers (who was assisted by David A. Breternitz) excavated the Belwood site at Colorado City, midway between Pueblo and Walsenburg. Excavation of the site–which included two structures of "Woodland" age–was not reported until a quarter-century afterward, when it became the subject of a master's thesis at DU by Grant O. Hunt (1975).

DU began conducting contract-based archaeological work in the region in the early 1960s, on a schedule similar to that of TSJC. In 1963, Withers conducted a reconnaissance survey of land in Pueblo County that was soon to be annexed by the U.S. Army for an expansion of Fort Carson Military Reservation (Withers 1964). The boundaries of Withers' survey are vague, but it is certain that he concentrated his efforts along Beaver, Red, and Turkey creeks, and in the process redocumented several sites first noted in the 1930s by Renaud and included in his "Turkey Canyon District" (above). In 1965 a stone enclosure site along the east rim of Turkey Canyon, originally called the Wand site but ultimately renamed Avery Ranch (5PE56), was partially excavated by Withers and Alan P. Olson. Avery Ranch was one of several sites described in Stephen K. Ireland's (1968) master's thesis at DU, the topic of which was "Apishapa focus" occupation of the general Pueblo Reservoir area. Ireland did not directly participate in the excavation and in fact had never seen the Avery Ranch site, but was instructed by Withers to add it to his thesis after a draft had been completed. Ireland's thesis also described excavations undertaken at the Snake Blakeslee site by the 1949 Columbia High Plains Expedition; no new work at the site was reported. In 1969, DU graduate student Howard K. Watts, under the general supervision of Withers, conducted additional excavations at the Avery Ranch site and subsequently wrote a master's thesis on the subject (Watts 1971; see also Watts 1975).

Archaeological work associated with the Fryingpan-Arkansas project, a massive undertaking designed to convey Western Slope water to the Arkansas River drainage basin via a system of dams, reservoirs, and tunnels, was begun in 1964 by DU under contract with NPS. In that year Withers supervised the survey of three reservoir flood pools of which two, Twin Lakes and Sugarloaf Reservoir (the latter a proposed enlargement of existing Turquoise Lake), are located in the Arkansas River headwaters near Leadville. Pueblo Reservoir west of the city of Pueblo was surveyed as well, with work consisting of both inventory and small-scale test excavation continuing the following summer. In the summer of 1966 Withers conducted testing and full-scale excavation of 14 sites in the Pueblo Reservoir area (Olson et al. 1968; Withers 1965; Withers and Huffman 1966). As a DU graduate student, Ireland participated in the Pueblo Reservoir excavations and used this material as the primary basis of his master's thesis (see preceding discussion of Avery Ranch site) (Ireland 1968).

The University of Southern Colorado (originally Southern Colorado State College) became involved with the Fryingpan-Arkansas project in 1972 and, under the direction of William G. Buckles, undertook numerous studies through 1978 in areas that reflected the broad geographical scope of the project. The studies were carried out variously for the NPS and BOR. Fieldwork was conducted in each of the years from 1972 to 1978, with the greatest expenditure of effort during the 1975-1978 period. Most of the work took place in the Arkansas River headwaters area and included surveys and excavations in the Twin Lakes-Turquoise Lake area; ancillary facilities such as transmission lines were also studied (Buckles 1973, 1975a, 1975b). The final synthetic report, entitled *Anthropological Investigations near the Crest of the Continent* (Buckles 1978), incorporates information from several hundred sites and constitutes the earliest attempt to describe comprehensively prehistoric adaptation over a period of several thousand years in the extreme upper Arkansas region. In addition to work in the headwaters area, Buckles surveyed the Fountain Valley Conduit, also for the Fryingpan-Arkansas project, between Canon City and Colorado Springs (Buckles 1974).

The University of Colorado (CU) never established a steady presence in southeastern Colorado during this period but did support two studies of enormous importance to the region's prehistory. The CU Museum in 1958 and 1960 excavated the Olsen-Chubbuck site under the direction of Joe Ben Wheat. Situated in the lower Big Sandy Creek drainage basin in southern Cheyenne County near the Colorado-Kansas border, this site produced extensive evidence of a well-organized mass bison kill and butchering event that occurred approximately 10,000 years ago. Olsen-Chubbuck has particular significance because it is one of very few known Paleoindian sites in the entire Arkansas River Basin of Colorado, and the only one that has been comprehensively excavated. Further, the monograph that resulted from the excavation and analysis set a standard for reporting in Paleoindian studies to which archaeologists still aspire (Wheat 1972).

Between 1964 and 1966, CU graduate student Robert G. Campbell undertook a doctoral research project with the stated goal of determining the "origin, development, and ultimate fate" of so-called Panhandle culture in the Chaquaqua Plateau area (Campbell 1969a:iii). This area of interest was limited to the southeastern portion of the plateau and extended eastward from the Purgatoire River in eastern Las Animas County to adjacent portions of Otero, Bent, and Baca counties. This region essentially coincides with the remote canyon country on the east side of the Purgatoire; it encompassed an area of approximately 5200 km^2 (2000 mi^2). Campbell relied heavily on the assistance of many knowledgeable local residents including Everitt and Lonnie Jackson of Villegreen, Colorado, and he utilized students from both CU and Colorado College (CC) as field workers. His work was undertaken in phases which included examination of museum records and private collections, survey, excavation, and intensive site surface collection. Most of Campbell's efforts were expended on survey and test excavation. He refers to the survey work as "intensive" although in fact it was of a reconnaissance nature and was often guided by prior information about known sites. Excavations were regarded as "testing," but considerable work took place at certain sites such as Medina Rock shelter and Steamboat Island Fort where between 11.3 and 17.0 m^3 (400-600 ft^3) of earth were removed. Although Campbell was most interested in Late Prehistoric archaeological manifestations of the area, he encountered and reported Archaic materials as well, particularly from certain rockshelters. He described in detail the wide morphological range of stone enclosure sites in the area and provided a regional context for their interpretation, comparing and contrasting his own data with information from throughout the Southern Plains. Likewise, he provided a comprehensive description of artifact assemblages, and examined the issue of incipient horticulture in southeastern Colorado. Campbell's (1969a) dissertation, entitled *Prehistoric Panhandle Culture on the Chaquaqua Plateau, Southeast Colorado*, remains a landmark study and primary information source for the region. Campbell (1963, 1969b, 1976; see also Galinat and Campbell 1967) also spun off several articles related to his southeastern Colorado work.

Fieldwork initiated by CC on behalf of the USDA Forest Service in Baca County during the early 1970s laid the groundwork for annual field schools that began operating in the area later in the decade. Under the general direction of Michael Nowak, groups of undergraduate students conducted surveys as well as partial excavations of several sites in Picture and Holt canyons in 1970, 1971, and 1972 (Nowak and Anderson 1972; Nowak and Gordon 1973). In 1972 recent CC graduates Jane L. Anderson and Fletcher F. Anderson, utilizing private funding in combination with student labor and facilities support from the college, conducted an inventory on the 132-square-kilometer (51 mi^2) Red Top Ranch between Walsenburg and La Junta. A wide range of open and rockshelter sites was recorded, the former including stone enclosure sites. Lithic artifacts from the project became the topic of a lengthy graduate seminar paper at CU (Anderson 1976).

In the mid-1970s the Colorado Department of Highways (CDOH) began conducting surveys and excavations associated with road construction projects throughout the state. The CDOH archaeology program was directed by John D. Gooding and was initially operated from a base in the newly created Office of the State Archaeologist of Colorado (OSAC) at CU. Only limited work was carried out in southeastern Colorado prior to 1978, the most significant inventory being that of the Powers Boulevard corridor in Colorado Springs (Gooding 1977). CDOH also conducted reassessments of sites recorded in the mid-1960s by TSJC along Interstate 25 on Raton Pass (Baker 1965).

Amateur archaeologists, particularly those affiliated with CAS, were active during this period and produced several important pieces of work, most which appeared as articles in the journal *Southwestern Lore*. Jerry Chubbuck, who discovered the Olsen-Chubbuck site in 1957, published a small article two years later that recounted his initial investigations and also described in detail (with accompanying illustrations) his collection of Paleoindian projectile points from the site (Chubbuck 1959). In 1960 a burial was discovered by the Englert family, who were affiliated with the Historical Society of the Pikes Peak Region, in northern Pueblo County on land that shortly thereafter was annexed by the U.S. Army for an expansion of Fort Carson. The remains were reported and analyzed by personnel from CC and the University of Kansas (Bass and Kutsche 1963). John W. Greer, working with then-CAS President Richard Louden and others on Louden property in Las Animas County, in 1965 excavated the Louden site, a ring midden of terminal Late Prehistoric age. Greer (1966) interpreted the site's function and offered comparisons with burned rock midden sites elsewhere on the Southern Plains. Chamber Cave, a rockshelter site along the St. Charles River southwest of Pueblo, was excavated in 1969 by Charles E. Nelson of CAS (Nelson 1970). This site, which apparently dates to the latter portion of the Late Prehistoric stage, produced a diverse artifact assemblage that included remarkably well preserved perishable materials such as hardwood arrow foreshafts (one with a hafted, side-notched point), hafted knife with a wooden handle, yucca-sewed leather pouch, wooden fire drills, and possible leather bow guard.

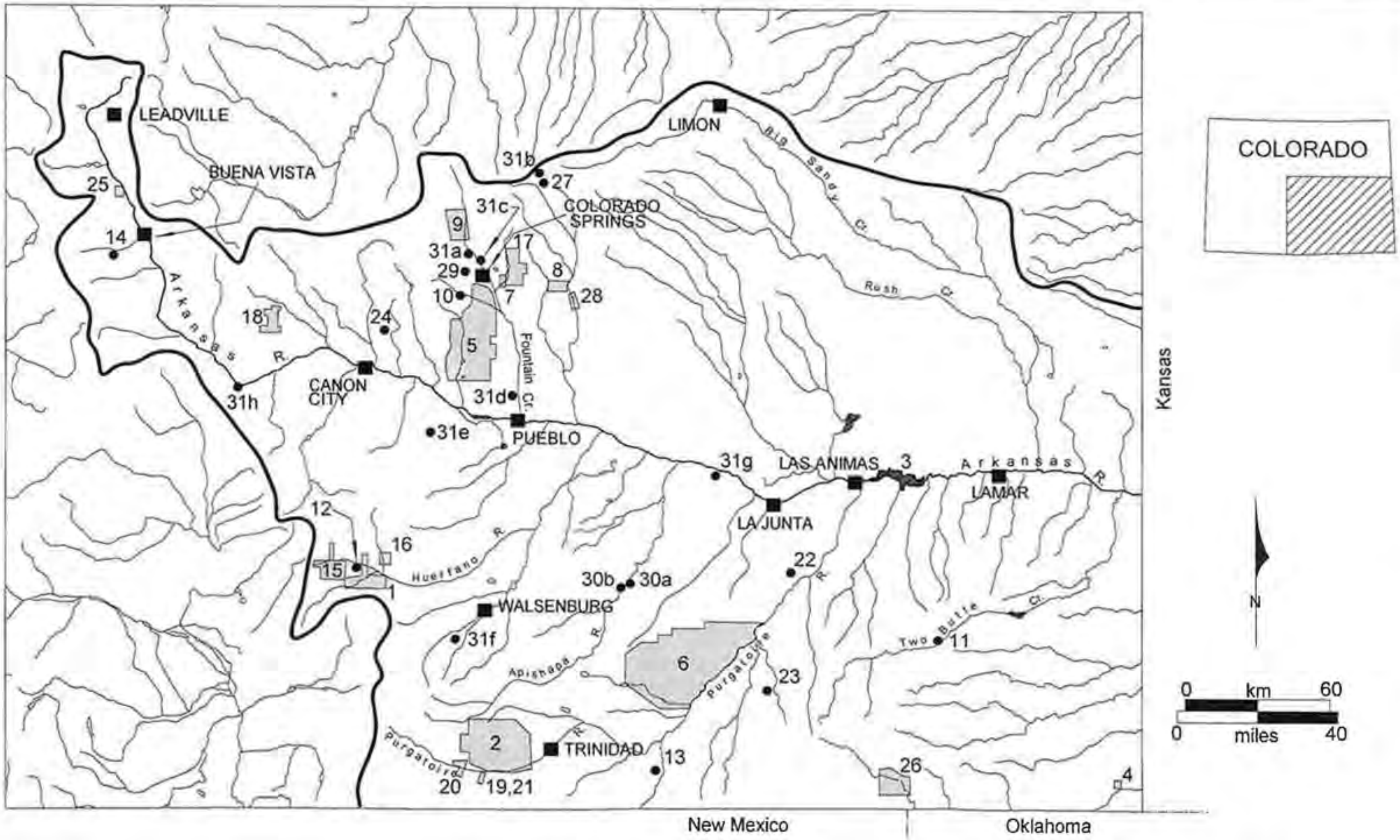
Between 1974 and 1977, the Denver Chapter of CAS tested and excavated Torres Cave near Villegreen in the canyon region east of the Purgatoire River, Las Animas County. This large-scale project yielded abundant and varied materials of Late Prehistoric age. The main excavation description was provided by Steven D. Hoyt (1979), with companion articles on various aspects of the project by several others (Guthrie 1979; Lyons 1979; Rathburn 1979). With the assistance of students from various universities and under the supervision of Ivol K. Hagar, the Denver Chapter of CAS in the mid-1970s also excavated Draper Cave. Located in northeastern Custer County south of Canon City, this site produced abundant lithic and ground stone artifacts, bone, several hearths, and a burial. The principal component is of Middle Archaic age, although Late Archaic and Late Prehistoric materials occur as well. The assemblage of Middle Archaic projectile points is the largest reported from an excavated context in the Arkansas River Basin of Colorado (Finnegan 1976; Hagar 1976; Kane 1976; Lyons 1976). The final project of note for this period was conducted in 1977 and 1978 by members of the Denver Chapter of CAS and other interested nonprofessionals, in cooperation with personnel from OSAC. Hackberry Springs, a combination prehistoric-historic rock art site lying along the Las Animas-Baca County line, was subjected to comprehensive documentation and was subsequently enrolled on the National Register of Historic Places (NRHP) (Halasi et al. 1981).

THE ERA OF CRM ARCHAEOLOGY: 1978 - PRESENT

As the 1980s approached, the relative importance of CRM-based studies grew in southeastern Colorado and elsewhere throughout the country. The 106 Compliance Process (a reference to Section 106 of the National Historic Preservation Act) became formalized with the establishment of State Historic Preservation Offices (SHPOs) and State Archaeologists, and without exception, undertakings involving federal lands, licensing, or funding came to incorporate archaeological studies. The energy boom of the late 1970s-early 1980s did not result in a dramatic increase in the level of archaeological work in the context region as it did in many parts of the west, in large part due to the near-absence of public land across much of southeastern Colorado. The area is also generally lacking in reserves of oil and natural gas, and coal deposits tend to be restricted to the Walsenburg-Trinidad vicinity. The pace of archaeological research increased nonetheless, and although contract work by academic institutions continued, private CRM companies dominated the landscape by the early 1990s. The beginning date of 1978 for this period is somewhat arbitrary. Contract-based investigations did not dramatically increase after this time, but rather built up steadily after 1975. The year 1978 does, however, mark the date of the earliest work by private CRM firms. Figure 3-2 depicts the locations of significant projects during this period.

Some of the largest and most important projects in southeastern Colorado during the recent era, as in the previous periods, have been funded by the federal government. These include regional planning studies, a reservoir flood pool study, various military land acquisition and development projects, and a sale of foreclosed ranch property. The planning studies were undertaken between 1976 and 1979 by the Office of Public and Contract Archaeology at the University of Northern Colorado under the general supervision of Bruce J. Lutz, and were conducted on behalf of the BLM through NPS-Interagency Archeological Services (IAS). The first investigation, referred to as the Mid-Huerfano project, consisted of survey of 1800 hectares (4500 acres) of BLM land in four widely separated parcels along the upper Huerfano River; approximately 75 prehistoric sites were recorded (Lutz et al. 1977). The second, larger project comprised a sample survey of 63 quarter-section (64-hectare [160-acre]) quadrats totaling 4,032 hectares (10,080 acres). The study area encompassed the foothills region on the east side of the Spanish Peaks, an area known as the Apishapa and Purgatoire highlands. It was bounded on the north and south by the Las Animas-Huerfano County line and the Purgatoire River, respectively, and extended approximately 40 km (25 mi) west from Interstate 25. One of the first systematic examinations of settlement patterns resulted from the survey, by way of analysis of site type distribution with respect to major environmental zones (Lutz and Hunt 1979).

In 1980 Science Applications, Inc., under contract to the ACOE, inventoried 6,200 hectares (15,500 acres) at John Martin Reservoir in Bent County, just downstream from Las Animas along the Arkansas River. This work was supervised by Frank W. Eddy, also a professor at CU. Nearly all of the area surveyed lay within the reservoir flood pool and had been subjected to inundation associated with seasonal fluctuations of the lake level since the 1930s. Statistical analyses were conducted on the large survey database in an effort to define site types (based mainly on artifact content) and to construct a predictive model of site distribution (based on a suite of environmental variables). Functional relationships among various sites and site clusters in the study area were posited on the basis of both archaeological and environmental factors, but the results may be questioned because of a general lack of chronological control (Eddy et al. 1982).



1 Mid-Huerfano Project
2 Purgatoire-Apishapa Highlands
3 John Martin Reservoir
4 Flank Field Storage Area
5 Ft. Carson Military Reservation
6 Pinon Canyon Maneuver Site and Picket Wire Canyonlands
7 Peterson AFB
8 Falcon AFB
9 U.S. Air Force Academy
10 Cheyenne Mountain AFB
11 McEndree Ranch Site
12 Montez Midden
13 Wolf Spider Shelter
14 Cottonwood Pass (Runberg Site)
15 Wolf Springs Ranch
16 Bucci Ranch
17 Banning-Lewis Ranch
18 Cyprus Mines Hanson Project
19 Lorencito Canyon Mine
20 Golden Eagle Mine
21 Veltri Site
22 5OT430
23 Upper Plum Canyon I
24 Moonshine Shelter
25 Heckendorf SWA
26 Carrizo Ranches
27 Davis Rockshelter
28 Crows Roost
29 Garden of the Gods
30 Apishapa Canyon: Cramer, Munsell, and Canterbury Sites (a); Snake Blakeslee and Juan Baca sites (b)
31 Burials: Popes Valley (a); Frederickson (b); OAHP #99 (c); Beacon Hill (d); Bronquist (e); OAHP #98 (f); Ancell (g); Coaldale-Fox Ossuary (h)

Figure 3-2. Map of Arkansas River context area showing locations of major archaeological projects and excavated sites, 1978 - present.

The Laboratory of Public Archaeology (LOPA) at CSU was active in energy-related CRM work in the late 1970s and early 1980s, but its efforts were concentrated mainly in northwestern Colorado. In 1979, however, LOPA conducted a 4,800-hectare (12,000-acre) block survey in Baca County for Colorado Interstate Gas Company (CIG) of a proposed gas storage area called the Flank Field. The survey area is in the extreme southeastern corner of the county near the borders with Oklahoma and Kansas, along a series of short watercourses that drain into the Cimarron River. This project remains one of the largest-scale intensive surveys conducted in the context area to date. More than 100 prehistoric sites and numerous isolated artifacts were recorded, representing habitation from Paleoindian through Late Prehistoric times (Wood et al. 1981).

The U.S. Army since the late 1970s has supported a considerable amount of archaeological work at Fort Carson and the PCMS. Fort Carson, encompassing approximately 562 km^2 (216 mi^2), lies along the plains/foothills boundary immediately south of Colorado Springs. Early studies along Turkey Creek in areas that would eventually become part of Fort Carson, including Renaud's reconnaissances of the "Turkey Canyon District" and initial work at the Avery Ranch site, are described above. Virtually all of the archaeological research since 1978 has been funded by the U.S. Army and administered by NPS. The first significant project following expansion of the military base to its present size, and the single largest fieldwork endeavor to date, consisted of a sampling survey between 1978 and 1982 by Grand River Consultants, Inc. under the direction of Robert K. Alexander. East/west-trending, 1-kilometer-wide (0.6-mile-wide) transects totaling more than 15,200 hectares (38,000 acres) were inventoried and 30 prehistoric sites were test excavated (Alexander et al. 1982; Hartley et al. 1983). Two small-scale surveys were conducted by 1983 by Goodson and Associates, Inc. and Metcalf-Zier Archaeologists, Inc. (Burns and Killam 1983; Zier 1984). Beginning in 1984 and continuing through 1997, Centennial Archaeology, Inc., operating under a succession of NPS contracts, undertook surveys along watercourses and other areas of high site probability throughout the reservation as well as surveys of areas slated for military development; conducted test and mitigative excavations at 15 sites including Recon John Shelter, the Ocean Vista site, Gooseberry Shelter, Two Deer Shelter, and surviving portions of the Avery Ranch site; and produced a reservation-wide historic preservation plan (HPP), later updated as a cultural resource management plan (CRMP) (Jepson et al. 1992; Kalasz et al. 1993; Van Ness et al. 1990; Zier 1989; Zier and Kalasz 1985, 1991; Zier et al. 1987; Zier et al. 1988, 1990; Zier et al. 1996a; Zier et al. 1997). Recent work at Fort Carson, consisting mainly of survey but including some test excavation, has been conducted by the NPS-Midwest Archeological Center under the direction of Melissa Connor and others, and by Fort Lewis College (FLC) under the direction of Mona Charles and Philip Duke (Charles et al. 1998; Charles et al. 1999a; Charles et al. 1999b). A geomorphic and geoarchaeological study was also conducted of the Red Creek drainage by Texas A&M University (Kuehn 1998). The total acreage surveyed since 1978 exceeds 65,000, or approximately half of the total area of the post. Well over a thousand prehistoric sites and isolates have been recorded.

The PCMS is under the Fort Carson Command but is located 90 miles southeast of Fort Carson between Trinidad and La Junta, on the west side of the Purgatoire River. The PCMS was carved out of several large ranches in the early 1980s, and at 988 km^2 (380 mi^2) is considerably larger than Fort Carson. As at Fort Carson, virtually all investigations until recently have been funded by the U.S. Army but administered by NPS. In 1983 and 1984, under the direction of (at various times) Sarah Nelson, Thomas Pozorski, and Mark Guthrie, personnel at DU conducted surveys of areas totaling approximately 21,400 hectares (53,500 acres) throughout the reservation. The 1983 work included intensive and sample surveys of portions of the post slated for military training, and provided the basis for development of a predictive model of prehistoric site locations. Fifty sites were also test excavated (Pozorski and Guthrie 1984; Kvamme et al. 1985). The 1984 fieldwork consisted of sample surveys of areas of high site probability as designated by the predictive model (Lintz 1985). Ethnohistorical, geomorphological, and other ancillary studies reservationwide in scale were also undertaken during 1983 and 1984 (Stoffle et al. 1984; Schuldenrein 1985). Christopher R. Lintz assumed control of the project in mid-1985 as part of a major reorganization effort and over the course of the following year directed procedures that culminated in termination of the DU's involvement at PCMS (Anderson et al. 1986a). An earlier report detailing the archaeological chronology of the PCMS was subsequently modified for publication in the *Memoirs* series of CAS (Lintz and Anderson 1989). Approximately 2,000 prehistoric sites and isolates had been recorded during DU's tenure at PCMS.

In 1987 Larson-Tibesar Associates, Inc., under the overall direction of William Andrefsky, Jr., performed a sample survey of 2,944 hectares (7,360 acres) in the northern region of the PCMS in areas largely overlooked by earlier inventories. Various site redocumentation tasks necessitated by inadequate recording by DU were also carried out at this time, as was reanalysis and cataloguing of all artifacts collected on the PCMS up to that time. Centennial Archaeology, Inc. held the position of a major subcontractor during the course of this work. Over the subsequent three years, two major reports were produced, one summarizing the results of all survey work conducted to date at the PCMS (Andrefsky 1990) and the other describing test excavations by DU in 1983 (Andrefsky et al. 1990). Under the general direction of Lawrence L. Loendorf, the University of North Dakota, between 1988 and 1991, conducted a study of PCMS rock art and also test excavated 16 sites. The rock art work consisted of both comprehensive documentation and cation-ratio dating; more than 40 dates were generated (Loendorf 1989, 1992a, 1992b; Loendorf and Kuehn 1991; Loendorf et al. 1996). Subsequent to this work, NPS produced a NRHP Multiple Property Documentation Form for prehistoric resources as well as a NRHP Registration Form for a rock art district (National Park Service n.d.a, n.d.b). Much of the recent work at the PCMS has been undertaken by New Mexico State University, and consists of intensive survey and test excavation of eleven sites in the Welsh Canyon area in 1995-1996 (Loendorf and Loendorf 1999; Schiavitti et al. 1999); production of a popular report describing the prehistory and history of the area (Loendorf 1996; see also Loendorf 1998); and inventories in 1997 of the Black Hills area and in 1998-1999 of Training Areas 7 and 10 (reports in progress). Other recent work includes the 1994 excavation of eight sites by FLC (Charles et al. 1996); survey in the area of Brown's Sheep Camp by NPS (Hunt 1998); and a geology/paleontology inventory of the PCMS by the CU Museum (Evanoff 1998).

In 1991, some 6,680 hectares (16,700 acres) of PCMS property along the Purgatoire River deemed by the U.S. Army to be unsuitable for mechanized training were ceded to the USDA Forest Service. Named the Picket Wire Canyonlands, the area was subjected to block survey of 2,860 hectares (7,150 acres) in 1993 and 1994 by Alpine Archaeological Consultants, Inc. This work was supervised by Alan D. Reed and Jonathon C. Horn. More than 250 prehistoric sites, including abundant rock art, were recorded (Reed and Horn 1995).

The U.S. Air Force has underwritten archaeological surveys at several facilities in the context area, all in the Colorado Springs vicinity. Peterson Air Force Base (AFB), which abuts Colorado Springs on the east side of the city, was subjected to three surveys associated with expansion and development between 1984 and 1990. Approximately 1,000 hectares (2,500) acres were surveyed by a succession of private contractors including Larson-Tibesar Associates, Inc. (Hilman and Tibesar 1984), Centuries Research, Inc. (Baker 1985), Centennial Archaeology, Inc. (Anderson 1991), and Western Cultural Resource Management, Inc. (Anderson 1994). A cultural resource management plan for Peterson AFB was also prepared (Mehls and Anderson 1995). At Falcon AFB, located 10 miles east of Peterson AFB, the full 1,392-hectare (3,840-acre) area of the facility was surveyed in 1982 and 1990 by DU and Centennial Archaeology, Inc., respectively (Guthrie 1982; Zier et al. 1992). The U.S. Air Force Academy, an approximately 65 km^2 (25 mi^2) tract nestled in the foothills of the Rampart Range immediately north of Colorado Springs, was subjected to large-scale surveys totaling 6,920 hectares (17,300 acres) in 1992 and again in 1994-

1995 by the University of Colorado at Colorado Springs (UCCS), primarily under the supervision of William R. Arbogast. A non-contiguous 262-hectare (655-acre) tract near Woodland Park was also surveyed. In total, approximately 100 prehistoric sites were recorded, one site was excavated, and four sites were test excavated (Arbogast et al. 1993; Arbogast et al. 1996a; Espinoza et al. 1997). A 203-hectare (508-acre) survey was also conducted in 1990 at Cheyenne Mountain AFB (formerly North American Air Defense Command, or NORAD) just west of Colorado Springs, by Arbogast (1990) acting as an independent contractor.

CDOH, which became CDOT in 1992, has undertaken or sponsored surveys of several hundred miles of road right-of-way throughout the context area since 1978. Prior to 1990, all work was conducted in-house by CDOT archaeologists, under the supervision of John D. Gooding, Debra Angulski, O D Hand, and others. Since that date some work of this type has been contracted by CDOT to Centennial Archaeology, Inc. under a long-term services agreement. Not uncommonly, surveys have been accompanied by test excavations. A partial listing of test excavation projects undertaken by CDOT includes the Matheson Hill site (5EL140) along U.S. Highway 24 near Limon in Elbert County (Chenault and Ellwood 1982); site 5HF246 along State Highway 69 near Gardner in Huerfano County (Legard 1983); sites 5LA1080, 5LA2190 (Veltri site), 5LA2191, and 5LA2193 along State Highway 12 west of Trinidad in Las Animas County (Indeck and Legard 1984); the Apishapa River Bridge site (5OT219) along State Highway 10 south of Fowler in Otero County (Kelly 1984); and the McEndree Ranch site (5BA30) in northwestern Baca County (Shields 1980; Scott 1982). The McEndree Ranch study is particularly important because of the evidence it provided of multiple structures of Late Archaic age.

Occasional mitigative excavations have been conducted for highway projects in the context area. The most significant are at the Montez Midden site (5HF289) near Gardner, a Late Prehistoric burned rock midden or hearth cluster (Chenault 1983), and Wolf Spider Shelter (5LA6197) along U.S. Highway 160 east of Trinidad. Wolf Spider Shelter, excavated under the supervision of Daniel A. Jepson and O D Hand, is a stratified multicomponent site with occupational evidence dating back to the Early Archaic/Middle Archaic period boundary (Hand and Jepson 1996). An important highway-related project that did not involve CDOT was carried out along the Cottonwood Pass Road (Colorado Forest Highway 59) by Metcalf Archaeological Consultants, Inc. under contract with the Federal Highway Administration. This work was completed between 1982 and 1985 under the direction of Kevin D. Black. The Cottonwood Pass Road extends westward over the Continental Divide from Chaffee County in the Arkansas River Basin to Gunnison County in the Colorado River Basin. Excavation at the Runberg site (5CF358) on the east side of the drainage divide yielded evidence of discontinuous occupation from late Paleoindian to Late Prehistoric times, and included the oldest Early Archaic radiocarbon dates from anywhere in the Arkansas River context area (Black 1986).

Timber sales by the two principal land-managing agencies in the context area, the BLM and USDA Forest Service, have triggered archaeological surveys of which the majority, which are generally small in scale, have been performed in-house by federal archaeologists (e.g., Bargielski 1988; McPherson 1987). Archaeological investigations associated with land sales and exchanges have been conducted both by the involved land-managing agencies and by consulting firms under contract to federal or private entities. The largest project of this type was undertaken by Western Cultural Resource Management, Inc. in 1995 and involved a proposed land exchange of 3,957 hectares (9,893 acres) between Wolf Springs Ranch and the BLM (Stoner et al. 1996). The survey tracts are located in the upper Huerfano River valley west of Gardner, in the shadow of the Sangre de Cristo Mountains. More than 400 prehistoric sites and isolates, ranging in age from Paleoindian to Late Prehistoric, were recorded. Under the direction of Christian J. Zier and William R. Arbogast, Centennial Archaeology, Inc. in 1991 surveyed the 944-hectare (2,360-acre) former Bucci Ranch east of Gardner at the base of the Wet Mountains. This work was conducted under contract to Farmers Home Administration. Five prehistoric sites were subsequently excavated in 1993 and 1994 prior to federal sale of the ranch property (Arbogast and Zier 1991; Zier 1994; Zier et al. 1996b).

A large-scale cultural overview study of the Banning-Lewis Ranch, proposed for development by Aries Corporation, was undertaken in 1986 by Pioneer Archaeological Consultants, Inc. under the direction of Jane L. Anderson and Christopher Lintz. The 8,540-hectare (21,325-acre) property lies immediately east of Colorado Springs and straddles the archaeologically rich zone along Jimmy Camp Creek, which flows north to south through the area (Anderson et al. 1986b). Recent work on the property has been supported by the City of Colorado Springs and includes a survey of Jimmy Camp Park, an area of about 700 acres (Anderson et al. 1999).

One of the earliest private CRM firms to operate in the Arkansas River Basin, Gordon and Kranzush, Inc., undertook a large-scale survey and test excavation project of a proposed uranium mine in 1979 and 1980 under the general supervision of Kris J. Kranzush and E. Kinzie Gordon. The 2,950-hectare (7,375-acre) Cyprus Mines Hanson project area in the foothills of northwestern Fremont County was surveyed in its entirety and 24 sites were tested. Nearly 250 prehistoric sites and isolates were recorded, with ages ranging from Paleoindian to Protohistoric. The tested sites yielded radiocarbon ages from excavated contexts that ranged rom Middle Archaic to Late Prehistoric (Engleman and Shea 1980; Kranzush et al. 1979). More recently, a major survey associated with coal development was conducted by Metcalf Archaeological Consultants, Inc. west of Trinidad in Las Animas County. The 706-hectare (1,765-acre) proposed Lorencito Canyon Mine was inventoried in 1996 under the direction of Anne McKibbin; nearly 100 prehistoric sites spanning the Early Archaic through Late Prehistoric range were recorded (McKibbin et al. 1997). Earlier, in 1990, a 2,164-hectare (5,410-acre) parcel at the nearby Golden Eagle Mine was the subject of an overview study by Powers Elevation Co., Inc. (Tucker 1990).

Much of the CRM work in the context area since 1978 has occurred along corridors of pipelines, transmission lines, and fiber optic lines, not uncommonly as part of interstate construction projects. Pioneer Archaeological Consultants, Inc., under the direction of Jane L. Anderson, surveyed rights-of-way for numerous above-ground and buried powerlines including the Public Service Co. of Colorado Malta-Basalt transmission line (which extends westward into the Colorado River drainage basin), the Centel Canon City-Westcliffe transmission line, and a buried cable for Mountain States Telephone west of Canon City (Anderson 1984; Anderson et al. 1980a; Anderson et al. 1980b). Pipeline construction in particular has spurred a significant amount of archaeological work. Since 1988 Metcalf Archaeological Consultants, Inc., under the direction of Michael D. Metcalf, Ronald J. Rood, Anne McKibbin, Wm. Lane Shields, and others, has surveyed several natural gas pipelines for CIG. Most of this work has occurred in Las Animas County but corridors east into Baca County and south into New Mexico have also been surveyed (McKibbin and Barclay 1994; Morrison 1998; Morrison et al. 1998; Rood and Church 1989; Shields 1994; Späth 1996). Test and full-scale excavations have been conducted at several sites including 5LA2190. This site, which had been test excavated previously in the course of a CDOH project (Indeck and Legard 1984; see above), yielded evidence of a Late Archaic structure (Rood and Church 1989; Rood 1990). Marilynn A. Mueller of Centennial Archaeology, Inc. in 1993 supervised the survey of an approximately 160-kilometer-long (100-mile) segment of the Diamond Shamrock Colorado Springs Pipeline, which extended across southeastern Colorado from Fountain to the Texas panhandle. Four sites were subsequently excavated including 5OT430, which featured a small burned rock midden of Late Archaic age (Mueller et al. 1994). Fiber optic cable routes have been surveyed in various parts of southeastern Colorado, but relatively few sites have been recorded and virtually none excavated, mainly due to the restricted rights-of-way and the typical placement in disturbed roadside ditches (e.g., Zier et al. 1998).

CAS continued to be active in the context area. A major excavation was undertaken in 1981 by the Denver Chapter at Upper Plum Canyon Rock shelter I (5LA2158) in the highly dissected canyon country east of the Purgatoire River and south of La Junta in Las Animas County. The project became the basis for a master's thesis at the University of Colorado - Denver (UCD) by Diane Lee Rhodes (1984). This work is very important because of the record of Late Prehistoric occupation that is presented for the shelter, and in particular in its descriptions of material culture including perishables. A hafted knife from the site was described in a separate article by Butler (1985). Moonshine Shelter (5FN844) in Fremont County, a short distance northeast of Canon City, was excavated between 1986 and 1988 by the Royal Gorge Chapter of CAS under the direction of Donald C. Tucker. It yielded evidence of terminal Late Archaic and Late Prehistoric occupation including remains of a dry-laid stone wall (Tucker 1989, 1991). Surveys have also been carried out by CAS members under the auspices of the Program for Avocational Archaeological Certification (PAAC), which is sponsored by OSAC and CAS. Of particular note is the 270-hectare (675-acre) inventory of the Heckendorf State Wildlife Area (SWA) north of Buena Vista in Chaffee County, conducted between 1992 and 1994 under the direction of Kevin D. Black. Twenty-five prehistoric sites were recorded (Black 1997).

University field schools have operated in the context area throughout this period. The CC field school, directed by Michael Nowak, has functioned on an annual or biennial basis since 1978 (and sporadically before that time). Surveys and excavations have been conducted on and near property owned by Carrizo Ranches along the Las Animas-Baca County line just north of the New Mexico border. The long-term study area includes small canyons with abundant prehistoric sites. Numerous sites have been recorded, and sites in both open and rockshelter settings have been excavated. The majority of the investigated sites are of Late Prehistoric age, although Middle Archaic and Late Archaic radiocarbon dates have also been produced. Investigations by the CC field school have resulted in a lengthy set of monographs in the *Colorado College Publications in Archaeology* series (Jones 1986; Kingsbury and Gabel 1980; Kingsbury and Nowak 1980; Nowak and Berger 1982; Nowak and Fahland 1994; Nowak and Fedor 1992; Nowak and Fiore 1987, 1988; Nowak and Headington 1983; Nowak and Jones 1984, 1985, 1986; Nowak and Kantner 1990, 1991; Nowak and Kingsbury 1979, 1981; Nowak and Morton 1998; Nowak and Spurr 1989).

UCCS has operated field schools at various locations in the Colorado Springs area since the early 1980s, beginning with Jackson Creek and Davis Rockshelter in the Palmer Divide area. Jackson Creek lies just to the north of the context area. Davis Rockshelter, situated along an upper tributary of Black Squirrel Creek, was subjected to initial survey and excavation work by the Pikes Peak Chapter of the CAS in 1987 and 1988. Further excavation was undertaken jointly between CAS and the UCCS field school in 1992 under the direction of Thomas Wynn (Dwelis et al. 1996). Between 1985 and 1990, under the direction of Wynn and Robert A. McDonald, the field school excavated a series of sites in an area known as Crows Roost along Black Squirrel Creek east of Colorado Springs. A 5,000-year occupation record dating back to the Middle Archaic period was revealed. McDonald (1992) subsequently used the data from this work as the basis of a CSU master's thesis (see also Wynn et al. 1993). Since 1995, field school excavations have been directed by Wynn at the Garden of the Gods and by Arbogast at Jimmy Camp. Recently, Arbogast supervised a survey of 192 hectares (480 acres) and test excavated six sites on the UCCS Cragmor Campus in Colorado Springs (Arbogast et al. 1998). This last work was supported by a State Historical Fund grant from the Colorado Historical Society.

In 1985 and 1986, the University of Nebraska State Museum, under the direction of James H. Gunnerson, conducted excavations at the Cramer site and several other sites in the lower Apishapa Canyon along the Pueblo-Las Animas County line. This project essentially sought to reinvestigate the area long considered the geographical core of Apishapa phase archaeology, which had attracted the attention of the 1949 High Plains Columbia Expedition and various other archaeologists over the years. The Cramer site was extensively excavated but the undertaking also included small-scale excavations at the Canterbury, Munsell, Snake Blakeslee, and Juan Baca sites. The degree to which these other sites were investigated is not clear. The report derived from this work not only describes the recent studies but also summarizes in some detail the history of archaeological research in the area, and in addition presents the results of the High Plains Columbia Expedition work at the Snake Blakeslee site, which had never been published (Gunnerson 1989).

In addition to the thesis of McDonald (1992), which developed out of UCCS field school activity (above), three masters theses and a doctoral dissertation have been produced in recent years that deal with aspects of the prehistory of the context area. Stephen M. Kalasz (1988) used data generated in the course of DU surveys at the PCMS in 1983 and 1984 for a Northern Arizona University master's thesis. He analyzed settlement patterns in the Taylor Arroyo drainage basin in an effort to discern patterns of community development in Late Prehistoric times. Mark Mitchell (1997), in a UCD master's thesis, analyzed patterns of ceramic exchange between Sopris phase sites near Trinidad and northern New Mexico cultures, interpreting the causes and consequences of social interaction across a cultural frontier. In the process, Mitchell also provided a much-needed reassessment of the chronological underpinnings of the Sopris phase. A master's thesis by Rhodes (1984), based on the CAS excavation of Upper Plum Canyon Rock shelter I, is discussed above.

William B. Butler's University of Missouri doctoral dissertation was principally a treatment of archaeological taxonomy in northeastern Colorado but also included implications for the Arkansas River Basin including a suggested new post-Archaic taxonomic unit, the Arkansas phase (Butler 1986; see also Butler 1988). Butler, a long-time NPS employee and currently Park Archaeologist at Rocky Mountain National Park (RMNP), has been active generally in eastern Colorado archaeology, producing journal articles on topics that include bison presence and absence, the archaeological faunal record in relation to climatic episodes, and Late Prehistoric burial practices, as well as a compendium of eastern Colorado radiocarbon dates (Butler 1981, 1985, 1992, 1997; Butler et al. 1986).

In the early 1980s the Office of Archaeology and Historic Preservation, Colorado Historical Society, sponsored research that resulted in production of a series of documents that summarized and evaluated known information about the prehistory and history of Colorado. Five of these so-called RP-3 (Resource Protection Planning Process) documents were created for Colorado prehistory, one for each of five geographical regions that were defined rather arbitrarily: plains, mountains, northwest, west-central, and southwest. Two of the reports, written for the plains and mountains, overlap the present Arkansas River context area (Eighmy 1984; Guthrie et al. 1984).

Since 1988, OSAC has investigated prehistoric human burials at several locations throughout the Arkansas River drainage basin of Colorado. These remains represent unanticipated discoveries on private lands and on lands administered by the State of Colorado or political subdivisions of the state. Most of the work has been supervised by Assistant State Archaeologist Kevin D. Black and consists of excavation or, occasionally, documentation of a disturbed gravesite. Information about these sites is available in various technical reports and small articles, and in a summary article by Black (1997). The sites consist of the Popes Valley Burial, Frederickson Burial, and OAHP Burial #99 in El Paso County (Arbogast et al. 1996b; Black 1997); Beacon Hill Burial and Bronquist Burial in Pueblo County (Black and Spurr 1989; Black et al. 1991; McMahon and Sullivan 1995); OAHP Burial #98 in Huerfano County (Black 1997); Ancell Burial in Otero County (Black et al. 1990; Black et al. 1991); and Coaldale-Fox Ossuary in

Fremont County (Black 1996, 1997). NPS has excavated occasional burials from military lands in the context area including the Red Creek Burial and the East Fork Burial on Fort Carson (Butler et al. 1986; Chomko and Hoffman 1993) and the Stage Canyon Burial on the PCMS (Colorado OAHP site files 1989).

Chapter 4

THEORETICAL CONSIDERATIONS AND CULTURAL SYSTEMATICS

Stephen M. Kalasz, Christian J. Zier, and Mark Mitchell

RESEARCH THEMES

Chronology

Delineation of temporal ranges for context area culture taxa is a crucial research concern. Achieving this goal requires not only the accumulation of raw chronometric data and relatively dated materials but also the establishment of associations with samples of artifact and features that are sufficient for discerning temporal trends in settlement and subsistence patterns, technology, and diagnostic attributes. Chronological data collected in the Arkansas River Basin at best provide a rough temporal framework for preceramic cultures inhabiting the region. The presence of these early groups is certainly well established by various dating methods, but the details of their existence are limited. Although considerably more information is available for later, post-A.D. 100 culture groups, the temporal fringes or "gray areas" between taxonomic divisions could be tightened considerably.

Archaeology has seen substantial improvement in the number and quality of analytical tools available for regional chronology building. Specifically, the development of absolute dating techniques has had a significant impact on investigations in the context area. Temporal assignments for important relatively dated materials such as projectile points and ceramics have been greatly enhanced through their associations with absolute age assessments. These relatively dated artifacts remain the primary means of assigning survey-recorded sites to cultural-temporal divisions.

In addition to the radiocarbon dating method, more recent advances in archaeomagnetism, obsidian hydration, and cation-ratio dating have been utilized to establish temporal controls in the Arkansas River Basin. The advantages and drawbacks of the various methods are well documented (Cassells 1997:25-34; Loendorf 1989; Michels 1973). Archaeomagnetism has supplemented radiocarbon data to assess more accurately the temporal range of the Sopris phase (Mitchell 1997). Cation-ratio dating has been used to develop rock art chronologies (Loendorf 1989) and obsidian hydration has been employed to date stone imported from northern New Mexico (Charles et al. 1996). The potential of these various methods has been barely tapped, and further refinement will undoubtedly promote their expanded use. The single most glaring deficiency in building a chronology in the context area is the complete lack of dendrochronological data. It is acknowledged that considerable effort would be required to develop a master tree-ring chart for the region and, furthermore, house timbers and posts integral for its successful application are rarely recovered. A previous attempt at dendrochronologically dating materials in the PCMS was unsuccessful, and the investigators concluded that the potential for such analysis was low (Lintz and Anderson 1989:83). However, should this situation change in the future, dendrochronology would facilitate resolution of a number of problems regarding site and perhaps structure contemporaneity.

Radiocarbon age assessments have been the most common absolute dating method employed in the context area. They are therefore heavily relied upon for the cultural-temporal assignments presented in this document. Occupations with age assessments derived entirely through relatively dated materials are generally excluded in delineating specific temporal ranges for culture taxa. However, relatively dated materials with adequate contextual information supplement the absolute dates in defining further the diagnostic hallmarks of various cultural-temporal divisions. Given their implications for regional chronology building, a review of the various qualifiers attached to radiocarbon age interpretations may aid in forming the most suitable explanations for inconsistencies in the data (Kalasz and Shields 1997:294). It is emphasized at the outset that radiocarbon determinations seldom provide the actual age of feature (e.g., hearth) construction and use. Because radiocarbon samples are commonly composed of wood charcoal or soil, such factors as the "old wood effect" (Polach and Golson 1966; Schiffer 1986, 1987) and the heartwood or "cross-section effect" (Smiley 1985) must be considered. The former refers to the fact that the radiocarbon analytical process does not date when a material was burned, but rather when it ceased to live. Plants absorb and fix carbon only while they are alive. As a result, the age determinations are reflective of when a plant died instead of when it was used for fuel. A dead branch or log may have rested on the ground for a considerable period of time prior to its use in a hearth. In such a situation the actual age of the hearth and the radiocarbon age determination may vary considerably. The cross-section or heartwood effect refers to the fact that, even if live wood is cut for use as fuel, consumption of the wood will begin with the outer portion and proceed inward. Thus, the younger portions of the wood are consumed, and the sample that remains consists of older material. The determination is then an average of the age of the remaining material, all of which predates the actual use of, for example, a hearth. For these reasons, determinations of actual hearth use require that ^{14}C determinations be made on annuals or small twigs, but it is emphasized that such ideal conditions rarely occur in archaeological contexts.

Population Dynamics

This research theme encompasses a wide range of interrelated topics concerning the movement of people and ideas within the context area, and between the context area and surrounding regions. Included are the large-scale observations of population growth, cultural boundaries, and interregional relationships, as well as smaller-scale observations of community organization and interaction among settlements in the context area. Complex data often associated only with later, post-Archaic periods are required to adequately address these topics. Assessing community organization and cultural boundaries, for example, becomes progressively easier through time simply because of the availability of more abundant and varied data sets. The nature, directionality, and intensity of earlier interaction networks is less well understood in part because the cultural affiliations of earlier assemblages are frequently unclear. Therefore, the discussions of post-Archaic population dynamics that follow are much more involved than those presented for earlier stages.

Interaction among prehistoric social groups has been a central domain of archaeological research since the nineteenth century. Indeed, some of the earliest attempts to explain culture change relied heavily on the twin notions of migration and diffusion, both distinct measures of culture contact. Later, processual approaches to culture contact focused on the economic importance of trade and exchange. More recent postprocessual approaches have tended to emphasize the social-historical processes that drive intercultural contact. Regardless of approach, the tools available for regional archaeologists to confirm and subsequently interpret intercultural contact are limited in large part to artifacts and materials that were determined to have arrived through trade and/or long-distance procurement. Alternatively, the identification of cultural attributes arriving via the rather abstract process of diffusion is more difficult to establish since such attributes involve an exchange of ideas. Although nonlocal artifacts (e.g., painted pottery, *Olivella* shell beads) and diffused traits (e.g., collared hearths, bison bone shims, basin houses) are a more or less common constituent of southeastern Colorado assemblages, their significance is poorly understood.

For the Arkansas River Basin, as for the surrounding southwestern High Plains, culture contacts occurring late in prehistory have generally been discussed under the rubric of "Plains-Pueblo" interaction (Baugh 1984, 1991; Spielmann 1983, 1991; Wedel 1950), or what has been termed "forager-farmer" interaction (Moore 1985; Spielmann and Eder 1994). Earlier culture contact has emphasized interaction within the context of the Southern Plains. The Panhandle aspect and later, the Upper Canark Regional Variant, were in part advanced to address the nature of the relationships among sedentary and less sedentary culture groups along the western margin of the Southern Plains (Campbell 1969a; Lintz 1984).

Smaller-scale observations within this theme center on community developments currently associated only with post-Archaic settlement. Specifically, the question arises as to whether the term "village" or "hamlet" should apply to any of the architectural settlements present within northeastern New Mexico and the larger context area. Unfortunately, the chronometric data available for the larger architectural settlements in most cases are not sufficient to establish room, structure, or in most cases, site contemporaneity. Furthermore, the large-scale block excavations necessary for establishing spatial and functional relationships among the various features and structures have rarely been accomplished. These are crucial concerns since it is believed that a village is comprised of a number of households organized to perform a variety of tasks within a common social structure. The authors of this volume therefore choose to side-step the issue somewhat by simply stating that some consensus must be made among context-area archaeologists on how the terms are defined. The question of whether the village concept should apply only to sedentary horticultural settlements occupied year-round is another related issue that should eventually be addressed. For this document terms such as "village" are avoided whenever possible in favor of less specific terms such as "settlement."

Technology

The technology research theme in this document focuses on portable artifact forms that are commonly found in Arkansas River Basin prehistoric contexts. Technological aspects of the construction of architecture and related features are presented as a separate theme. Therefore, technology research themes are oriented toward topics centered on the manufacture and use of bone tools and ornaments, ceramics, and lithic artifacts.

As with many of the research themes discussed herein, typology, or the manner in which archaeologists sort artifacts to reduce the overall variability of an assemblage, is a crucial concern. The use and abuse of typologies has long been argued among archaeologists and considerable variability is seen among current investigators in approach (processual versus postprocessual, emic and etic types, statistical or multivariate classification as opposed to hierarchical or monothetic divisive classification), and variable selection (quantitative versus qualitative). There is not now nor probably ever will be a consensus among archaeologists as to the single "best" or "standard" typology available for sorting a particular collection. Context-area artifact typologies have generally been project specific. Variable selection and subsequent classification is generally based on a number of factors including budgetary restraints, the size and condition of the collection (e.g., is the collection comprised primarily of small fragments or cattle trampled specimens?), the results of previous analyses, and the research emphases of the particular investigator in charge. Depending on the methods employed, a particular typology may elucidate certain aspects of prehistoric adaptation while masking others.

Given the complexities involved in discerning temporal trends in context-area technology, archaeologists sometimes combine typological approaches to interpret more effectively artifact "styles" as well as use and manufacturing procedures. Projectile points and ceramics are particularly appropriate for interpreting sylistic behavior because considerable effort is invested in arriving at consistently patterned forms or decorations. Such forms–and for ceramics, decoration–become recognizable in the archaeological record as "diagnostic" of a particular spatial, temporal, or cultural sphere of influence. Although multivariate statistical techniques have been used to quantitatively sort projectile points and ceramics into morphological categories, subjectively assessed attribute combinations are still largely relied upon to define a particular diagnostic style. However, the great majority of artifacts associated with prehistoric sites, e.g., debitage, are not highly patterned. For these, more objective nominal-, ordinal-, and interval-scale attribute measures have been successfully employed in ascertaining the more mundane yet important aspects of technology such as production techniques. Debitage size grading, ceramic elemental composition, and various multivariate statistical analyses, for example, provide data that are critical for establishing foundational or baseline manufacturing trends that may be temporally, spatially, and/or culturally sensitive.

Chipped stone analyses are particularly relevant to the topic of context-area approaches to technology because chipped stone constitutes the most consistently recovered and abundant class of artifact. Furthermore, lithic analyses have varied greatly in orientation due to the factors listed previously. In addition to the definition of cultural-temporal point types, lithic analyses employing a more traditional approach have emphasized the sorting of other formally patterned tools into "functional" categories, e.g., knives, scrapers, and drills (Campbell 1969a:96-113; Gunnerson 1989; Ireland 1968; Nowak and Kantner 1990, 1991; Rhodes 1984; Watts 1971). Artifacts were assigned to these categories strictly on the basis of a subjectively assessed morphological similarity to highly stylized diagnostic artifact forms that have been abundantly illustrated through the years. This sort of terminology implies a relationship between a particular artifact form and a specific function. However, the relationships or "bridging arguments" are generally supported by little or no use wear, blood residue, or ethnographic evidence. Indeed, a number of lithic studies employing independent measures (e.g., use wear or blood residue) have indicated that so-called scrapers, knives, and points as well as manos and metates were probably used for a variety of tasks (Andrefsky 1990, 1997; Kalasz and Shields 1997; Kelly 1988; Zier et al. 1988:160). An excellent review of the literature regarding the relationship between "traditional" artifact form and function is presented in a recent analysis of PCMS lithic artifacts (Andrefsky 1990:IX-232–IX-240).

The traditional approach is most useful in identifying specific diagnostic artifacts such as Reed points, diamond beveled knives, and "guitar pick" scrapers that facilitate discernment of interregional relationships. Again, these comparisons are achieved largely through an intuitive assessment of overall artifact form. Ideally, similarities are subsequently clarified by describing certain unique or key artifact attributes. Inspectional or subjective sorting never has been nor ever will be entirely replicable (one person's scraper may be another person's chopper), but the resultant types can be effective comparative devices if properly described and illustrated. That said, an emphasis on the more formally patterned tools sometimes results in minimal interpretation of overall production strategy and may foster some erroneous functional conclusions. For example, Gunnerson (1989:46-47) deduced on the basis of the paucity of formal scrapers that hide-working was of little concern at the Cramer site. However, although the "utilized flakes" listed in Table 3 (Gunnerson 1989:39) comprise 42 percent of the entire chipped stone tool collection, no mention of the nature of these tools appears in the text. Flake tools could have functioned quite well as hide-working tools especially if used as disposable blades in hafting elements. It is noteworthy that the Cramer site bone tool assemblage includes a number of specimens termed tool or knife handles (Gunnerson 1989:232). Furthermore, minimally modified flake tools figured most prominently in the results of a recent blood residue analysis undertaken for a variety of tool types (Kalasz and Shields 1997:216). Although the reliability of blood residue and even use wear techniques has yet to be established, these data suggest that the flake tool should not be overlooked in functional interpretations.

Alternative approaches to lithic analysis have promoted various mixtures of objective and traditional classificatory measures (Andrefsky 1990; Andrefsky et al. 1990; Kalasz et al. 1993; Nowak and Kantner 1991:43-106; Rhodes 1984; Zier and Kalasz 1985; Zier et al. 1988). Objective attributes used in these schemes included measures of thinning, retouch, utilization, flake characteristics, and various metric measurements. Resultant artifact groupings were derived by hierarchical sorting according to attribute presence/absence measures as well as by means of multivariate statistics. Therefore, rather than categories such as scrapers and knives, groups such as modified flake tools and unstemmed bifaces were generated. In most cases a traditional artifact classification was employed to supplement the more objectively derived groups, particularly for hafted bifaces (i.e., projectile points). This important step ensures that specimens from earlier and later investigations may be compared. Still, the more recent objective analyses have not been as effective as the purely traditional approaches in elucidating the distribution of certain diagnostic lithic artifact forms (e.g., Kalasz et al. 1993; Zier et al. 1988) . They have largely been remiss in discerning regional comparisons among specific diagnostic tool types other than projectile points. However, the objective studies have provided information pertaining to behavioral aspects of lithic technology; such information can, for example, demonstrate relationships between lithic production and settlement behavior. Debitage as well as tools were emphasized so that a more complete view of lithic production could be obtained. Toward this end, research focused on a number of interrelated factors such as reduction strategy, relationships between raw material and tool use and/or manufacture, time and effort invested in manufacture, tool variability, and preferred tool forms.

Although detailed descriptions of patterned diagnostic artifacts are important, more generalized technological observations may provide new perspectives on temporal and regional trends in prehistoric hunter-gatherer adaptation. In other words, analyses are most effective if general observations accompany those that are more specific. Too often, specific functions and/or cultural-temporal relationships have often been assigned to patterned diagnostic artifacts prior to establishing some basic morphological trends. For example, artifacts have been assigned to the "scraper" category without establishing whether they are flake tools with unifacial retouch or split cobbles that have been thinned and utilized. Generalized observations of technological trends are proving useful for testing some basic hypotheses related to prehistoric adaptations and have therefore become more prevalent in the archaeological literature.

A recent example examines a fairly simple concept such as the manufacture and use of minimally modified tools in light of their relationship to the complexities of sedentism and mobility. The perceived dichotomy in formal versus informal chipped stone tool production stimulated attempts by Arkansas River Basin lithic analysts to link such observations to temporal and behavioral aspects of prehistoric settlement. Andrefsky (1991) tentatively discerned a temporal trend related to the expanded use of expedient (e.g., utilized flakes) as opposed to patterned chipped stone tools (e.g., bifaces) in the PCMS. This trend, the interpretation of which is derived from research conducted by Andrefsky (1986), Bamforth (1986), Henry (1989), and Parry and Kelly (1987), among others, is thought to be indicative of increasing post-Archaic stage sedentism. Parry and Kelly (1987:287-304) propose that a shift in manufacturing strategy accompanied the Archaic/Late Prehistoric stage transition in North American temperate zones. This shift involves a change in emphasis from standardized cores and finely crafted, symmetrical stone tools to reduction of unstandardized cores yielding casual, informal flake tools. The authors assert that this shift is a response to the widespread adoption of sedentary village life, or at least a significant reduction in residential mobility, during the Late Prehistoric stage. They note, for example, that the change seems to correlate with the first emphasis on maize as a major staple in the diet of groups in the eastern Woodlands, Northwestern Plains, and Southwest:

> Ethnographic accounts of expedient core reduction show that flake tools can be produced with little expenditure of effort, used once, and thrown away. Such a technology is not costly in terms of time or effort needed to manufacture or use tools, but it is wasteful of raw material. Inefficient use of raw material is not a problem for sedentary populations who can maintain stockpiles near the locations where the tools will be used (usually at their residence). For highly mobile groups, however, it is advantageous to invest the additional time and effort to produce formalized tools such as bifaces, because these tools can be repeatedly reused and provide much more potential cutting edge per unit weight, and thus are more portable. The use of portable formal tools allows mobile populations to transport sufficient tool material from its source to the locations of tool use, so that both anticipated and unanticipated needs can be met [Parry and Kelly 1987:303].

Researchers also note that formal tool technology is generally not abandoned by sedentary populations but instead de-emphasized. Further, the following qualifier concerning raw material availability is attached. "Some highly mobile populations may emphasize expedient core reduction strategies like those of sedentary groups, however. This occurs when lithic raw materials are abundant and ubiquitous, eliminating the need to transport tools" (Parry and Kelly 1987:303).

Andrefsky's (1991) initial observations concerning the proposed correlation between increased expedient tool use and post-Archaic sedentism in southeastern Colorado were based on small, spatially restricted samples. Other site assemblages in Colorado including those in the Arkansas River Basin do not support this particular correlation. Excavation of stratified rockshelters on Fort Carson demonstrate that flake tools or tools associated with minimal manufacturing effort were predominant in Archaic stage occupations as well as those of later post-Archaic periods (Kalasz et al. 1993; Zier et al. 1988; Zier 1989). Excavations undertaken in adjacent regions to the north, specifically at the Yarmony Pit House and the Massey Draw sites, provide further indication that expedient flake tool technologies were predominant at sites occupied by Archaic as well as Late Prehistoric hunter-gatherers (Anderson et al. 1994; Metcalf and Black 1991).

Andrefsky (1994) again employed the PCMS collection, in combination with those from other regions, to reassess his interpretation of the correlation between informal tool use and increasing sedentism. For this later study, selected chipped stone tools associated with noncontiguous (spaced) stone wall architecture were compared against those associated with contiguous rock wall foundations. Whereas the former were thought to denote the short-term tipi locations of nomadic groups, the latter were generally associated with longer-term semisedentary occupations (Kalasz 1990). However, it must be emphasized that these assumptions were based on minimal excavation data and have yet to be confirmed. Again based on previous research (e.g., Andrefsky 1983, 1991; Bamforth 1986; Morrow and Jeffries 1989; Parry and Kelly 1987; Torrence 1983, 1989), more formal tools and cores were expected to correlate with the short-term nomadic occupations and expedient tools with the more sedentary occupations. Instead, as was the case with Fort Carson components (Kalasz et al. 1993), Andrefsky found that these collections were strikingly uniform in the relative frequencies of formal and informal tools (Andrefsky 1994:30-31). On the basis of ethnographic data from work among the Australian aborigines (Gould 1980; O'Connell 1977), Andrefsky (1994:31) concluded that this situation was due to easy access to local, high quality raw materials.

If all other variables are held constant, quality and abundance of raw materials may structure stone tool production in a predictable manner. Low quality raw materials tend to be manufactured into informal tool designs. This trend is apparent whether the low quality raw material are in high or low abundance. High quality raw materials tend to be manufactured into formal kinds of tools. This is particularly true when the high quality raw materials occur in low abundance or at some distance. When high quality raw materials occur in great abundance, as in the Pinon Canyon example, both tool classes are produced in equivalent proportions.

The Fort Carson and PCMS artifact studies are examples of the application of technological data to larger theoretical issues (Andrefsky 1991, 1994; Zier and Kalasz 1991). However, few studies comparing basic technological trends have been used to address temporal and regional issues pertaining specifically to the Arkansas River Basin. Some relatively simple precepts regarding the manufacture and use of tools, containers, and ornaments have yet to be established for the context area. Are certain wares locally made? Are all Archaic chipped stone assemblages characterized by an emphasis on minimally modified flake tools? This situation can largely be traced to the analytical emphasis on subjectively derived "diagnostic" attributes in lieu of a more balanced approach.

Settlement and Subsistence Strategies

Site Types and Locational Variability

Typological discussions presented in the preceding Technology section are generally applicable to this theme. That is, the locational and content variability seen in archaeological sites in the context area is reduced by sorting the population into meaningful classificatory units. The resultant site types and their distribution through various environmental zones provide a basis for comparison with previous settlement models, or alternatively, the development of modified or entirely new models. As with artifacts, the number of different site typologies generated in the context area nearly matches the number of individual investigations; for better or for worse, site typologies have generally been project specific. It is reiterated that a number of factors, including the nature of the site sample and the research emphases of the investigators, enter into the creation of a project specific site typology.

The few expansive efforts to model regional settlement patterns have been restricted by site samples heavily skewed toward survey data (Andrefsky 1990; Campbell 1969a; Loendorf et al. 1996). They have had to rely on a minimal number of extensively excavated sites for the more robust data sets necessary to adequately "flesh out" the models and move beyond the realm of speculation. Survey has the advantage of garnering site-level observations over large areas relatively quickly in comparison to excavation. Survey data are therefore beneficial for discerning preliminary trends in site density, site variability (both functional and temporal), and sites worthy of additional investigation. Significant drawbacks include the reliance on relative dating methods for chronological control and the absence of more explicit subsistence and feature data. Temporal assignations are thus often tenuous and the discernment of site seasonality, function, and duration of occupation is frequently impossible. Survey data sets are synthesized by creating site types whose distribution may be viewed spatially, and to a very limited extent, temporally. By interpreting these distributions the archaeologist hopes to arrive at some basic conclusions regarding prehistoric settlement pattern. Some rather sophisticated quantitative approaches have attempted to maximize the interpretive potential of survey site samples, but any important temporal and functional trends they reveal must eventually be supported by excavation data (Andrefsky 1990; Eddy et al. 1982; Jepson et al. 1992; Van Ness et al.1990).

The variability seen among the prehistoric sites in the Arkansas River Basin has also been interpreted on a project-specific basis. Recent attempts to explain the spatial distribution of various site types have featured the application of a viable theoretical paradigm; behavioral aspects of settlement such as the exploitation of a particular resource during a specific season were sometimes subsequently inferred. A large body of theoretically oriented literature has emphasized the range and variety in hunter-gatherer adaptive strategy (Bettinger 1991; Binford 1980; Butzer 1982; Jochim 1976; Kelly 1995; Lightfoot 1983; Rafferty 1985; Testart 1982). Tying together a series of sites within a specific theoretical model, e.g, Binford's collector or forager strategies, requires assessments of site occupation duration and degree of sedentism as well as the functional role of particular site types within a seasonal round. A key element for explaining settlement within the context of current theoretical paradigms is the ability to distinguish prehistoric sites according to size and complexity. The spatial distribution of larger sites with diverse, abundant artifact and feature assemblages needs to be juxtaposed against smaller, less complex sites to address the most basic settlement questions. Drawing even simple distinctions from analysis of surface remains can be a perplexing undertaking. The site concept itself may be more a management convenience than an accurate reflection of any single settlement event or occupation. First and foremost it is emphasized that site boundaries are arbitrarily set by the archaeologist. There is no foolproof way to determine whether an artifact concentration located 20 meters from a series of features is associated with a common occupation. Additionally, the surface remains associated with the larger and seemingly more complex sites may represent use and reuse of the area over a prolonged period of time. The debris from hundreds or even thousands of years of overlapping occupation may be compressed on the surface of a site. The particular tasks accomplished at a site may change with each succeeding occupation, leaving the impression that the site is a "residential base" characterized by a number of divergent tasks, when in reality it is a surface accretion of several limited-activity occupations. Ideally, contemporaneity of sites, features, rooms, and even activity areas must be established so that settlement may be examined synchronically and diachronically.

Economy

The interrelationship between economy and settlement patterns is demonstrated by the term "subsistence," which refers not only to what is consumed but also the means necessary to find and obtain food. The greater concepts of hunter-gatherer settlement theory referred to above are thus fully applicable to the subject of economies. For the Arkansas River context area generally, a good deal of hard data are available about the specific underpinnings of the prehistoric economy, not only for the relatively well known Late Prehistoric stage but for the less thoroughly studied Middle and Late Archaic periods as well. However, only limited effort has been put forth by archaeologists toward the development of integrated models that account for 1) the full range of subsistence-related activities in the context area or portions thereof, 2) the relative importance of specific food sources, and 3) temporal-economic shifts and the multiplicity of factors that may have induced those shifts (e.g., climatic change, demographic processes such as internal population or in-migration, and the addition of cultigens).

Economic and settlement changes are evident in the Arkansas River Basin during the Late Prehistoric stage following a lengthy (ca. 4500-year) period of Archaic adaptation. The Middle Archaic-Late Archaic economic system must be regarded as highly successful because of its static nature and its association with apparent settlement stability and steady population growth. Subsequent modifications in economic strategies during the Late Prehistoric stage are manifested more in terms of significant settlement shifts than alterations in the subsistence base. If the demographic changes of the Late Prehistoric stage are to be understood, it is first essential to describe fully the Archaic economic system from which the Late Prehistoric system evolved.

The mechanisms behind Late Prehistoric community development certainly involve subsistence-related factors such as resource availability, but could also relate to demographic processes such as long-term population growth. For example, the concentration of human populations in the canyon country of the lower Purgatoire River could reflect hunter-gatherer exploitation strategies in which specific ecological niches became heavily used as population numbers rose. Maize is present in the long-term archaeological record of the context area (Late Archaic-Late Prehistoric; possibly also Middle Archaic) but is rarely well represented in a given site component. Maize may have served only as a dietary supplement of incidental significance or as a hedge against the failure of traditional gathered wild plants, but it is also possible that it is causally related to the Late Prehistoric process of populations becoming concentrated in certain locales near usually reliable water sources. Thus, while on the basis of archaeological data the fundamental hunter-gatherer subsistence base of the Archaic stage appears little changed in the Late Prehistoric stage, a previously stable economic system may have been thrown off balance by demographic or other factors to the extent that settlement patterns were altered and the relative importance of specific food resources modified.

Architecture

The Arkansas River Basin is characterized by considerable variability in prehistoric architecture. However, most architecture recorded to date is associated with post-Archaic occupation. This particular research theme emphasizes construction methods and overall structure morphology whenever possible, but the detailed excavation data required to address these topics are fairly meager in southeastern Colorado and northeastern New Mexico. Theoretical concerns pertaining to architectural construction attributes and interior features are connected to interregional relationships and culture contact. Research along these lines remains concerned with the origins of the various forms of architecture as well as the diffusion of individual architectural traits. For example, distinctions in architectural attributes are crucial factors in describing the differing interregional connections of Apishapa and Sopris phase occupations (see Organizing Time and Space, below). While certain Southwestern and eastern plains architectural attributes have been noted among context-area structures, overall their morphologies are unique.

Most architectural data have been recovered through survey, and therefore the development of architectural typologies has often been intertwined with site type and locational variability in the Arkansas River Basin. Architectural features have many implications for the study of regional settlement, including relative degrees of sedentism, the role of habitation sites in seasonal rounds, and the morphological and functional distinctions between residential bases and temporary field camps. Simply put, substantial effort placed in the construction of houses and related features (e.g. subfloor storage pits) generally correlates with occupations of longer duration (Binford 1990; Lightfoot 1983; Rafferty 1985; Testart 1982). Observations of architectural variability in the context area have been used to define specific site types such as "population coalescence and specialized task communities" (Kalasz 1988) or "complex versus simple habitation sites" (Reed and Horn 1995). In addition to its relevance for specific theoretical concerns, architecture is particularly useful for survey-generated settlement studies because of its visibility. The interpretive value of architecture to a certain extent matches that of diagnostic artifacts such as points and pottery, but it is much more difficult to bury, wash away, or place in a pants pocket. A number of project-specific architectural typologies have been advanced that vary considerably in their method of sorting and overall research emphasis (Campbell 1969a; Kalasz 1988, 1990; Lintz and Anderson 1989; Nowak and Kantner 1990, 1991; Reed and Horn 1995). All were based largely on surface remains north and east of the Park Plateau. Because most structures were not excavated, neither basic temporal and functional data nor detailed construction and internal feature data were used for the classifications. Although limited in their utility for more precise measurements of architectural variability, the typologies have been important for settlement observations garnered through survey.

With the exception of the Park Plateau, architectural typologies have been influenced to various degrees by the broad site classification of Campbell (1969a), a work that was in turn undoubtedly inspired by Renaud's (1942a) early descriptions of "Indian stone enclosures." Campbell's taxonomy emphasized the classification of architecture at the *site* level. Based on the general morphologies of associated structures, architectural loci were designated stone enclosure, slab enclosure, stone circle, stone wall, or spaced stone ring sites. The following limitations in using Campbell's method of site-level architectural classification were identified in a subsequent study (Lintz and Anderson 1989:89): (1) the range of architecture at a site seldom conforms neatly to the pre-established site type taxonomy; (2) unwarranted weight or values are placed on some architectural attributes or rooms over others; and (3) the occurrence and significance of minor architectural variations at a site are lost in the broad taxonomic category. In light of these limitations, the present volume displays a bias toward *room*-level classification of structures prior to their assignment within a particular site type (Andrefsky 1990:XII-1-XII-66; Kalasz 1988; Lintz and Anderson 1989:86-110).

Rock Art

Rock art studies received relatively little attention in the Arkansas River Basin prior to 1984. Indeed, Loendorf (1992a) argues that rock art studies have not been well integrated into broader archaeological research designs because such studies have typically been undertaken by rock art specialists, many of whom lacked training in traditional archaeological methods. By the same token, archaeologists have frequently been reluctant to incorporate rock art research into archaeological data recovery and mitigation projects. Francis (1996, 1998) and Francis et al. (1993) note that rock art studies have been frustrated by a lack of chronological control on individual sites (whether absolute or relative), and by a lack of "replicable and consistent systems of classification and taxonomy" (Francis 1998:1). In southeastern Colorado, such biases are evident in some of the most comprehensive studies conducted prior to 1984. Campbell (1969a) devotes just three pages to a discussion of Native American rock art, although he recorded nearly 1,200 prehistoric sites. By way of explanation, Campbell (1969a:328) comments that "[n]o diagnostic artifacts have been found at pictorial sites. Without artifacts, descriptive scenes, and accurate means of dating, the sites have little value for interpreting the district prehistory." However, more recent research has demonstrated that many of the sites first recorded by Campbell contain dozens of rock art panels (Reed and Horn 1995). In fact, archaeological research conducted since 1984 has clearly demonstrated that rock imagery is one of the most conspicuous and important attributes of many sites in the context area. Most of the intensive rock art studies in the region have been conducted at the PCMS. The first general synthesis was produced by Cole (1984), based on investigations conducted by DU. Subsequently Loendorf (1989; Loendorf and Kuehn 1991) built upon and substantially expanded the research begun by Cole. Important contributions have also been produced by Reed and Horn (1995) and Winter (1988). Somewhat shorter descriptions and summaries have been provided by Buckles (1989), Campbell (1969b), Faris (1995), Gunnerson (1989), Halasi et al. (1981), Ireland (1968), Jones (1984), Loendorf (1992b), Quinn (1989), Robertson and Robertson (1975), and Schaafsma (1972). Loendorf (1989:47-51) provides a summary of the history of rock art research in the region.

Rock art imagery in the Arkansas River Basin has generally been classified according to style. Each style consists of a recognizable series of forms, or motifs, expressed in a particular way, and localized in time and space (see Loendorf 1989:75-80 for detailed discussion). In this sense the notion of style is parallel to the notion of "phase" as it is generally used in archaeological systematics, although particular styles are not necessarily intended to be temporally coterminous with particular phases. Given the difficulties associated with dating particular rock art styles, and with determining the geographical extent of particular motifs or modes of expression, complementary notions of style, including structuralist and synchronic approaches, have also been employed in Arkansas River Basin rock art research.

Styles are generally constructed from elements or motifs, attributes, and types. Elements are the formal descriptive units into which a rock art design may be divided (Loendorf 1989:77). Although elements are fundamentally arbitrary, they can include recognizable motifs, such as "anthropomorph," "quadruped," or "circle." Attributes describe the characteristics of elements, including both their natural and cultural properties. Rock art attributes might include their method of manufacture, design orientation, degree of repatination, or design variability. Types are formal groupings of elements and attributes. Types differ from styles in that the temporal and spatial dimensions of the former are not well understood. Types are created primarily for comparative purposes, and as a first step in the definition of a style.

A variety of rock art styles has been defined for the Arkansas River Basin. Cole (1984) defines ten more-or-less distinct styles, which are described with varying degrees of precision. Loendorf (1989) has reevaluated and modified Cole's research, proposing seven named styles. Reed and Horn (1995) utilize much the same scheme, although they combine all pre-Protohistoric rock art into a generalized Plains Representational and Abstract Rock Art tradition, citing what they view as the paucity of chronometric dates and the lack of explicit criteria by which to define distinct styles. A variety of other types or styles has also been proposed (Faris 1995; Schaafsma 1972; Winter 1988).

Despite these differences most rock art researchers recognize a common set of types or styles in Arkansas River Basin rock art. Abstract motifs may be among the oldest rock imagery in the region. Defined by Cole (1984:6-12) as the Great Basin/Plains Abstract Tradition, and by Loendorf (1989:352-353) as the Pecked Curvilinear and Pecked Rectilinear Styles, these abstract images are found at rock art sites throughout the context area, although they appear to have been produced primarily during the Archaic stage. Pecked Curvilinear motifs include circles, solid dots, and curved and wavy lines. Meandering lines, many of which intersect to form irregular grids or knots, are also common. Many of the circles are bisected or are embellished with rays or tails. Preliminary dating suggests that this style may have begun during the Middle Archaic period, and continued through the Diversification period. Pecked Rectilinear motifs include intersecting lines that form rectangles, squares, grids, and rakes. Pecked Rectilinear imagery is thought to be contemporaneous with Pecked Curvilinear imagery, although it may have first been produced somewhat later. Elements assignable to both styles were produced by the solid-pecking technique. Although both of these styles were originally associated with Great Basin rock art, Loendorf (1989:351) cautions that too little is known about Archaic cultural affiliations to make the assumption that the Great Basin is their source. Similar abstract motifs have been noted outside the context area in northern New Mexico (Schaafsma 1980), and in western Colorado (Cole 1988).

Pecked Representational Style motifs consist primarily of crude or simple quadrupeds with both rectangular and boat-shaped bodies. Antlers are rarely depicted as branching, and legs occasionally have individual digits displayed. Elements are produced by both solid- and stipple-pecking techniques. Pecked Representational Style panels frequently consist of a single quadruped, or small groups of quadrupeds. The images are typically not connected by abstract lines and are frequently unassociated with other motifs. Winged forms, perhaps meant to depict birds or butterflies, occasionally co-occur with Pecked Representational quadrupeds. In some rare instances stick-like anthropomorphs may also be included in this style. Preliminary dates suggest that this style was produced during the terminal Middle Archaic period through the early

Developmental period, from ca. 3500 B.P. to 1450 B.P. (A.D. 500). Pecked Representational imagery is therefore contemporaneous with both Pecked Curvilinear and Pecked Rectilinear, and accordingly shows similarities to Great Basin styles (Loendorf 1989:354). The Purgatoire Petroglyph Style is the principal rock art type in the context area during the Late Prehistoric stage prior to Protohistoric times, ca. A.D. 1450. It is succeeded by Protohistoric and historic styles, particularly Rio Grande and Plains Biographic Styles. These styles are described further in Chapter 7.

One of the most persistent and intractable problems in rock art research is the inability to date accurately most motifs or panels. In order to overcome this problem a variety of indirect, relative, and absolute dating techniques has been developed. These techniques are discussed at considerable length by Loendorf (1989:119-137, 333-350). Indirect methods include establishing associations among a series of rock art sites and cultural materials of known age; covering deposits; and subject matter analysis. For example, Purgatoire Petroglyph Style motifs are among the most common rock art images in the context area, as are architectural remains attributable to the Diversification period, suggesting a relationship between the two. In this connection, Loendorf (1992b; Loendorf and Kuehn 1991) has argued that the Zoo Keeper site at the PCMS is Late Prehistoric in age in view of its proximity to dated architectural sites. Similarly, covering deposits have been used effectively to provide minimum ages for a number of rock art sites (Loendorf and Kuehn 1991; Quinn 1989; Buckles 1989). Finally, analysis of subject matter is particularly important for Protohistoric and historic rock art which depicts horses, rifles, and other items with known maximum ages.

Relative dating methods include seriation, scaling, varnish repatination, and superimposition. Loendorf (1989) has made considerable use of these techniques on rock art imagery from the PCMS. Estimates of varnish repatination, type seriations, and superimposition analyses have been particularly useful, although repatination studies are limited to sites on the PCMS, and image superimposition is relatively rare at rock art sites in the context area. Moreover, seriation studies must assume temporal differences among image assemblages; if differences in the frequencies of types are the product of functional differences among sites, then type seriation will yield spurious results. However, each of these relative means has produced broadly comparable results, suggesting that at least in outline the sequence of styles discussed above has some validity.

Since the early 1980s, several researchers have attempted to develop an absolute dating technique for rock art. Two techniques, typically used in conjunction, have been employed. Cation-ratio dating utilizes changes in the abundance of three metallic ions over time to estimate the minimum age of the rock varnish adhering to a rock art image. Accelerator mass spectrometry (AMS) dating of minute carbon particles trapped beneath this layer of rock varnish has also been used to provide direct minimum dates for rock art images. In practice, cation-ratio dating requires the use of AMS-derived chronological data to provide the temporal control points needed to construct a calibration curve, also known as a cation-leaching curve (CLC). The CLC is produced by comparing the ratio of potassium and calcium to titanium ([K+Ca]/Ti) in a rock varnish sample with a measured AMS date on minute carbon residues present at the contact between the varnish and the rock surface (Dorn 1989; Francis et al. 1993). Subsequent cation-ratio measurements on varnish samples can be compared with the CLC to establish absolute dates. Cation-ratio dates for a wide range of rock art sites in the context area have been reported by Loendorf (1989, 1991), Loendorf and Kuehn (1991), and Dorn et al. (1990). These data are also summarized by Faris (1995).

There are a number of uncertainties associated with both AMS dating of minute carbon samples and cation-ratio dating. Many of these uncertainties are methodological in nature, including sample selection and collection procedures. A summary of these critiques is provided by Francis et al. (1993). Although cation-ratio dates appear to be internally consistent, and in general agreement with independent archaeological data, the number of uncertainties associated with the procedure suggests that such dates should be treated with caution. In particular, sampling and sample processing procedures, and evaluating the effects of prehistoric environmental change on potassium and calcium leaching, have proven problematic. For example, Francis et al. (1993) argue that the post-A.D. 1000 CLC for the Bighorn Basin in northern Wyoming and southern Montana is not valid due to the possible effects of modern alterations to the rock surface and to problems associated with radiocarbon dating and calibration of relatively recent organic material. In this context it is important to note that the CLC for southeastern Colorado (Dorn 1989) includes no dates more recent than about 1700 B.P.

Cation-ratio dates should also be treated with some caution because of their large standard deviations. Most published dates include a standard deviation of 100 to 300 years; some reported Early Archaic period dates have 800-year standard deviations (Francis et al. 1993). For example, two samples from the Zoo Keeper site on the lower Purgatoire River produced ages of 1000 ± 225 B.P. and 1000 ± 250 B.P., indicating a 68 percent probability that the true date falls between about A.D. 700 and A.D. 1200. Like radiocarbon dates, cation-ratio dates should be treated as ranges, rather than as point data based on the CLC intercept.

Rock art researchers in the context area have also offered a number of functional and synchronic interpretations which augment the chronological interpretations discussed above. Loendorf (1989) has compared the distribution of rock art styles with hypothesized settlement strategies in order to evaluate prehistoric group size and mobility patterns. Rock art has also been used as a possible indicator of cultural identity, or what Loendorf (1989:376) terms "social geography," a measure of human territoriality and cultural boundaries. In this context, Loendorf and Kuehn (1991) have also utilized more traditional archaeological data sets, such as pollen analysis, to support arguments about the cultural affiliation of rock art image makers or users. Such data may also provide information about the functional significance of particular rock art styles or rock art site locations.

The formal structure of rock art elements has been used to relate rock art manufacture with prehistoric shamanism (Lewis-Williams and Dowson 1988). Under this interpretation abstract rock art imagery is an expression of "entoptic phenomena," images produced by human optic systems while in trance states or under the influence of hallucinogenic substances (Loendorf 1989:388). Such abstract forms, including straight and wavy parallel lines, grids of intersecting lines or lattices, and thin meandering lines, may have been produced by shamans as they entered a trance state. If abstract rock art imagery in the context area is related to entoptic phenomena, then "they clearly support a shamanistic origin for major segments of the rock art in the PCMS" (Loendorf 1989:389). Loendorf has also discussed the possibility that rock art is related to vision questing, or to other sacred activities (Loendorf 1989; Loendorf and Kuehn 1991).

These studies clearly demonstrate that rock art can be used, in conjunction with traditional archaeological methods, to answer basic questions about prehistoric culture history, site function, and fundamental social and economic processes (Loendorf 1992a). Particularly in the Arkansas River Basin, where such imagery is a significant component of many sites, rock art research should be fully integrated into more traditional data recovery and mitigation projects. Viewing rock art as a complementary data set will expand the range of interpretive possibilities for research projects conducted in the region.

Geomorphology and Paleoclimates

The topics of geomorphology and paleoclimates create a backdrop to more purely cultural themes such as chronology, technology, and economics. Geomorphology and paleoclimates fall outside the realms of human behavior and thus tend to be viewed by archaeologists in a purely mechanistic fashion. Few archaeologists would deny the importance of paleoclimates in describing long-term human adaptation in an area or the importance of the processes of geomorphology, as they both affected humans at any given time in the past and contributed to site preservation or destruction. Geomorphology and paleoclimates do not stand in isolation from cultural processes, however, for adaptations to specific environmental conditions are very much influenced by cultural factors such as level of social organization, subsistence base and general economic system, and very likely cultural idiosyncracies that are not detectable archaeologically. For example, whereas a long-term drought in a given area may only be cause for minor adjustments in a hunter-gatherer economy, a sedentary horticulturalist system could collapse altogether. Paleoenvironments and geomorphology have traditionally received far too little attention in the context area, with the result that cultural interpretations have tended to be unidimensional and simplistic. In bringing this theme to the forefront of research in the context area, archaeologists must attempt to understand fully the physical processes that shaped the area while avoiding deterministic traps that result in adaptational explanations devoid of cultural content.

CULTURAL SYSTEMATICS

Organizing Time and Space

Background Discussion

The synthesis of archaeological data from the Arkansas River Basin requires the construction of a systematic classificatory scheme to provide a means of sorting the thousands of known prehistoric sites. If properly constructed, such a system (also termed regional framework or cultural taxonomy) enables broader comparisons between and among individual sites or districts, and facilitates the explanation of observed differences. Sites in the Arkansas River Basin have been grouped according to combinations of variables including chronology, geography, material culture, and architectural features. Earlier taxonomies did not enjoy the benefits of the now-common absolute dating methods such as radiocarbon and archaeomagnetic. Therefore, they relied on the latter three variables listed above to group prehistoric sites. In the ensuing years, a wide variety of cultural taxonomies has been employed to sort the sites. In fact, so many have been advanced that the "explanation of observed differences" mentioned previously has been hindered rather than facilitated. Taxonomy remains a crucial research problem for archaeologists working in the context area and surrounding regions of Colorado and northeastern New Mexico: "If one reads even a few archaeological reports dealing with Colorado, it is soon obvious that taxonomic standardization is yet to be accomplished by field workers in the state. Often, what an archaeologist uses in categorizing finds is a blend of many systems. In addition, errors in applying various terms (some of which have become entrenched in the literature) has led to confusion" (Cassells 1997:329).

The predecessor to this document, the *Colorado Plains Prehistoric Context*, listed a number of interrelated taxonomic concerns as primary research problems (Eighmy 1984:141). However, the author did not believe the regional context document, intended as an outline of Plains archaeology in Colorado, to be an appropriate venue for a critical review of such matters:

> This outline has been modified after study by a review committee and does not provide an analysis of all available or possible "regional frameworks." The approach taken is a conservative and general overview for two reasons. First, any such statement is bound to generate disagreement and a general conservative statement should be the least objectionable. Second, and more important, a conservative approach is the best context for managing the Plains resources. If the CPO [Colorado Preservation Office] were to use [a] context written by a few and ignored by others and based on only a particular view of Plains prehistory, then the resources would likely be ill served [Eighmy 1984:1].

The authors of the present volume believe that it provides an ideal forum for review and critical assessment of previous "regional frameworks." The authors acknowledge that the statements presented herein reflect their own professional biases; it is impossible not to form opinions when a significant portion of one's career is spent researching a particular area. Further, it is assumed that context authors were selected in part because of their expertise in assessing the pros and cons of various regional classificatory systems. Disagreement with particular aspects of the narrative presented below is expected and encouraged. Debate is often beneficial since it facilitates arriving at the long-overdue consensus regarding Colorado/New Mexico culture taxa.

In an earlier subsection the authors acknowledge that a general discussion of Arkansas River Basin cultural affiliations and processes should not be confined to southeastern Colorado. An unbiased view of this topic requires consideration of the broad similarities and continuity that characterize the majority of prehistoric sites investigated on the High Plains of eastern Colorado and northeastern New Mexico. Initially, an unequivocal dichotomy is recognized in the development of the region's Archaic versus post-Archaic cultural taxonomies. The stage-period taxonomy currently in place for Archaic site classification has historically caused minimal controversy among archaeologists. Perhaps because of the relative paucity of earlier sites, this straightforward, simple taxonomy has emphasized broad patterns of adaptation in defining an Archaic stage that encompasses the Early, Middle, and Late Archaic periods. Taxonomic abuses arose when archaeologists saw an opportunity to increase the level of precision in delineating post-Archaic, High Plains culture groupings. They took advantage of the fact that complexity of material culture and architecture increased in post-Archaic times with the introduction of certain new technologies. The larger array of stylized artifacts among post-Archaic assemblages, particularly ceramics, provided pioneering Colorado archaeologists with a descriptive justification for further separation of roughly contemporaneous sites on the eastern plains. Unfortunately, a plethora of localized culture taxa were generated largely on the basis of what has proved to be insignificant morphological differences among arbitrarily selected diagnostic artifacts. For example, past taxa have been distinguished on the basis of such attributes as incurving versus outcurving pottery rims and serrated versus unserrated corner-notched projectile points (Nelson 1971; Withers 1954). Since most, if not all, of the region's past post-Archaic taxonomic systems persist in current literature (e.g., Biella and Dorshow 1997a; Gunnerson 1987; Lintz and Anderson 1989; Nowak and Kantner 1991) it is necessary to review them before continuing the discussion of cultural systematics in the Arkansas River Basin.

Although Southwestern connections have at times been attributed to specific, southeastern Colorado, post-Archaic sites (see Sopris phase discussion, below), archaeologists working in the area have generally believed that diffusion of traits from plains groups has played a greater role in determining interregional relationships. Therefore, early taxonomic nomenclature (e.g., Withers' [1954] foci) was largely derived from the Midwest Taxonomic System (MTS) (McKern 1939). Although MTS terms such as "aspect" and "focus" continue to be used, Butler (1988:450) notes that systems developed by Mulloy (1958) and the Cultural-Historic Integration approach of Willey and Phillips (1958) have also influenced site classification on the eastern plains of Colorado. More recent approaches to the problem continue to run the gamut from well-defined modifications of the Willey and Phillips taxonomic system following Lehmer (1971) and Krause (1977), to the presentation of culture "designations" (Butler 1988; Gunnerson 1989; Lintz 1984). The result is a bewildering assortment of taxa that overlap considerably in terms of their temporal, spatial, and cultural parameters. A single site recorded in the Arkansas River Basin, for example, may be listed as Apishapa phase, Apishapa focus, Classic Apishapa, Late Prehistoric period, or Middle Ceramic period, depending upon the inclination of the investigator. A list of cultural taxa used in describing post-Archaic occupation of southeastern Colorado prior to the Protohistoric period as defined by Eighmy (1984) is provided below. The list is accompanied by narrative text presenting the perceived merits and drawbacks of each. The discussion attempts to focus on taxa assigned specifically to sites situated in the Arkansas River Basin; however, it is emphasized that some of the taxa listed below, e.g. Graneros focus, are part of a larger taxonomic system developed for eastern Colorado. Post-Archaic taxonomic schemes that have been applied to the context area in the past are summarized in Figure 4-1.

Graneros Focus

The Graneros focus as defined by Withers (1954) is part of a taxon designated the Woodland Pattern that included two foci (Graneros and Parker) belonging to the Late Woodland period of the Midwest. This taxonomy is derived from the MTS of McKern (1939). In the years before absolute dating techniques were available to order chronologically prehistoric groups, this particular approach was appropriate because it emphasized cultural traits over temporal and spatial factors (Lintz 1984:38). However, data collected since the 1950s have demonstrated that the Graneros focus is not a valid taxon. It is recognized that early (pre-A.D. 1000) post-Archaic site variability cannot be described adequately by the original definition; perhaps for this reason implicit spatial and temporal elements have crept into the Graneros focus concept. This taxon has been applied almost automatically to sites perceived to date between A.D. 250 and 1000 in the Arkansas River Basin. Further, the justification for separating Graneros from other foci was based on what have proven to be specious distinctions (Butler 1988). For example, the Parker and Graneros foci are distinguished by variation in cord-marked pottery, the size of corner-notched projectile points, and the presence or absence of stone wall architecture. The Graneros focus is defined by cord-marked pottery with straight or slightly outcurving rims, very small to large corner-notched points and small, circular structures. Contrastingly, the Parker focus is characterized by cord-marked pottery with straight or incurving rims, medium to large corner-notched points and no associated architecture. More recent investigators have argued convincingly that the ceramic variability described by Withers (1954) to define different foci can in fact be associated with a single vessel (Butler 1988:454-455; Hummer 1989; Zier et al. 1988). Additionally, projectile point collections from radiocarbon dated post-Archaic contexts in both the South Platte and Arkansas basins typically include corner-notched specimens encompassing a wide range of sizes (Anderson 1989a; Andrefsky 1990; Kalasz and Shields 1997). Finally, early post-Archaic architecture has now been excavated all along the Front Range rather than just in the Arkansas River Basin (Biella and Dorshow 1997a; Brunswig 1990; Kalasz and Shields 1997; Morris and Litzinger 1985; Nelson 1971).

Colorado Plains Woodland Regional Variant of the Western Plains Subarea of the Plains Woodland Pattern

This framework includes two taxa referred to as the South Platte and the Arkansas phases. The classification was proposed by Butler (1986, 1988) in response to the limitations of previous eastern Colorado cultural taxonomies that focused on occupations occurring between A.D. 100 and 1150. This particular system utilizes a mixture of taxonomic concepts including Lehmer's regional variant (Krause 1977; Lehmer 1971), the phase concept of Willey and Phillips (1958), the Western Plains Subarea as defined by Wood (1967), and the pattern construct of the MTS

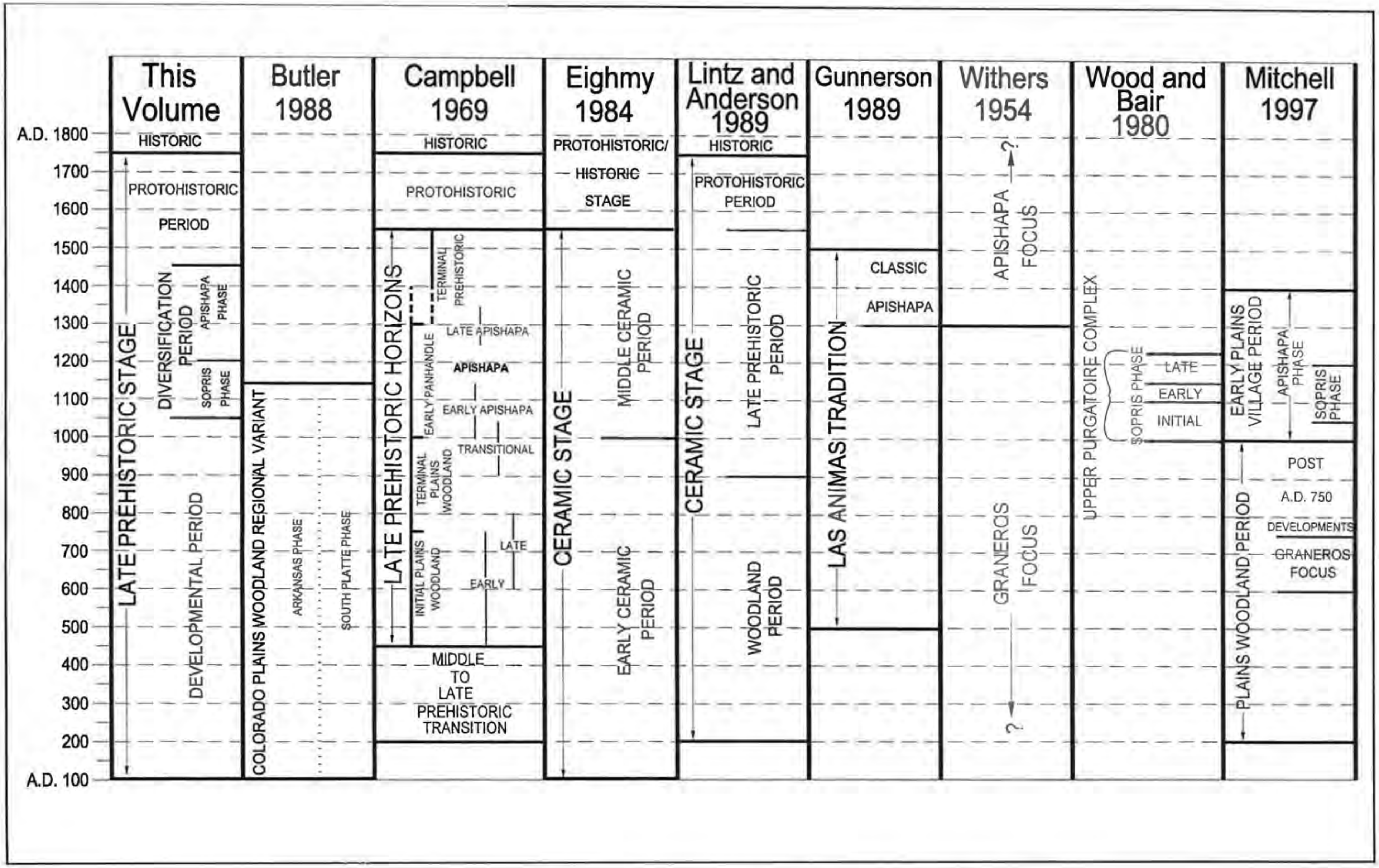


Figure 4-1. Post-Archaic taxonomic summary for the Arkansas River Basin.

(McKern 1939). Although two phases are defined, one for sites in the South Platte drainage basin and the other for Arkansas River Basin sites, this particular taxonomy emphasizes the former. Butler (1988:462) notes that because the archaeology of southeastern Colorado is poorly understood, the Arkansas phase should be regarded only as a provisional taxon, stating that "we may find that the Arkansas phase does not exist as a legitimate taxonomic unit as more information is obtained from the area." Most importantly, Butler examines the validity of previous taxonomies and justifiably argues for their rejection on the basis of the considerable continuity and similarity characterizing early post-Archaic occupation of Colorado's eastern plains. Additionally, it is suggested that there may be no discernible differences in the early post-Archaic cultural manifestations south and north of the Palmer Divide, i.e., the Arkansas phase may be indistinguishable from the South Platte phase.

Although Butler's research into the region's taxonomic problems is a valuable contribution, terminology associated with the regional variant and phase level of his classification may cause problems for investigators as more recent information is disseminated. It is important to point out that the "Colorado Plains Woodland Regional Variant" described by Butler (1988) is apparently not restricted to Colorado. Recent investigations have indicated that early post-Archaic sites in northeastern New Mexico bear a striking resemblance to those of the High Plains of eastern Colorado (Biella and Dorshow 1997a). These sites are placed within a generalized Plains Woodland period construct derived from Campbell (1969a; see discussion below). Further, the phase terminology employed by Butler implicitly distinguishes taxa according to physiographic province and may lead to the same sorts of problems created by Graneros and Parker foci, i.e., the classification of sites according to location rather than cultural factors. Justification for distinguishing between the two phases is weak and based on minimal data; Arkansas phase sites are thought to exhibit greater incidences of architecture and increased reliance on horticulture. Butler (1986, 1988:462), in fact, underscores the possibility that the provisional Arkansas phase is an invalid taxon in the initial presentation of his taxonomic system. This premise is strongly supported by data collected over the last decade, which indicate minimal differences in adaptation and material culture among early post-Archaic sites regardless of their association with a particular drainage basin (Biella and Dorshow 1997a; Hand and Jepson 1996; Kalasz et al. 1993; Kalasz and Shields 1997; Zier 1989). If the two phases are subsumed within a single taxon, either the South Platte or Arkansas phase designation may have to be dropped to avoid confusion.

Panhandle Aspect

This taxon was developed by Krieger (1946) for prehistoric stone slab architectural sites in the panhandle regions of Texas and Oklahoma. The Panhandle aspect originally encompassed the Antelope Creek and Optima foci (Lintz 1984). This taxonomy therefore represents yet another application of the MTS to Plains Village manifestations (McKern 1939). Withers (1954) later defined the Apishapa focus on the basis of Renaud's recording of the stone enclosure sites along the Apishapa River and noted the affiliation of the Apishapa focus with the Panhandle aspect. Campbell (1969a) followed suit and added the Apishapa focus to the Panhandle aspect on the basis of architectural similarities between sites on the Chaquaqua Plateau and those of the Antelope Creek focus in northern Texas; by this time the Optima focus had been abandoned (see below).

Late Prehistoric Horizons on the Chaquaqua Plateau

This expression refers to the post-Archaic/pre-Protohistoric portions of a rather involved taxonomic system developed by Campbell (1969a) to classify sites recorded in the process of completing his doctoral research. The Chaquaqua Plateau region examined by Campbell is situated along the Purgatoire River and some of its southern tributary canyons in southeastern Colorado. This particular taxonomy is apparently most influenced by Krieger's (1946) Panhandle

Aspect concept, the MTS (McKern 1939), and Withers' (1954) subsequent interpretation, but is modified considerably by the introduction of temporal elements. Also, rather than apply Withers' Graneros focus to his pre-Panhandle taxa, Campbell uses the more general Plains Woodland designator. Although the post-Woodland taxon is termed Early Panhandle, Campbell (1969a:389) describes it as "full-blown Apishapa Focus Culture" in the accompanying text. The post-Archaic and pre-Protohistoric portion of Campbell's taxonomic system is presented below:

- Middle to Late Prehistoric Transition, A.D. 200-450
- Late Prehistoric Horizons
    - Initial Plains Woodland, A.D. 450-750
        - Early, A.D. 450-750
        - Late, A.D. 600-800
    - Terminal Plains Woodland, A.D. 750-1000
        - Transitional Terminal Plains Woodland, A.D. 900-1050
    - Early Panhandle, A.D. 1000-1300/1400
        - Early Apishapa, A.D. 1000-1150
        - Apishapa, A.D. 1000-1300
        - Late Apishapa, A.D. 1250-1350
    - Terminal Prehistoric, A.D. 1300-1550

An interesting departure from the earlier taxonomy of Withers (1954) is the introduction of more precise temporal/cultural divisions such as Initial versus Terminal Plains Woodland. The "Early" and "Late" subheadings under Initial Plains Woodland and Early Panhandle, as well as the Transitional Terminal Plains Woodland, are derived from figures in Campbell's dissertation showing the distribution of sites within the larger taxon. These more precise temporal divisions shown in the figures (e.g., Campbell 1969a:Figures 53-58) are either not discussed or are described only vaguely in the dissertation text. Realistically, the level of analytical precision indicated by the definition of, for example, an Initial versus Terminal Plains Woodland, is not supported by many absolute dates (Campbell 1969a:345). The emphasis of the project was on survey and testing, and not formal excavation. Therefore, the temporal trends observed by Campbell are derived through cross dating of various architectural forms and artifact assemblages with 11 radiocarbon dates as well as diagnostic artifacts (points and ceramics) from adjacent areas that had known temporal ranges. In actuality the accuracy of the "known time ranges" associated with particular diagnostic artifacts varied greatly due to the general lack of absolute dates from High Plains contexts that were available in the 1960s. Perhaps for these reasons the shift from Initial to Terminal Plains Woodland on the Chaquaqua Plateau is described in ambiguous terms: "Few major innovations occur in this horizon, but in general, the cultural pattern becomes more varied" (Campbell 1969a:381). Some select architectural elements are emphasized in distinguishing Initial from Terminal Plains Woodland but the dating criteria for these changes are not specified. Campbell (1969a:376) notes in his description of Initial Plains Woodland that "apparently, occupants of the region were shifting toward surface structures as primary residences and more than likely, the stone enclosure served as the primary residence in the winter months." Regarding Terminal Plains Woodland on the Chaquaqua Plateau, he proposes that "a major change in settlements involves the appearance of barrier walls at habitation sites" (Campbell 1969a:383).

Although long trait lists accompany the description of each cultural taxon in Campbell's study, meaningful distinctions among them are difficult to discern. Subsequent research has never established, for example, that the presence of barrier walls distinguishes Initial from Terminal Plains Woodland, or that cord marks on Plains Woodland ceramics are deeper and wider than those of the Apishapa focus. As was often the case in the 1960s, some potentially important technological trends were overlooked in the rush to ascertain temporally/culturally diagnostic tool or feature forms.

The key descriptors in Campbell's taxonomy are Late Prehistoric, Plains Woodland, and Panhandle. Additional nomenclature applied to these major headings varies greatly within the dissertation, e.g., designations such as horizon, culture, stage, phase, period, focus, or simply "materials" are often used interchangeably. Although the Initial Plains Woodland taxon describes the beginning of the Late Prehistoric horizons, a Middle to Late Prehistoric Transition characterized by a mixture of Plains Woodland and Late Archaic attributes precedes it. The definition of this particular taxon emphasized Campbell's belief that Woodland populations were directly related to indigenous Archaic groups, i.e., the Woodland manifestation is not the result of any "new waves of immigrants" (Campbell 1969a:367). Inexplicably, there is no mention of the Middle Prehistoric taxon prior to the Late Prehistoric; the earlier taxon is designated "Archaic" (Campbell 1969a:364). The Middle to Late Prehistoric Transition designation is apparently a reference to an unspecified taxonomy where Paleoindian is referred to as Early Prehistoric, Archaic as Middle Prehistoric, and post-Archaic as Late Prehistoric.

As with the previous shift from Archaic to Plains Woodland, Campbell (1969a:499) proposes that the Early Panhandle culture developed in situ from Plains Woodland groups. In contrast to Plains Woodland populations, Early Panhandle groups represent "a well developed Late Prehistoric horticultural complex" made possible by "the introduction of improved horticultural traits such as Harinosa de Ocho maize" (Campbell 1969a:500). There is no "Late Panhandle" on the Chaquaqua Plateau because Campbell believes that the area was abandoned by Apishapa focus populations by the late A.D. thirteenth century due to drought conditions. Apishapa populations were believed to have moved east to develop the Antelope Creek focus villages; the Antelope Creek focus taxon would thus evidently constitute "Late Panhandle" (Campbell 1969a:508-509). Campbell uses the taxon Terminal Prehistoric to describe post-Apishapa occupations on the Chaquaqua Plateau that were believed to reflect the incursion of prehistoric Apache groups.

Despite the limitations of the taxonomic system that Campbell employs, his research provides important insight into the relationships among post-Archaic southeastern Colorado cultural taxa. For example, in describing his Initial Plains Woodland it is specified that "by A.D. 450 the inhabitants seem to have developed a local variant of the widespread Plains Woodland tradition," and further, that "the culture appears to be a local manifestation of the Graneros Focus, a prehistoric complex defined by A. M. Withers [1954:3]" (Campbell 1969a:370). Further, Campbell (1969a:428) presents the possibility of a far-reaching cultural manifestation that extended north to the Denver area: "Perhaps, both Graneros and Parker materials developed from a widespread, generalized Woodland phase similar to the transitional materials found in the Southeastern District of the Chaquaqua Plateau." He also recognizes relationships among subsequent Early Panhandle or Apishapa focus occupations on the Chaquaqua Plateau and those to the north in the Canon City, Apishapa River, and Turkey Creek (Fort Carson) areas. Equally important were observations about the extension of Chaquaqua Plateau cultural manifestations south to the Las Vegas Plateau of northeastern New Mexico. Campbell (1969a:462-471) notes the presence of both Plains Woodland and Apishapa focus occupations on the Las Vegas Plateau. Concerning the Late Archaic origins of Las Vegas and Chaquaqua Plateau populations, Campbell (1969a:464) proposed that "the two districts seem to share in a common cultural development."

A more recent derivation of Campbell's typology was applied to Ancho Canyon Archaeological Project sites in northeastern New Mexico (Biella and Dorshow 1997a). However, this system differs with Campbell's taxonomy in several key aspects and, because the majority of the project sites date between 1800 and 1000 B.P., emphasizes the Plains Woodland portion. Initially, the Ancho Canyon Woodland taxonomy (termed chronology in the report) features some important modifications of Campbell's terminology, resulting in significant improvements. The Ancho Canyon chronology has the Late Archaic period extending to A.D. 200, and the subsequent

Plains Woodland is divided into three taxa (Biella and Dorshow 1997a:28): Transitional Plains-Woodland (A.D. 200-450), Initial Plains-Woodland (A.D. 450-750), and Terminal Plains-Woodland (750-1000). Therefore, the confusing Middle to Late Prehistoric Transition taxon is dropped in favor of a Transitional Plains Woodland taxon that spans the identical time period. Additionally, whereas Campbell subsumes Plains Woodland and Early Panhandle under the heading "Late Prehistoric Horizons," the Ancho Canyon chronology emulates Lintz and Anderson (1989) in that the Late Prehistoric taxon is used to encompass a number of post-Woodland and pre-Protohistoric cultural manifestations.

A number of interesting classificatory concerns are raised with Biella and Dorshow's recent application of an old and generally outdated southeastern Colorado taxonomy to northeastern New Mexico. Although the limitations of Campbell's taxonomy have become more apparent with the infusion of new data, one possible advantage for the Ancho Canyon investigators is that its use highlights the authors' central thesis that the Archaic and Plains-Woodland populations in northeastern New Mexico were strongly affiliated with plains rather than Southwestern groups (Biella and Dorshow 1997a:67, 947, 1033). Further, it is obvious that the Ancho Canyon investigators selectively applied portions of the Campbell taxonomy, i.e., only those portions that facilitated the chronological ordering of their archaeological data. The authors acknowledge that they adopt Campbell's Woodland *chronology* because "these categories best distinguish major changes in material culture observed in the...Woodland period sample" (Biella and Dorshow 1997a:37). The word chronology is emphasized in the preceding statement since it is primarily the temporal intervals associated with the Campbell taxonomy that were adopted. Many of the more ambiguous cultural definitions were purposefully ignored. Thus, the "major changes in material culture" that Biella and Dorshow associate with the respective Woodland taxa often differ considerably from those specified in Campbell's dissertation. Because of the greater availability of excavation data (as opposed to survey and testing), interpretation of Ancho Canyon Woodland taxa is supported by a number of tightly provenienced absolute dates. Rather than emphasize poorly dated artifact/feature inventories, the more recent classification takes advantage of advances in excavation and dating techniques to delineate more precisely the most meaningful temporal patterning in their limited sample. In contrast to Campbell (1969a), the differentiation of Initial from Terminal Plains Woodland in northeastern New Mexico focuses on well-dated changes in feature morphology. Rather than becoming mired in the explication of trait lists, Biella and Dorshow (1997a:946) are able to focus on a shift from semisubterranean to above-ground structures in the Terminal Plains Woodland that is strongly supported by a suite of radiocarbon assays (Biella and Dorshow 1997a:946). After analysis of broader technological and settlement and subsistence trends, most facets of Archaic/Woodland adaptation in the area were found to have remained relatively stable (Biella and Dorshow 1997b:1024-1027).

Ceramic Stage

This regional framework encompasses the post-Archaic portion of a taxonomic system developed for the *Colorado Plains Prehistoric Context* (Eighmy 1984). As discussed above, this system reflects a conservative approach to assessing the various taxonomies employed in the eastern plains of Colorado. Eighmy uses a broad stage/period classification, vaguely based on concepts presented in Willey and Phillips (1958), to provide a general framework within which sites as well as previous taxonomies could be discussed in the most appropriate temporal context. The stage level was defined by Eighmy (1984:6) as "a large block of time usually, though not necessarily, characterized by a dominant pattern of economic existence." This particular definition is apparently derived, at least in part, from a statement by Alex Krieger that was reproduced in Willey and Phillips (1958:68). They believed that the Krieger statement "contains the clearest discrimination between the concepts of stage and period that we have yet seen in print."

> For present purposes, I will consider a "stage" to be a segment of a historical sequence in a given area, characterized by a dominating pattern of economic existence. The general economic life and outlines of social structure of past peoples can often be inferred from archaeological remains and can be related to similar phenomena, whether the dates are known or not. The term "period" on the other hand, might be considered to depend upon chronology. Thus a stage may be recognized by content alone, and, in the event that accurate dates can be obtained for it in a given area, it could be said that the stage *here* existed during such-and-such a *period* [italics in original]. Further, the same stage may be said to appear at different times or periods in different areas and also to end at different times. A stage may also include several locally distinctive culture complexes and minor time divisions. A great deal of discussion is needed on these points [unpublished paper by A. D. Krieger, cited by Willey and Phillips 1958:68-69].

This statement was associated with Krieger's paper on a "developmental scheme for North America" (Willey and Phillips 1958:68). Willey and Phillips applied some of Krieger's ideas concerning stage developments, as well as those associated with Julian Steward's "functional-developmental" classification, to generate their own five-stage historical-developmental sequence (Willey and Phillips 1958:73).

Krieger's statement emphasizes the associations between stage and cultural content and between period and chronology. In contrast, Eighmy uses stages and periods in a simple hierarchical scheme wherein both taxa blend temporal and cultural elements. Therefore, a number of periods are grouped within a particular stage or "large block of time usually...characterized by a dominant pattern of economic existence" (Eighmy 1984:6). Although employing a modified stage concept, Eighmy wisely chooses not to use the actual stage construct defined by Willey and Phillips other than that of the Archaic. Stages such as Formative, Classic, and Postclassic simply do not apply to the eastern plains of Colorado. A period was defined by Eighmy (1984:6) as "a unit of time in a given region usually demarcated by identifiable changes in the archaeological record." Components within periods are based on the Willey and Phillips (1958) definition of "a site or level within a site representing a single occupation of the site" (Eighmy 1984:6). But, as Eighmy states, the discrimination of individual components is a rare occurrence in eastern Colorado because of the paucity of absolute dates. Further, the very nature of hunter-gatherer settlement, e.g., the seasonal reoccupation of sites wherein similar tasks are performed, makes it almost impossible to distinguish individual components. The stage and period levels of Eighmy's classification are much less ambitious in their definition and therefore more applicable to the great majority of sites. It is emphasized that in Eighmy's framework both stage and period have temporal elements. Interestingly, the age applied by Eighmy to the Archaic/Ceramic stage shift, as well as that of the transition from Early to Middle Ceramic period, is identical in the northeastern and southeastern Colorado subareas. Therefore, this particular regional framework at least implicitly emphasizes some degree of cultural and developmental continuity between the Arkansas and South Platte basins.

A major advantage to Eighmy's approach lies in its simplicity, especially given the confusion associated with the region's profusion of cultural taxonomies. Because all prior taxa are dropped for this framework, the most relevant aspects of earlier systems could be reviewed without subsequently having to apply the nomenclature. Recent investigators at Fort Carson and the PCMS have interpreted their results within Eighmy's framework (Andrefsky 1990; Jepson et al. 1992; Kalasz et al. 1993; Van Ness et al. 1990; Zier et al. 1988; Zier et al. 1997). Major drawbacks to this taxonomy are employment of the term "Ceramic" to describe the stage/period taxa following the Archaic, and the emphasis on dominant economic patterns in the definition of stages. First, the transition from Archaic to Ceramic stage has little to do with a shift in a dominant pattern of economic existence. In fact, many investigators see the Early Ceramic period as a continuation of basic Archaic hunter-gatherer adaptation but with the addition of new technologies (Zier and Kalasz 1991). Second, the terms Ceramic stage, Early Ceramic period, and Middle Ceramic period suggest an undue emphasis on the importance of ceramic technology and pottery types in defining post-Archaic taxa. The transition from the Archaic stage is complex and involves much more than the introduction of this particular industry. Further, the distinction between an Early and Middle Ceramic period implies that these taxa are associated with well-defined differences in pottery types. Temporal variability in the construction of the predominant local cord-marked wares is yet to be convincingly established.

Upper Canark Regional Variant

This taxonomic system was developed by Lintz (1984, 1989) to describe the westernmost Late Prehistoric (post-A.D. 900/1000) manifestations of the Southern Plains Village tradition. This system provides an alternative to the vagaries surrounding Panhandle aspect terminology by modifying the taxonomic concepts of Willey and Phillips (1958) and Lehmer (1971). Lintz (1989:285) states that "the regional variant concept was merely employed as a descriptive designation to a series of generally similar manifestations along the western margins of the Southern Plains subarea as a contrast for other Village manifestations in the Prairie-Plains region." These sites are grouped together as the Upper Canark Regional Variant, with "variant" defined as "a unique and reasonably uniform expression of a cultural tradition which is distinguished from other variants of the same tradition by its geographic distribution, age and/or cultural content" (Lehmer 1971:32, cited in Lintz 1984:43). The Upper Canark Regional Variant is comprised of two phases, Apishapa and Antelope Creek. The phase is defined by Willey and Phillips (1958:22) as "*an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time*" [italics in original]. Whereas sites affiliated with the Apishapa phase are situated along the tributaries of the upper Arkansas River in southeastern Colorado, those of the Antelope Creek phase are centered around the upper portion of the Canadian River in the panhandles of Texas and Oklahoma. Determination of the extent to which each is affiliated with sites in northeastern New Mexico was not possible given available data. The Antelope Creek phase, dating between A.D. 1200 and 1500, is believed to have developed later than the Apishapa phase, which Lintz (1989:275, 281) places between approximately A.D. 900 and 1400. It is important to emphasize that the grouping of these two phases within a common variant was not meant to suggest any sort of phylogenetic relationship (Lintz 1989:285). In other words, these phases should not be viewed as branches of a single family tree. As Lintz (1984:44) explains, "The grouping of phases and complexes within a regional variant need not carry implicit notions of cultural continuity or affinity as much as an indication of intense cultural interaction or parallel development." Both phases were believed to have developed independently from indigenous populations in their respective regions. Simply put, these two geographically contiguous phases differ from other Southern Plains Village tradition manifestations to the extent that a separate taxon was believed appropriate for comparative or heuristic purposes. Difficulties arise in comparing the phases themselves because considerable disparity exists between the respective data sets for Apishapa and Antelope Creek sites; the former are known primarily from surface reconnaissance and limited excavation, and the latter from large-scale block excavations. However, at the most basic level the Upper Canark Regional Variant is associated with a semisedentary, dual foraging and horticultural settlement-subsistence strategy. Primary attributes include masonry slab architecture, small side-notched projectile points, and cord-marked ceramics.

At finer levels of analysis Lintz (1989:285) emphasizes that the two phases exhibit a number of significant differences. Antelope Creek and Apishapa phase attributes were compared against the following traits suggested by Lehmer (1954:139-140, cited in Lintz 1984:41, 1989:285) to be diagnostic of the Plains Village pattern or tradition:

- Subsistence based about equally on hunting and horticulture
- Semipermanent villages
- Villages located adjacent to the larger flood plains
- Semisubterranean earth lodges with entryways
- Undercut and straight-walled cache pits in and between the houses
- Grit-tempered pottery with paddle-marked body and cord- or tool-impressed decorations
- Small, light projectile points
- Chipped end scrapers
- Scapula hoes
- Bone hide dressing tools

The author notes that although the Antelope Creek phase exhibits all the above traits with the possible exception of equal reliance on horticulture, Apishapa phase sites lack evidence of equal reliance on horticulture, semisubterranean earth lodges with entryways, scapula hoes, and bone hide-dressing tools (Lintz 1989:285). Despite the dissimilarities between the phases, Lintz (personal communication to Centennial Archaeology, Inc. 1998) believes that the Upper Canark Regional Variant remains a useful heuristic device.

Lintz's framework provides valuable insight into one of the two known hamlet levels of community development in the Arkansas River context area (the other being the Sopris phase), and a detailed and in-depth comparison of the two westernmost "Plains Village" manifestations long thought to be somehow linked. The Upper Canark Regional Variant therefore establishes a crucial basis upon which additional contrast and comparison can be conducted should Apishapa phase sites undergo large-scale block excavations in the future.

Upper Purgatoire Complex

The Sopris phase, or Upper Purgatoire complex as it was originally known, was defined by Dick (1963) to describe a series of sites located along the terraces of the Purgatoire River west of Trinidad. These sites were characterized by the presence of rectilinear stone masonry architecture in association with ceramics of the Pueblo II period. Based on production dates for Southwestern black-on-white trade wares, the Sopris phase was originally placed between A.D. 1150 and 1250/1300 (Dick 1963). Subsequent revisions of the northern Rio Grande ceramic chronology (e.g., Wetherington 1968), as well as a suite of 10 archaeomagnetic dates from the Trinidad district, resulted in modification of this preliminary framework to include three subphases: Initial Sopris (A.D. 1000-1100), Early Sopris (A.D. 1100-1150), and Late Sopris (A.D. 1150-1225).

Subsequent reanalyses have demonstrated that these subphase designations cannot be supported (Mitchell 1997). On the basis of new radiocarbon dates and a reexamination of the available archaeomagnetic data, it appears that the Sopris phase as currently defined began during the middle of the eleventh century, and ended before the close of the twelfth century (A.D. 1025/1050-1175/1200). Some Sopris phase sites may have been reoccupied during the twelfth century. Within that temporal period, no architectural construction sequence can be established, nor can individual structures be ordered into a temporal sequence on the basis of their associated assemblages.

Las Animas Tradition

This taxonomy, which includes Early Las Animas (ca. A.D. 500-1300) and Classic Apishapa (ca. A.D. 1300-1400) subdivisions, was developed by Gunnerson (1989) to account for traits exhibited by certain large architectural sites associated with the Apishapa phase, particularly Snake Blakeslee and Cramer, which appeared to distinguish them from other sites. These large sites, all situated along the Apishapa River, are often thought of as the "type sites" for the Apishapa focus as defined by Withers (1954). The taxon is apparently restricted to Apishapa phase sites "of the 1300s" that are associated with "cord roughened pottery and small triangular projectile points, including unnotched, side notched, multiple side notched and side and basally notched, but with corner notched or stemmed varieties virtually absent" (Gunnerson 1989:125-126). In addition to the Snake Blakeslee, Cramer, Munsell, and Canterbury sites on the Apishapa River, Gunnerson (1989:125-128) believes that the Avery Ranch site on Fort Carson is an example of a Classic Apishapa site. Excluded in the taxon are numerous sites excavated and identified as Apishapa focus by Colorado College in the 1980s, as are "the earlier sites that Campbell (1969[a], 1976) would also include in Apishapa" (Gunnerson 1989:126-127). Gunnerson places the Classic Apishapa, and presumably the Apishapa phase from which it sprang, within the Las Animas tradition, a local in situ manifestation beginning approximately A.D. 500 (Gunnerson 1989:127). Classic Apishapa is conceived as the end product of this particular tradition, which also encompasses the Graneros focus. According to Gunnerson (1989:127), "the diagnostic traits for this local tradition would include: cord roughened pottery, small projectile points, and the use of considerable rock in the architecture."

Gunnerson is in essential agreement with other southeastern Colorado investigators in stating that the Apishapa phase or focus represents the culmination of a long-lived local development. The early portion of the Las Animas tradition is assumed to replace previous taxa such as Plains Woodland period, Graneros focus, Ceramic stage, or Early Ceramic period. Although no specific boundaries are delineated, the name Las Animas suggests that this taxon has inherent southeastern Colorado/northeastern New Mexico spatial parameters. However, the diagnostic traits of the Las Animas tradition apply to early post-Archaic manifestations in northeastern as well as southeastern Colorado.

Summary

Few of the post-Archaic cultural taxonomies discussed above provide much supporting evidence for differentiating among defined taxa, or describe accurately the long term continuity in adaptation that characterizes the context area. Often, the available post-Archaic cultural taxa are defined so narrowly that it has been difficult to explore what now appear to be broad, fundamental similarities in the archaeological record of the region. On the other hand, these same taxa have been applied so broadly that it has been difficult to evaluate the possibility of real spatial and temporal cultural variability in the region. It is now generally accepted among the region's archaeologists that post-Archaic cultural manifestations sprang directly from the earlier Archaic stage and continued without the infusion of outside populations until roughly A.D. 1400. Despite the recognition of this continuity, regional taxonomies have often been oriented toward emphasizing minimal differences in material culture rather than synthesizing available data in a manner that recognizes broader geographical or temporal trends. Past taxonomic confusion can be traced in large part to a tendency to define more explicit cultural taxa without adequate foundational data. Observations of small-scale variability among cultures, e.g., in pottery rim morphology, were used to define cultural taxa before large-scale relationships were established. In light of these tendencies, the broad stage/period taxonomy employed by Eighmy (1984) in the previous research context for the eastern plains of Colorado was a definite step in the right direction.

The shortcomings of various cultural taxonomies used previously to describe early post-Archaic occupation (pre-A.D. 1000) of the foothills and eastern plains of Colorado are well summarized by Butler (1986, 1988). In reality these taxa were not data driven and were often applied to sites mainly on the basis of locational characteristics (Butler 1988:455). For example, if a site with small, serrated, corner-notched points is recorded in the foothills west of Denver, it is likely to be placed within the Hogback phase (Nelson 1971); sites with similar assemblages found farther east on the Piedmont are likely to be associated with the Parker focus, and those in the valley of the Arkansas River are usually affiliated with the Graneros focus. The degree of disparity among the sites rarely warrants such taxonomic separation and often they are simply grouped under the heading "Plains Woodland." More importantly, the continued indiscriminate application of these taxonomies may have masked more valid comparison and contrast among the larger sample of sites along the Front Range. If one discards much of the taxonomic baggage that has accrued over the last 50 years, trends possibly reflective of more widespread cultural processes may be discerned. Further, site type variability may at last be considered in light of functional differences within a common settlement-subsistence pattern rather than causes related to dissimilar cultural influences.

It is recognized that in contrast with early post-Archaic sites, there is abundant evidence of true directional change in Arkansas River Basin cultural systematics after A.D. 1000. Perhaps most importantly, greater levels of population coalescence are exemplified by increased architectural complexity that is well demonstrated by the appearance of multiroom structures. The most obvious and conclusive distinctions are apparent between post-A.D. 1000 architectural sites situated on the Park Plateau and those located along major drainage courses to the east. Whereas Southwestern influences are attributed to the former (designated Upper Purgatoire complex or Sopris phase), the latter (generally designated Apishapa phase) are characterized by various traits believed to have originated in Central/Southern Plains contexts to the east and southeast. However, the fact that both probably sprang from a common Archaic and early post-Archaic hunter-gatherer tradition cannot be dismissed. Therefore, available data should be reviewed for evidence of overlap in both material culture traits and adaptation. Again, the overall goal is an unbiased reassessment of existing southeastern Colorado culture taxonomies; similarities and continuity, as well as contrast, must be addressed.

The manner in which the Ancho Canyon investigators approached cultural chronology and reconstruction for their project underscores a number of taxonomic problems facing the region's archaeologists. Given the current state of post-Archaic culture history in southeastern Colorado and northeastern New Mexico, it is certainly understandable that bits and pieces of various existing taxonomies were cobbled together to accommodate best the data at hand. However, such approaches to regional taxonomy will undoubtedly lead to more confusion. As classificatory schemes continue to be merged and apportioned, the archaeological meaning of specific taxa will change and may eventually become so generalized that they are entirely useless for delineating distinctive cultural manifestations. Currently, as in the past, terms with specific definitions such as phase, focus, period, tradition, and aspect, among others, are often used interchangeably or are simply dropped. The time clearly has arrived for consensus on a standardized framework for eastern Colorado and northeastern New Mexico that is, in turn, dynamic with respect to accommodation of new data.

Proposed Taxonomy for the Arkansas River Context Area

Cultural taxa for the Arkansas River Basin are placed within the following framework (Table 4-1). Chronometric dates (from radiocarbon, obsidian hydration, archaeomagnetic, and thermoluminescence techniques) that comprise the temporal foundation for this scheme are listed in Appendix A. Cation-ratio dates from rock art sites in the context area are listed in Appendix B, and Appendix C presents basic data about all excavated and tested sites. Figure 4-2 displays the distribution of chronometric dates from the context area in 200-year increments.

Table 4-1. Proposed Cultural Taxonomy for the Arkansas River Basin

Cultural Taxon	Temporal Range
Paleoindian Stage	>11,500 - 7800 B.P.
Pre-Clovis Period	>11,500 B.P.
Clovis Period	11,500 - 10,950 B.P.
Folsom Period	10,950 - 10,250 B.P.
Plano Period	10,250 - 7800 B.P.
Archaic Stage	7800 - 1850 B.P. (A.D. 100)
Early Archaic Period	7800 - 5000 B.P.
Middle Archaic Period	5000 - 3000 B.P.
Late Archaic Period	3000 - 1850 B.P. (A.D. 100)
Late Prehistoric Stage	1850 - 225 B.P. (A.D. 100 - 1725)
Developmental Period	1850 - 900 B.P. (A.D. 100 - 1050)
Diversification Period	900 - 500 B.P. (A.D. 1050 - 1450)
Apishapa Phase	900 - 500 B.P. (A.D. 1050 - 1450)
Sopris Phase	900 - 750 B.P. (A.D. 1050 - 1200)
Protohistoric Period	500 - 225 B.P. (A.D. 1450 - 1725)

Modifications of the existing cultural scheme in the context area are restricted largely to the post-Archaic segment of prehistory (Eighmy 1984), where the greatest taxonomic confusion has resided. The purpose of the proposed modifications is to simplify the post-Archaic framework by discarding outdated nomenclature, providing more precise definitions of terminology, and providing new labels that describe more clearly the processes that distinguish individual taxa. This system employs hierarchical sorting into stages and periods. At these levels the introduction of nomenclature differing from that presented by Eighmy (1984) is avoided. The term "component" as defined by Eighmy (1984) is only rarely used in subsequent narrative since the ability to delineate consistently single occupations at context-area sites is lacking. Most often, occupations can at best be grouped by period.

A discussion of the Willey and Phillips (1958) conception of stage and period as it applies to Eighmy's (1984) regional framework is presented above. For Eighmy's framework, these two constructs comprise a simple hierarchical scheme wherein periods are smaller blocks of time

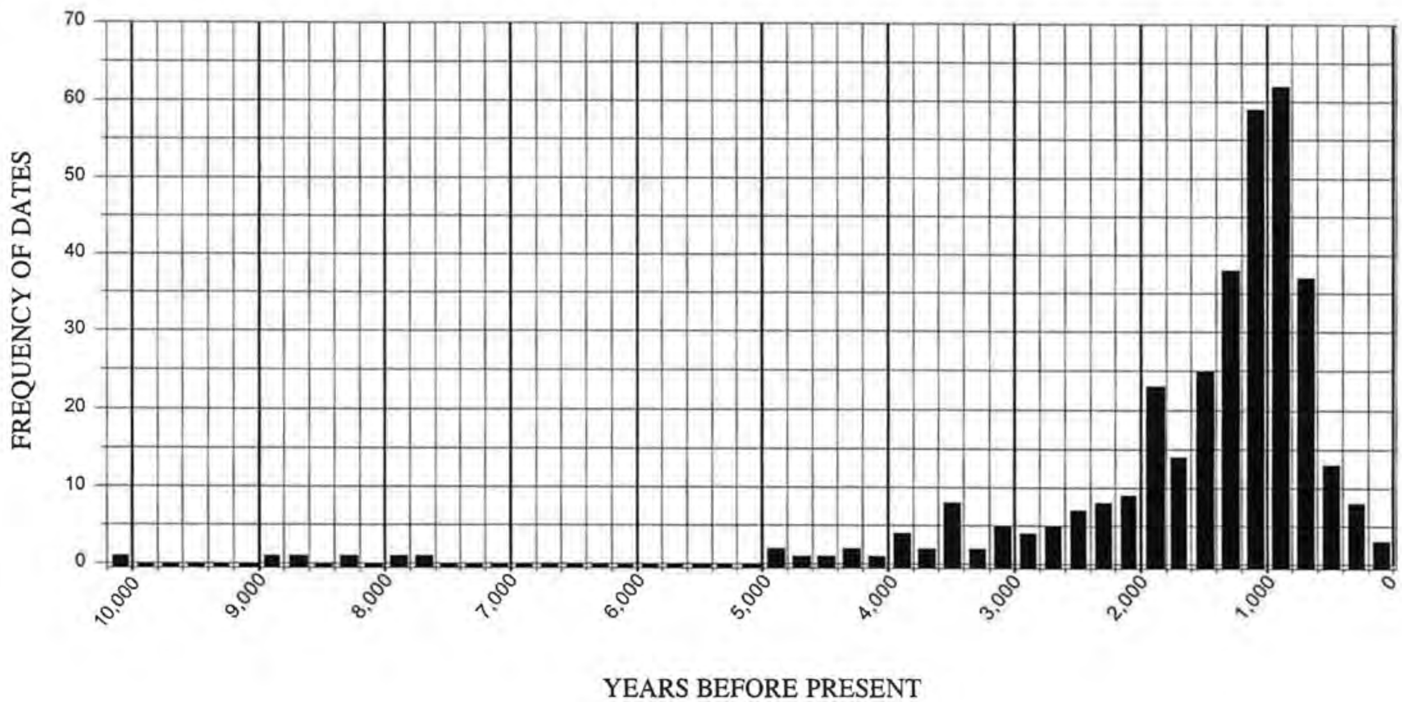


Figure 4-2. Histogram showing distribution of chronometric dates from the context area in 200-year increments (cation-ratio dates excluded).

subsumed under stage headings, which are characterized by larger blocks of time. Realistically, the stage level defined by Eighmy (1984:6) as "a large block of time usually, though not necessarily, characterized by a dominant pattern of economic existence" is not specific enough to allow sorting of the great majority of Arkansas River Basin prehistoric sites. Because of the predominant hunter-gatherer economy, a single stage could reasonably encompass most of the context area's prehistory. Eighmy's (1984:6) period definition, "a unit of time in a given region usually demarcated by identifiable changes in the archaeological record," is similarly vague but much more useful because it is not tied specifically to subsistence strategy. Given the lack of solid excavation information as of 1984, these inherent ambiguities were evidently purposeful so as to accommodate more easily the infusion of new data. Although more systematically collected survey and excavation data are now available, the overall situation remains much the same in that a considerable amount of new information can be expected in the future.

The broad stage/period system of the previous eastern Colorado context is not greatly revised in the current document. However, there are differences with regard to stage and period definitions, and post-Archaic taxa are modified significantly. For most of southeastern Colorado prehistory, the cultural distinctions defining the breaks between stages and between periods are based largely on technological factors rather than dominant economic patterns. The dominant pattern in the context area was unequivocally one of hunter-gatherer subsistence. Although fairly consistent in this basic adaptation, variation in hunter-gatherer settlement and subsistence strategies plays a more prominent role in defining cultural taxa after ca. A.D. 100. However, it is also stressed that excavated sites with radiocarbon and archaeomagnetic ages falling between approximately A.D. 100 and A.D. 1400 far outnumber all other examples (see Figure 4-2 and Appendix A). The relative paucity of dated Paleoindian and Archaic components within the context area necessitates distinctions that are based primarily on associations with extinct megafauna (Paleoindian) and specific projectile point types (Paleoindian and Archaic). Because of the greater quantity of settlement, subsistence, and chronological data, more precise levels of classification can be applied to post-Archaic sites.

For the cultural taxonomy developed here, portions of which are applicable to both the Arkansas and South Platte context areas, temporal elements are initially emphasized in that a period is defined as a specific temporal increment within a stage. Stages encompassing a number of periods are then also chronologically ordered. At a minimum, periods may be distinguished by technological attributes that are subjectively determined to be important temporal markers. For example, Early Archaic sites are separated from Middle Archaic sites on the basis of projectile point morphologies that are shown to occur, preferably by means of absolute dates, within a prescribed temporal range. If possible, nontechnological factors such as a particular subsistence strategy may be associated with a specific period. For example, the presence of faunal remains indicative of mammoth procurement is seen as a prominent element of the Clovis period. Because this taxonomic system is hierarchical, the definition of a stage (as opposed to that of a period) is largely a matter of scale. The distinctions observed between successive periods are subjectively determined to be of such magnitude that a new level of sorting - the stage - is required. As with periods, stages are consistently separated by chronologically demarcated technological trends. At the stage level, however, greater quantities of these technological aspects are involved and/or are believed to carry more interpretive weight. For example, the break between the Archaic and Late Prehistoric stages involves not just a change in projectile point haft element morphology, but rather the introduction of entirely new technologies, specifically ceramics and the bow and arrow. Further, other nontechnological facets of the archaeological record are more likely to play a greater role in defining stages as opposed to periods. The shift from the Paleoindian to the Archaic stage, for example, is distinguished by adaptational shifts to exploitation of a more varied resource base.

For the Arkansas River Basin, levels of taxonomic precision finer than that of the period are currently possible only within the Diversification period of the Late Prehistoric stage. Here the term "phase" is employed to distinguish the Sopris and Apishapa manifestations from one another. Summarizing briefly, although Apishapa phase seems most valid in its placement within the Upper Canark Regional Variant (Lintz 1984), this term also continues to be used interchangeably with focus (Gunnerson 1987), a term derived from the MTS (McKern 1939) by Withers (1954). It is therefore defined very differently from the phase as conceived by Lintz (1984). The phase construct as applied to "Sopris phase" is often used interchangeably with Upper Purgatoire complex (Dick 1963). Although Sopris and Apishapa phase taxa were seemingly conceived in isolation from one another, at least the possibility of a common Developmental period origin for Sopris and Apishapa is acknowledged in the current taxonomy. Phases as used in this document follow Lintz's (1984) definition in that they emphasize only the most prominent spatial/cultural distinctions occurring within a specific period. Apishapa and Sopris phases represent geographically distinct, culturally different manifestations of the Diversification period in the Arkansas River context area. However, they are not grouped within a common Late Prehistoric stage regional variant. Whereas the eastern plains-influenced Apishapa phase has been placed within the Upper Canark Regional Variant, no similar level of classification is currently defined for the Southwestern-influenced Sopris phase. The proposed taxonomy emphasizes that Apishapa and Sopris phases are both Southern Plains manifestations that developed from a common Developmental period origin. Temporal information plays an important role in phase definitions but, in contrast to stages and periods, chronological ordering is de-emphasized among phases since they may or may not be entirely contemporaneous. Rather, a combination of technological, stylistic, physiographic, and settlement-subsistence factors is compared and contrasted in discerning discrete phases. Therefore, more than a minimal measure of excavation data is necessary to delineate adequately the phases within a particular period.

The addition of systematically collected data may in the future be sufficient to warrant the introduction of temporal-cultural elements within each phase. These data may then lead to even finer levels of classification such as, for example, Initial and Late Apishapa subphases.

> Since components of a cultural system do not change at a uniform rate, there is no reason to believe that phases are static throughout their defined existence (Plog 1974). Once general temporal and spatial limits of a phase have been defined, the minor variants in material culture can be examined to determine the kinds and rates of changes within cultural components of the phase. Such studies of intro-phase variability were anticipated by graphically portraying minor temporal and spatial differences for components comprising a phase (Willey and Phillips 1958:Figure 1) and the establishment of a subphase taxonomic unit" [Lintz 1984:40-41].

However, delineation of these finer levels requires an adequate foundation of chronological, settlement, subsistence, and technological data, i.e., subphase definitions should not be attempted on the basis of information gleaned from just a few sites.

Large excavation databases with attendant absolute dates and quantifiable information have only recently begun to be produced in the context area. The cultural taxonomy presented in this document is best regarded as a dynamic scheme that will undoubtedly require future refinement, particularly if large-scale excavations of a wide range of site types are undertaken. Thus, the framework remains reasonably simple and reflects shortcomings in the present prehistoric database. Future modifications of this framework should be based on a variety of interrelated information sets systematically collected from well-dated archaeological contexts.

Chapter 5

PALEOINDIAN STAGE

Christian J. Zier

GENERAL BACKGROUND AND CHRONOLOGY

The Paleoindian stage is comprised of four periods of which the earliest, Pre-Clovis, is largely hypothetical and has no established beginning date. Thus, the Paleoindian stage is essentially open-ended chronologically. The four periods and associated age ranges are:

Pre-Clovis period	> 11,500 B.P.
Clovis period	11,500 B.P. - 10,950 B.P.
Folsom period	10,950 B.P. - 10,250 B.P.
Plano period	10,250 B.P. - 7,800 B.P.

In the Arkansas River Basin, the Paleoindian stage is very poorly manifested from an archaeological standpoint. Just two buried components, at the Olsen-Chubbuck site (plains) and the Runberg site (mountains), have been comprehensively studied through excavation. Most localities consist of isolated projectile points from surface contexts. Accordingly, the discussions that follow are generalized and involve extrapolation from adjacent regions, some of which, such as the South Platte River basin of northeastern Colorado, are blessed with abundant Paleoindian sites. Paleoindian radiocarbon dates from the context area are itemized in Appendix A; known sites of Paleoindian age are depicted in Figure 5-1.

Paleoindian time-lines have been, and continue to be, difficult to define because of the finite number of radiometrically dated sites from all periods. In this document, the four periods within the Paleoindian stage are represented as being chronologically contiguous because archaeologists assume occupational continuity. In fact, the radiocarbon database does not fully support such continuity, and within the Clovis and Folsom periods radiocarbon dates tend to cluster within fairly narrow ranges.

The subject of Pre-Clovis occupation of the western hemisphere has long been a controversial one. Radiocarbon-dated sites exceeding 12,000 years in age, and in some cases 20,000 years, are scattered throughout North and South America (Shutler 1983). Some archaeologists strongly support an early entrance of man into the New World from Asia, with "early" being defined as prior to the end of the last Wisconsin glaciation, ca. 12,000 B.P. (Martin et al. 1985; Shutler 1985). Others, for example Waters (1985), note that so-called early sites consistently have attendant problems with dating such as disturbed or nebulous sample contexts, or sample contamination, or exhibit "artifacts" of questionable human association. Dennis Stanford (1991; see also Stanford 1983) has observed that despite the "tantalizing" evidence from a number of sites, pre-Clovis occupation of the New World - at least south of the Wisconsin ice sheets - is not a certainty, and that in fact there is little solid evidence predating 12,000 B.P. Among archaeologists there has been a palpable shift in opinion in the last few years toward acceptance of the notion of an earlier, pre-Clovis human presence in the Americas, although there is little consensus as to the timing and underlying mechanisms of early colonization. Widely circulated information about the carefully excavated and radiocarbon dated sites of Monte Verde, Chile (ca. 12,500 B.P. [Dillehay 1997; Meltzer et al. 1997]) and Meadowcroft Rockshelter, Pennsylvania (to ca. 14,500 B.P. and possibly earlier [Adovasio et al. 1985; Adovasio et al. 1990]) have had much to do with this change in attitudes.

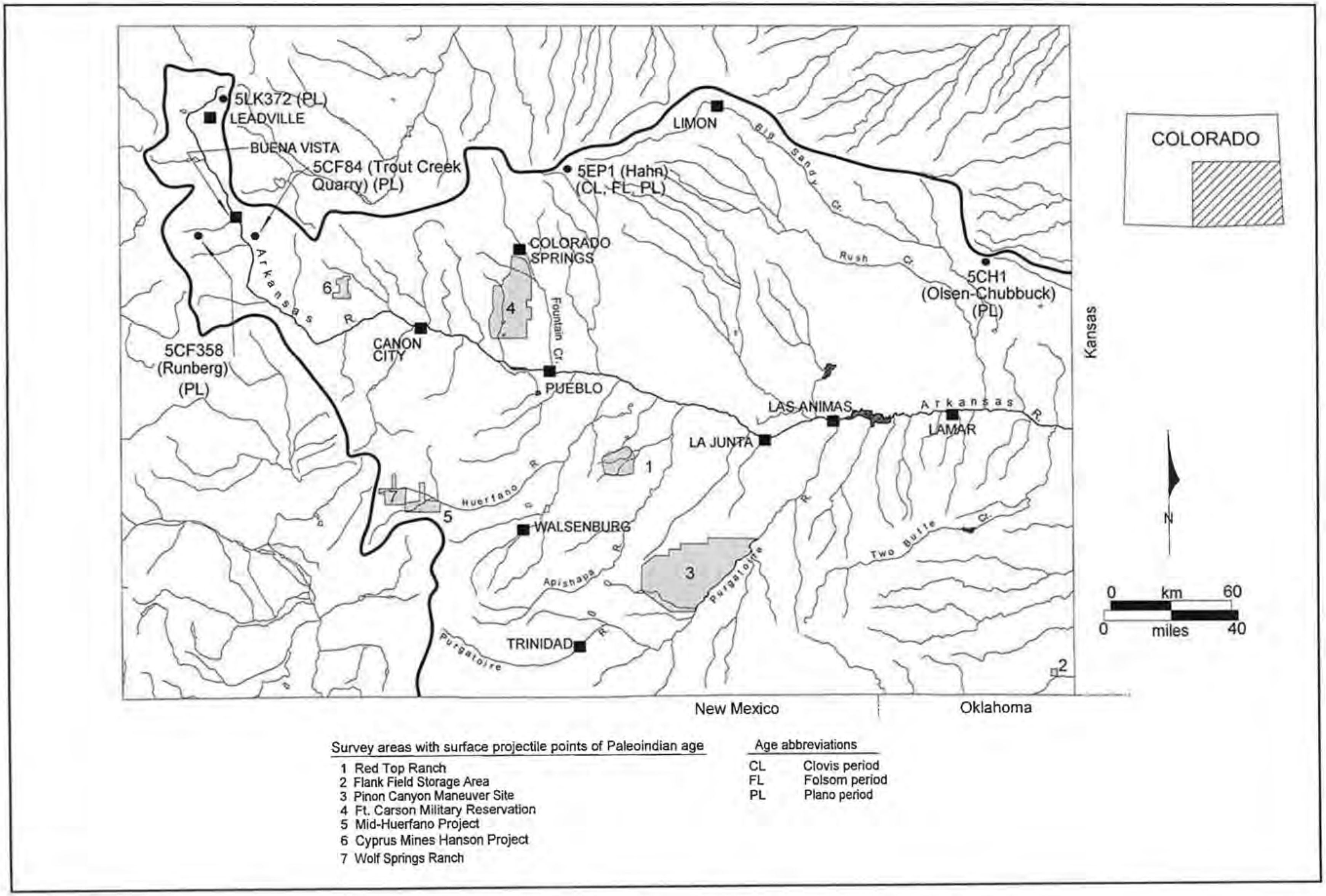


Figure 5-1. Map of Arkansas River context area showing locations of Paleoindian sites.

The Dutton, Selby, and Lamb Spring sites in eastern Colorado are routinely noted as having possibly pre-Clovis occupational evidence. All are within the South Platte River drainage basin. At the Dutton and Selby sites, in lacustrine deposits estimated to date ca. 12,000-17,000 B.P., possibly butchered bones of several mammal species including mammoth and bison were found. Dutton produced a few, small, heat-treated flakes from the lacustrine stratum; at Selby, a date of 11,710 B.P. was obtained from a horizon containing Clovis materials that overlay the lacustrine stratum. At Lamb Spring, an extensive mammoth bone bed, representing as many as 24 individuals, was found underlying a Cody (Paleoindian) level. The bone-bearing stratum was dated at 13,140 B.P. Five flaked stone items, of which only one is positively artifactual, were recovered in association with the bone bed. There is, however, evidence of possible butchering as well as production of bone flakes from mammoth bone cores (Rancier et al. 1982; Stanford 1979, 1980, 1983; Stanford et al. 1981). In an article summarizing the evidence from these and several other sites outside of the region, Stanford (1983) states that none of the sites meets criteria that would unequivocally place them in pre-Clovis times, i.e., clearly defined stratigraphy, reliable radiometric dates, supporting interdisciplinary data, and the occurrence of artifacts of definite human association.

Firmly dated Clovis components fall within a narrow temporal range. Haynes (1991), in a reevaluation of chronometric data from a series of Clovis sites, concluded that Clovis occupation falls into a ca. 300-year span between 11,200 and 10,900 B.P. (see also Stanford 1991:2). To account for occasional earlier dates and associated sigma ranges, for example from the Colby site in Wyoming (Frison 1991:25), a somewhat broader range is offered here that extends the Clovis period back to 11,500 B.P. The Folsom period exhibits a narrow date range as well. Newly acquired dates from the Folsom site in northeastern New Mexico, considered in the context of a general reassessment of Folsom chronometric dates, lead Haynes et al. (1992) to conclude that Folsom components fall within the 700-year span from 10,950 B.P. to 10,250 B.P. Haynes et al. (1992:96) observe that within the one-sigma range, the latest Clovis dates overlap the earliest Folsom dates by about a century, a fact that they find consistent with stratigraphic evidence indicating that Folsom immediately supersedes Clovis. A temporal boundary between Clovis and Folsom of 10,950 B.P. is employed here.

The Plano period is comprised archaeologically of numerous projectile point traditions which in some instances overlap in time and space. The better known traditions occur on the Northern and Central Plains and in adjacent mountains areas and consist of, in rough chronological order, Agate Basin (ca. +10,000-9600 B.P.), Hell Gap (10, 250-9500 B.P.), Alberta (9500-9000 B.P.), Cody (9300-8700 B.P.), Frederick (8400-8000), and Prior Stemmed and Lovell Constricted (8500-7800 B.P.) (Frison 1991:26-79; Gleichman and Gleichman 1989:21-34). It is these traditions (often regarded as representative of cultural complexes; Frison 1991) that provide much of the basis for dating of the Plano period.

On the Southern Plains and the Central/Southern Plains margin, which generally defines the context area east of the mountain front, a somewhat distinct series of projectile point traditions may be identified with Plano occupation. The dates for these traditions fall within the chronological boundaries of the Plano period as designated for the Central/Northern plains. However, owing to the relative scarcity of excavated sites in the region, the full temporal range of the period is not represented by actual radiometric dates. Projectile points of the southern traditions generally differ from those of the northern traditions in that they are leaf shaped and rarely stemmed. These complexes, in rough chronological order, are Plainview (ca. 10,250-9800 B.P., or later), Firstview (ca. 10,150-8500 B.P.), and Kersey (ca. 9,000 B.P., temporal range uncertain) (Gleichman and Gleichman 1989:25-27; Johnson and Holliday 1980; Wheat 1972, 1979). The Southern Plains region known as the Llano Estacado, which encompasses the western Texas panhandle and an adjacent strip of eastern New Mexico, boasts numerous Paleoindian sites.

Where Plano cultural components are stratigraphically superimposed on the Llano Estacado, as at the Lubbock Lake site in Texas, Plainview underlies Firstview (Johnson and Holliday 1980:102). On the Llano Estacado generally, radiometrically dated Plano sites suggest an occupational range of ca. 10,000-8300 B.P. (Johnson and Holliday 1981; see also Holliday et al. 1983, 1985).

Black (1991) has defined the Mountain tradition for the Southern Rocky Mountains and adjacent upland regions extending northward into Montana. He views this tradition as a distinct adaptation to upland terrain including that portion of the Arkansas River Basin west of the mountain front. According to Black, the Mountain tradition begins around 9500/9000 B.P., or the middle portion of the Plano period, and for the Southern Rockies extends forward in time to as late as 700 B.P. Its origins are thought to lie in the Great Basin, and little or no connection with plains "big game hunters" is seen. Black views even the earliest expressions of the Mountain tradition in the Colorado Rockies as Archaic rather than Paleoindian, based on a generalized form of economic adaptation. The multicomponent Runberg site near Buena Vista includes a sparse Paleoindian component with projectile point evidence suggesting plains influence or contact and an age of ca. 10,000-9500 B.P. (Black 1986). Overlying materials dating between 8840 and 7740 B.P. are regarded as Early Archaic by Black (1986:91-108) but are here included in the Plano period on simple chronological grounds.

PRE-CLOVIS PERIOD

Database of the Context Area

No identifiable sites of Pre-Clovis age exist in southeastern Colorado, and in fact just three possible localities, Dutton, Selby, and Lamb Spring, are known from anywhere in the state (see above). All are in the South Platte River basin of northeastern Colorado.

Population Dynamics

The study of population dynamics in Pre-Clovis times is conducted on a largely theoretical level, a fact that is not surprising when one considers that human presence in the New World prior to ca. 11,500/12,000 B.P. is widely debated. It is generally assumed that if people did enter North America prior to the final two millennia of the Pleistocene, it was via the Bering Land Bridge from western Siberia, which was created by a dramatic lowering of sea level. Fladmark (1983) has observed that paleoenvironmental conditions allowing a land bridge entry from Asia existed by ca. 60,000 B.P. A hypothesized "Ice Free Corridor" (also known as the McKenzie Corridor) along the eastern flank of the Canadian Rocky Mountains, between the Cordilleran and Laurentide glacial masses, may have functioned as an avenue for southern expansion; southward spread along the western coast of Alaska and Canada is also possible (Burns 1990; Fladmark 1979; Shutler 1985:123-124). At present there is little archaeological evidence of early human use of the interior corridor, but as Stanford (1991:9) states, any sites would have been obliterated by later glacial advances. It has been pointed out by Shutler (1985:123) that if people were indeed in South America by 15,000 B.P. or earlier, the date of initial entry into the New World must have been early; or, at the very least, expansion beyond the southern limit of the Wisconsin ice sheets must have proceeded rather efficiently. However, little can be said of the timing and geographical associations of human expansion throughout the New World, or of the mechanisms that drove such migrations. There is no evidence whatsoever of when humans may have first entered the Arkansas River context area.

Technology

A recurring attribute of numerous supposed Pre-Clovis sites throughout the Americas is the possible evidence of bone tool manufacture and use (e.g., Morlan 1983:54-58). The authenticity of bone tools that are not significantly modified or highly patterned is difficult to establish, and bone flakes that might result from intentional breakage and subsequent modification are especially hard to identify. At all three of the possible Pre-Clovis sites in northeastern Colorado (Dutton, Selby, Lamb Spring) there are indications of intentional bone breakage, including possible production of bone cores and flakes (Stanford 1983:67). Stanford (1991:9) notes possibly widespread evidence for Pre-Clovis lanceolate bifaces at sites that may be as old as 14,000 B.P. However, it is the general absence of recognizable or diagnostic lithic artifacts that tends to characterize sites of Pre-Clovis age (Eighmy 1984:31-35) and supports the lingering skepticism about the validity of this period.

Settlement and Subsistence Strategies

Given the limited database for the Pre-Clovis period, economic patterns are best hypothesized on the basis of paleoenvironmental data. North America during the late Pleistocene has been described as a complex "mosaic" of open tundra, steppes, grasslands, savannas, and woodland/forests, with melting glacial waters creating conditions of high ground water and abundant pluvial lakes throughout the countryside (Stanford 1991:6). In the two or three millennia leading up to the Clovis period precipitation levels in North America may have been 25 percent higher than those of the present, and the landscape was probably dominated by megafauna (Brunswig 1992:5-6). Stanford (1991:9) believes that late Pre-Clovis sites in the American West, reflecting exploitation of a pluvial lakes/marsh ecosystem, would have been established on high ground in geomorphic contexts not conducive to burial. Such sites may yet exist, but would have been reoccupied during the Holocene with attendant mixing of artifact assemblages. The potential for big game hunting in the continental setting described by Stanford cannot be overemphasized, and seems to be underscored by the faunal assemblages from the Dutton, Selby, and Lamb Spring sites in northeastern Colorado (mammoth, bison, horse, camelops, peccary, sloth, as well as canid and other smaller animals) (Fisher 1992; Stanford 1983:67). Prior to ca. 14,000 B.P., when fully glacial conditions prevailed, human-environmental relationships are more difficult to reconstruct, but can also be assumed to have involved exploitation of large game. Regardless of its time depth, for the Pre-Clovis period generally it may be postulated that human systems were characterized by a band level of organization and a high degree of residential mobility.

Directions for Future Research

Chronology

The Pre-Clovis period is poorly defined throughout North America. The most basic avenues of research–those related to archaeological identification and dating of the period–are appropriate. Progress within this theme will require the application of radiometric dating to clearly definable, unmixed cultural assemblages at specific sites as well as cross dating based on geomorphic context.

- Is there datable evidence of humans in the context area prior to 11,500 B.P.?
- If evidence of pre-11,500 B.P. occupation exists, does it suggest distinctly earlier habitation than Clovis or simply a "pushing back" of the established temporal boundaries of the Clovis period?

- Can sites lacking temporally diagnostic artifacts and radiometrically datable materials be placed in early temporal contexts based on associations with broad geomorphic events?

Population Dynamics

As is the case with the chronology theme, research questions within the realm of population dynamics are basic in nature because of the dearth of Pre-Clovis evidence in the Arkansas River Basin. An understanding of settlement systems, population dynamics, and economies is dependent upon basic site identification, which in turn is heavily dependent upon geomorphology and site dating.

- If humans were present prior to Clovis times, in what manner did they enter the southeastern Colorado area?
- Is there evidence of multiple events of human entry into the area, or is Pre-Clovis occupation manifested as a continuum of development growing out of a single episode of emigration?
- Based on site characteristics, can general cultural or economic associations be established between Pre-Clovis sites in the context area and those elsewhere in North America?

Technology

A vexing problem with interpreting Pre-Clovis occupation throughout North America is the lack of stylistically or temporally diagnostic artifact industries. Thus, a primary objective of early man research in the context area and elsewhere is identification of the range of artifacts associated with early human occupation as well as stylistic hallmarks that can be used to "fingerprint" such sites if other indicators are absent. The apparent absence of lithic projectile points of Pre-Clovis age suggests that other tool forms may be more informative in this regard.

- Is there a lanceolate biface industry that can be associated with Pre-Clovis sites, and if so are the artifacts morphologically distinct from bifaces dating to later time periods?
- Are there other lithic artifact forms, such as microblades, that can be associated with probable Pre-Clovis assemblages elsewhere in North America?
- If stylistically distinct lithic tools do not occur on Pre-Clovis sites, can whole assemblages be identified with unique combinations artifact types?
- What does the Pre-Clovis bone tool industry consist of, and are there temporally diagnostic bone tool forms or assemblage combinations?
- Is there a Pre-Clovis ground stone industry, and if so what attributes define it?
- What patterns of lithic material procurement are apparent, and what do these patterns reveal about regional movement and/or trade?

Settlement and Subsistence Strategies

The range of site types associated with the Pre-Clovis period is yet to be described. The few possible Pre-Clovis sites in Colorado - none of which is located in the Arkansas River context area - are associated with butchered (or possibly butchered) bone, suggesting kill and/or processing activities. The occurrence of mammoth and bison bone at these sites would seem to indicate a Paleoindian-like economy based on exploitation of megafaunal species. However, paleoclimatic data suggest that the megafauna associated with Paleoindian occupation of western North America did not achieve prominence until the terminal stages of the Pleistocene, and therefore may not have served as a primary food source for humans in the more distant past. Little is known of the Pre-Clovis economy, or of the archaeological expressions of subsistence practices. Although the locations of the possibly Pre-Clovis sites in plains settings are suggestive of exploitation of a specific type of environment, their limited numbers could mean that they are far from representative in terms of either setting or function.

- What is the full descriptive and functional range of Pre-Clovis site types?
- What is the range of ecological settings favored by Pre-Clovis peoples; are the possibly Pre-Clovis sites of the Colorado plains typical in terms of location, or do they represent one element of a more widespread settlement system?
- What was the economic basis of Pre-Clovis adaptation prior to the terminal Pleistocene; in particular, were adaptational strategies geared toward lacustrine and/or riverine environments that presumably dominated the Pleistocene landscape?
- How does the Pre-Clovis economy of the context area compare and contrast with that evident over the remainder of North America, and can Pre-Clovis origins be hypothesized on the basis of similarities with other areas?

Geomorphology and Paleoclimates

If humans were indeed established in western North America prior to the Clovis period, the paucity of known, positively identifiable sites is attributable in large part to geomorphic factors such as systematic burial or erosional destruction of old surfaces. Elucidation of geomorphic processes, and the climatic conditions that governed those processes, is thus an essential initial step in locating and describing the distribution of Pre-Clovis sites. Paleoenvironmental data are critical not only in the manner in which they relate to geomorphology, but also in providing a basis for an understanding of the Pre-Clovis economy. The types of investigations that may be brought to bear on problems of geomorphology and paleoclimate are varied and include analysis of landscape evolution (particularly alluvial geomorphology and sand dune formation and activation/dormancy cycles), long-range climatic studies including climatic modeling, study of fossil soils and soil development processes, radiometric dating, palynology, faunal analysis including fossil insect studies, macrobotanical analysis, and gastropod analysis.

- What climatic conditions prevailed between 30,000 B.P. and the beginning of the Clovis period at 11,500 B.P., and what major changes occurred during that time?
- What are the paleoclimatic implications for human economic practices?
- What were the predominant geomorphic processes affecting landscape development in the context area during this time span?

- Are Pleistocene terrains identifiable that may harbor Pre-Clovis sites, and would sites associated with these terrains be buried or on the surface?

- If intact Pleistocene terrains are present, how would soil-forming processes and more general geomorphic processes have affected internal site structure?

- Can buried soils of Pre-Clovis age be identified and dated on a regional scale?

CLOVIS PERIOD

Database of the Context Area

Clovis materials are rare in southeastern Colorado. A single surface site, the Hahn site (5EP1) in northern El Paso County, has been recorded (see Figure 5-1). It is situated in the upper headwaters of Big Sandy Creek on the Palmer Divide, along a gravel ridge near natural springs. Artifacts from the site are in a private collection (Greiser 1985:57-58). Campbell (1969a:360-362) reported a Clovis projectile point on an unexcavated surface site, 5LA756, in northeastern Las Animas County. This site is located in an open, unwatered plain on the east side of Smith Canyon. Areas of southeastern Colorado that have been subjected to large block surveys, for example the PCMS, Fort Carson, and John Martin Reservoir, have not yielded Clovis evidence (Eddy et al. 1982; Lintz and Anderson 1989; Zier et al. 1997). However, occasional Clovis projectile points appear in private collections around the region and have been reported specifically from near Aguilar (between Walsenburg and Trinidad) and west of Fort Carson. Anderson (1989b:13) also notes that Clovis points have been found in Black Mesa State Park in the Oklahoma panhandle, a short distance from the Colorado/Oklahoma border in the valley of the Cimarron River, and in several locations in western Kansas (see also Yaple 1968; Saunders 1978). North of the context area in northeastern Colorado, several Clovis sites are clustered near the South Platte River in the Greeley-Kersey-Fort Morgan vicinity. All are associated directly with, or are situated very close to, the Late Pleistocene Kersey terrace of the South Platte (see summaries in Cassells 1997:58-69 and Jepson et al. 1994:14-16, 24-28; Zier et al. 1993). South of the context area, important Clovis components are present at Blackwater Draw (the Clovis "type site") in eastern New Mexico adjacent to the border with Texas, and at Domebo in southwestern Oklahoma (Hester 1972; Leonhardy 1966).

Population Dynamics

Much has been hypothesized about Clovis origins, and most theories inevitably deal with the issue of Pre-Clovis occupation (above; see Bonnichsen and Turnmire 1991). Once established, the Clovis projectile point tradition evidently became widespread in a relatively short time: Clovis artifacts have been reported from all 49 states in the continental U.S., and from Canada, Mexico, and Central America. Once assumed to have spread generally from north to south, the tradition is now believed by some to have originated in the southeastern quarter of North America and from there spread outward (e.g., Bryan 1991:22). The degree to which the spread of such a tradition–regardless of origin point and direction of movement–is truly an issue of population dynamics is debatable, since the transference of a technological style from one region to another may have little to do with population movement. The ubiquity of Clovis projectile points does, however, suggest at the very least that the North American continent was broadly (if thinly) occupied by humans by terminal Pleistocene times, and that interregional contact occurred.

Technology

The archaeological hallmark of the Clovis period is the Clovis projectile point, a large (up to 15 cm [6 inches] in length) lanceolate dart point with bifacial fluting near the proximal end. Bases and proximal edges are usually ground. Clovis-period sites not uncommonly exhibit projectile points but few other artifacts, likely reflecting a bias in the archaeological record toward kill sites and, occasionally, remains of mammoths carrying spear points from nonfatal wounds (Frison and Todd 1986; Zier et al. 1993). In fact, Clovis lithic artifact assemblages are fundamentally diverse and geographically varied. Campsites (as opposed to kill sites) may exhibit projectile points; bifacial, unifacial, and flake tools suited to cutting, scraping, and other tasks; gravers; blades and blade cores; and debitage. Clovis tools are most apt to be bifaces or are manufactured from flakes produced in the course of biface reduction. Lithic materials nearly always consist of high-quality, fine-grained silicates often obtained from distant sources. Large bifaces, flakes, and blades were manufactured at quarry locations and curated until needed. Heat treatment of lithic materials was sometimes practiced. The Clovis projectile point was a truly multifunctional tool, consistently exhibiting evidence of reworking and of nonprojectile use (Bradley 1991:369-373; Frison 1991:39-44; Goebel et al. 1991:67-70; Johnson 1991:226-227; Stanford 1991:2).

Lithic artifact caches dating to the Clovis period are common and widespread. They usually consist of projectile points but may also include bifaces and other tool forms (Frison 1991:39-44). One such site, the Drake Clovis Cache, is located in northeastern Colorado (Stanford and Jodry 1988). Ground stone has been recovered from Clovis sites but only rarely. Although not common, bone and ivory tools do occur at some sites and include such items as cylindrical ivory and bone dart foreshafts, bone shaft wrenches, and ivory and bone projectile points (Saunders et al. 1990; Stanford 1991:3-5). Carlson (1983:75) observes that evidence of atlatl use (for example, atlatl hooks) is generally lacking in the Clovis period.

Settlement and Subsistence Strategies

Site Types and Locational Variability

A direct consequence of the dramatic environmental change during the Clovis period was the concentrating of animals and humans around water sources. Clovis sites are consistently situated near water, particularly in the plains of Colorado and adjacent areas, for example playa lakes and Pleistocene-outwash stream terraces (Stanford 1991:6-7). Site types include kill and/or butchering localities, and less commonly, campsites. Isolated occurrences of Clovis artifacts are widespread. Almost without exception, Clovis period sites are suggestive of temporary settlement by small groups of people (Stanford 1991:5). Thus, as with the Pre-Clovis period, Clovis-age societies are believed to have been developed at the band level with little presumption of any higher degree of organization. Mobility would again have been an integral part of the settlement system.

Economy

The perception that Clovis-period survival was contingent on the successful hunting of mammoths stems from early and sometimes dramatic discoveries of sites exhibiting elephant bone in direct association with Clovis points (for example, Dent in Colorado, Blackwater Draw in New Mexico; see also Colby in Wyoming [Frison and Todd 1986; Hester 1972; Wormington 1957:43-45]). A growing body of evidence suggests that Clovis hunters were generalists who probably exercised a preference for large game but frequently exploited smaller animals as well. Clovis sites have yielded, in addition to mammoth, the remains of horse, camel, peccary, sloth, bison

(Bison antiquus), caribou, and wolf, (all extinct or largely extirpated from late Pleistocene and early Holocene ranges), and deer, bear, pronghorn, rabbit, marmot and other rodents, turtle, fish, bird, and mollusk (Bryan 1991:23; Hester 1972; Stanford 1991:5-6; Willig 1991:105). Evidence has accumulated as well from many areas of North America to suggest that the Clovis diet commonly included collected plants. In the eastern U.S. these wild vegetal foods included grape, hawthorn, plum blackberry, and hackberry, and in the far western U.S., a wide range of edible plants associated with lake and marsh habitats (Willig 1991:105, 109-110). Clovis sites of the continental interior display an apparent economic orientation toward large game procurement (e.g., Johnson 1991:230) but may reflect a bias in which kill and processing localities are more readily identifiable archaeologically.

Directions for Future Research

Chronology

Clovis evidence is widespread throughout western North America but strictly limited in the upper Arkansas River Basin. Important sites occur both north and south of the basin in Colorado and New Mexico, and thus, though the chronometric basis for occupation during this period has not been established, the context area was almost certainly inhabited during Clovis times. Establishing a Clovis database will require application of geomorphic study in combination with both direct radiometric dating and cross dating using known projectile point styles and possibly diagnostic tool kits.

- What is the chronological range of Clovis occupation of the context area?
- How do radiometric dates on Clovis materials compare with the narrow, ca. 700-year range that spans most dated Clovis sites elsewhere?
- Can distinctive combinations of lithic and/or bone tool attributes (tool kits) be described at dated Clovis sites that would facilitate identification of Clovis sites for which no radiometric or projectile point data are available?
- Can Clovis sites lacking chronological indicators be placed in a temporal context based on associations with broad geomorphic events?

Population Dynamics

Given the limited Clovis database, the topic of population dynamics is difficult to approach in the context area without resorting to extrapolation from adjoining regions. As is the case with the Pre-Clovis period, comprehension of settlement, population dynamics, and general adaptations must await discovery and identification of sites, a process in turn dependent upon geomorphic study and dating.

- Is Clovis occupation of the context area suggestive of development from an indigenous population base, or movement into the area from elsewhere at some point during the Clovis period?
- Do radiometric dates from Clovis sites in the context area, when compared to those from adjoining regions, suggest a geographical sequence of occupation that could indicate migrations or other significant movements of people?

- Do lithic material types indicate regional interaction such as is apparent elsewhere at Clovis sites in western North America, or is the Clovis occupation of the context area more localized in nature?

- Based on site characteristics, can general cultural or economic associations be established between Clovis sites in the context area and those elsewhere in western North America?

Technology

Clovis artifact assemblages have been described from a number of sites throughout the western U.S. although sites typically produce only limited artifacts inventories, often heavily skewed in favor of patterned tools, particularly projectile points. This phenomenon is especially apparent at Colorado Clovis sites. From a regional standpoint, Clovis lithic and bone industries are poorly understood and thus are demanding of the most basic description and technological interpretation. Characterization of Clovis industries will facilitate site recognition in cases where diagnostic artifacts are absent, but more importantly will promote an understanding of subsistence activities and general adaptational strategies.

- What is the morphological and functional range of lithic tools, and can tool kits be identified that would aid in recognition of Clovis sites for which projectile point and radiometric data are unavailable?

- Do Clovis lithic assemblages reflect intersite consistency, or are geographical and/or functional differences apparent within the context area?

- What is the prevailing mode of lithic reduction?

- Where and in what manner were raw lithic materials quarried; do site assemblages reflect consistent use of high-quality lithic materials, and are exotic materials common?

- What do patterns of lithic procurement suggest about regional movement and/or trade?

- How do Clovis lithic procurement and techniques of manufacture, as evidenced within the context area, compare and contrast with data from the western U.S.?

- Do significant differences exist between lithic assemblages in the plains/foothills portion of the context area and the higher mountains, and can fundamental cultural differences be inferred on this basis?

- What is the nature of the Clovis ground stone industry; does ground stone frequency in comparison with other artifact classes suggest economic emphasis on certain types of resources at the expense of others?

- What is the nature of the bone tool industry (including ivory), and are there diagnostic forms that may aid in Clovis site recognition?

- Are bone tools suggestive of an in-place industry that might have Pre-Clovis antecedents, or are they expedient in nature?

Settlement and Subsistence Strategies

Because the Clovis period in southeastern Colorado is manifested as a near-total gap in the archaeological record, virtually nothing is known of settlement patterns and economic strategies except by inference from examination of sites outside the area. Traditional views of Clovis subsistence and settlement emphasize mammoth hunting and occupation and use of moist environmental niches, but there is little information from the context area to support such notions. Site recognition is therefore of paramount importance in developing an understanding of Clovis occupation of the area. If sites cannot be identified, explanations may be either geomorphological or behavioral in nature.

- What is the full descriptive and functional range of Clovis site types?
- What is the range of ecological settings favored by Clovis peoples, and how do Clovis site locations compare with those of Clovis sites in the western U.S. and, in particular, the South Platte River basin of northeastern Colorado?
- How do Clovis site settings and general settlement patterns in the plains and foothills compare with those of the higher mountains, and do these sites suggest a single, integrated economic system or separate cultural groups?
- What was the economic basis of Clovis adaptation, and were adaptational strategies oriented toward lacustrine and/or riverine environments as suggested elsewhere in the region?
- How does the Clovis economy of the context area compare and contrast with that evident over the remainder of the western U.S.; is there a strong orientation toward exploitation of megafauna or is the economic system more generalized?

Geomorphology and Paleoclimates

Because Clovis occupation is clearly indicated in the archaeological record of northeastern Colorado and elsewhere, and suggested by scattered evidence such as surface projectile points in southeastern Colorado, it is clear that the general region was occupied during this period. As noted above, prehistoric behavior may provide an explanation for the paucity of evidence within the context area. In consideration of the evidence from outside the area, however, the explanation is more apt to lie in the realm of geomorphology. As was the case with the Pre-Clovis period, delineation of geomorphic processes and the prevailing paleoclimates that conditioned those processes is essential to an understanding of Clovis site preservation and distribution. Paleoclimatic interpretation is also critical to understanding the Clovis economy. The types of investigations that may profitably contribute to the study of geomorphology and paleoclimates are identical to those identified for the Pre-Clovis period, and the research questions that may be posed are likewise similar.

- What climatic conditions prevailed during the Clovis period in the context area, and did significant differences exist between the Arkansas and South Platte drainage basins that might result in a behavioral/adaptational explanation for the high occurrence of Clovis sites in the former and near-total absence in the latter?
- What are the paleoclimatic implications for human economic practices?

- What were the predominant geomorphic processes affecting landscape development in the context area during the Clovis period?

- Are terminal Pleistocene-early Holocene terrains identifiable that may harbor Clovis sites, and would sites associated with these terrains be buried or on the surface?

- Does the potential exist in the valley of the Arkansas River east of the mountain front for late Pleistocene-early Holocene stream terrace occupation and site preservation, such as is evident in the Kersey terrace of the South Platte drainage?

- Are there fundamental geomorphic/preservation differences between the Arkansas and South Platte basins that might account for the disparity in Clovis site numbers?

- If intact terrains of Clovis age are present, how would soil-forming processes and more general geomorphic processes have affected internal site structure?

- Can buried soils of Clovis age be identified and dated on a regional scale?

FOLSOM PERIOD

Database of the Context Area

Folsom period materials are only slightly more common in southeastern Colorado than are those of Clovis age. The only recorded sites of possible Folsom age are 5LA57 and 5LA986, both surface lithic scatters occupying open grassland settings in the Mesa de Maya vicinity of Las Animas County, and the Hahn site (5EP1) in northern El Paso County (see Figure 5-1). Folsom projectile points at the two Las Animas County sites may not be in primary context, as indicated by the presence of more recent artifacts (Campbell 1969a:360-363). The Hahn site was noted previously as having a Clovis-period component as well (Greiser 1985:65). Campbell (1969a:363) cites "frequent reports" of "Lindenmeier" (presumably Folsom) materials exposed in blowouts along the eastern margin of the Chaquaqua Plateau in extreme southeastern Colorado. A Folsom point was apparently collected from the surface at an extensive multicomponent quarry site (5CF84) on Trout Creek Pass northeast of Buena Vista in Chaffee County (Chambellan et al. 1984:58). Cassell (1940; cited in Campbell 1969a:363) also reported Folsom materials from Raton Mesa, which roughly straddles the Colorado/New Mexico border east of Raton, New Mexico. As noted in Anderson (1989b:13), isolated Folsom points have been identified in the course of archaeological surveys at several locations scattered around the context area including Red Top Ranch between Walsenburg and La Junta, the Flank Field storage area in southeastern Baca County, and in the vicinity of Canon City (Anderson 1976; Kranzush et al. 1979; Wood et al. 1981). Folsom artifacts are also reported from the valley of the Cimarron River in southwestern Kansas (Yaple 1968).

Folsom sites are relatively plentiful in regions adjacent to the Arkansas River context area. In the Cache la Poudre-South Platte drainage basin to the north are the Lindenmeier, Fowler-Parrish, Powars, and Johnson sites (Agogino and Parrish 1971; Galloway and Agogino 1961; Wormington 1957:31-40); in the San Luis Valley to the west are Stewart's Cattle Guard, Zapata, and Linger sites (Dawson and Stanford 1975; Jodry and Stanford 1992; Wormington 1957); and immediately to the south in the Cimarron River basin is the Folsom site itself (Wormington 1957:23-24). The Folsom and Lindenmeier sites are of particular significance. The Folsom site lies about 16 km (10 mi) from the southern border of Colorado in Colfax County, New Mexico, a short distance west of the small town of the same name. The discovery and excavation of the site in the 1920s firmly established the considerable antiquity of humans in North America. Portions of approximately 25 bison (*Bison antiquus*) exhibiting evidence of butchering were excavated, as were 19 partial or complete projectile points (Anderson 1975; Figgins 1927; Haynes et al. 1992; Wormington 1957). Also an early (1920s) discovery, the Lindenmeier site north of Fort Collins, Colorado retains its importance in Paleoindian studies as an extensively excavated Folsom period campsite. The site also exhibits evidence of at least one bison kill and butchering event (Haynes et al. 1992; Wilmsen and Roberts 1978).

Population Dynamics

As described in the following subsection, Folsom projectile points are believed to be contemporaneous with Midland points on the Central and Southern Plains, to the extent that they almost certainly represent morphological variation within a single technological complex. Thus, a consideration of the distribution of Folsom period sites must include localities identified as "Midland." Folsom sites occur within a broad geographical range but one that is regional rather than continental in scale. Folsom is largely a Great Plains phenomenon, and Folsom sites and isolated projectile points have been found from Alberta in Canada southward to southern Texas. The Central and Southern Rocky Mountains, from Montana south into New Mexico, are also within the Folsom range (Davis and Greiser 1992:226-227; Gleichman and Gleichman 1989:14; Greiser 1985:62-66; Hofman 1992; Ingbar 1992:169-172). Folsom-age Paleoindian complexes that do not feature the distinctive characteristics of Folsom are widespread throughout the Americas, perhaps indicating a trend toward regionalization of styles in post-Clovis times.

Temporal continuity between Clovis- and Folsom-period radiocarbon dates suggests that Folsom developed directly from a Clovis population base. Based on the significantly greater number of Folsom-age sites in comparison to Clovis in the plains-mountains region, it has been suggested that population increased during the Folsom period (Cassells 1997:77). However, a good deal of additional research will be required to confirm or disprove this notion. Archaeological evidence is also suggestive of a greater physiographic distribution of human populations than before, with sites situated in settings ranging from basins and plains to high mountains (Cassells 1997:70-78). As was also the case with Clovis, a high degree of mobility and/or interregional interaction is indicated by the geographical dispersion of lithic raw materials (Hofman 1992:197-198).

Technology

Folsom technology is better understood than Clovis owing to the more complete archaeological record resulting from the greater number of intensive excavations that have been carried out. Further, comprehensive studies have been made of campsites as well as kill/butchering localities, most importantly at the Lindenmeier site in northern Colorado. The Folsom projectile point, which represents a continuation of the fluted point tradition of the Clovis period, is the diagnostic tool form. Folsom points are on average considerably smaller than Clovis, rarely exceeding 7.5 cm (3 inches) in length. A longitudinal flake scar (flute) extends for nearly the length of the blade on either face; bases and lower edges are typically ground. As was the case with the preceding period, projectile points in Folsom assemblages often show evidence of rejuvenation and reworking for nonprojectile use (Hofman 1992:211). The Midland point, once believed to represent a separate but roughly contemporaneous complex to Folsom, is now regarded as an unfluted Folsom point and an integral part of the Folsom lithic industry. Midland points are restricted in distribution to the Central and Southern Plains and are most common in the south (Gleichman and Gleichman 1989:13-14; Hofman et al. 1990:239-247).

Folsom assemblages are characterized by an array of tool types although, as Ingbar (1992:169) and Hofman et al. (1990:225-233) observe, with the exception of projectile points the frequency of highly formalized tools is relatively low. Most assemblages are derivatives of biface reduction and include tools made from bifaces, flakes, and cores (Ingbar 1992:169). In contrast to Clovis assemblages, collections from Folsom sites are generally lacking in blades and blade cores. Folsom tool forms commonly include bifaces; modified flake tools, particularly side and end scrapers and including concave-edge "spokeshaves"; channel flakes that are the byproduct of projectile point fluting, often reworked into tools; unmodified (expedient) flake tools; gravers or burins; drills; and hammerstones and anvils, sometimes in direct association with crushed bone. Lithic debitage is common and typically includes tool resharpening flakes (Frison and Bradley 1980; Gleichman and Gleichman 1989:14; Hofman et al. 1990:225-233; Wilmsen and Roberts 1978; Wormington 1957:34-37). True manos and metates are rare but do occur. However, abrading stones are found and not infrequently display pigment staining. Faceted ocher (hematite) nodules also occur (Cassells 1997:75-76; Frison and Bradley 1980:100-101; Wormington 1957:37).

Folsom peoples were selective about the raw materials used in tool production, and lithic artifacts at Folsom sites frequently indicate long-distance transport. Hofman (1992:199, 211) believes that high-quality lithic materials were curated until their utility was exhausted, as indicated by multiple "retooling" episodes evident in tool assemblages.

A well-developed bone (and possibly antler) tool industry was in place as well. Bone tools found in Folsom campsites such as Lindenmeier consist of awls, needles, beads, possible projectile points, incised disks that may be gaming pieces, and probable fleshers manufactured through modification of large mammal ribs and other elements (Frison 1991:51; Gleichman and Gleichman 1989:14; Wormington 1957:37). Antler tools have been recovered from Folsom components at the Hanson and Agate Basin sites in northern and eastern Wyoming, respectively (Frison 1991:51-57; Frison and Bradley 1980:103).

Settlement and Subsistence Strategies

Site Types and Locational Variability

Folsom period settlement patterns mirror somewhat those of the Clovis period. Sites tend to be located near water sources, particularly ponds and streams, but do also occur in waterless hinterlands (Greiser 1985:62). Site types include kill and/or butchering sites, campsites both with and without connections to kill sites, and isolated artifacts. Campsites and kill locations are suggestive of band-level organization; evidence for the type of large-group communal activity apparent at some Plano-period sites is generally absent in the Folsom period. Intrasite organization and activity patterning has emerged from analyses of some sites and may suggest the presence of discrete households. At Stewart's Cattle Guard site in south-central Colorado, for example, at least five activity loci were identified, perhaps associated with hearths, which represent bison butchering, hide-working, and domestic activities. As noted above, the common presence of exotic lithic materials in Folsom assemblages reflects a high level of group mobility and, possibly, trade (Jodry and Stanford 1992).

Economy

Just as many observers associate the Clovis period with mammoth hunting, so has a stereotype developed of a Folsom "culture" subsisting almost exclusively on bison (Wormington 1957:23-41). As game diversity diminished over the course of the Folsom period, it is indeed likely that bison procurement became disproportionately significant in the Folsom economy. Techniques for trapping bison, for example the use of arroyo head-cuts, were well developed and highly effective (Frison 1991:158-164). However, the Folsom subsistence base was varied and included a prominent vegetal food component (Frison 1983:111-114). In addition to *Bison antiquus*, animals recovered from Folsom sites include horse and camel (like *B. antiquus*, extinct by the end of the Folsom period), elk, pronghorn, deer, fox, wolf, coyote, prairie dog and other rodents, cottontail and jack rabbit, turtle, and birds (Greiser 1985:66; Cassells 1997:71). A canid from a Folsom component in eastern Wyoming may be the remains of a domesticated dog (Walker 1982). Information about specific vegetal resources is rare from Folsom contexts, but the abundance of grinding stone at some sites, particularly in comparison with Clovis sites, suggests that plant processing was commonly practiced.

Directions for Future Research

Chronology

The Folsom chronology of the context area, much like Clovis, is problematic. Although known sites occur in practically all directions from the upper Arkansas River Basin, including the Folsom site itself a short distance south of the Colorado/New Mexico border, Folsom evidence within the context area is limited to widely scattered surface finds usually consisting of isolated projectile points. Known Folsom materials do display a considerably wider distribution within the basin than Clovis. Folsom habitation is assumed to have occurred but its archaeological expression is minimal. As with Clovis, development of a Folsom database will involve radiometric dating, cross dating, and the application of geomorphic techniques.

- What is the chronological range of Folsom occupation of the context area?
- How do radiometric dates on Folsom materials compare with the narrow temporal range that characterize Folsom sites elsewhere, and does Folsom represent a chronological continuum from the preceding Clovis period?
- Can distinctive combinations of lithic and/or bone tool attributes (tool kits) be described at dated Folsom sites that would facilitate identification of Folsom sites for which no radiometric or projectile point data are available?
- Can Folsom sites lacking chronological indicators be placed in a temporal context based on associations with broad geomorphic events?

Population Dynamics

From a regional perspective, Folsom population dynamics are somewhat better understood than are those of either of the two preceding periods, due simply to the greater number of known sites. Although perhaps more regionalized than Clovis, Folsom occupation appears to occur in a wider range of settings, possibly suggesting population increases. Addressing Folsom demographic issues within the context area will necessitate additional site discovery and identification as well as geomorphic study of Folsom-age terrains and site preservation processes.

- Is Folsom occupation of the context area suggestive of development from an indigenous Clovis base, movement of Folsom populations into the area from elsewhere at some point during the Folsom period, or some combination thereof?
- Are there temporal differences between Folsom sites in the plains and foothills and those in the higher mountains that might suggest population shifts within the period?

- Do radiometric dates from Folsom sites in the context area, when compared to those from adjoining regions, suggest a geographical sequence of occupation that could indicate migrations or other significant movements of people?

- Do lithic material types indicate regional interaction, or is the Folsom occupation of the context area more localized in nature?

- Does the geographical distribution of Folsom sites suggest population increase since the Clovis period, or more effective exploitation of a wider range of ecosystems?

Technology

If and when Folsom artifact assemblages are discovered in southeastern Colorado the opportunities for comparison and contrast with Folsom materials elsewhere will be abundant. Folsom lithic and bone industries are better known than Clovis, particularly in the western Great Plains region. If Folsom sites with temporally diagnostic projectile points and/or radiometric dates are not found in the context area, it may still be possible to "fingerprint" Folsom sites based on combinations of technological attributes as identified at sites such as Lindenmeier in north-central Colorado. Because of the limited database within the context area, research questions are largely unchanged from those posed for the Clovis period.

- What is the morphological and functional range of lithic tools, and can tool kits be identified that would aid in recognition of Folsom sites for which projectile point and radiometric data are unavailable?

- Do Folsom lithic assemblages reflect intersite consistency, or are geographical and/or functional differences apparent within the context area?

- What is the principal mode of lithic reduction, and are there significant departures from the technological organization of the Clovis period?

- Where and in what manner were raw lithic materials quarried; do site assemblages reflect consistent use of high-quality lithic materials, and are exotic materials common?

- What do patterns of lithic procurement suggest about regional movement and/or trade?

- How do Folsom lithic procurement and techniques of manufacture, as evidenced within the context area, compare and contrast with data from the western U.S.?

- Is there artifactual evidence (particularly lithic evidence, e.g., microblades) of a separate Folsom-period manifestation of the Mountain tradition in the higher elevation portions of the context area?

- Is Folsom occupation of the higher mountains a more isolated phenomenon than that of the plains, as indicated by lithic material type and distribution?

- Do Midland projectile points occur in Folsom-period assemblages; do they occur in mixed assemblages with Folsom points, or as archaeologically distinct phenomena that might suggest occupation of the region by separate culture groups?

- What is the nature of the Folsom ground stone industry; does ground stone frequency in comparison with other artifact classes suggest economic emphasis on certain types of resources at the expense of others?

- What is the nature of the bone tool industry, and are there diagnostic forms that may aid in Folsom site recognition?

- Is the bone tool industry an outgrowth of the Clovis industry?

Settlement and Subsistence Strategies

As is the case with the Clovis period, Folsom settlement and economic patterns are little known in the context area and thus are inferred largely on the basis of data from elsewhere. Folsom settlement is viewed as similar to that of the Clovis period in the sense that it tends to exhibit a strong association with water, although the general distribution of sites may include a wider range of ecological settings. The traditional view of Folsom peoples as primarily hunters of now-extinct bison has been challenged by data from sites across a broad geographical range that suggest a more generalized subsistence base. However, little useful information in this regard has been derived from the context area. As with Clovis, site recognition is critical to understanding Folsom settlement and subsistence; if sites cannot be found or do not exist in appreciable numbers in the area, explanations both behavioral and geomorphic in nature must be considered.

- What is the full descriptive and functional range of Folsom site types?

- What is the range of ecological settings favored by Folsom peoples, and how do site locations compare with those of Folsom sites in the western U.S. in general and the western margin of the Great Plains in particular?

- How do Folsom site settings and general settlement patterns in the plains and foothills compare with those of the higher mountains, and do these sites suggest a single, integrated economic system or separate cultural groups?

- What was the economic basis of Folsom adaptation, and were adaptational strategies oriented toward lacustrine and/or riverine environments as suggested elsewhere in the region?

- How does the Folsom economy of the context area compare and contrast with that evident over the remainder of the western Great Plains and adjacent mountains areas?

- Is there a strong orientation toward exploitation of megafauna or is the economic system more generalized; does the Folsom economy display a trend toward more generalized subsistence pursuits in comparison with the preceding Clovis period?

Geomorphology and Paleoclimates

There is little doubt that southeastern Colorado was inhabited during the Folsom period despite the dearth of evidence within the context area. Geomorphic factors most likely account for the general absence of sites (explanations relating to prehistoric behavior and archaeological site recognition notwithstanding), and discernment of paleoclimates is essential to explaining geomorphic processes. The types of investigations that may enhance our understanding of paleoclimates and geomorphology are the same as those identified for the Pre-Clovis and Clovis periods.

- What climatic conditions prevailed during the Folsom period, and are there paleoclimatic explanations for the dearth of sites in the context area?
- What evidence exists for climatic change between the Clovis and Folsom periods?
- What are the paleoclimatic implications for human economic practices?
- What were the predominant geomorphic processes affecting landscape development in the context area during the Folsom period?
- Are early Holocene terrains identifiable that may harbor Folsom sites, and would sites associated with these terrains be buried or on the surface?
- If intact terrains of Folsom age are present, how would soil-forming processes and more general geomorphic processes have affected internal site structure?
- Can buried soils of Folsom age be identified and dated on a regional scale?

PLANO PERIOD

Database of the Context Area

Considerably more evidence of Plano occupation exists in southeastern Colorado than for the preceding periods, although the database is far from extensive (see Figure 5-1). The Olsen-Chubbuck site, for which the Firstview complex is named (after a small nearby town), is located in the northeastern corner of the context area in the drainage basin of Big Sandy Creek. This bison kill and butchering site, dated slightly over 10,000 B.P., is one of just three excavated sites of this period in the upper Arkansas River watershed and the only Paleoindian-age communal kill site in the context area (Wheat 1972). The other excavated sites are the Runberg site (5CF358) and site 5LK372, both in the far upstream end of the context area. The Runberg site is located on Cottonwood Pass west of Buena Vista near the Arkansas River-Gunnison/Colorado rivers drainage divide. It is a multicomponent campsite exhibiting evidence of late Paleoindian, Archaic, and Late Prehistoric occupation (Black 1986:78, 81-91). The earliest component yielded projectile point evidence suggesting occupation within the ca. 10,000-9500 B.P. range and a probable plains association. Two subsequent components are better documented and well dated, with four radiocarbon assays between 8840 and 7740 B.P. Black (1986:91-108) considers these components to be Early Archaic, and certainly they fall outside the general description of "Plano" as the term is applied to sites on the Colorado plains. The Runberg components are incorporated into the late Paleoindian discussion here on the basis of age alone, but may have little or no cultural and economic connection with Plano occupation of the lowlands. Also in Chaffee County, several late Paleoindian projectile points have been reported from the surface at the Trout Creek Pass quarry site (Chambellan et al. 1984:58). Excavations at site 5LK372, in Lake County, were less extensive than at either Olsen-Chubbuck or Runberg, but did expose a multicomponent campsite with an early radiocarbon age of 8365 B.P. (Arthur 1981).

The remaining archaeological evidence of the Plano period is thinly distributed across the context area and consists primarily of isolated surface discoveries (Anderson 1989b:16-17). The Hahn site in El Paso County, which also exhibits Clovis and Folsom components, has yielded projectile points described as Cody complex or "Cody/Kersey" in affiliation (Greiser 1985:73-76). Campbell (1969a:362-364) reportedly found eight Plano sites on the Chaquaqua Plateau in Las Animas County of which seven occurred in canyon environments; of these, one was in a rockshelter. Most of the sites are located in the headwaters area of Chacuaco and Smith Canyons, and at the foot of Mesa de Maya on the north side. At the PCMS, also in Las Animas County, three possibly Plainview projectile points and five miscellaneous lanceolate points probably of Plano age have been reported from widely scattered locations. Most are fragmentary (Anderson 1989a:115-118). Projectile points described as Agate Basin and Eden (Cody complex) were recovered from the surface at two sites in the Flank Field storage area in Baca County (Wood et al. 1981), and an Eden point was found by CDOH in a gravel pit northeast of Ordway (Henss 1984). Four likely Plano projectile points, of which three are fragments, have been recorded on the surface at Fort Carson. Three are isolated finds; the fourth was recovered from a site of Late Prehistoric age and is probably intrusive. Two of the points are described as resembling Scottsbluff or Eden (Cody complex) styles (Alexander et al. 1982:103, 110-112, 179). Three point fragments of Plano age were also recovered during a survey in the valley of the upper Huerfano River northwest of Walsenburg (Lutz et al. 1977), and a single Cody complex point was recovered from the Trinidad Lake area west of Trinidad (Dore 1993). Plano materials are also reported from the Wolf Springs Ranch survey in Huerfano County and the Cyprus Mines Hanson project survey in Fremont County (Kranzush et al. 1979; Stoner et al. 1996). In addition, Plano period projectile points occur in private collections from around the context area. As early as the 1930s, Renaud (1932a, 1933) and Figgins (1935) reported observing "Yuma" points in collections from blowouts in the eastern portion of the area. As Greiser (1985:69) notes, "Yuma" was formerly a catchall term for late Paleoindian projectile points.

Sites of Plano period age occur outside but near the Arkansas River context area and include several that have been intensively excavated. They are particularly well represented in the South Platte River basin in northeastern Colorado. Examples are the Frazier site along the South Platte in Weld County, an Agate Basin-complex (9650 B.P.) campsite and bison butchering locality (Haynes and Haas 1974; Malde 1984; McFaul et al. 1991; Wormington 1984); the Jones-Miller site on the Arikaree River in Yuma County, a Hell Gap complex (10,020 B.P.) bison kill and processing locality (Stanford 1974, 1975); the Jurgens site, located a mile east of the Frazier site, a Kersey-complex (9070 B.P.) site with discrete long- and short-term campsites and a bison processing area (Wheat 1979); the Claypool site in Washington County, which yielded a large assemblage of Kersey complex projectile points from deflated contexts (Stanford and Albanese 1975); the Gordon Creek Burial, a rare Paleoindian interment (9700 B.P.) in the foothills of Larimer County (Anderson 1966; Breternitz et al. 1971); and the Nelson and Frasca sites, in proximity to one another in Logan County, both Kersey-complex sites consisting respectively of a bison arroyo trap (7995 B.P.) and a bison processing locality (Fulgham and Stanford 1982; Cassells 1997:84-85). The Lindenmeier site north of Fort Collins, best known for its Folsom occupation, also produced some Alberta/Kersey materials from the upper levels (Wilmsen and Roberts 1978; Greiser 1985:76). The Lamb Spring site near Denver, with a reputation as a possible Pre-Clovis site, also has produced evidence of Cody-complex bison kill and processing events (Stanford et al. 1981; Rancier et al. 1982; Greiser 1985:77). Plano sites are also widely distributed across the Southern Plains. Examples are the Lubbock Lake site in the southern Texas panhandle, which exhibits both Plainview and Firstview components oriented toward bison processing (Johnson and Holliday 1980, 1981); and Blackwater Draw in eastern New Mexico, with Plainview and later Paleoindian materials, including Firstview, of which some are also associated with bison processing (Johnson and Holliday 1981:188; Wheat 1972).

Population Dynamics

The relatively high number of known Plano sites in eastern Colorado and elsewhere, in comparison with Clovis and Folsom site counts, has given rise to the notion that population levels rose in late Paleoindian times (e.g., Cassells 1997:91). In fact, the onset of xeric climatic conditions and the progressive reduction in mammal species diversity (below) would logically have effected a reduction in human populations as the ecological carrying capacity was reduced.

It should be noted as well that the Plano period was of longer duration than either the Clovis or Folsom period, and thus a higher site density need not be justified in terms of greater populations. The tendency for Plano occupations to be manifested as extensive bison kill and butchering sites that are comparatively easy to recognize may also be responsible for a skewing of the archaeological record.

General indicators of mobility evident in the Clovis and Folsom periods persist in the Plano period. Lithic assemblages at Plano sites consistently display material types from sources that are broadly distributed geographically (Bradley 1974:191-192; Stanford 1974:35; Wheat 1972:126-127, 1979:123). The Olsen-Chubbuck site, for example, yielded tools manufactured from silicates derived from the Knife River flint quarries in western North Dakota, the Alibates dolomite quarries in the Texas panhandle, the Spanish Diggings quarries in east-central Wyoming, and a petrified wood source in the Black Forest area near Colorado Springs (Wheat 1972:126-127). Stanford (1974:35) notes that the dispersion of lithic tool material from source areas could represent the coalescing of several small bands at a central location, the cyclical movement of a single band across a vast territory, or regional trade. Whatever the precise explanation - and it could well involve some combination of Stanford's several scenarios - it is apparent that late Paleoindian peoples operated on a regional scale.

Frison (1992:337-339), observing Plano evidence on the Northwestern Plains and adjacent mountain areas, believes that an adaptational dichotomy developed after ca. 10,000 B.P. The groups inhabiting the foothills and mountains were, according to Frison, relatively isolated, and exploited mainly local lithic sources. Occupants of the plains and intermontane basins utilized widespread sources and thus appear to have traveled more widely or were integrated into trade networks. Black (1991:20-21) would regard Frison's observations as a manifestation of the Mountain tradition, which he views as a late Paleoindian (ca. 9500-9000 B.P.) movement of peoples into the mountains most likely derived from a Great Basin population base. This tradition would have been in contact with, but distinct from, plains Paleoindian groups. For the Plano period generally, the diversity of lithic complexes may be viewed as a furthering of the trend toward regionalism that began during Folsom times. As Gleichman and Gleichman (1989:21-34) note, however, the relationships among the various complexes - particularly those that overlap one another temporally and geographically - are interpreted in different ways by different Paleoindian researchers.

Technology

As noted, the Plano period is marked by a series of temporally and spatially overlapping projectile point traditions. These traditions, or complexes, have core geographical areas but are also widely distributed. For example, the Plainview complex is a general Southern Plains overlay, and the Kersey complex in generally distributed across the Central and Southern Plains. Archaeologists tend to view specific archaeological complexes as representative of distinct prehistoric culture groups although there is no way of knowing if geographical projectile point variability is anything more than a technological veneer upon a single, widespread cultural tradition. At some sites such as Carter/Kerr-McGee in northeastern Wyoming, mixed assemblages representing more than one complex may be found in a single component (Frison 1984). Beyond projectile point morphology, Plano tool industries appear to crosscut regional boundaries, and the peculiarities of the artifact assemblage at any given location are most likely to reflect specific site function (Eighmy 1984:41-47; Gleichman and Gleichman 1989:21-34).

A considerable body of data exists about projectile point form, function, and manufacture during the Plano period (e.g., Bradley 1974; Frison 1991; Wheat 1972, 1979). This accumulated information derives from the preponderance of points at many Plano sites, which often consist of bison kill and/or processing localities, as well as a general research bias among many archaeologists. No attempt is made here to describe the morphological variability among Plano projectile point styles. It is important to note, however, that fluting no longer characterizes the points of the Plano period but other traits persist from earlier Paleoindian industries such as generally large size and lanceolate form, basal and proximal edge grinding, and attributes of manufacture that bespeak a consistently high level of craftsmanship. A significant percentage of projectile points exhibits evidence of reworking, whether recovered from kill, processing, or campsites. Frequently, broken or damaged points are simply reworked for the purpose of keeping them functional as projectile points; but at some sites, such as Jurgens, points were refashioned into other forms such as hafted cutting tools (Frison 1974:71-92; Holliday 1981:178-182; Wheat 1979:71-83).

Despite the singular nature of many Plano sites, i.e., bison killing and processing, a wide array of lithic tool forms occurs. The industry thus represented is an outgrowth of Folsom but exhibits somewhat greater morphological, if not functional, variability. Because of the mixture of functional and morphological terminology employed in many site reports (e.g., Wheat 1979:83-111), a comprehensive characterization of Plano tool kits is difficult to achieve. As is the case with Folsom, Plano period lithic tools are both formal and expedient in nature, with the latter more common at most sites. The majority of patterned bifaces at Plano sites are either projectile points or are identified as projectile point preforms. The only other common formal tool form is the scraper, which essentially consists of a flake that has been unifacially retouched to produce a steeply angled edge. Though side scrapers are predominant in Folsom assemblages, end scrapers are far more common in Plano assemblages. Occasional formal drills also occur. As noted, hafted knives–typically reworked projectile points–are common. Less formal tools include flakes that are minimally modified into piercing and graving tools, and cores utilized as choppers. Utilized flakes lacking evidence of retouch are common (Greiser 1985:68-77; Stanford 1974; Wheat 1972:133-140, 1979:83-111). Black (1991:7-8) associates a split cobble technology with Mountain-tradition occupation of upland areas, and notes that it is represented in the older components at the Runberg site (see also Black 1986). The split cobble technology of the Mountain tradition contrasts significantly with the bifacial reduction techniques and common utilization of flake tools evident in plains sites. Lithic microtools are also broadly associated with the Mountain tradition (Black 1991:7-9)

Also consistent with Folsom and earlier occupants of the region is the procurement and use of high-quality silicates for tool stone. Recurring raw material types identified in Plano assemblages from the Central Plains and adjacent areas include those listed in the previous subsection, plus Flat Top chert from northeastern Colorado and Republican River chert from south-central Nebraska and north-central Kansas.

Ground stone artifacts are decidedly more common at Plano than earlier sites but are not ubiquitous. Some occur in bison processing locales and were probably used in rendering of faunal products, but others are found in contexts more suggestive of plant processing. Common ground stone tools include grinding slabs, "handstones" or manos, grooved shaft abraders, and miscellaneous abrading stones (Cassells 1997:91; Greiser 1985:75-76; Wheat 1979:129-132). The Jurgens site also yielded a stone tube that is believed to have been a pipe (Wheat 1979:129).

Use of bone tools is widely documented in Plano sites but the industry is largely expedient in nature. Worked items include occasional awls, antler and bison molar atlatl hooks, engraved bone, and from the Jones-Miller site, a drilled antler tine that could be a flute (Stanford 1975:34; Wheat 1979:135-146). Expedient bone tools are especially common at bison processing sites where fresh bone was in abundant supply. They were manufactured from a range of bison bone elements, in particular scapulae, ribs, and various long bones (humeri, femora, metapodials, ulnae, radii, and especially tibiae) and tend to exhibit minimal intentional modification but telling signs of intentional breakage and use wear consisting of striations and polish. In most cases they were used in the butchering process and then discarded on the spot (Frison 1974:51-57; Stanford 1974:32; Wheat 1979:136-146). The abrupt appearance of expedient bone tools in the archaeological record of the Plano period is probably not indicative of the sudden emergence of a new industry. The pattern of behavior suggested by the widespread occurrence of expedient bone tools is more apt to be recognized in the mass kill sites of the Plano period, of which several have been extensively excavated. Further, it is only since the 1970s that Paleoindian archaeologists have consistently and systematically examined faunal assemblages for indications of expedient tool production and use (Frison 1974; Stanford 1974; Wheat 1979).

Settlement and Subsistence Strategies

Site Types and Locational Variability

Plano site locations do not display the near-universal attachment to water sources evident in the preceding periods, this despite the relatively warmer and drier climate. A bias in the archaeological record toward large-scale kill sites, which because of bison behavioral patterns often occur in upland settings, probably accounts for this difference. It is likely that a reliance in permanent water sources and the microenvironments that they supported in fact intensified in Plano times. For example, on the Southern Plains, where the most xeric conditions are apt to have existed, Johnson and Holliday (1981:190) note prodigious occupation and use of the draws-the lengthy, often incised drainages with ground water if not surface water-but that only limited evidence exists from the adjacent open prairies. The widespread occurrence of Plano sites in upland settings such as the foothills and high mountains of the Central and Southern Rocky Mountains (Benedict 1992; Frison 1992), and the apparent development of lithic complexes unique to these areas (e.g., Pryor Stemmed and Lovell Constricted), may broadly reflect the responses of Plano-period Paleoindians to an increasingly arid climate.

Site type variability in the Plano period is limited, with a skewing of the archaeological record in the plains areas toward kill and butchering sites. In some mountainous settings, the earliest evidence of rockshelter habitation is from the late Plano period (Frison 1991:67-79). Isolated Plano artifacts are widespread throughout the plains and adjacent mountainous regions.

Late Paleoindian society is believed to have been organized at the band level. There is little doubt that a higher level of complexity was also achieved, although supraband organization may have been transitory in nature, as large groups were constituted from several smaller ones for the purpose of staging bison hunts. According to Wheat (1972:120-124), the Olsen-Chubbuck site in the Arkansas River context area, which resulted from a hunt in the spring of the year, probably represents the activities of between 75 and 200 people. His estimate is based on a careful consideration of the number of animals killed, the amount of meat extracted from the kill location, and other variables; it has not been seriously challenged by other archaeologists.

Economy

The shift from the small-scale hunts that typified the Folsom period to the communal kills of Plano times was dramatic. A fundamental evolution in strategy in implied, not only in carrying out the actual kill but in the organization of processing activities and perhaps even patterns of consumption. Though the Folsom site may be considered a large-scale bison kill by Folsom-period standards (approximately 25 animals), it is small in comparison with Plano sites such as Olsen-Chubbuck (190 animals), Jones-Miller (200+ animals), Casper (77 animals), and Frazier (43+ animals) (Stanford 1974; Wheat 1972; Wilson 1974; Wormington 1984). Small-scale kills also occur, for example in the Plainview component at the Lubbock Lake site (Johnson and Holliday 1980), but are less common in the archaeological record. Data suggest that arroyo traps were most commonly employed in communal bison hunting but pounds and parabolic sand dune traps were also used.

Although bison increasingly dominate faunal assemblages of Plano period sites in terms of overall biomass, various other species were also exploited. These include elk, moose, deer, pronghorn, cottontail and jack rabbit, possibly fish and various birds, and probably several rodent species as well (e.g., Wheat 1979:30-32, 59-60). Numerous other species have been recorded at Plano sites but are probably natural occurrences, and in some cases reflect the attraction to a recently abandoned bone bed by carnivores such as coyote, wolf, and red fox (Stanford 1974; Wilson 1974). An increase in vegetal food processing is broadly suggested in the Plano period by the widespread occurrence, if not abundance, of ground stone artifacts. Little hard data are available to indicate which plant species were exploited or how they were utilized. However, there is excellent evidence from Plano components in several caves and rockshelters in the Big Horn Mountains of Wyoming (Medicine Lodge Creek, Schiffer Cave, Southsider Cave) of the use of globular storage pits of which some are associated with seeds of sunflower, prickly pear, pine, juniper, amaranth, and chokecherry or wild plum (Frison 1973, 1976, 1991:340-345).

Little information exists for the mountainous portion of the context area. Black (1991:19-23) interprets Mountain-tradition subsistence as broad-spectrum in nature, which suggests a dramatic economic departure from the developing lowland pattern. According to Black (1991:21), Mountain-tradition groups occupied the upland areas on a year-round basis, utilizing environments ranging from high mountains to foothills. Whether the location of the Runberg site along Cottonwood Creek near a mountain pass is typical of site locations in upland areas during this period is unknown because so few sites have been documented.

Directions for Future Research

Chronology

Plano evidence is thinly scattered across the context area. Although the occurrence of Plano people in a wide variety of ecological settings has been established archaeologically through surface finds of mostly isolated projectile points, few sites have been identified and the temporal database is lean. As is true for the earlier Paleoindian periods, establishing a Plano chronology within the upper Arkansas River Basin will involve a combination of radiometric dating and cross dating, in combination with geomorphic investigation. Likewise, research questions are similar to those posed for the Clovis and Folsom periods.

- What is the chronological range of Plano occupation of the context area?
- Does Plano represent a chronological continuum from the preceding Folsom period?
- Can distinctive combinations of lithic and/or bone tool attributes (tool kits) be described at dated Plano sites that would facilitate identification of Plano sites for which no radiometric or projectile point data are available?
- Can Plano sites lacking chronological indicators be placed in a temporal context based on associations with broad geomorphic events?
- Do Plano complexes within the context area overlap temporally or is there a single chronological sequence of occurrence?

Population Dynamics

The increased archaeological visibility of the Plano period, in the context area and elsewhere in the western Great Plains-eastern Rocky Mountains region, suggests the presence of geographically diverse and mobile populations. Current information–particularly the emergence of stylistically unique material culture complexes–suggests a trend toward regionalization that may have begun in the preceding period. However, comprehensive data are available from just one site within the border of the context area. Fundamental questions remain about Plano demographics that can be answered only through identification and study of sites across the area.

- Is there a true increase in human population during the Plano period, or is population growth an illusion created by the greater temporal span of the period and/or increased archaeological visibility of certain types of sites?

- Is Plano occupation of the context area suggestive of development from an indigenous Folsom base, movement of Folsom populations into the area from elsewhere at some point during the Plano period, or some combination thereof?

- Are individual Plano artifact complexes suggestive of the presence of distinct cultural groups, or local adaptations by a single group?

- Is the Plano-period Mountain tradition truly a separate cultural manifestation from that of the plains and foothills or simply a local manifestation of a single, broadly distributed Plano culture?

- Do radiometric dates from Plano sites in the context area, when compared to those from adjoining regions, suggest a geographical sequence of occupation that could indicate migrations or other significant movements of people?

- Do lithic material types indicate interaction on a regional scale, and if so what sorts of connections between and among groups of people may be inferred?

Technology

Although comprehensive study has been undertaken of large and complete Plano artifact assemblages, the collections are the result of excavations at a limited number of sites distributed across the western Great Plains and adjacent areas. Few such studies of upper Arkansas River Basin sites have been conducted, although the distribution of Plano surface materials across the area suggests that intact sites may be found in the future. Abundant opportunities for comparison and contrast with the significant body of data from outside the area will exist at such time that sites in the context area are identified and excavated. Because the present database is so limited, the types of research questions posed for the Clovis and Folsom periods are still germane.

- What is the morphological and functional range of lithic tools; can distinctive tool kits or lithic assemblage characteristics be identified that would facilitate the identification of Plano sites for which projectile point and radiometric data are unavailable?

- How are individual Plano complexes distributed across the context area, and do their distributions change over time and space within the Plano period?

- Is there artifactual evidence (particularly lithic evidence, e.g., microblades) of a separate Plano-period manifestation of the Mountain tradition in the higher elevation portions of the context area?

- Where does the geographical boundary lie between bifacial reduction technology (common on the plains and perhaps in the foothills) and split cobble technology (higher mountains); does the boundary change over time, and is it suggestive of a highland Mountain tradition that is distinct from that of the lowlands?

- Where and in what manner were raw lithic materials quarried; do site assemblages reflect consistent use of high-quality lithic materials, and are exotic materials common?

- What do patterns of lithic procurement suggest about regional movement and/or trade; are mountain-based Plano groups more locally adapted as indicated by lithic material use?

- How do Plano lithic procurement and techniques of manufacture, as evidenced within the context area, compare and contrast with data from the western U.S.?

- What is the nature of the Plano ground stone industry; does ground stone frequency in comparison with other artifact classes suggest economic emphasis on certain types of resources at the expense of others?

- What is the nature of the bone tool industry, and are there diagnostic forms that may aid in Plano site recognition?

- Is the expedient Plano bone tool industry observed elsewhere in the region present in the context area, and of so is it an outgrowth of the Folsom industry or an innovation of the period?

Settlement and Subsistence Strategies

The Plano economic focus as suggested by various sites on the western Great Plains, including Olsen-Chubbuck in the context area, demonstrates intensifed bison procurement that may have included newly developed modes of communal procurement. Archaeologically, Plano sites tend to be large and spectacularly arrayed with abundant faunal remains, but demonstrate limited variability from one site to the next. Elucidation of Plano economic and settlement patterns within the context area will require site discovery and recognition; as is true in the realm of technology, excellent opportunities for comparison and contrast with data from outside the context area will be present when such sites are investigated. The dearth of intact sites (as opposed to isolated surface occurrences) may again owe to geomorphic factors, prehistoric human behavior, or some combination thereof.

- What is the full descriptive and functional range of Plano site types?

- Do Plano sites display a singular orientation toward bison procurement as elsewhere in the region, or is a more generalized economy evident?

- What is the range of ecological settings favored by Plano peoples, and how do site locations compare with those of Plano sites in the western U.S.?

- Did the apparent, progressive environmental desiccation of the Plano period result in increased habitation at higher elevations (foothills/mountains), or did humans in fact respond by concentrating on the plains where large bison herds were present?

- How do Plano site settings and general settlement patterns in the plains and foothills compare with those of the higher mountains, and do these sites suggest a single, integrated economic system or separate cultural groups?

- What was the economic basis of Plano adaptation; were adaptational strategies less oriented toward lacustrine and/or riverine environments than in Clovis and Folsom times, or is the archaeological record simply skewed in favor of large, visible kill sites in unwatered localities?

- How does the Plano economy of the context area compare and contrast with that evident over the remainder of the western Great Plains and adjacent mountainous areas?

- Is there evidence of large-group adaptation and resource exploitation that departs significantly from the mode of preceding periods?

Geomorphology and Paleoclimates

The presence of widely scattered surface artifacts of Plano age–particularly isolated projectile points–but near absence of known intact sites strongly indicates that geomorphic factors have worked to either eliminate or obscure through burial much of the evidence of Plano occupation. As is the case with the Clovis and Folsom periods, the geomorphology of the period and the climatic conditions that governed it must be understood if the nature and distribution of sites is to be grasped. The types of investigations that will contribute to these topics are unchanged from those identified for the preceding periods.

- What climatic conditions prevailed during the Plano period, and are there paleoclimatic explanations for the dearth of sites in the context area?

- Is there evidence of climatic desiccation between the Folsom and Plano periods, or over the lengthy course of the latter period?

- What are the paleoclimatic implications for human economic practices?

- What were the predominant geomorphic processes affecting landscape development in the context area during the Plano period?

- Are early Holocene terrains identifiable that may harbor Plano sites, and would sites associated with these terrains be buried or on the surface?

- If intact terrains of Plano age are present, how would soil-forming processes and more general geomorphic processes have affected internal site structure?

- Can buried soils of Plano age be identified and dated on a regional scale?

Chapter 6

ARCHAIC STAGE

Christian J. Zier

GENERAL BACKGROUND AND CHRONOLOGY

The Archaic stage features three subdivisions designated the Early Archaic, Middle Archaic, and Late Archaic periods. These periods are sequential without demonstrable gaps. The associated age ranges are as follows:

Early Archaic period	7800 B.P. - 5000 B.P.
Middle Archaic period	5000 B.P. - 3000 B.P.
Late Archaic period	3000 B.P. - 1850 B.P. (A.D. 100)

There are only limited direct indications of Early Archaic occupation in the upper Arkansas River Basin, a condition that is widespread in the archaeological records of the western Great Plains and Rocky Mountains areas. Evidence of Middle and Late Archaic habitation in the context area is abundant and generally intensifies through time. Archaic chronometric dates from the context area are listed in Appendix A, and cation-ratio dates are listed in Appendix B.

The criteria for identification of periods within the Archaic stage are technological in nature and are far from sweeping. The Archaic stage in fact is viewed as a time of long-standing continuity in terms of its lithic industries, and the general lack of evolution in material culture must necessarily reflect economic continuity (Zier and Kalasz 1991). However, projectile points do exhibit time-sensitive morphological characteristics and allow a convenient partitioning of the ca. 6,000-year-long Archaic stage into manageable descriptive units. It may be noteworthy that general temporal correlations appear to exist between individual periods within the Archaic and broad climatic trends, a situation most evident during the Early Archaic period. Paleoclimate cannot be used as a primary criterion for distinguishing among periods for two principal reasons. First, paleoclimates are characterized through the consideration of multiple lines of evidence (e.g., macrobotanical, palynological, and faunal data, and records of sand dune activation and stability) that are difficult to weight in terms of importance and that are not necessarily mutually corroborative and are frequently contradictory. Second, climatic events are difficult to date, and paleoclimatic models usually lack the temporal precision that the archaeological record possesses as a product of radiometric dating. The paleoenvironmental backdrop is thus employed as part of the general description of a given period but is not part of its definition.

The beginning date of 7800 B.P. for the Early Archaic period corresponds with the terminal radiocarbon ages for the latest Plano-period complexes of the Paleoindian stage (previous section). Frison (1983:124) describes the technological transition from Plano to Early Archaic projectile point styles as a "sudden, sharp break" in the archaeological record, although few firm dates are actually available from the earliest Early Archaic. On the plains, this transition consisted of the replacement of lanceolate-form projectile points with large, side-notched forms that display the same high level of craftsmanship as the types they replaced. In the Southern Rocky Mountains portion of the context area, the abandonment of lanceolate projectile points in favor of other varieties, which include stemmed and corner-notched forms, appears to have occurred as much as a millennium earlier (Black 1986, 1991).

The termination date for the Early Archaic period is set at 5000 B.P., a round figure that is less arbitrary than it might appear. The Early Archaic-Middle Archaic boundary coincides with the appearance of McKean-complex projectile points, which became widespread in the Northern and Central Plains at about 5000 B.P. The McKean complex probably had its origins in the Northwestern Plains (Frison 1991:97-101) but spread rapidly to adjacent plains and upland areas, encompassing much of the Central Rockies and part of the Southern Rockies. Black (1991:21) views the Mountain tradition as spatially limited to the Southern Rockies after ca. 4500 B.P. because of the expansion of the McKean tradition elsewhere; in fact, McKean materials occur in the Southern Rockies as well but may be restricted largely to lower elevation areas (foothills) on the east side of the Continental Divide. At Mummy Cave, a deep, stratified site in northern Wyoming, the latest firmly dated Early Archaic radiocarbon assay is 5255 B.P. (Husted and Edgar n.d.; McCracken et al. 1978), after which time McKean materials appear. Citing data from the Northwestern Plains and mountains generally, Frison (1991:98) notes that McKean materials appear in sites as early as 4900 B.P., with the earliest dates occurring in the Big Horn Mountains (e.g., Husted 1969). Within the Arkansas River context area virtually no radiocarbon dates fall within the lengthy interval from 7740 to 4930 B.P. The 4930 B.P. date is from Gooseberry Shelter (5PE910) on Fort Carson and is derived from a stratum that also produced a large, straight-stemmed projectile point that is probably of McKean affiliation (Kalasz et al. 1993:266). A nearly identical date of 4900 B.P. was obtained from a storage pit at Wolf Spider Shelter (5LA6197) east of Trinidad. This pit is associated with a stratum that also yielded a McKean-like, indented-base projectile point (Hand and Jepson 1996:29-31, 63-70).

The Middle Archaic period in the context area, beginning with the Gooseberry Shelter and Wolf Spider Shelter dates noted above, is represented by a near-continuum of radiocarbon assays with few gaps of more than a century in the sequence of absolute ages (see Figure 4-2). The temporal boundary between Middle and Late Archaic is established at 3000 B.P., a somewhat arbitrary date that marks the approximate disappearance of McKean-style projectile points from the archaeological record. Mainly on the basis of cross dating from other regions, Anderson (1989c:434-437) observes that numerous projectile point styles span the Middle-Late Archaic temporal boundary, and further notes that McKean-complex points vanish between ca. 3000 and 2500 B.P. The older date is chosen here as temporal line of demarcation because of the preponderance of large, corner-notched point styles found after that time. It is possible that McKean-type points do persist after 3000 B.P., but the general absence of projectile points from radiometrically dated contexts in the 3000-2500 B.P. range makes this assertion difficult to assess in the Arkansas River study area. At Dipper Gap, a large McKean-complex site in northeastern Colorado, the most recent radiocarbon age is 3180 B.P. (Metcalf 1974). In the Northwestern Plains origin area, McKean-complex materials have largely disappeared from the archaeological record by around 3000 B.P. (Frison 1991:97-101).

Late Archaic materials are located throughout the context area. An even smoother continuum of radiocarbon dates exists than for the Middle Archaic period, with average gaps between absolute dates of about 21 years and no single gap greater than 110 years (see Figure 4-2). The ending date for the Late Archaic period, which serves as the temporal divider between the Archaic and Late Prehistoric stages, is established at 1850 B.P. (A.D. 100). This date coincides with the best evidence from the context area for the emergence in the archaeological record of small arrow points. Further discussion of the derivation of this date may be found in Chapter 7.

EARLY ARCHAIC PERIOD

Database of the Context Area

The virtual absence of radiometric dates in the Arkansas River drainage basin for the nearly 3,000-year span from 7740 B.P. to 4930 B.P. has been noted (see Appendix A). Evidence does exist for occupation of the context area during this time but it is meager indeed, consisting of projectile points from widely scattered surface sites and, occasionally, test excavated sites (Figure 6-1). None of the Early Archaic points from tested contexts is associated with a radiocarbon-derived date. It is because of the lack of direct association between point styles and radiometric dates that the projectile point evidence throughout the area cannot be accepted uncritically. Furthermore, as Anderson (1989c:434-435) has observed, in regions adjacent to the Arkansas River context area where age ranges for projectile point styles have been firmly established, several Early Archaic forms continue into the Middle Archaic period.

Projectile points that are probably of Early Archaic age occur with somewhat greater frequency in the mountains and foothills despite the fact that considerably less survey and excavation work has been conducted in these areas. Lutz and Hunt (1979:133) reported nine surface sites with possibly Early Archaic projectile points in the foothills west of Interstate 25 between Trinidad and Walsenburg, and McKibbin et al. (1997) found Early Archaic points on two surface sites at the Lorencito Canyon Mine west of Trinidad. The Cyprus Mines Hanson project surveys in the foothills of Fremont County yielded several Early Archaic projectile points, and one tested site from the project (5FN185) produced an Early or Middle Archaic point (Engleman and Shea 1980). Two tested sites at widely separated locations in Chaffee County (5CF19, 5CF390) produced points of probably Early Archaic age (Buckles 1975b; Zier and Black 1983), and the Trout Creek Pass quarry, also in Chaffee County, has yielded several Early Archaic points from surface contexts (Chambellan et al. 1984). The Heckendorf SWA in Chaffee County also produced limited Early Archaic surface evidence (Black 1997:22). Several Early Archaic points were recovered in the Wolf Springs Ranch survey area in Huerfano County (Stoner et al. 1996). On Fort Carson, which lies along the plains/foothills boundary, as many as four surface sites have yielded points of possibly Early Archaic age, although the occurrence of small arrow points at two of the sites and ceramics at a third cast some doubt on the temporal identifications (Alexander et al. 1982:74-89, 103). The tentative identification of another 13 Fort Carson sites as Early Archaic based on the Magic Mountain ground stone typology (Irwin-Williams and Irwin 1966), which was viewed with caution by the original investigators (Alexander et al. 1982:180), should be discounted entirely based on a reevaluation of the Magic Mountain ground stone analysis by Kalasz and Shields (1997:15-16; see also Irwin-Williams 1963). The Runberg site on Cottonwood Pass is described in the preceding subsection. A substantial component considered by Black (1986) to be Early Archaic is included in the Paleoindian/Plano discussion because of radiocarbon ages that range between 8840 and 7740 B.P.

Plains sites in the context area that exhibit Early Archaic evidence are uncommon. Several surface sites in the PCMS have produced projectile points that could date to the Early Archaic, although all but two of the point styles associated with these sites are believed to extend into the Middle Archaic as well (Anderson 1989c:434). A tested site at the PCMS (5LA5258) also yielded an Early or Middle Archaic projectile point but no radiocarbon age (Andrefsky et al. 1990). A projectile point that is probably Early Archaic was found on a surface site in the Flank Field storage area in Baca County (Wood et al. 1981:69), and a tested site in Lincoln County (5LN120) produced a possibly Early Archaic point from a surface context (Hand 1990). Anderson (1989b:17) points out that Campbell's (1969a:364) identification of seven Early Archaic surface sites on the Chaquaqua Plateau in Las Animas County should be viewed with caution since his

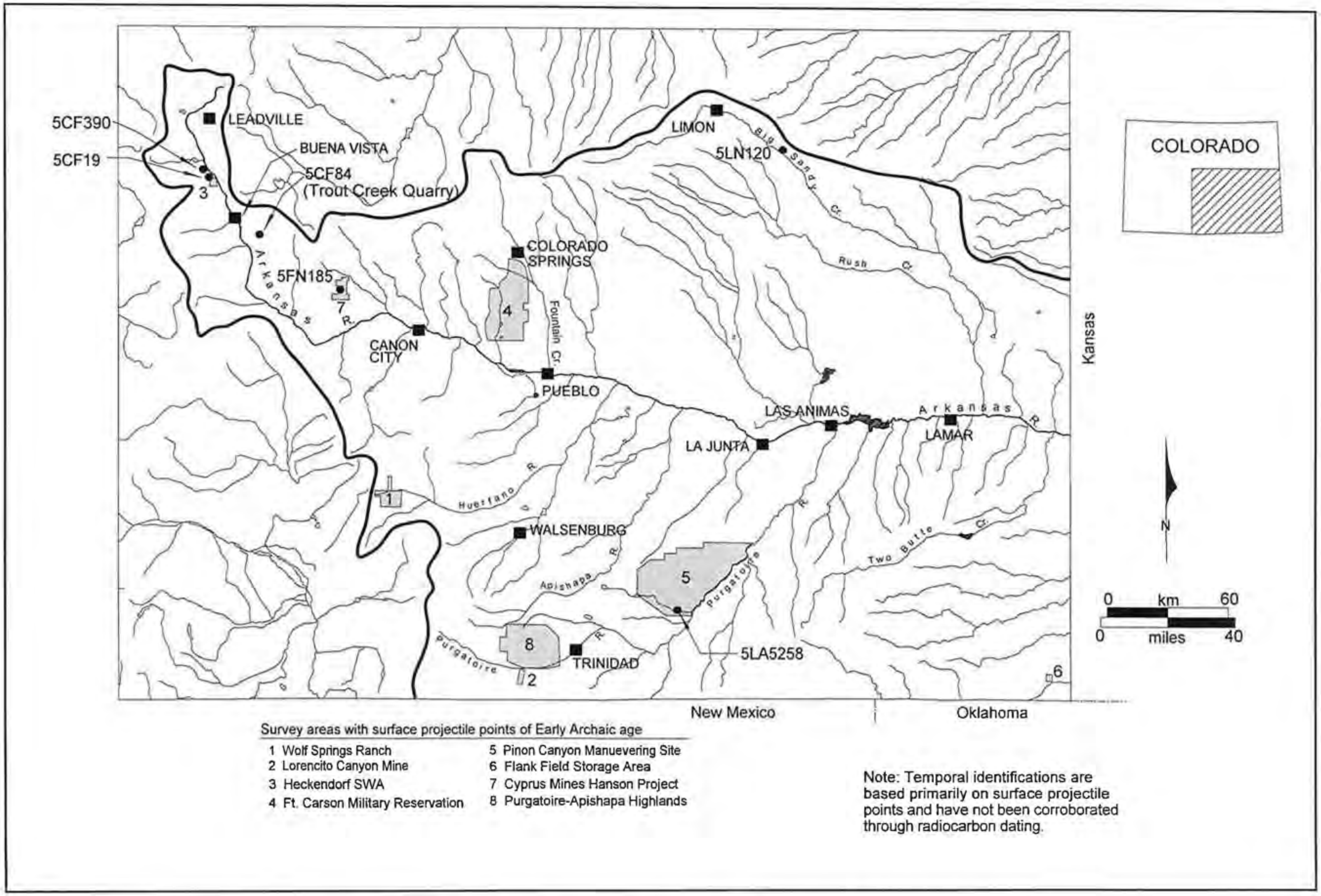


Figure 6-1. Map of Arkansas River context area showing locations of Early Archaic period sites.

"Early Archaic" extended forward in time through the Middle Archaic and into the Late Archaic period as defined by Anderson and as defined here. Further, projectile points from the sites in question are not illustrated. A single Early Archaic site in the John Martin Reservoir flood pool in Bent County may be misidentified (Eddy et al. 1982:124-125). The projectile point collected from the site is unnotched with a broad stem and exhibits light basal and stem grinding, which may indicate a Paleoindian age. Further, the point has been reworked, suggesting that it may be out of its original context.

Early Archaic sites are uncommon in the vast region surrounding the upper Arkansas River Basin. As in the context area, known sites tend to occur in upland settings, although broad tracts of land east of the foothills of the Rocky Mountains, as well as intermontane basins, are nearly devoid of evidence (e.g., Frison 1991:79-88). A short distance north of the context area in the Indian Peaks vicinity, within the South Platte River drainage basin, Benedict (1978, 1981, 1985, 1990) has excavated several Early Archaic sites and identified archaeological "complexes" on the basis of this work (see also discussion in Black 1991:17-19). Early Archaic sites (including multicomponent sites with an Early Archaic component) also occur in the upper Colorado River watershed in central Colorado (Black 1991:16-22; Gooding 1981; Metcalf and Black 1988, 1991). In northeastern Colorado few sites of this age are known, and those that have been identified are close to the foothills, for example the Magic Mountain site at the western edge of the city of Golden (Irwin-Williams and Irwin 1966) and the Wilbur Thomas Shelter north of Fort Collins (Breternitz 1971; Luebbers 1971). These sites are also multicomponent, with evidence of more intensive later occupations. Immediately south of the context area, in the southern Park Plateau foothills, extensive archaeological investigations have revealed little or no Early Archaic evidence (Biella and Dorshow 1997a:29-31).

Population Dynamics

If a virtual absence of archaeological data can be considered a form of data in itself, then there is compelling evidence that broad areas of the western Great Plains and adjacent intermontane basins witnessed only limited human habitation for a period of perhaps 2,500 to 3,000 years. The intensification of early Holocene warming and drying trends into the prolonged Altithermal climatic episode (discussed in greater detail below and in the Paleoclimates section of Chapter 2) is generally cited as the underlying cause of fundamental demographic changes. It is naive to think that the long-standing Paleoindian tradition of occupation and use of the western plains could have been terminated altogether, and indeed Frison (1991:79) observes that once-held notions of an Early Archaic "cultural hiatus" (see Reeves 1973) are being reconsidered. It is possible that Early Archaic sites in lowland settings have, for various geomorphological reasons, simply not been preserved or have been deeply buried; for example, Paleoindians are also known to have inhabited these regions, and their sites are rare in southeastern Colorado. Site recognition may be problematical as well, with a poorly defined Early Archaic projectile point chronology for southeastern Colorado. These factors notwithstanding, occupational evidence for the period ca. 7800-5000 B.P. is scant, and is generally consistent with that of adjacent areas to the north, south, and east.

The concept of Early Archaic abandonment of plains and basins in favor of high ground–in essence, a migration on a regional scale in response to deteriorating climatic conditions–crystallized in the hands of Benedict (1979) although the notion had received some print prior to Benedict's work (e.g., Frison 1978). Black (1991:17-19) counters that the Mountain tradition was firmly in place in the Southern Rocky Mountains and elsewhere by the beginning of the Altithermal (ca. 7500-8000 B.P.). He states that sites viewed by Benedict as indicative of high-country "refugia" are better explained as elements of an ongoing system of upland occupation and use. Black (1991:5-6) views lowland occupants as part-time users of upland areas who were culturally distinct from the Mountain tradition. If Black is correct, the apparent reduction in occupation of the plains and basins is best explained as a simple diminution in human population. So little hard evidence currently exists from either upland or lowland areas in the Arkansas River context area that the issue cannot be resolved.

From Paleoindian sites it is often possible to infer patterns of interaction and exchange based on the distribution of lithic raw material types. No such opportunity exists in the context area for the Early Archaic period. Not only is the site database limited–particularly excavated sites–but far less research emphasis has been placed on projectile point morphology and lithology than for the Paleoindian stage. Raw material types reported by Benedict from Early Archaic components at his sites in the Indian Peaks area suggest procurement from sources relatively close to the sites, particularly the Kremmling area of Middle Park (e.g., Benedict 1990:19-34). This information tends to bolster Black's (1991:5-6) thesis that such sites are elements of an in situ Mountain tradition and are not related to Archaic manifestations on the plains. However, virtually no lithic data are currently available that would permit an assessment of Black's notion that plains groups were indeed separate from those in the mountains, and population dynamics within the plains portion of the context are unknown.

Technology

Anderson (1989c:434) best describes Early Archaic projectile point taxonomy with the observation that points from this period "display some experimentation and variability in haft morphology." Although certain general morphological themes are recurrent in collections from around the region, few attributes can be consistently and exclusively associated with the Early Archaic period. Most readily identifiable projectile points are large, side-notched forms usually exhibiting low, shallow notches and straight to concave bases. Points of this type occur in Early Archaic contexts most consistently on the Northwestern Plains where they are termed Hawken Side-notched (Frison 1991:84-88). On the plains of southeastern Colorado, Hawken-like points are as likely to have convex bases and exhibit a greater overall size range (Anderson 1989a:124-126, 159-160, 250-251, 280-281). The placement of side notches varies, although the notching is consistently shallow. These points resemble forms associated with the Mount Albion complex of the Southern Rockies (Benedict 1979:7-9; Benedict and Olson 1978) although the placement of side notches on the latter is so low as to give a corner-notched, expending stem appearance to some specimens. A distinctly different variety of side-notched projectile point, identified in the Indian Peaks area and termed Albion Boardinghouse by Benedict (1975a, 1979:6-7), exhibits short, broad blades, high, deep side notches, and deeply concave and sometimes serrated bases. Similar points are reported from the PCMS and elsewhere on the plains (Anderson 1989a:166-167, 254-255), perhaps indicating a broad geographical distribution, but on the plains they are suggested to represent later Archaic occupation. The predominant projectile point form from Yarmony Pit House site in the upper Colorado River drainage in Eagle County, which dates ca. 6300-6000 B.P., is medium to large with a stemmed-indented base, and most closely resembles Pinto types common in the northern Colorado Plateau–Great Basin region (Metcalf and Black 1991:92-98).

Various unnotched and unstemmed projectile point forms also occur. Teardrop-shaped points (resembling Abasalo points of the Southern Plains) occur in the Early Archaic Magic Mountain complex at the site of the same name (Irwin-Williams and Irwin 1966:66-70), and east of the mountains within the context area (Anderson 1989a:118-119, 242-243); however, they may span the entire temporal range of the Archaic stage. Large lanceolate and stemmed points of Benedict's (1979:6-8, 1981) Fourth of July complex in the Indian Peaks area most closely resemble Plano forms from the western portion of the Great Plains. Corner-notched projectile points that bear discouraging similarities to certain Late Archaic types also occur in Early Archaic contexts. They are most likely to exhibit relatively short, broad blades, convex blade edges, and deep corner notches with pronounced expanding stems. However, the full morphological range of Early Archaic corner-notched projectile points has not been described, particularly in the context area, and site recognition has probably been inhibited as a result (Anderson 1989a:126, 140, 153, 243, 263, 275; Irwin-Williams and Irwin 1966:71; Frison 1991:85).

The lack of information about Early Archaic projectile point forms extends to lithic industries in general, and again is probably associated at least in part with the problem of site recognition. Early Archaic assemblages have been described at certain high-altitude sites both within and outside the context area. The only comprehensive examination of an Early Archaic lithic assemblage from the lower foothills or plains is that of the Magic Mountain site. Black (1991:7-9) characterizes the Mountain tradition lithic industry as one dominated by split cobble core reduction, probably a reflection of the availability of nodular and nonplaty lithic raw materials. He sees the greatest archaeological visibility of this trend in Paleoindian and Early Archaic times but notes that it continues into later periods. The common use of microtools is also a Mountain tradition trait, evident not only at the Runberg site in the context area (Black 1986) but also in Early Archaic components in the Indian Peaks region and elsewhere in the Colorado mountains (Benedict 1979:6-9; Benedict and Olson 1978; Metcalf and Black 1991:105-117). Benedict's (1975a, 1979; Benedict and Olson 1978) Early Archaic assemblages in fact display a range of tool forms consisting of microtools as well as flake end scrapers, flake gravers, bifaces including so-called bifacial knives, and miscellaneous unifacial tools. The Early Archaic Magic Mountain complex at the Magic Mountain site bears distinct similarities to Mountain tradition assemblages. As Black (1991:8-9) notes, the prevalent industry is erroneously described by the researchers (Irwin-Williams and Irwin 1966:178-179) as dominated by the production of "prismatic blades" from prepared subconical cores. However, microtools made on thin flakes (some bladelike) are common and include "micro-scrapers," perforators, and knives. Other tool forms present in the Magic Mountain assemblage are finely made end scrapers and side scrapers that are often manufactured from thin flakes, unifacial and bifacial perforators, flanged drills, and small ovoid bifaces. It is also suggested that the manufacture of Magic Mountain-complex tools commonly included heat treatment (Irwin-Williams and Irwin 1966:179). The meager Early Archaic assemblage from the Wilbur Thomas Shelter appears to compare favorably with Magic Mountain-complex tools (Luebbers 1971:67-69); however, little else is known of Early Archaic lithic assemblages from eastern Colorado east of the mountain front.

Archaeologists' descriptions of the Paleoindian-Archaic transition not uncommonly include a reference to an increased use of grinding stones, presumably in response to a relatively greater dietary emphasis on collected wild plants (e.g., Cassells 1997:95). Ground stone certainly does occur in Early Archaic contexts, as it does in Paleoindian/Plano, but little data corroborate the notion of increased popularity. It is not necessarily abundant and is sometimes quite rare. Grinding stones are reported by Benedict (1979:6-9) from Early Archaic components in the Indian Peaks area although they do not occur with great frequency. At the Magic Mountain site, numerous ground stone artifacts were found in Early Archaic contexts and included a variety of mano and metate (ground slab) forms (Irwin-Williams and Irwin 1966:137-154). The very limited data on Early Archaic ground stone artifacts indicate that they are essentially expedient in nature and rarely, if ever, exhibit formality of shape. Manos usually consist of stream cobbles selected on the basis of convenience of size and shape, and metates are flat slabs, generally of sandstone, with limited evidence of intentional shaping (e.g., Metcalf and Black 1991:126-133).

Little can be said of Early Archaic bone artifacts or of perishable materials. Elucidation of a bone artifact industry relies on collections from excavated contexts because of the preservation requirements of bone, but such collections are practically nonexistent in the context area. Bone preservation was poor at the Magic Mountain site (Irwin-Williams and Irwin 1966:165-172), and few bone tools can be positively associated with the Magic Mountain complex. Likewise, virtually no information exists about perishables because of the absence of known dry caves and shelters in or near the context area that harbor Early Archaic deposits.

Settlement and Subsistence Strategies

Site Types and Locational Variability

The broad tendency of known Early Archaic sites to be located in upland environments was noted previously. Within and to the north of the context area in the mountains of Colorado, Early Archaic sites occupy a range of settings but usually occur in proximity to water (lakes, streams) in high valleys, and not infrequently, near passes breaching the Continental Divide. Specific site settings include glacial moraines, lower mountain slopes, and streamside terraces and benches (Benedict 1975a, 1979, 1981, 1990; Benedict and Olson 1978; Black 1986; Gooding 1981). Locational trends in the foothills and plains are practically unknown. The Magic Mountain site occurs along the western margin of the plains and is situated beside a small stream that issues from the foothills immediately to the west. Although intermittent, the stream is fed by small springs in the immediate site area (Kalasz and Shields 1997:20-23). If the thesis of general Altithermal warming and drying is accepted, it would logically be expected that Early Archaic sites on the plains would tend to be situated close to sources of permanent water, particularly streams such as the Arkansas and Purgatoire Rivers. At the PCMS in the lower Purgatoire River drainage, possibly Early Archaic projectile points (on surface sites as well as isolates) crosscut a range of environments and in fact are somewhat more common in the drainage basins of tributary streams than in the immediate vicinity of the Purgatoire River (Anderson 1989c:434-435; Andrefsky 1990). Known sites of this period are in fact rare in riparian zones within the context area, perhaps reflecting a general absence of remnant early Holocene landscapes (e.g., Schuldenrein 1985:203-257), or the dynamic, and ultimately destructive, nature of fluvial environments. It may be noteworthy that Early Archaic sites do occur in riparian localities on the Southern Plains, as at the Lubbock Lake site (Johnson and Holliday 1986), and their presence there may reflect interregional geomorphological differences.

Early Archaic sites are known to occur in both open and rockshelter settings, although, with the exception of Wilbur Thomas Shelter (Breternitz 1971) north of Fort Collins, the latter are rare in eastern Colorado. In central and northern Wyoming, Early Archaic deposits are present at or near the bases of deposits in several multicomponent rockshelters, particularly in the Big Horn Mountains, and in some cases represent the oldest materials in long, stratified sequences (Frison 1962, 1991; Frison and Huseas 1968; Husted and Edgar n.d.; McCracken et al. 1978). Benedict's high-altitude Early Archaic sites in the Indian Peaks area of central Colorado appear to be campsites within which multiple activities occurred, including animal butchering, wild plant processing, and lithic tool manufacture and refurbishing. Some of the earliest known game drives in North America also are found in this area and in RMNP immediately to the north. They occur above timberline and sometimes are associated with blinds (Benedict 1975b, 1979, 1981, 1990, 1996; Benedict and Olson 1978).

Sites that include subterranean domiciles, which may take the form of either steep-sided pithouses or, more commonly, shallow basin houses, first appear in the archaeological record of the intermountain West during the Early Archaic period but are unknown from the context area. More than 20 Early Archaic structures with associated radiocarbon dates ranging between 7160 and 5050 B.P. have been excavated in northwestern and central Colorado and southern Wyoming (Shields 1998:284-287). The implications of this apparently widespread settlement phenomenon for the context area are uncertain, although, given the environmental similarities between the locations of known sites such as Yarmony Pit House in the upper Colorado River drainage

(Metcalf and Black 1988, 1991) and the upper reaches of the Arkansas River drainage basin, it is probable that similar sites do occur but have not yet been found. Sites such as Yarmony Pit House, which represents winter occupation, demonstrate beyond doubt that harsh, high-altitude environments in the Colorado Rockies were inhabited year-round.

Within the context area there is little firm information about site types and virtually no information about nonarchitectural features. As noted above, sites that can be assigned with some degree of confidence to the Early Archaic period consist almost entirely of surface manifestations and generally take the form of lithic artifact scatters. These sites have been exposed on the surface for lengthy periods of time ranging up to 8,000 years; some also exhibit more recent projectile points that suggest multicomponent occupation and attendant mixing of artifact assemblages. Conspicuously absent from the context area east of the mountains - and from the High Plains in general - are the bison kills that typify the latter periods of the Paleoindian stage. A notable exception is the Hawken site in the foothills of the Black Hills of northeastern Wyoming, which exhibits evidence of multiple kills employing an arroyo trap and dates to ca. 6200-6500 B.P. (Frison et al. 1976; Frison 1991:187-191).

Economy

The dearth of excavation data from Early Archaic sites around the region strictly limits interpretation of subsistence practices. That economies became more generalized with the onset of the Archaic stage has long been assumed by archaeologists in western North America (e.g., Jennings 1968:134-163); on the High Plains this transition is associated specifically with an apparent dramatic reduction in bison numbers in response to the onset of Altithermal climatic conditions (Dillehay 1974). In fact, little solid information from the context area is available to substantiate the notion of a significant shift in economic orientation, but the cumulative data from the High Plains and adjacent areas are compelling (e.g., Butler 1997). The small-band level of social organization that characterized the Paleoindian stage was not altered during the Early Archaic period. However, there is no indication that the periodic coalescing of bands into larger groupings, so evident at certain Paleoindian/Plano bison kill sites such as Olsen-Chubbuck, was repeated during the Early Archaic.

For the plains of eastern Colorado generally, Butler (1997) has essentially corroborated Dillehay's (1974) concept of an Altithermal "bison absence period" (according to Dillehay, dating ca. 7500/6500-4500 B.P.) by recording comprehensive presence/absence data for bison, deer, elk, pronghorn, and rabbit among a group of 75 excavated and dated sites. Butler (1997:21) substantiates a general shift away from bison in favor of smaller mammals, in particular deer and jack rabbit, in the course of the Paleoindian-Archaic transition. More specific information about plains faunal resource use during the Early Archaic period in or near the context area is simply not available. Plant use on the plains is also poorly understood, although the abundance of ground stone in Early Archaic components at sites such as Magic Mountain (Irwin-Williams and Irwin 1966) hints at the dietary importance of vegetal foodstuffs.

The record of faunal procurement for upland areas is far better than for the plains, but is still generally lacking within the context area. Circumstantial evidence of large mammal trapping is present in the form of rock game drive systems in the Indian Peaks area and in RMNP; however, no faunal remains have been found in association with these features. Benedict (1996:76-77) believes that the intended prey were bighorn sheep or elk, although bison and mule deer are also possibilities. Yarmony Pit House in the upper Colorado River area produced a varied and highly processed faunal assemblage suggestive not only of meat consumption but marrow extraction and bone grease production. Jack rabbit, cottontail, deer, elk, and possibly bison were primary food sources, and dog, blue grouse, fish (sucker), porcupine, and probably other smaller rodents were also utilized (Rood 1991:167). This inventory reflects winter occupation and, as the researchers note (Metcalf and Black 1991:205), the condition of the bone is suggestive of a food stress situation. Grinding stones associated with Early Archaic components in high-altitude sites are suggestive of plant food processing, as they are in the foothills and plains, but macrobotanical remains from such sites are rare. Yarmony Pit House yielded abundant evidence of prickly pear use but only limited evidence of other plants, most notably goosefoot (*Chenopodium*) and cherry seeds (Van Ness 1991:182-189). Evidence of food storage is absent from the context area, but storage pits of Early Archaic age have been excavated in western Colorado, northern Wyoming, and elsewhere (Metcalf and Black 1991:68-73; Frison 1991:343-345).

Directions for Future Research

Chronology

Establishing an Early Archaic chronology in the context area is fundamental to the pursuit of all other research avenues related to this period. Early Archaic evidence is so scarce over much of the eastern Rocky Mountains-western Great Plains region that the period is regarded by some archaeologists as a cultural hiatus, particularly in low-altitude areas (basin, plains) where Altithermal climatic conditions are believed to have been most severe. Although it is unlikely that broad areas of the continental interior were totally uninhabited during this lengthy period, archaeological evidence is certainly meager. Development of an Early Archaic database will require that site recognition processes be refined, and that intact sites be located, excavated, and radiometrically dated. Geomorphic processes may also have played a critical role in site destruction or burial, and their influence on the Early Archaic chronology must be considered.

- What is the chronological range of Early Archaic occupation in the context area?
- Are there temporal trends in settlement within the Early Archaic period that might indicate recurring episodes of abandonment and reoccupation, or movement between upland and lowland locales?
- Can distinctive combinations of artifact attributes (tool kits) be described at dated Early Archaic sites, either within or outside the context area, that would allow identification of Early Archaic sites for which no radiometric or projectile point data are available?
- Can Early Archaic sites lacking chronological indicators be placed in a temporal context based on associations with broad geomorphic events?
- Is there a geographical skewing of dated Early Archaic sites that might suggest variable settlement intensity within the context area?

Population Dynamics

Much has been hypothesized about Early Archaic population movements in the general region, particularly in regard to environmentally induced abandonment of low ground in favor of higher terrain less susceptible to xeric Altithermal conditions. Negative data are an essential element of such hypotheses, and it is generally presumed that a lack of sites on the plains and in the low basins implies absence of human habitation and, by inference, migration to adjacent higher ground. While Early Archaic settlement may well be explainable in terms of paleoclimates, geomorphic processes as they pertain to site preservation and destruction may come into play as well.

- Is the present record of Early Archaic habitation in the context area, which suggests occupation mainly of foothills and higher mountain areas, reflective of actual settlement trends during the period?

- If intact Early Archaic sites are identified on the plains, are there temporal differences between these sites and those at higher elevations that might indicate the timing and direction of movements within the period?

- Is it possible to discern multiple episodes of abandonment and reoccupation during the Early Archaic period, and can such cycles be associated with paleoclimatic shifts?

- Is the population density of the foothills and higher mountains during the Early Archaic period sufficiently high to be explained in terms of migrations from the lowland areas?

- If occupants of the plains were part-time users of the high mountains, are their sites sufficiently distinct in terms of artifact assemblages or settlement characteristics that they can be distinguished from in situ Mountain-tradition peoples?

- Do lithic material types at Early Archaic sites in the context area indicate contact with adjacent regions; was movement of materials and/or people during the period mainly vertical in nature, i.e. between lower and higher altitudes, or is the demographic picture of the period more complex?

Technology

Because of the limited number of positively identified Early Archaic sites, technological aspects of Early Archaic occupation of eastern Colorado are poorly understood, particularly east of the mountain front. Further, opportunities for comparison and contrast with data from adjacent areas are limited to a finite number of sites of which almost all are situated in high-altitude settings. If the context area was indeed occupied during the Early Archaic period–if only sparsely–future research may facilitate recognition of sites based on technological attributes that do not include traditional chronological indicators such as stylistically unique projectile points. The limited state of knowledge about Early Archaic technological process requires that the most basic of research questions be posed. These questions do not differ greatly from those formulated for the Paleoindian periods.

- What is the morphological and functional range of lithic tools, and can tool kits be identified that would aid in recognition of Early Archaic sites for which projectile point and radiometric data are unavailable?

- Do Early Archaic lithic assemblages reflect intersite consistency, or are geographical and/or functional differences apparent within the context area?

- Are material culture assemblages of the mountains distinct from those of sites at lower elevations, and can the presence of an in situ Mountain tradition be inferred on this basis?

- What is the principal mode of lithic reduction, and are there significant departures from the technological organization of the final period (Plano) of the Paleoindian stage?

- Where and in what manner were raw lithic materials quarried, and what do patterns of lithic procurement suggest about regional movement and/or trade; is Early Archaic occupation of the mountains a more isolated phenomenon than that of the plains, as indicated by lithic material type and distribution?

- Is there artifactual evidence (particularly lithic evidence, e.g., microblades) of a separate Early Archaic manifestation of the Mountain tradition in the higher elevation portions of the context area?

- What is the morphological range of Early Archaic projectile points, and what stylistic differences are evident between upland and lowland areas?

- To what extent do projectile points of the Early Archaic period overlap the temporal span of the Middle Archaic period?

- Which projectile point styles are unique to the Early Archaic period, and can they be related to chronological ranges that do not span the entire period?

- What is the nature of the Early Archaic ground stone industry; is ground stone more common at Early Archaic sites than those of the preceding Plano period?

- What is the nature of the bone tool industry, and are there diagnostic forms that may aid in Early Archaic site recognition?

- Does the expedient bone tool industry of the Plano period carry forward into the Early Archaic period?

Settlement and Subsistence Strategies

Settlement patterns on the plains during the Early Archaic period are virtually unknown for the context area and adjacent regions, and data from the mountains are limited. An Altithermal association of site locations with reliable water sources would seem logical in low-elevation areas but is undemonstrated archaeologically. Such a connection is apparent in high-elevation locales where water would in fact appear to be a less critical settlement variable. Site types and site variability are also very poorly known on the plains and the subject has received only limited attention in the high country, particularly within the boundaries of the context area. Comprehension of Early Archaic settlement and subsistence is dependent upon site discovery and recognition; explanations for the overall dearth of sites may owe to behavioral factors (which in turn may relate to unfavorable environmental conditions), geomorphic processes, or a combination of both.

- What is the full descriptive and functional range of Early Archaic site types?

- What is the range of ecological settings occupied by Early Archaic sites, and do they display a stronger affinity for water sources than in preceding or subsequent periods?

- How do Early Archaic site settings and general settlement patterns in the plains and foothills compare with those of the higher mountains, and do these sites suggest a single integrated economic system or separate cultural groups?

- Did the large bison herds evident on the plains during the preceding Plano period in fact disappear; did bison migrate to higher ground as a result of Altithermal desiccation, and did bison procurement patterns of the Plano period continue in upland areas during the Early Archaic period?

- Is there archaeological evidence of fluctuations in large fauna populations within the Altithermal that might reflect variable paleoclimatic conditions?

- Is the Early Archaic economy more generalized than that of late Paleoindian times?

- Is the apparent large-group resource exploitation pattern of the Plano period replaced by a dominant small-group pattern?

- Is there an increase in rockshelter use in comparison to the Paleoindian period, and if so could it be associated with an increased need to store food?

- What evidence exists for habitation structures, and how does structural evidence compare morphologically and functionally with that from adjacent areas, particularly the Southern Rocky Mountains generally and the Wyoming Basin?

Geomorphology and Paleoclimates

Paleoclimates are a critical issue in Early Archaic investigations because of the temporal coincidence of this period with the Altithermal climatic episode. Altithermal conditions are believed by many archaeologists to provide an obvious explanation for the limited evidence of human habitation of low-elevation areas over a vast region of the western Great Plains. However, paleoclimates have been little-studied in the context area, and in eastern Colorado Holocene paleoenvironmental studies are temporally and geographically spotty. Definition of early Holocene geomorphic processes is essential to understanding human behavior during the Early Archaic period because of the manner in which paleoclimates will be reflected in those processes. Furthermore, explanations for patterns of site presence and absence may well lie in an understanding of geomorphic processes of site preservation and destruction, and identification of landscapes of early Holocene age. The types of investigations that may contribute to an understanding of early Holocene geomorphology and paleoclimates include analysis of landscape evolution (particularly alluvial geomorphology and sand dune formation and activation/dormancy cycles), long-range climatic studies including climatic modeling, study of fossil soils and soil-development processes, radiometric dating, palynology, faunal analysis including fossil insect studies, macrobotanical analysis, and gastropod analysis. Further, temporally controlled comparison between high-altitude paleoclimatic and geomorphic events and those of the plains needs to be conducted.

- What climatic conditions prevailed during the Early Archaic period, and are there paleoclimatic explanations for the dearth of sites in the context area?

- What are the paleoclimatic implications for human economic practices?

- Can the general absence of sites on the plains during the Early Archaic period be attributed to the same paleoclimatic and/or geomorphic processes that prevailed during the Paleoindian stage?

- What evidence exists for fluctuations of environmental conditions within the Early Archaic period, and are such fluctuations reflected in prehistoric settlement?

- What were the predominant geomorphic processes affecting landscape development in the context area during the Early Archaic period?

- Are early Holocene terrains identifiable that may harbor Early Archaic sites, and would sites associated with these terrains be buried or on the surface?

- If intact terrains of Early Archaic age are present, how would soil-forming processes and more general geomorphic processes have affected internal site structure?

- Can buried soils of Early Archaic age be identified and dated on a regional scale?

MIDDLE ARCHAIC PERIOD

Database of the Context Area

The Middle Archaic is the earliest period in the prehistoric sequence for which a solid–if not extensive–database exists for the context area. Consequently, it is possible to discuss attributes of the Middle Archaic without heavy reliance on the use of critical information from outside the area. Twenty-eight absolute dates (26 radiocarbon, two obsidian hydration) have been obtained from 20 tested and excavated sites in the context area (see Appendix A and Figure 4-2; Figure 6-2). These sites display a wide geographical distribution and are found in plains (Las Animas County), plains/foothills (Custer, El Paso, Fremont, and Pueblo counties), and mountainous (Chaffee and Lake counties) settings. An additional five cation-ratio dates spanning the range of 4675 to 3300 B.P. have been secured from four separate rock art sites in the PCMS in Las Animas County (see Appendix B). As noted in the opening paragraphs of this section, the temporal distribution of Middle Archaic dates is remarkably smooth throughout the course of the period and lacks significant hiatuses.

Middle Archaic sites have also been identified on the basis of projectile points through surface inventory throughout the context area. Nearly all large-scale and many smaller surveys have yielded such evidence. On the plains these inventories include the various investigations at the PCMS (Anderson 1989a, 1989b; Andrefsky 1990), John Martin Reservoir in Bent County (Eddy et al. 1982), the Flank Field storage area in Baca County (Wood et al. 1981), Carrizo Ranches vicinity in Baca and Las Animas counties (various Colorado College citations; see History of Archaeological Investigations), and the Diamond Shamrock Colorado Springs pipeline corridor between the Colorado-Oklahoma border in Baca County and the Colorado Springs area (Mueller et al. 1994). It is also worth noting that the Olsen-Chubbuck site in the extreme northeastern corner of the context area, best known as a Paleoindian/Plano kill site, has an apparently Middle Archaic surface component as well (Wheat 1972:138-139).

Inventories in the foothills and along the plains/foothills boundary with Middle Archaic materials include numerous surveys on Fort Carson in El Paso, Pueblo, and Fremont counties (Alexander et al. 1982; Zier et al. 1997), the Cyprus Mines Hanson project in Fremont County (Kranzush et al. 1979), the Lorencito Canyon Mine in Las Animas County (McKibben et al. 1997), and the Apishapa-Purgatoire highlands survey, also in Las Animas County (Lutz and Hunt 1979). Middle Archaic evidence has been found in higher altitude surveys in the Wolf Springs and Bucci ranches in Huerfano County (Stoner et al. 1996; Arbogast and Zier 1991), the mid-Huerfano survey area, also Huerfano County (Lutz et al. 1977), and at both the Heckendorf SWA and Trout Creek Pass quarry in Chaffee County (Black 1997; Chambellan et al. 1984).

Regions adjacent to the Arkansas River context area likewise exhibit widespread and often abundant evidence of Middle Archaic habitation, which stands in stark contrast with the meager record of the Early Archaic (Black 1991; Eighmy 1984; Frison 1991). A possible exception is the southern Park Plateau area of north-central New Mexico, including the Ancho Canyon Mine west

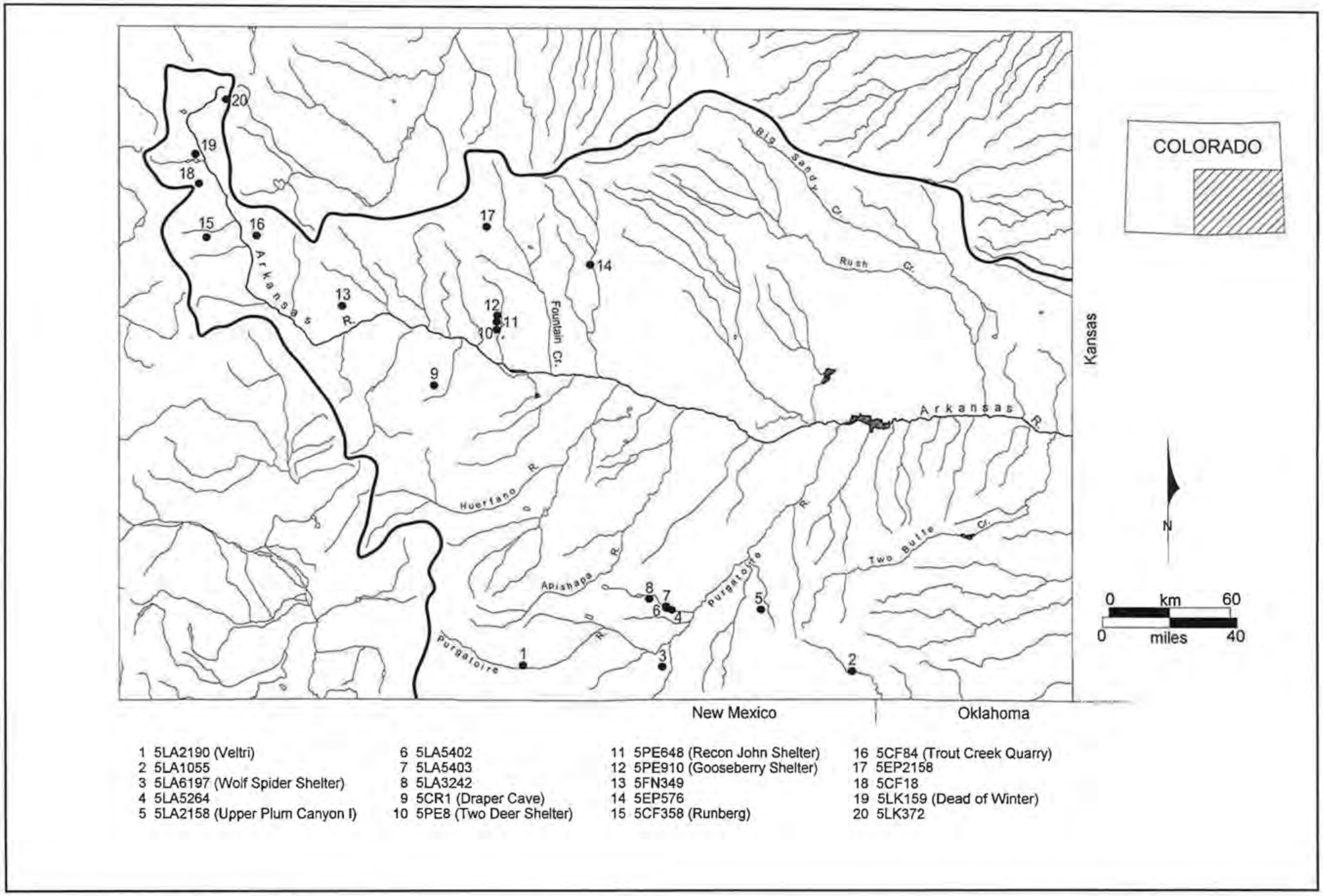


Figure 6-2. Map of Arkansas River context area showing locations of chronometrically dated Middle Archaic period sites.

of Raton. Middle Archaic remains do occur but are not particularly common, especially in comparison to the evidence for Late Archaic and Late Prehistoric materials (Biella and Dorshow 1997a:31-36). Two sites in the South Platte drainage basin of northeastern Colorado are specifically cited because of the important information they provide about occupation during this period. These sites are Dipper Gap east of Pawnee Buttes in Logan County (Metcalf 1974) and the Magic Mountain site adjacent to Golden (Irwin-Williams and Irwin 1966). Dipper Gap is a stratified butte-top site with a predominant Middle Archaic component overlain by Late Archaic and Late Prehistoric materials. The Apex complex component at Magic Mountain overlies the Early Archaic Magic Mountain component and includes both Middle and Late Archaic materials.

No attempt will be made to describe individually all tested and excavated sites of Middle Archaic age. Much of the information in the following subsections is drawn from a few key sites, however, and a review of these sites is appropriate. It should be noted that of the 20 sites that have yielded Middle Archaic radiometric dates, just nine were subjected to full-scale ("mitigative") excavation; the remainder were only test excavated, and in some cases the level of effort was minor. Of the excavated sites, none was investigated in its entirety with the exception of Wolf Spider Shelter, at which cultural deposits had been largely removed by natural erosional processes prior to excavation. The excavation database thus has inherent limitations.

Exactly half of the 20 tested/excavated sites are in rockshelters, and four of these sites (Draper Cave, Recon John Shelter, Gooseberry Shelter, Wolf Spider Shelter) are of particular importance. All of these sites are multicomponent, and in each case the Middle Archaic component is the deepest and earliest. Draper Cave (Hagar 1976) may be the single most important Middle Archaic site in the Arkansas River context area. Located in the foothills of Custer County near Wetmore, this extensively excavated site (approximately 90 m^2) exhibits a substantial Middle Archaic component with overlying, and perhaps partially intermixed, Late Archaic and Late Prehistoric materials. It appears that most cultural material occur within 1 m of the surface, although unfortunately the report is lacking in stratigraphic details. Radiocarbon dates of 3520 and 3480 B.P. are associated with the Middle Archaic component.

Recon John and Gooseberry shelters (Zier 1989; Zier and Kalasz 1991; Kalasz et al. 1993) are situated 2.4 km (1.5 mi) apart in the small canyon of Turkey Creek in the southern portion of Fort Carson in Pueblo County. Despite their proximity to one another, the sites are in fundamentally different geomorphic contexts. Cultural materials at Recon John Shelter are in a matrix of alluvial overbank sediments that accumulated gradually over several millennia. This site had been extensively looted and excavation was limited to a 6-meter-long trench extending outward from the dripline. Substantial, deep Late Archaic and Late Prehistoric strata overlie a thick but comparatively sparsely manifested Middle Archaic component that occurs at a depth of 1.40-1.95 m. More Middle Archaic radiocarbon ages were derived from this site than any other in the context area (4400 B.P., 4050 B.P., 3680 B.P., 3530 B.P.), although the 3530 B.P. age is associated with an overlying component otherwise identified as Late Archaic and is out of stratigraphic sequence. Gooseberry Shelter is positioned just above the Turkey Creek flood plain and is filled with eolian sediments. Two 1 x 2 m test pits were excavated. This deeply stratified site has substantial Middle Archaic, Late Archaic, and Late Prehistoric components. Middle Archaic ages (4930 B.P., 3890 B.P.) were obtained from features in the two lowest cultural strata, which occur at depths of 1.80-2.48 m. With the notable exception of the Olsen-Chubbuck site date, the earlier age of 4930 B.P. is the oldest radiocarbon assay in the context area east of the mountain front.

Wolf Spider Shelter is located east of Trinidad in Las Animas County (Hand and Jepson 1996). Cultural deposits had been largely washed away by Trinchera Creek, and the excavation consisted of a salvage operation limited to about 9 m^2 of area (including prior testing). Middle

Archaic materials, supported by three radiocarbon ages (4900 B.P., 4300 B.P., 3900 B.P.), occur in alluvial sediments ranging in depth from approximately 0.70 to 1.6 m. Late Archaic and Late Prehistoric deposition overlies the Middle Archaic stratum.

Important open sites in the context area are 5EP576 and 5LA2190 along the plains/foothills margin, and the Dead of Winter site in the high mountains. Site 5EP576 is located along Black Squirrel Creek a few miles east of Colorado Springs in El Paso County (McDonald 1992; Wynn et al. 1993). It is part of a complex of sites associated with a prominent sandstone cliff known as Crows Roost. While some minor shelter is provided by an erosional sandstone remnant in the site vicinity, the site is basically open. The total excavation area was 12 m^2. A Middle Archaic component up to 1 m deep but of unknown total depth is overlain by sterile sand, above which rests a Late Archaic component. Bone from the Middle Archaic component produced a radiocarbon age of 4690 B.P. All cultural materials occur in a colluvial matrix. Archaeological materials from the two components were, unfortunately, regarded as a single assemblage in the analysis; however, it appears that little technological or other variation was discernible between the components. Site 5LA2190 is located near the upper Purgatoire River a short distance west of Trinidad (Rood 1990; Rood and Church 1989). A total of 23 m^2 of excavation was conducted, excluding testing some years earlier (Indeck and Legard 1984). Excavation exposed a structure with an associated external feature that yielded a radiocarbon age of 3160 B.P. The investigators note that the date falls close to the Middle Archaic-Late Archaic boundary, and in the article title it is arbitrarily assigned to the latter period (Rood 1990:26). Because its age predates the 3000 B.P. temporal boundary established in this document, the site is here regarded as terminal Middle Archaic. No diagnostic artifacts were found in association with the structure or external feature.

The Dead of Winter site (5LK159) is the only extensively excavated high-altitude site in the context area that has a substantial Middle Archaic component (Buckles 1978), although several sites with diagnostic Middle Archaic projectile points and/or radiocarbon-derived dates in Lake and Chaffee counties have been subjected to limited-scale testing or excavation (Arthur 1981; Buckles 1975b; Chambellan et al. 1984), and the Runberg site on Cottonwood Pass has yielded one Middle Archaic radiocarbon age (Black 1986). The Dead of Winter site is located at an elevation of 2833 m (9295 ft) on a moraine ridge in Twin Lakes Valley, Lake County, to the southwest of Leadville. An area totaling 70 m^2 was excavated. The site exhibited evidence of several activity areas that included features, ground stone, and an extensive lithic assemblage, with most materials occurring within 40 cm of the surface. Buckles (1978:338-340, 382-387) believes the site to be single-component Middle Archaic, although difficulties in interpretation of the stratigraphy and high-altitude turbation processes are acknowledged. The Runberg site near Buena Vista (discussed above) probably includes terminal Middle Archaic materials but they are intermixed with, and analytically indistinguishable from, a more prominent Late Archaic component (Black 1986).

Population Dynamics

While explanations for the dearth of Early Archaic sites throughout the region vary (see previous section), there is little doubt that Middle Archaic habitation was geographically widespread both within and beyond the borders of the upper Arkansas River Basin. The context area essentially mirrors the pattern of the High Plains, Central and Southern Rocky Mountains, and intermountain basins. Ecological settings at higher elevations that were occupied during the Early Archaic were still utilized, with reuse of specific site locations in some cases. However, broad regions at lower elevations for which the archaeological record is a virtual blank prior to ca. 5000 B.P. were now clearly inhabited. The sheer numbers and sudden widespread distribution of Middle Archaic sites strongly suggests that the significant changes in the archaeological record are best explained in terms of demographic processes, rather than factors relating solely to geomorphology. The apparently regionwide population expansion may have been internally generated or could reflect outward spread of people from one or more core areas.

The various, related projectile point styles collectively referred to as the McKean complex, the presence of which is critical to the definition of temporal boundaries for the Middle Archaic period, became widespread in the Central and Southern Rockies, adjacent plains, and intermountain basins and valleys after about 5000 B.P. The area of origin is subject to debate (e.g., Black 1991:3), but is very possibly the mountainous portion of the region described (Black 1991:3-4, 21; Husted 1969). Because occupational evidence of expansion into low-elevation regions is concomitant with the appearance of the McKean complex, the spread of the complex may represent the geographical expansion of human groups and not merely the diffusion of traits through in situ populations. Specific attributes of the McKean complex are described in the following subsection.

Some site-specific data from the context area, for example Recon John Shelter (Zier 1989; Zier and Kalasz 1991), are at odds with scenarios of population movement or trait diffusion on a regional scale. While McKean-type projectile points are common in Middle Archaic sites, lithic assemblages as a whole are suggestive of local procurement of tool stone with only limited evidence of the sort of widespread movement of raw materials that is apparent in the Paleoindian stage. The description "static and relatively isolated" was applied to the Middle Archaic and later occupations at Recon John Shelter (Zier and Kalasz 1991:111). As more investigations involving materials sourcing are conducted in the context area, this impression may be altered.

Technology

The suite of projectile point styles subsumed by the McKean complex is comprised of both lanceolate and stemmed-indented base forms. All are dart points. McKean lanceolate points vary greatly in overall size but exhibit concave bases and convex blade edges, and are generally wider at midblade than at the base (Frison 1991:91). The stemmed-indented base points are usually classified as Hanna or Duncan, and sometimes "Hanna-Duncan," obviously related types that show a great deal of regional and even intrasite variation in overall size, stem length and shape, and blade shouldering (Frison 1991:89-91; Metcalf 1974:54-72). A long, slender variant from the Northwestern Plains with a distinct expanding, indented stem known as Yonkee (Frison 1991:94) is rarely identified as such in Colorado although similar points do occur (e.g., Hand and Jepson 1996:66-69). The Mallory point is sometimes regarded as an element of the McKean complex although its origin may be in the Southern Rockies (Black 1991:4). Mallory points incorporate both Early Archaic (side notching) and McKean-like (basal indentation) traits but are clearly of Middle Archaic age based on radiocarbon and other associations (e.g., Lobdell 1973; Miller 1976).

Plains sites in and near the context area exhibit other, apparently unrelated projectile point forms in Middle Archaic contexts. These types have temporal spans independent of that of the McKean complex (ca. 5000-3000 B.P.); some originate in the Early Archaic and continue into the Middle Archaic, while others span the Middle-Late Archaic juncture and extend forward in time well into the latter period. As noted in the discussion of the Early Archaic period, teardrop-shaped points probably originate in Early Archaic times and continue into succeeding periods, as may corner-notched points with broad blades, convex blade edges, and deep notching (Anderson 1989c:435-436). Styles that begin during the Middle Archaic period–and sometimes occur in association with McKean types–but continue forward in time include straight and expanding stemmed forms, shouldered or unshouldered, lacking basal indentation; and large corner-notched forms with relatively narrow blades and expanding stems (Anderson 1989c:435-436; Hagar 1976).

It is likely that the tradition of corner-notched dart points that became predominant in the Late Archaic period had Middle Archaic origins.

McKean-complex projectile points, as well as Mallory points, occur in Middle Archaic contexts in the high country as well (Black 1986:137) and indeed some or all of these forms may have originated there (above). Corner-notched Middle Archaic points are also present including some with serrated edges (Black 1986:138). With regard to the latter attribute, Black (1991:11) notes that blade edge serration is common in Mountain tradition projectile points after about 7000 B.P. and that it is found in association with all point types. Edge serration is rare on projectile points from plains sites.

The Middle Archaic lithic industry of the plains/foothills portion of the context area is based on a combination of intensive and unintensive core reduction of usually locally available materials. Assemblages consistently display a mixture of formal and expedient tools. Bifaces dominate formal tool inventories and are manifested in a wide range of sizes and shapes, the latter including ovate and lanceolate and, less commonly, triangular forms. Edge-retouched flakes are also abundant and include formal end and side scrapers that often are made on thin flakes. Retouched flakes displaying minimal edge modification and lacking formality of shape comprise one element of a ubiquitous tradition of expedient tools that also includes utilized flakes and chopping/battering tools derived from cores and cobbles. Expedient tools dominate Middle Archaic lithic assemblages on the plains, just as they do in collections from the succeeding period (Hagar 1976; Kalasz et al. 1993; McDonald 1992; Metcalf 1974; Zier 1989; Zier and Kalasz 1991).

Far less information is available about high-altitude Middle Archaic lithic industries in the context area. The extensive lithic assemblage from the Dead of Winter site near Leadville (Buckles 1978:346-367) conforms very closely to Black's (1986:8-9) description of Mountain tradition lithic artifacts. More than 500 end and side scrapers (with the former predominant) were found in an assemblage of approximately 7,000 artifacts, with many of the items described as "micro-flake tools." Some exhibit intentional edge retouch and others have been modified through use. Other expedient tools, many of small size, are present in large numbers as are bifaces of a range of sizes and shapes–similar to biface inventories from Middle Archaic plains sites.

Ground stone is common at Middle Archaic sites throughout the region. Frison (1991:89) believes that ground stone artifacts "proliferate" after showing modest increases in terminal Paleoindian and Early Archaic times, but the general absence of known sites during the Early Archaic period in fact makes most classes of artifacts seem to proliferate in the Middle Archaic. Most information about Middle Archaic ground stone in the context area is derived from sites in the plains and foothills. The industry is expedient and largely unformalized. Metates consist of flat, unifacial or bifacial slabs, usually of sandstone, that only occasionally exhibit evidence of intentional shaping. They may be slightly basined as a result of use. Manos are most likely to consist of ovate river cobbles although sandstone nodules were also used. Manos also do not display intentional shaping but often become flattened and faceted, either unifacially or bifacially, through repeated use. Ground stone is frequently found in very fragmentary condition, suggesting that slabs were utilized until they became thin and breakable (Hand and Jepson 1996; Irwin-Williams and Irwin 1966; Kalasz et al. 1993; Zier 1989; Zier and Kalasz 1991). Other types of ground stone artifacts found at Middle Archaic sites on the plains include sandstone shaft abraders, grooved sandstone cobbles that were probably hafted mauls (Metcalf 1974), and from Wolf Spider Shelter, a sandstone pallet with ground surfaces, pecked depressions, and traces of iron-based pigment (Hand and Jepson 1996). Abundant evidence of mineral paint consisting of both limonite and hematite, occurring in several forms, was also found at Dipper Gap (Metcalf 1974). Only a limited number of ground stone artifacts have been recovered from dated Middle

Archaic contexts in the mountains but in this area also they consist of expedient slab and cobble tools (e.g., Buckles 1978).

Bone and shell artifacts are uncommon at Middle Archaic sites in and near the context area but do occur in a variety of forms. The scarcity of such artifacts could to some extent reflect poor conditions of preservation, as at the Magic Mountain site (Irwin-Williams and Irwin 1966:165-167). Modified bone from Middle Archaic contexts includes tubular beads manufactured from cottontail, jack rabbit, and bird bone; awls of varying shape made from bones of medium and large mammals (bison scapula, pronghorn and canid metapodials); and bison scapula scraping tools (Hand and Jepson 1996; Metcalf 1974; Zier and Kalasz 1991). A pendant manufactured from freshwater bivalve shell was recovered from Wolf Spider Shelter (Hand and Jepson 1996).

Settlement and Subsistence Strategies

Site Types and Locational Variability

The wide geographical distribution of Middle Archaic sites, both within and outside the context area, has been noted. Unfortunately, no settlement syntheses have been attempted in the Arkansas River Basin that investigate the specific factors that conditioned Middle Archaic site location practices. Extensive locational modeling has been conducted within surveyed areas of the PCMS but chronological differentiation was given minimal treatment (Benko and Larson 1990; Kvamme 1984). Thus, while environment-location correlates can be demonstrated for the prehistoric site assemblage as a whole, specific information about settlement within a particular temporal period is somewhat limited. It is evident, however, that surface sites with Middle Archaic projectile points are widely distributed at PCMS and occur within several ecological zones (Andrefsky 1990). At Fort Carson, where numerous surveys on a large scale have been conducted, Middle Archaic sites also are found in a range of settings including open plains, timbered uplands, and canyons and valleys. The greatest representation is in canyons and valleys, near permanent or intermittent water sources, and includes several rockshelter sites (Alexander et al. 1982:207-216; Kalasz et al. 1993; Zier 1989; Zier et al. 1996a).

Data from throughout the context area indicate that, although widespread and occurring within a broad range of ecological zones, Middle Archaic sites display a strong tendency to be situated near water sources, particularly permanent and intermittent watercourses. Middle Archaic sites are found scattered across the plains of southeastern Colorado but their locations are by no means randomly placed, and interfluvial areas are far less likely to exhibit evidence of habitation than riparian locales. In the mountains, Middle Archaic sites occur in high valley bottoms and on valley slopes, often on moraine deposits overlooking or in proximity to streams and lakes, and are also found in and along routes leading to high saddles and passes (Arbogast and Zier 1991; Arthur 1981; Buckles 1978; Engleman and Shea 1980; Lutz and Hunt 1979). In southern Wyoming and northeastern Colorado, there is a strong correlation between human settlement and sand dune settings that dates back to at least the mid-Holocene (e.g., Jepson et al. 1994; Zier et al. 1981). Despite the occurrence of significant eolian deposition–in some cases dunal–in parts of southeastern Colorado east of the mountain front, a similar association has not been established in the area.

Sites of Middle Archaic age occur in both open and sheltered settings. Middle Archaic rockshelters are common in the foothills and in areas of the plains where the proper geological conditions exist, for example, small canyons incised into sandstone. Sheltered sites exhibiting only Middle Archaic materials are rare, however. The frequent use of shelters during this period extends beyond the context area to northeastern Colorado and elsewhere (e.g., Breternitz 1971;

Burgess 1981; Frison 1991:99-101). It is possible that the relatively large number of rockshelter sites is as much a reflection of preservation in favorable environments as it is an actual indicator of prehistoric settlement preferences. Rockshelter deposits, although sometimes thick, are generally more suggestive of short-term and repeated use than intensive, sustained habitation (e.g., Kalasz et al. 1993; Zier 1989; Zier and Kalasz 1991).

Open sites display variation in size and complexity and usually consist of lithic or lithic/ground stone scatters, both with and without evidence of hearths (e.g., Zier et al. 1997). Small limited-activity sites exhibiting low artifact numbers and diversity and lacking features occur, as do spatially extensive multiple-activity sites with a wide range of tool types and hearths. As is the case with rockshelters, Middle Archaic open sites frequently display evidence of reoccupation with attendant implications for artifact assemblage mixing. Isolated Middle Archaic projectile points are also common throughout the region. Stone circles ("tipi rings") appear on the Northern and Northwestern Plains during the Middle Archaic period (Frison 1991:92-97) and are common in parts of the South Platte basin in northeastern Colorado (e.g., Day and Eighmy 1998). However, such structures of Archaic age appear to be rare south of the South Platte-Arkansas drainage divide. Bison kill and butchering sites are also known to the north of the context area, for example, the Scoggins site in south-central Wyoming (Lobdell 1973; Miller 1976). While butchered bison bone is found in Middle Archaic contexts (see below), procurement sites are unknown in the context area.

The major quarry site on Trout Creek Pass in the upper Arkansas River Basin was almost certainly utilized in Paleoindian and Early Archaic time, as based on projectile points recovered from the surface. Its use during the Middle Archaic period is demonstrated not only through points but also a deep pit of unknown function that is radiocarbon dated at 3910 B.P. (Chambellan et al. 1984). High-altitude game drive systems that include hunting blinds, first identified with the Early Archaic period, were also employed in Middle Archaic times. Although best known from the Indian Peaks-Rocky Mountain National Park area (Benedict 1996), they also occur on Monarch Pass along the drainage divide between the upper Arkansas and Gunnison River headwaters (Hutchinson 1990).

Evidence of basin-type structures becomes widespread during the Middle Archaic in the Wyoming Basin, and scattered structures occur elsewhere in the region during this time (Shields 1998:290-292). The single known Middle Archaic habitation structure from the context area is 5LA2190 west of Trinidad (Rood 1990; Rood and Church 1989). The structure consists of a shallow, oval depression with a crude semicircle of sandstone slabs on one side. The basin is small, measuring 1.8 x 1.35 m, with a central depth of 10 cm; if the sandstone slab distribution around the perimeter is included, the overall dimensions expand to 2 x 1.5 m. Unburned clay chunks at one margin of the basin suggest slumped roof or wall material, and the position of the sandstone slabs is indicative of a slumped wall of dry-laid, horizontally stacked members. No postholes were found, nor are interior features present. A small, basin-shaped hearth with burned rock and ash lies adjacent to the structure and is associated with it. Few artifacts were found in association with the structure or hearth. As noted above, the radiocarbon age of 3160 B.P., which was derived from the hearth, falls very close to the Middle Archaic-Late Archaic boundary.

Nonstructural features, particularly hearths, are common at Middle Archaic sites where they assume a variety of forms. Far more information is available from the plains and foothills of the context area than from the high-elevation areas. The majority of excavated hearths consist of shallow, circular to ovate basins less than 20 cm deep. Most often they are unlined, but they may also exhibit cobble lining or lining with upright, sloped, or flat-lying slabs. Hearth fill varies from ash-stained soil to charcoal to burned sandstone slabs and/or stream cobbles, or most commonly, some combination thereof. The single unifying theme for Middle Archaic hearths seems to be small size. Virtually all excavated features in the context area for which metric data are available are less than 1 m in diameter, and the majority of these do not exceed 50 cm (Hagar 1976:3-4; Hand and Jepson 1996:34-39; Kalasz et al. 1993:266-268; Rood 1990:36). At Draper Cave, Hagar (1976:4) reports a cobble-lined hearth of almost certain Middle Archaic age that exhibits an upright slab deflector positioned between the feature and the mouth of the shelter. Numerous Middle Archaic hearths excavated at Dipper Gap in northeastern Colorado (Metcalf 1974:37-53), which consist of shallow unlined, sometimes rock-filled basins, amorphous cobble concentrations, and charcoal lenses, do not display the consistently small size evident in southeastern Colorado features. Feature diameters consistently ranged between 80 cm and 1.65 m, with some larger.

The limited information from the mountains indicates consistent use of circular to oval, shallow basins, sometimes rock filled, usually not exceeding 50 cm in diameter (Buckles 1975b:113-116, 1978:368-382). Exceptions are a larger (80 cm diameter) cobble-lined hearth of Middle Archaic age at the Runberg site (Black 1986:110113), and a deep pit (approximately 1 m) filled with dark sediment and charcoal at the Trout Creek Pass quarry site (Chambellan et al. 1984).

The five dated rock art panels of Middle Archaic age in the context area, which represent four sites (see Appendix B), are located on the PCMS in Las Animas County. All of the panels occur on boulders, and all are petroglyphs. Four of the five panels display pecked abstract designs, which consist of paired wavy lines, an amoeba-shaped element associated with straight and wavy lines, a curvilinear meander associated with an enclosure, and wavy lines associated with connected circles and rows of dots. The fifth panel, which exhibits the only dated Middle Archaic pecked representational element in the context area, consists of a well-formed quadruped with horns (5LA5599) (Faris 1995; Loendorf 1989).

One Middle Archaic burial, from Draper Cave, has been reported in the context area (Hagar 1976:4-5; Finnegan 1976). It is a fully articulated young adult male, semiflexed, interred in an unlined pit on its left side. The burial faced the opening of the shelter. Thirty-eight chert bifaces were found in the burial pit, concentrated in the vicinity of the skull, torso, and knees.

Economy

Evidence exists for consumption of an array of animal and wild plant species during the Middle Archaic period. Better information is again available from the plains and foothills of the context area because more excavations have been carried out. Based on regional presence/absence data from archaeological sites, Butler (1997) notes that bison, deer, pronghorn, and rabbit all occur in Middle Archaic components, and Dillehay (1974) regards most of the Middle Archaic (after ca. 4500 B.P.) as a "bison present" period on the High Plains. One cannot state with confidence that Middle Archaic hunter-gatherers engaged in more broad-spectrum subsistence practices than did Early Archaic inhabitants of the region, because the database for the earlier period is so meager. The faunal and floral inventories after 5000 B.P. are, however, extensive. Small-group exploitation of a wide range of ecological niches is evident, with little or no fundamental change in social organization from the preceding period.

Remains of cottontail and jack rabbit occur in most tested and excavated sites on the plains, and usually are represented by the highest numbers of identifiable bones. Prairie dog is also common but not to the extent of rabbit. Somewhat less common are deer and pronghorn, various small rodents (woodrat, pocket gopher, ground squirrel, several species of mouse), and birds including waterfowl. Occurring occasionally are remains of bison, badger, fish, crayfish, frog and possibly other amphibians, and snake (Hand and Jepson 1996; Kalasz et al. 1993; Zier 1989; Zier and Kalasz 1991). Evidence of canid (dog or coyote) and turtle has also been found in

Middle Archaic contexts in northeastern Colorado (Metcalf 1974:126; Burgess 1981:125). Bison are surprisingly rare in the archaeological record of the Middle Archaic period, a fact that may reflect the locations of tested/excavated rockshelter sites in canyons. However, the fragmented condition of much of the artiodactyl bone from Middle Archaic sites makes identification to the species level impossible. Long bone fragments from large mammals are common, but the overall evidence of small mammal use is predominant in faunal assemblages from this period.

The occurrence of game drives at or above timberline indicates that large mammals were exploited in the high country of the context area. Though no direct faunal evidence is associated with these sites, it is most likely that bighorn sheep, bison, or elk were taken. Fragmented bone does occurs in high-altitude sites, for example, at the Dead of Winter site (Buckles 1978), but almost no species data are available.

Floral inventories are also lengthy and, like faunal, tend to be dominated by a few species. Most commonly occurring are seeds of goosefoot, hackberry, Indian ricegrass, and purslane. Seeds of prickly pear, hedgehog cactus, skunkbrush, pinyon pine, juniper, sunflower and possibly other Compositae, pigweed, and grape occur but with less frequency. Perhaps significantly, the Middle Archaic storage feature at Wolf Spider Shelter (Hand and Jepson 1996:111-113) yielded abundant, charred goosefoot seeds. Middle Archaic strata at Recon John and Gooseberry shelters also yielded possible corncob fragments (Zier and Kalasz 1991:123; Kalasz et al. 1993:280). A strong argument in favor of maize in southeastern Colorado during this period cannot be made, given the tentative nature of the remains in combination with evidence of rodent disturbance and possible stratigraphic mixing at both sites.

Directions for Future Research

Chronology

The Middle Archaic period is the earliest time frame for which evidence of human occupation in the context area is both widespread and reliably dated through radiometric techniques. Occupation appears to have occurred throughout the course of the period as indicated by the steady progression of radiocarbon ages beginning ca. 5000 B.P. and continuing to the close of the period some 2,000 years later. Despite this relative abundance of information, problems persist with the chronometric database. Dated sites in the plains portion of the context area generally occur in rockshelters with access to reliable water sources, and thus no fine chronological control exists over surface sites in upland areas, which are dated on the basis of projectile points alone. In fact, few firmly dated Middle Archaic sites are known to occur over vast unwatered areas of the plains. The level of prior investigation in the mountains and foothills of the context area is insufficient to yield a reliable assessment of the age and distribution of Middle Archaic populations.

- Is the chronological range of Middle Archaic occupation of the context area continuous or episodic?
- Are there discernible temporal trends in settlement that might indicate the manner in which the area became fully occupied following the close of the Early Archaic period?
- Can distinctive combinations of artifact attributes (tool kits) be described at dated Middle Archaic sites within the context area that would allow identification of sites for which no radiometric or projectile point data are available?

- Can Middle Archaic sites lacking chronological indicators be placed in a temporal context based on associations with broad geomorphic events?

- Can cation-ratio dates on rock art be corroborated through traditional radiocarbon dating of associated deposits, e.g., in rockshelter sites?

Population Dynamics

The sudden and widespread appearance of datable evidence at the beginning of the Middle Archaic period very likely reflects more than a simple change in geomorphic factors that affected site preservation. If indeed the human population of the context area did increase during Middle Archaic times, various processes may have been in effect, including a general regional movement-possibly from higher to lower altitude areas-or outward spread from niches that were occupied during the previous period. Comprehension of the mechanisms behind the apparent demographic changes of the Middle Archaic will require comprehensive dating of a range of sites in all settings within the context area, and comparison and contrast with similar data from neighboring regions.

- Is the sudden, widespread occurrence of habitation evidence at the beginning of the period reflective of population expansion and/or increase, or simply improved recognition of sites due to geomorphic or other factors?

- If population did increase, was it internally or externally generated?

- If population increase was internally generated, did it originate in one or more core areas within the context area, e.g., high-altitude niches, and spread outward?

- Can lithic material types be used as indicators of population movement?

- Can the rapid spread of McKean materials during the Middle Archaic period be correlated with actual movement of population at the same time, or was McKean a stylistic overlay on an in situ population?

- Could a population from outside the context area-e.g., one associated with McKean materials-have interacted with an existing in situ population during the Middle Archaic period?

Technology

Middle Archaic technologies, particularly lithic technologies, are better understood than those of the preceding period. However, the seemingly large database is derived from a limited number of tested and excavated sites that can probably not be taken as representative of the context area as a whole. In fact, for broad expanses within the context area such as unwatered plains, Middle Archaic artifacts have not been systematically studied and few artifact assemblages have even been dated by radiometric means. Fundamentally different lithic industries may have characterized high-altitude and low-altitude settlement, although the functional and geographical relationships between the two are poorly understood. Areawide artifact description and analysis, coupled with comparison and contrast with existing collections, is fundamental to an understanding of Middle Archaic technology. Though the current state of knowledge is far better than for the Early Archaic period or the Paleoindian stage preceding it, basic research is still in order.

- What is the morphological and functional range of lithic artifacts, and can distinctive Middle Archaic tool kits be identified?

- Are material culture assemblages of the higher mountains distinct from those of the plains, and is there a geographical line or demarcation between upland and lowland industries; does the boundary line change over time, and does it suggest outward spread of a particular industry?

- Where and in what manner were raw lithic materials quarried, and what do patterns of lithic procurement suggest about regional movement and trade?

- What are the temporal and geographical relationships between McKean and non-McKean projectile points, and are the differences suggestive of distinct cultural groups?

- Does the Mallory projectile point display a geographical or temporal distribution unique from that of other McKean points, and may a different origin be inferred?

- What are the stylistic and chronological ranges of non-McKean artifacts, and to what extent do they overlap the temporal boundaries of the preceding and following periods?

- What is the nature of the ground stone industry, and how does ground stone compare morphologically and in terms of frequency with sites of the preceding and following periods?

- What is the nature of the bone tool industry, and how does it compare with that of the preceding and following periods; do formal (as opposed to nonexpedient) tools first consistently appear at this time?

- Is there an increase in bone tool frequency, and/or a significant change in bone tool morphology, that can be correlated temporally and geographically with the appearance and spread of McKean lithic artifacts?

Settlement and Subsistence Strategies

A picture of prehistoric settlement in the context area emerges for the first time during the Middle Archaic period with a suite of radiometric dates from sites occurring in a range of ecological contexts. Rather than query whether people were present at all–as during much of the Paleoindian stage and the Early Archaic period–archaeologists may begin to describe locational patterning and the differences between and among locales within the context area. Importantly, the conditioning factors behind settlement patterns may be explored. Comprehensive subsistence data, albeit from a limited number of excavated sites, also facilitate comparative studies and promote an understanding of total economic systems. The need remains for additional studies of site distribution as well as intensive excavation of Middle Archaic components throughout the context area.

- What is the full descriptive and functional range of Middle Archaic site types?

- What is the range of ecological settings occupied by Middle Archaic sites; is water a less critical variable with respect to site location than in the preceding Early Archaic period?

- Can correlations be drawn between descriptive and/or functional site types on the one hand and ecological settings on the other?

- How do Middle Archaic site settings and general settlement patterns in the plains and foothills compare with those of the higher mountains, and do these sites suggest a single, integrated economic system or separate cultural groups?

- What evidence exists for habitation structures, and how does structural evidence compare morphologically and functionally with that of adjacent areas and that of the preceding and following periods?

- Is the Middle Archaic economy, as viewed from a context area-wide perspective, more generalized than in preceding periods, or is the present database skewed as a result of sample size and/or by the predominance of rockshelter excavations?

- Does rockshelter occupation and use first come into prominence during the Middle Archaic period, and why might this be the case?

- Is there an increase in food storage in the Middle Archaic, and does rockshelter use relate in some way to the need for storage?

- When and in what form does rock art first appear, and how does it compare stylistically with rock art from neighboring regions?

- Was bison a preferred food source when available in a given locale, i.e., did a generalized subsistence base tend to become focused when key resources were available in abundance?

- Does maize arrive in the context area during the Middle Archaic period; if so, when does it first appear in the archaeological record, and what can be inferred about the place of origin and the processes by which it spread to southeastern Colorado?

Geomorphology and Paleoclimates

The onset of the Middle Archaic period is generally believed to have coincided with a shift from Altithermal to comparatively mesic mid-Holocene climatic conditions. A changed paleoclimate could imply altered geomorphic processes that resulted in more stable or better-preserved landscapes. Thus, while the human population of the context area probably increased during Middle Archaic times, the archaeological record may be better preserved as well for reasons unrelated to human behavior. The types of investigations that must be conducted to further an understanding of Middle Archaic paleoclimates and geomorphic processes are unchanged from those described for the Early Archaic period.

- What paleoclimatic conditions prevailed during the Middle Archaic period, and how do they differ from conditions of the Early Archaic?

- Can the sudden appearance of Middle Archaic sites in the archaeological record of the context area at ca. 5000 B.P. be correlated with a significant climatic shift?

- Was the Middle Archaic paleoclimate static or are internal fluctuations apparent; are internal fluctuations reflected in prehistoric settlement?

- Are there episodes of sand dune/sand sheet activation and stability within the Middle Archaic period that might indicate episodic climatic changes?

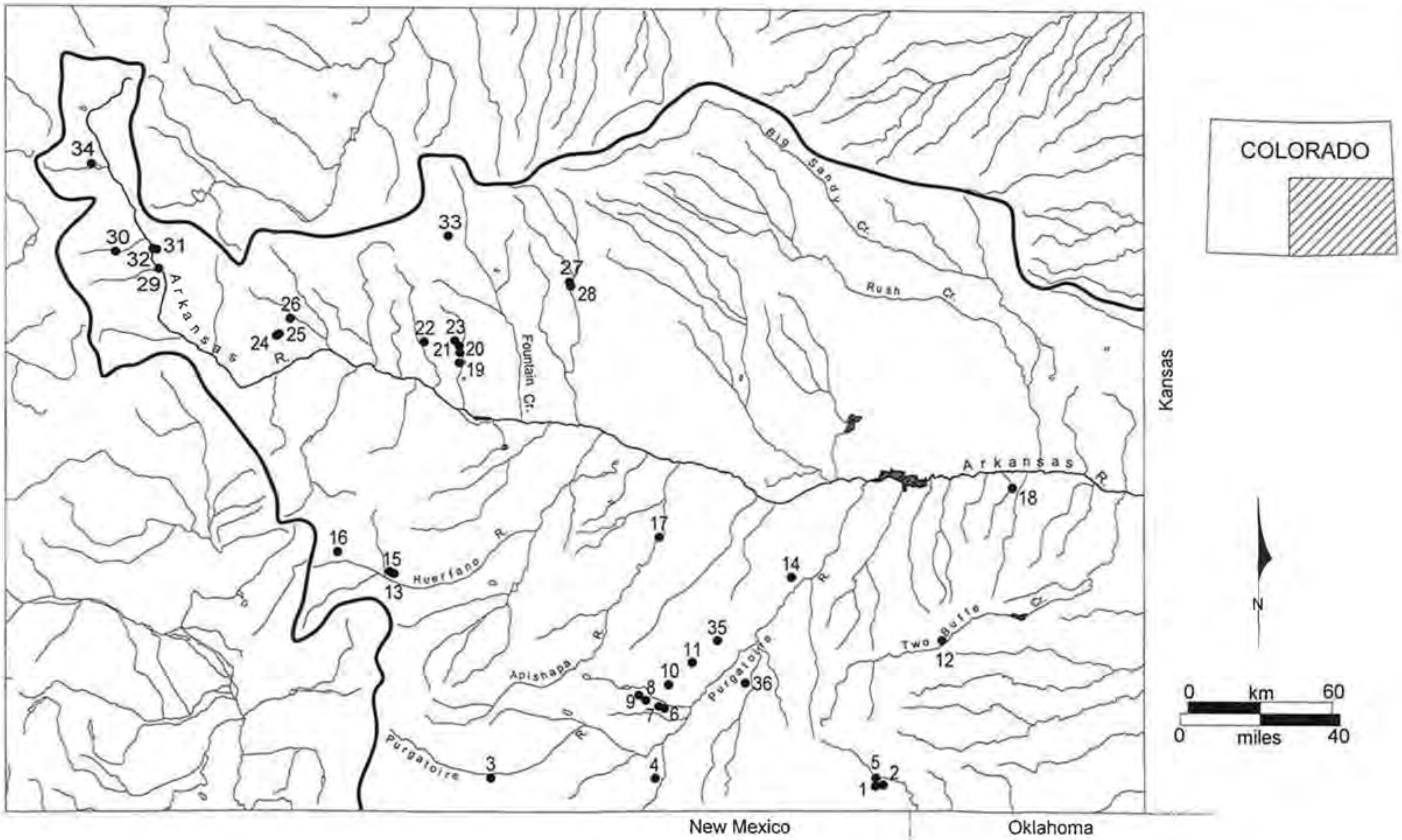
- What were the predominant geomorphic processes affecting landscape development in the Middle Archaic period, and how do they differ from those of the Early Archaic?
- Is there a geomorphic explanation for the relative abundance of Middle Archaic sites in the context area in comparison with the Early Archaic record?
- Are mid-Holocene terrains identifiable that may harbor Middle Archaic sites, and would sites associated with these terrains be buried or on the surface?
- If intact terrains of Middle Archaic age are present, how would soil-forming processes and more general geomorphic processes have affected internal site structure?
- Can buried soils of Middle Archaic age be identified and dated on a regional scale?

LATE ARCHAIC PERIOD

Database of the Context Area

Evidence of Late Archaic occupation has been found in virtually all parts of the context area where archaeological investigations have been carried out. The sequence of radiometric dates is essentially uninterrupted over the term of the period (see Figure 4-2). In the course of excavation and testing projects 50 absolute dates have been obtained (see Appendix A). These dates, which represent a time span of 1,150 years, contrast with the 28 absolute dates for the ca. 2,000-year-long Middle Archaic period. Radiocarbon-dated Late Archaic components are widespread throughout the drainage basin (Figure 6-3), with representation in plains areas (Las Animas, Baca, Otero, and Prowers counties), plains/foothills transition areas (Fremont, El Paso, Pueblo, and Huerfano counties), and mountain areas (Chaffee and Lake counties). In addition, eight rock art sites in Las Animas, Baca, and Bent counties have yielded a total of 16 cation-ratio dates (see Appendix B).

Late Archaic projectile points are ubiquitous in collections from large- and small-scale surveys throughout the area, and the frequency with which they occur is exceeded only by that of materials from the subsequent Late Prehistoric stage. All of the major surveys cited in the discussion of the Middle Archaic period, in addition to the Picket Wire Canyonlands inventory (Reed and Horn 1995), have yielded Late Archaic projectile points, in some cases in abundance. These surveys are widespread throughout the context area and encompass plains, foothills, and mountainous environments. The Trout Creek Pass quarry near Buena Vista also exhibits evidence of relatively intensive Late Archaic use (Chambellan et al. 1984). Areas bordering the upper Arkansas drainage basin on all sides have numerous sites as well (e.g., Biella and Dorshow 1997a:32-36; Black 1991; Eighmy 1984:59-63; Lintz and Zabawa 1984), suggesting that the phenomenon of Late Archaic settlement was at least regional in scope. Because of the large number of investigated sites of this period within the context area there is little need to describe studies from elsewhere. However, the attributes of Late Archaic adaptation are in most ways not unique to the area.



1 5LA5855 (Snakeweb)
2 5LA1053 (Carrizo Rock Shelter)
3 5LA2190 (Veltri)
4 5LA6197 (Wolf Spider Shelter)
5 5LA6294
6 5LA5255
7 5LA5383
8 5LA5598
9 5LA3242
10 5LA2405
11 5LA3570
12 5BA30 (McEndree Ranch)
13 5HF1109
14 5OT430
15 5HF1100
16 5HF246
17 5OT219
18 5PW2 (Clay Creek)
19 5PE8 (Two Deer Shelter)
20 5PE648 (Recon John Shelter)
21 5PE910 (Gooseberry Shelter)
22 5FN12
23 5EP45
24 5FN349
25 5FN348
26 5FN395
27 5EP576
28 5EP935
29 5CF589 (Ruby Mtn.)
30 5CF358 (Runburg)
31 5CF555
32 5CF554
33 5EP2158
34 5LK221 (Campion Hotel)
35 5LA6568
36 5LA22 (Medina Rock Shelter)

Figure 6-3. Map of Arkansas River context area showing locations of chronometrically dated Late Archaic period sites.

About one-third of the sites in the context area with associated Late Archaic radiometric dates occur in rockshelters. As was true for the Middle Archaic, these sites are significant in a disproportionate way to an understanding of the period for a number of reasons: cultural levels are in some cases thick, with evidence of repeated occupation if not clear stratigraphy; archaeological materials are concentrated and relatively well-preserved; and the level of investigation at some shelter sites has been high. Three shelters have underlying Middle Archaic deposits that have been described previously, namely Recon John, Gooseberry, and Wolf Spider shelters. At most stratified Archaic sites in the context area, the Late Archaic is more prominent than the Middle Archaic component, i.e., it is thicker and with more densely concentrated cultural remains, although this is not the case with Wolf Spider Shelter (Hand and Jepson 1996). Other important Late Archaic rockshelters in the context area are Two Deer Shelter at Fort Carson, and farther to the south and east in Las Animas County, Carrizo and Medina rock shelters.

The Late Archaic component at Recon John Shelter is manifested as a thick, dense zone occurring at depths of 0.65-1.40 m. This zone unconformably overlies the Middle Archaic materials and, based on two radiocarbon ages (1910 B.P. and 1870 B.P.), represents only the terminal portion of the Late Archaic period despite its thickness. A gap in the habitation record of approximately 1,500 years' duration (ca. 3500-2000 B.P.), best explained as the consequence of an erosional event (the shelter is on the active flood plain of Turkey Creek) rather than an actual occupational hiatus, is suggested by stratigraphy and the radiocarbon evidence (Zier 1989; Zier and Kalasz 1991). At Gooseberry Shelter the Late Archaic deposits average 1 m thick and occur at a depth of 0.80-1.80 m. Two radiocarbon ages of 2600 B.P. and 2160 B.P. were obtained (Kalasz et al. 1993). Two Deer Shelter is also located in the small canyon of Turkey Creek (Zier et al. 1996a). Like Gooseberry Shelter, it is situated a few meters above the flood plain of the stream and is filled with mainly eolian sediments, intermixed with spalls from the shelter roof and walls. Two deep 1 x 2 m test pits were excavated. Late Archaic deposition is manifested as a massive, thick unit lying between 1.0 m and at least 2.42 m below the surface; the base of this unit was not reached during testing and its total thickness is unknown. Late Archaic radiocarbon ages of 2430 B.P. and 2170 B.P. were obtained, as was a third date of 3070 B.P. which falls at the approximate temporal boundary between the Middle and Late Archaic periods. A substantial Late Prehistoric component overlies the Archaic material.

Medina and Carrizo rock shelters are located in the dissected canyon country of extreme eastern Las Animas County. Medina Rock shelter is an enormous alcove in the depths of lower Chacuaco Canyon on the east side of the Purgatoire River (Campbell 1969a). Its depositional history is unknown, but the floor of the shelter is just above the creek flood plain, and alluvial sediments may predominate. A total surface area of approximately 24 m² was excavated. A stratum lying 0.30-0.45 m below the surface yielded cultural materials that apparently span the Late Archaic-Late Prehistoric transition. A radiocarbon age 1970 B.P. was obtained from a hearth. Abundant Late Prehistoric materials overlie this level. Carrizo Rock shelter is situated along the creek of the same name near the southern Las Animas-Baca County line (Kingsbury and Nowak 1980). Two stratigraphically superimposed strata comprised of eolian sediments and lying at a depth of about 0.25-1.0 m produced Late Archaic artifacts and a radiocarbon age 2040 B.P. The presence of substantial Late Archaic occupational evidence at Trinchera Cave east of Trinidad is also acknowledged (Simpson 1976). However, this material is of limited interpretive value for a combination of reasons including extensive disturbance at the hands of vandals, evident stratigraphic mixing between Late Archaic and Late Prehistoric components, and the failure of past investigators to produce usable reports.

Important open sites with Late Archaic components are more widely distributed within the context area than are shelters, and occur in mountain settings as well as foothills and plains. Numerous open sites on the plains have been test excavated but few have been subjected to comprehensive excavation. Site 5EP576 at Crows Roost east of Colorado Springs, which has a significant Middle Archaic component (previous subsection), exhibits an overlying Late Archaic component of unreported maximum depth; the combined thickness of the Middle and Late Archaic deposits is about 1 m (McDonald 1992). A single Late Archaic radiocarbon age of 2640 B.P. was obtained. Site 5EP935, also at Crows Roost, spans the Late Archaic-Late Prehistoric transition but most of the excavated material appears to be associated with the latter temporal frame (McDonald 1992). To the southeast in Otero County, just west of the Purgatoire River near Higbee, lies site 5OT430 (Mueller et al. 1994). A broad, shallow burned rock midden at the site produced radiocarbon ages of 2110 B.P., 2090 B.P., and 2000 B.P., and a smaller feature nearby yielded an age of 1730 B.P. Areas totaling 15 m^2 were excavated. In Baca County in the extreme southeastern corner of the state is the McEndree Ranch site (5BA30), which has produced the only Late Archaic structural evidence in the context area (Shields 1980). This site, exposed at a depth of 2.39-3.32 m in the cutbank of an intermittent drainage, was subjected to limited excavation and feature salvage. Hearths associated with the structure yielded radiocarbon ages of 2350 B.P. and 2170 B.P.

Excavated open sites in the foothills and lower mountain valleys include 5HF1100 and 5HF1109 in the upper Huerfano River drainage basin and 5LA2190 west of Trinidad. Sites 5HF1100 and 5HF1109 are on the Bucci Ranch a short distance northeast of Gardner. The former was exposed in a cutbank along a tributary of Turkey Creek (not to be confused with the Turkey Creek on Fort Carson) and consisted of a closely spaced grouping of four features (Zier 1994). A block measuring 1 x 5 m was excavated. Three radiocarbon ages spanning the approximate Late Archaic-Late Prehistoric boundary (1880 B.P., 1770 B.P., 1660 B.P.) were obtained. Site 5HF1109 is situated at the mouth of the same tributary drainage, one-half mile east of 5HF1100, and overlooks Turkey Creek (Zier et al. 1996b). Excavation of just 4 m^2 was conducted, but three features were exposed of which two, like the site nearby, yielded radiocarbon ages spanning the Late Archaic-Late Prehistoric boundary (2060 B.P., 1820 B.P.). Site 5LA2190 is best noted for the presence of a terminal Middle Archaic structure but also produced two radiocarbon-dated features of Late Archaic age (2200 B.P., 1860 B.P.), of which one may be a post mold (Rood 1990; Rood and Church 1989). The presence of several Late Archaic components at tested sites in the Cyprus Mines Hanson project area in Fremont County, demonstrated both by radiocarbon dates and projectile points, should be noted as well (Engleman and Shea 1980). However, extensive work was not carried out at any of these sites.

Significant high-altitude sites with Late Archaic components include the Runberg site on Cottonwood Pass, sites 5CF554 and 5CF555 near Buena Vista, also in Chaffee County, and 5LK199 and the Campion Hotel site in the Twin Lakes vicinity of Lake County. The high-altitude sites, with their usually thin soils, are geomorphically different from those of the foothills and plains, and are especially unlike the rockshelter sites with their often deep, stratified deposits. Mountain sites exhibit usually shallow cultural strata in thin soils. Most are multicomponent–particularly Late Archaic/Late Prehistoric–with mixed or spatially overlapping occupations. The multicomponent Runberg site produced a radiocarbon age of 2840 B.P. from a hearth (Black 1986:114-118). Other cultural materials that are probably of Late Archaic age occur in the same depth range as the feature although evidence of mixing, particularly with Late Prehistoric materials, is cited. Sites 5CF554 and 5CF555 are located a short distance apart at an elevation of 2450 m (8040 ft), on the east side of the Arkansas River and west of Trout Creek Pass (Hand 1991). Although just a few square meters were excavated at widely scattered locations, multiple hearths with associated Late Archaic radiocarbon ages were exposed (5CF554: 1930 B.P., 1860 B.P.; 5CF555: 2770 B.P., 2350 B.P.). There is surface evidence of later occupations as well. Site 5LK199 and the Campion Hotel site are both situated on glacial moraines in the valley of Lake Creek southwest of Leadville, at respective elevations of 2810 m (9220 ft) and 2804 m (9200 ft). The former site, at which a total area of 20 m^2 was excavated, exposed evidence of a Late Archaic activity area consisting of a hearth and associated lithic artifacts (including large, corner-notched projectile points) and other materials, but no radiocarbon-derived date (Buckles 1978). At the Campion Hotel site, where areas totaling about 7 m^2 were excavated, both Late Archaic and Late Prehistoric occupations are apparent with the latter component predominant. A hearth yielded a radiocarbon age of 2840 B.P. (Buckles 1979).

Population Dynamics

The pattern of widespread geographical distribution of Late Archaic sites within the context area is barely distinguishable from that of the Middle Archaic period. A general demographic continuum is suggested by the fact that many Middle Archaic sites continued to be inhabited or used in the succeeding period. There is compelling evidence that population growth took place during the Late Archaic period. Unlike the Middle Archaic, during which time in-migration or expansion from a core area(s) may account for the explosion of archaeological evidence, Late Archaic population increases were probably internally generated as suggested by the widespread, in situ population already present in the area at the beginning of the period.

The notion that human populations increased in Late Archaic times is supported less by the sheer differences in radiocarbon assay numbers than by site-specific evidence. Considerably more radiocarbon assays of Late Archaic have been obtained than Middle Archaic (50 versus 28), over a significantly shorter time span, but factors relating to site preservation and individual researchers' biases could affect the totals. It is at multicomponent Middle Archaic-Late Archaic sites where significant differences between the periods tend to emerge. At stratified rockshelter sites in particular, for example Recon John and Gooseberry shelters, Late Archaic deposits tend to be thicker and richer, suggesting more intensive human habitation (Zier 1989; Zier and Kalasz 1991; Kalasz et al. 1993).

Technology

The Late Archaic period witnessed a florescence of projectile point styles with recurrent morphological themes of stemming and corner notching of haft elements. All are dart points; the emergence of the bow and arrow at ca. 1850 B.P., and concomitant reduction in projectile point size, marks the close of the Late Archaic period. Stemmed-indented base points all but disappear from the archaeological record at ca. 3000 B.P., which marks the Middle Archaic-Late Archaic boundary. The proliferation of corner-notched and stemmed dart points is a regional phenomenon that extends in all directions beyond the boundaries of the Arkansas River context area.

In the plains and foothills portion of the context area, certain styles that originated in the Middle Archaic continue into the Late Archaic period; these forms are described above in the Middle Archaic subsection. While variability in projectile point morphology is perhaps greater during the Late Archaic than at any previous time–and considerable diversity is sometimes seen even within single-component assemblages–basic recurring attribute combinations effectively describe a majority of projectile points (Anderson 1989a:232-233; Hand and Jepson 1996:66; Jepson et al. 1992:134-166; McKibbin et al. 1997:62-67; Van Ness et al. 1990:115-197; Simpson 1976:49; Zier 1989:138). These combinations are 1) very large size with broad blades, deep corner notches, and expanding stems with straight or concave bases; 2) narrow blades with shallow corner notches, expanding stems, and straight to concave bases; and 3) unshouldered points with variable blade width, stemmed with contracting or straight stems and convex bases. Anderson (1989a:232-233) notes the preponderance of expanding-stemmed types with reference to the assemblage from the PCMS Las Animas County, which comprises the single largest, professionally documented collection from the entire context area.

Late Archaic projectile points from the mountains are less distinct morphologically from plains/foothills counterparts than in earlier periods. Citing information from several regional sites, Black (1986:10-11) observes that a common, high-altitude, Late Archaic style is characterized by stemmed points with straight basal edges. The example illustrated by Black (1986:10) is not unlike Late Archaic stemmed points found occasionally at plains sites (e.g., Zier and Kalasz 1991:129; Reed and Horn 1995:90). Corner-notched forms with expanding stems occur in the mountains as well, and again fall within the variability range of specimens commonly found on Late Archaic sites at lower elevations (Anderson 1989a:232-233). The single unique characteristic associated with projectile points from the mountains is blade edge serration, which begins as early as 7000 B.P. and continues through the Archaic. Though many individual points lack serration, the trait is found in association with the full range of point types. Black (1986:11) also notes that projectile points in the mountains are frequently made from flakes, a characteristic rarely seen in plains contexts where biface reduction is almost always used in projectile point manufacture.

Despite a much more comprehensive body of data that exists for the Late Archaic period, lithic industries are virtually indistinguishable from those of the Middle Archaic in the plains and foothills of the context area (Hand and Jepson 1996; Kalasz et al. 1993; Zier 1989). The lack of discernible changes in lithic assemblages has been interpreted by Zier and Kalasz (1991) as evidence of a generally static adaptation. As in the Middle Archaic period, Late Archaic lithic industries are characterized by a combination of intensive and unintensive core reduction; common manufacture and use of bifaces representing extreme variability in size, shape, and workmanship; a predominance of expedient flake tools including unifacially modified and utilized flakes; and exploitation of locally available raw materials to the near-exclusion of exotic types (Zier 1989; Zier and Kalasz 1991). High-country lithic industries of the Late Archaic period continue to follow the Mountain-tradition pattern, exhibiting a combination of split cobble and bifacial reduction strategies, production and use of microtools, a predominant expedient tool technology, and utilization of locally available raw materials (Black 1986:62-71, 1991:7-9; Buckles 1979; Hand 1991).

The Late Archaic ground stone industry of the plains and foothills is also indistinguishable from that of the Middle Archaic but at stratified sites is represented in greater artifact frequencies. Assemblages are expedient with little evidence of formal shaping with the exception of occasional edge retouch of metates. Metates consist of usually thin sandstone slabs, either unifacial or bifacial, sometimes worn to a basin shape but more often flat. Manos are of sandstone or quartzite in either nodule or stream cobble form, are ovate, and may exhibit unifacial or bifacial grinding facets. Pecking is common on both manos and metates (Kalasz et al. 1993:76-80; McDonald 1992:59-63; Simpson 1976:100-108; Zier 1989:155-166; Zier and Kalasz 1991:128; Zier et al. 1996a:122-127; Zier et al. 1996b:68). Also associated with a Late Archaic component in the context area is a tubular pipe fragment from Medina Cave (Campbell 1969a:140). No Late Archaic shaft abraders are known from the area although the fact that they occur in both Middle Archaic (Metcalf 1974) and Late Prehistoric components (Zier et al. 1988:148) on the Colorado plains suggests that they comprise part of the Late Archaic industry as well. Ground stone at high-altitude sites that can be positively associated with Late Archaic occupation is limited in quantity. It appears to exhibit the same lack of formality that characterizes ground stone on the plains but reflects the availability of local rock types such as schist (Hand 1991; Buckles 1978).

Worked bone and shell artifacts are no more common in Late Archaic than in Middle Archaic components, but again are manifested in a variety of forms. The plethora of Late Prehistoric bone tools at certain, well-preserved rockshelter sites, for example Trinchera Cave and Upper Plum Canyon Rock shelter I (Simpson 1976:131-148, 183-185; Rhodes 1984:128-136), is suggestive of a well-developed industry that probably had Archaic or earlier antecedents. As noted in the discussion of Middle Archaic bone tools, poor preservation conditions may be responsible for the minimal inventories at most sites. Bone tool forms that are known to occur include awls and miscellaneous worked items, usually of artiodactyl long bones, pressure flaking tools, and tubular beads manufactured almost exclusively from jack rabbit and cottontail long bones (Kingsbury and Nowak 1980:20-24; Shields 1980:4-8; Zier 1989:193-197). Simpson (1976:131-138) reports numerous bone splinter awls and other miscellaneous tools from "preceramic" levels at Trinchera Cave. These items are most likely derived from Late Archaic contexts, but stratigraphic and interpretive problems with the site make this assessment tentative. The few items of shell from the context area consist mainly of unworked bivalve fragments (Kingsbury and Nowak 1980:20-24; Zier 1989:197). Bivalve shells (some perforated), disks, and miscellaneous worked fragments are reported from lower levels at Trinchera Cave, but their association with the Late Archaic period is again questionable (Simpson 1976:117-119).

Little perishable material from the context area can be firmly associated with Late Archaic habitation with the exception of yucca cordage from Medina Rock shelter (Campbell 1969a:135). Yucca cordage was also recovered at Trinchera Cave by Simpson (1976:149-152) in levels that are probably, but not demonstrably, of Late Archaic age. It is likely that at least some of the abundant and varied perishable materials extracted from that site by Herbert W. Dick between 1954 and 1956 are also of Late Archaic age, although most is probably Late Prehistoric as indicated by the predominance of small arrow points in the collections. Perishables were recovered at depths up to 1 m in one portion of the site and include wood and reed beads, wood arrow shafts with sinew, feather blanket, leather items including hide bags, sandal fragments, and strips, reed and cordage game snares, and various yucca products including cordage, woven sandals, a threaded needle, and bundles tied with cordage (Simpson 1976:179-183).

Settlement and Subsistence Strategies

Site Types and Locational Variability

Late Archaic settlement patterns of the context area closely mirror those of the Middle Archaic, and many Middle Archaic sites were reoccupied on one or more occasions during the course of the Late Archaic period. Sites in both open settings and rockshelters are common. The known distribution of Late Archaic sites is even broader than that of the previous period and clearly indicates at least transitory use of the widest possible range of environmental settings: plains riparian zones, including inner canyons and canyon rims, alluvial terraces, and higher valley slopes; open plains both with and without eolian cover; timbered hills and mesas within greater plains areas (as at the PCMS); uplands and valleys in the foothills; high mountain valleys traversed by both major and minor streams, and especially glacial moraines on valley floors and lower slopes; passes and routes leading to passes that breach high drainage divides; and alpine ridges and divides including the Continental Divide (Alexander et al. 1982; Andrefsky 1990; Black 1986; Buckles 1978; Engleman and Shea 1980; Hutchinson 1990; Lutz and Hunt 1979; Zier et al. 1997).

Late Archaic deposits in rockshelters often overlie, and may be geomorphically indistinguishable from, Middle Archaic horizons, suggesting occupational continuity. Rockshelter sites are logically restricted to those areas where overhangs occur (usually of sandstone, and most often Dakota Sandstone), as in the small canyons associated with streams that issue from the foothills in the Fort Carson vicinity, and the intricate network of canyons associated with the drainage system of the lower Purgatoire River. Late Archaic settlement is apparent not only in large alcoves such as Trinchera Cave and Medina Rock shelter, but in the often marginal protection afforded by large and small overhangs (some essentially vertical cliffs, like Gooseberry Shelter at Fort Carson) and talus blocks of all sizes that are strewn across canyon slopes and floors as in the Purgatoire River canyon (Andrefsky 1990; Campbell 1969a; Kalasz et al. 1993; Reed and Horn 1995; Simpson 1976; Van Ness et al. 1990; Zier 1989).

Considerably more information is available about settlement patterns in the context area for the Late Archaic than for earlier periods, owing to the greater number of sites dated through radiometric means, and also the much higher number of surface sites and isolated occurrences dated on the basis of temporally diagnostic projectile points. While not foolproof–as noted, the temporal ranges of some point types crosscut period and stage boundaries–relative dating does tend to corroborate patterns discernible in the sample of excavated and tested sites. In intensively surveyed portions of the context area, the tendency of sites to be located near water is apparent again in the Late Archaic, as it was for earlier periods. A more complex pattern emerges, however, where sufficient locational data are available. Larger, more complex sites (defined as those with greater absolute artifact numbers, higher diversity of tool types, and features such as hearths) display a greater affinity for water sources than do smaller, less complex sites and isolated occurrences. Although not randomly distributed with respect to water, the locations of small sites are less strongly correlated with it, and they are much more apt to occur in upland settings (Alexander et al. 1982; Andrefsky 1990; Jepson et al. 1992; Van Ness et al. 1990; Zier et al. 1996a). Larger and more complex sites may represent base camps of hunter-gatherers while small sites are short-term, limited-activity localities that did not necessarily witness repeated use.

Descriptively, Late Archaic sites exhibit attributes that are identical in most ways to those of the Middle Archaic period. Lithic artifacts (tools, debitage) and combinations of lithic and ground stone artifacts commonly occur, and less frequently, modified and unmodified bone. Hearths or hearth remnants in the form of heat-altered rock (fractured and/or discolored) are also commonplace. Site size as expressed in terms of surface area varies widely, from artifact and burned rock scatters covering an acre or more and indicative of multiple functions and, perhaps, multiple occupations, to small lithic scatters or concentrations confined to a few square meters and indicative of a single, short-term knapping event, to isolated projectile points. Surface sites as well as rockshelters are often multicomponent in nature, with evidence of occupation prior to and/or following the Late Archaic period. Temporally mixed cultural material assemblages are obviously present at such sites.

Quarrying of lithic raw material is again evident at the Trout Creek Pass site (Chambellan et al. 1984). Projectile points of Late Archaic age also occur on the surface at other sites where naturally occurring silicates are available. It appears that numerous local sources were utilized, particularly along the plains/foothills boundary where upturned sedimentary formations of mainly Cretaceous age are exposed on the surface (Zier et al. 1997). The quarrying evidence that does exist suggests casual testing and procurement of raw materials. However, very little archaeological research in the context area has focused on the identification, distribution, and extraction technologies of quarries for the Late Archaic or other temporal periods.

The archaeological record of the Northern and Northwestern Plains during the Late Archaic period witnessed an apparent resurgence in communal bison hunting, and kill and processing sites are widespread throughout the region (Frison 1991). This pattern is not duplicated in eastern Colorado, although there is more evidence for bison procurement than for the preceding period, both in the South Platte drainage (e.g., Morris and Kainer 1975) and in the Arkansas River drainage. Even though bison bone occurs as a minor component in many Late Archaic faunal assemblages in the context area (following subsection), as it does in the Middle Archaic, it is present in abundance in just two known sites. Site 5HF978 is exposed in a dune blowout near the Huerfano River a few miles north of Walsenburg (Colorado OAHP site files 1972). It is uncertain if formal excavation was carried out, but at the very least some screening of cultural materials was accomplished. The site is described as having "thousands" of fractured bison bones, mainly skull and long bones. The presence of several large, deeply corner-notched dart points leaves little doubt about the site's age. At the McEndree Ranch site in Baca County (described in more detail below), bison bone dominates the assemblage to the extent that the investigator believed a primary function of the site to be processing, and that a kill site lay somewhere nearby (Shields 1980:9).

No Late Archaic game drives have been recorded in the plains or foothills of the context area, and they are in fact scarce throughout eastern Colorado during this and all other temporal periods. However, the game drive systems described previously in the Monarch Pass vicinity exhibit evidence of Late Archaic use as indicated by surface projectile points (Hutchinson 1990:78). Benedict's (1996; Benedict and Olson 1978) game drive systems of the Indian Peaks-RMNP region also were used in Late Archaic times. These drives exhibit blinds, rock walls, and cairns in abundance, and were probably modified many times (see also Cassells 1995).

Late Archaic structures are no more common in the context area than are Middle Archaic structures, but the presence of such a feature at one site may have implications for the entire area. At the McEndree Ranch site, which is locked in alluvial sediments associated with Two Butte Creek, a large, basin-shaped structure in a cutbank was partially excavated (Shields 1980). The structure, designated Habitation Feature 1, is 5 m long in profile and exhibits a ramp entrance, a shallow basin interior, and an outside wall consisting of a slight rise on the side opposite the entryway. No postholes were found. Cultural material associated with the structure, which tends to be manifested as concentrations (referred to by the investigator as activity areas), consists of lithic artifacts and fragmented bison bones. Four hearths are arranged along the cutbank, the closest about 10 m from the structure. Although the site is described as a "repeatedly occupied village" (Shields 1980:9), there is no evidence of multiple structures.

A common site type of the Southern Plains and portions of the Southwestern deserts, the burned rock midden has an apparent southeastern Colorado counterpart but it is not well represented in the area. The only excavated example of Late Archaic age in the context area is 5OT430 south of La Junta (Mueller et al. 1994). A similar site, the Louden site, is located on Mesa de Maya (Greer 1966); it is approximately 1,500 years younger than 5OT430. The principal feature of 5OT430 is a roughly circular, 4-meter-diameter concentration of angular, fire-cracked sandstone spalls. In the center of the main feature were found two small, stratigraphically superimposed hearths separated by a vertical distance of 24 cm. The upper hearth consisted of a small, rock-filled basin, and the lower hearth, a flat-lying, tight concentration of fire-cracked rock. Little macrobotanical material was recovered from the fill of either hearth. However, it is likely that the midden and associated hearths reflect preparation of succulents such as prickly pear pads (see Greer 1966), much in the way that burned rock middens of the Southern Plains and deserts were used for processing of agave or sotol, and that the midden represents a toss zone of rock pulled from the central hearth area. The presence of superimposed hearths suggest reuse.

A superficially similar site, 5BA320, is located in Big Hole Canyon in eastern Baca County (Nowak and Jones 1985:41-48). An approximately 6-meter-long mound of fire-cracked rock, ash, and burned soil yielded terminal Late Archaic and Late Prehistoric radiocarbon ages that are separated by more than a millennium (1870 B.P., 650 B.P.). Dense artifacts such as lithic debitage, expedient and formal tools, and ground stone were found in the feature, but no faunal remains were found. Burned seeds of several native plant species were also recovered. This feature appears to be a midden associated with vegetal processing. Nowak and Jones (1985) note that similar features occur in the vicinity of the Carrizo Ranches.

Hearths at Late Archaic sites in the plains and foothills of the context area are manifested in a range of forms and sizes. Small, unlined, shallow basins no greater than 50 cm in diameter, also typical of Middle Archaic sites, are widespread. These features usually do not exceed 25 cm in depth, and may occur in multiples with little variation from one to another. The interior matrix is frequently dominated by heat-altered rock, particularly stream cobbles if they were available in the immediate area (Campbell 1969a:132; Hand and Jepson 1996:38-39; Loendorf et al. 1996:35-37; Zier 1989:72-82; Zier et al. 1996b:144-150). Small-diameter hearths with deep and/or steep-sided basins also occur but less often (Legard 1983:11-13; Zier et al. 1996a:192). Hearths in the 50 cm-1 m diameter range are nearly as common as the smaller features described above and most often occupy shallow unlined basins. Deep basins, occasionally slab-lined, are also known to occur (Buckles 1974; Charles et al. 1996; Kalasz et al. 1993:258; Shields 1980:2-5). Site 5HF1100, with several radiocarbon ages at the approximate Late Archaic-Late Prehistoric boundary, consists of a complex of four features of which three are unlined, basin-shaped, rock-filled hearths ranging in diameter from 1.08 to 1.65 m and in depth between 20 and 49 cm (Zier 1994). Hearths comprised solely of concentrations of heat-altered rocks with charcoal or ash, occurring on a flat surface rather than in a pit, are found in Late Archaic contexts as well and can range between 50 cm and 1.40 m in diameter (McDonald 1992:65-67; Kalasz et al. 1993:258; Zier et al. 1996b:144-150). Many Late Archaic features are probably secondary in nature and represent materials cleaned from nearby hearths (Kalasz et al. 1993:258; Zier 1989:72-82); an example of such a feature, from 5HF1100, is a discrete concentration of burned cobbles perched near the rim of a large basin-shaped hearth (Zier 1994).

Morphological variability in combination with associated faunal, macrobotanical, and artifactual data indicate that these features represent a range of functions. Plant food processing and preparation are most often indicated, not only by the presence of charred seeds in hearth fill but also by ground stone occurring in or near the features (Kalasz et al. 1993:258; Zier et al. 1996b:144). Faunal remains are found in direct association with features somewhat less frequently, but occasionally occur in abundance in a highly fragmented and burned form, suggesting the use of boiling stones in the process of bone grease rendering (McDonald 1992:65-67; Shields 1980:4-5). Some features yield little or no subsistence-related debris but occur in general association with lithic artifact scatters or concentrations, indicating that they served as the focal points of activity areas.

Far fewer Late Archaic features have been excavated in the high country of the context area. The available data suggest a lack of morphological variability but some range in size. Most hearths are circular to ovate and occur in shallow basins rarely more than 20 cm deep. The basins are usually unlined but cobble filled. Diameters range from 20 cm to 1.0 m, and usually fall within the 50-60 cm range. As is the case at many sites at lower elevations, hearths are often the focal points of general activity areas (Black 1986:114-116; Buckles 1978, 1979:70-71; Hand 1991:14-20, 28-30).

No Late Archaic storage pits are known to occur in the context area, with the possible exception of a feature eroding from an arroyo cutbank at 5LA3242 in the PCMS (Loendorf et al. 1996:207-208). This 1.5-2 m diameter pit produced a mano cache and an early Late Archaic radiocarbon age of 2980 B.P., but little other information.

The eight radiometrically dated rock art sites (see Appendix B) are located in the eastern portion of the context area in Las Animas, Baca, and Bent counties. Sixteen individual panels have been dated. Of this number, 12 are pecked abstract, two are incised abstract, and two are pecked representational in nature (Dorn et al. 1990; Loendorf 1989; Loendorf and Kuehn 1991). Pecked abstract elements include the following forms: parallel lines; vertical line topped with circle; meandering lines; bisected rectangular grids; treelike symbol; rayed circle; vertical "dumbbell" figure; figure-eight; concentric circles with bisecting lines; and modified Y symbols. The incised (abraded) abstract elements are parallel lines. Representational elements consist of an anthropomorphic figure and multiple horned quadrupeds. It is interesting to note that the two similar-looking modified Y elements, at sites 5BN10 and 5BN124, produced identical cation-ratio dates of 1975 B.P. (Dorn et al. 1990) (see Appendix B). Two bisected, rectangular grid elements on separate panels at site 5LA5598 produced respective cation-ratio dates of 2350 B.P. and 2300 B.P.; charcoal from a test pit near both of the panels yielded a radiocarbon age of 2290 B.P. (Loendorf 1989; Andrefsky et al. 1990:1023-1033) (see Appendixes A and B).

No Late Archaic burials are known from the context area.

Economy

The fundamental hunter-gatherer subsistence base that was well established in the context area by the Middle Archaic period was maintained with little appreciable alteration through the course of the Late Archaic. Faunal and floral inventories from Late Archaic contexts are lengthier than those of the preceding Archaic periods. This change could indicate broader patterns of exploitation, which is also suggested by the wide distribution of Late Archaic sites; or, the explanation may simply lie in the fact that the Late Archaic components at tested and excavated sites tend to be thicker and richer than those of earlier components. The recurring species featured in these Late Archaic inventories are fully modern. As was true for the Middle Archaic period, exploitation of the fullest possible range of habitats by Late Archaic peoples is suggested not only by faunal and floral remains at excavated sites but also settlement patterns. A continuation of the organizational pattern of small, highly mobile groups is inferred.

Late Archaic faunal inventories from plains/foothills sites tend to be dominated by cottontail and jack rabbit, particularly the former, and frequently produce evidence as well of prairie dog and other small rodents including woodrat, ground squirrel, voles and mice, chipmunk, and pocket gopher. Artiodactyls include bison, deer, pronghorn, and elk. Bison and pronghorn bone is poorly represented at most sites and deer is only slightly more common, although as noted previously, two known sites (McEndree Ranch, 5HF978) are dominated by bison. Elk has been positively identified at just one site. Though small mammal bone is indeed predominant in most assemblages, artiodactyl bone tends to be underrepresented in excavation inventories because much of it is fragmentary and thus unidentifiable as to species. Other mammals identified in Late Archaic deposits include coyote, fox, and bobcat, the remains of which do not necessarily represent use as food. In addition to the above, there is scattered evidence for the consumption of birds, crayfish, frog and/or toad, fish (probably trout), and possibly rattlesnake. Mollusk shell fragments have also been recovered from one Late Archaic context (Campbell 1969a:134-145; Kalasz et al. 1993:275-278; Kingsbury and Nowak 1980:20-24; McDonald 1992:68-71; Shields 1980; Zier 1989:198-214; Zier and Kalasz 1991:122-124; Zier et al. 1996b:144).

Little is known about game animals that were taken at high elevations. Bone processing is evident at a few sites but the fragmentary nature of the remains has precluded identification (e.g., Buckles 1978). The continued use of game drive systems at or above timberline in the Late Archaic period provides circumstantial evidence for the exploitation of large mammals (Hutchinson 1990), most likely bighorn sheep or bison.

Plains/foothills botanical inventories from Late Archaic contexts are diverse although certain taxa recur with regularity. Goosefoot seeds are dominant throughout the area, in terms of both overall distribution and sheer numbers within sites. Other common occurrences are seeds or fruits of pigweed (amaranth), hackberry, purslane, prickly pear, hedgehog, various grasses (particularly dropseed and Indian rice-grass), and Compositae, particularly sunflower. Taxa that occur occasionally in seed, nut, or fruit form include povertyweed, shadscale, skunkbrush, verbena, sedge, spurge, ground-cherry, juniper, pinyon pine, wild gourd (species unknown), and chokecherry (Hand and Jepson 1996:39; Kalasz et al. 1993:278-280; Nowak and Jones 1985:41-

48; Zier 1989:214-262, 1994:30-38; Zier and Kalasz 1991:122-123; Zier et al. 1996a:162; Zier et al. 1996b:144).

Corn has been found in definite association with three Late Archaic components in the context area (Medina Rock shelter, Gooseberry Shelter, Recon John Shelter) and at one site that straddles the Late Archaic-Late Prehistoric boundary (5HF1109) (Campbell 1969a:136; Kalasz et al. 1993:279-280; Zier 1989:257-258; Zier et al. 1996b:144). Corn is represented in whole cob, cob fragment (cupule), and kernel form. Firm radiocarbon age associations for the remains are 2600 B.P. at Gooseberry Shelter, 1910 B.P. at Recon John Shelter, and 1820 B.P. at 5HF1109. A more general association with a hearth dated 1970 B.P. can be made for Medina Rock shelter (see Appendix A). Although it may have been present in the context area by ca. 2600 B.P., corn is not found at most Late Archaic sites, and where it does occur the evidence is almost always very scant. Corn was obviously a minor dietary component at best, and its occasional archaeological presence does not signify any real shift in subsistence orientation or practices.

Limited data from high-elevation sites in the context area suggest repeated use of a small number of plant taxa: goosefoot, hedgehog, and purslane. Goosefoot is best represented (Black 1986:114-116; Hand 1991:14-20). There is no archaeological evidence of corn in the higher mountains of the context area.

Directions for Future Research

Chronology

The Late Archaic chronology of the context area is comparatively complete, with a nearly unbroken progression of radiocarbon ages spanning the breadth of the period. A continuum from the preceding Middle Archaic period is evident. Scattered cation-ratio assays provide support for the radiocarbon ages. While the continuous presence of humans in the context area is well demonstrated, the temporal database suffers from the same basic shortcomings as the Middle Archaic: a great many ages are derived from tested or excavated sites near drainages, of which several are rockshelters with multiple assays. Although dated sites occur in plains/foothills and mountain settings alike, the geographical distribution is restricted and many unwatered areas, such as the expanse of upland prairie north of the Arkansas River and east of the mountain front, are virtually unrepresented. Research questions posed for the Middle Archaic period are largely applicable to the Late Archaic.

- Is the chronological range of Late Archaic occupation of the context area continuous or episodic?
- Are there temporal or geographical fluctuations in the occupation of the context area within the Late Archaic period?
- Can distinctive combinations of artifact attributes (tool kits) be described at dated Late Archaic sites within the context area that would allow identification of sites for which no radiometric or projectile point data are available?
- Can Late Archaic sites lacking chronological indicators be placed in a temporal context based on associations with broad geomorphic events?
- Can Late Archaic cation-ratio dates on rock art be corroborated through traditional radiocarbon dating of associated deposits, e.g., in rockshelter sites?

Population Dynamics

The population of the context area almost certainly increased during the Late Archaic period as indicated by the profusion of radiometric dates and the comparatively thicker and richer deposits at multicomponent Middle Archaic-Late Archaic sites. The temporal continuum and largely unchanged technologies from the Middle to the Late Archaic are suggestive of internally generated population growth. This rather simplistic image of Late Archaic demographics could be altered as the full range of settlement in all parts of the context area become known.

- Assuming that population growth did occur, is it attributable to an in situ increase or is there evidence of movement into the context area during the Late Archaic period?
- Did steady population growth take place throughout the course of the Late Archaic period, or were the increases cyclical?
- Can lithic materials types be used as an indicator of population movement?
- Is there evidence of distinct cultural groups occupying the plains/foothills and mountains portions of the context area, and with what outside regions are they most closely affiliated?
- Is the diversification of projectile point types indicative of a trend toward localization of styles within the Late Archaic period?
- Is there a causal relationship between the appearance of maize in the Late Archaic archaeological record and apparent population increase?

Technology

A broad technological continuum is apparent between the Middle Archaic and Late Archaic periods, particularly with regard to lithic and ground stone characteristics. Temporally coincident but distinct lithic industries may have existed in the plains/foothills and mountains portions of the context area. As is the case with the preceding period, Late Archaic technologies will not be fully understood until sites are recorded and excavated throughout the context area, and comparison and contrast with existing materials within and outside the area are attempted. Because of the close technological similarities between the Middle and Late Archaic periods, several research questions pertinent to the former period are unchanged.

- What is the morphological and functional range of lithic artifacts, and can distinctive Late Archaic tool kits be identified?
- Are material culture assemblages of the higher mountains distinct from those of the plains and foothills, and is there a clear line of demarcation?
- How do Late Archaic lowland/upland technological differences compare with those of the Middle Archaic?
- Where and in what manner were raw lithic materials quarried, and what do patterns of lithic procurement suggest about regional movement and trade?
- How may Late Archaic projectile point variability be described, and to what extent are Late Archaic forms a carry-over from the Middle Archaic period?

- Does the profusion of projectile point styles in the plains and foothills reflect the influence of Mountain-tradition styles indigenous to the higher elevations?

- What is the nature of the ground stone industry, and how does it compare morphologically and functionally with that of the Middle Archaic?

- Does the abundance of ground stone indicate an expanded functional range of this class of artifact?

- What is the nature of the bone tool industry; is it a simple outgrowth of the Middle Archaic industry or is stylistic and/or functional evolution apparent?

- What is the nature of perishable materials, and are they stylistically and functionally antecedent to documented Late Prehistoric materials (e.g., from Trinchera Cave)?

Settlement and Subsistence Strategies

The settlement patterns of the Middle Archaic period appear to be fundamentally unchanged in the Late Archaic, in line with evident technological and economic continuity between the periods. Shortcomings in the settlement database persist, caused by an extreme geographical skewing of large-scale surveys which has left broad expanses of plains, foothills, and higher mountains untouched. Likewise, while comprehensive subsistence data are available from a number of well-preserved, tested and excavated sites, these localities tend to be concentrated in certain types of settings such as small canyons in the plains. Just as survey in little-studied sectors of the context area will promote an understanding of Late Archaic settlement, so will excavation of sites in a wide range of ecological settings provide for a more complete picture of the Late Archaic economic system. Research questions are much like those posed for the Middle Archaic period.

- What is the full descriptive and functional range of Late Archaic site types?

- What is the range of ecological settings occupied by Late Archaic sites, and are settlement shifts between the Middle and Late Archaic periods discernible?

- Can correlations be drawn between descriptive and/or functional site types on the one hand and ecological settings on the other?

- How do Late Archaic site settings and general settlement patterns in the plains and foothills compare with those of the higher mountains, and do these sites suggest a single, integrated economic system or separate cultural groups?

- What evidence exists for habitation structures; are Late Archaic structures morphologic or functional precursors of structures known in the archaeological record of the earlier portion of the Late Prehistoric stage?

- Is further diversification of the subsistence base evident in the transition from Middle to Late Archaic, and is there greater exploitation of upland zones that are distant from permanent water?

- What evidence exists for food storage, and is it associated in some way with rockshelter habitation?

- Do styles and locational patterns of rock art display the Middle Archaic-Late Archaic continuity that is apparent in general settlement patterns, material culture industries, and economic practices?

- Are there Late Archaic changes in patterns of bison consumption manifested either as increased exploitation or human organizational adjustments?

- When is maize first evident in the archaeological record; what is its distribution within the context area, and how did it spread?

- What adjustments in economic patterns may be inferred from the addition of maize to the subsistence base; is there ethnographic information that might suggest how a domesticate was integrated into the basic hunter-gatherer economy?

Geomorphology and Paleoclimates

There is little information at present to suggest that dramatic paleoclimatic changes occurred during the Late Archaic period although there may have been small-scale shifts in precipitation and temperature patterns. However, as is true for virtually the entire Holocene in the context area, the paleoenvironmental database is extremely limited and much is inferred on the basis of better-studied areas elsewhere. Geomorphic processes are at best understood only in the broadest sense. Needed investigations are essentially the same as those identified for the Early and Middle Archaic periods.

- What paleoenvironmental conditions prevailed during the Late Archaic period, and are significant changes from the Middle Archaic detectable?

- Was the Late Archaic paleoclimate static or are internal fluctuations apparent; are internal fluctuations reflected in prehistoric settlement?

- Are there episodes of sand dune/sand sheet activation and stability within the Late Archaic period that might indicate episodic climatic changes?

- What were the predominant geomorphic processes affecting landscape development in the Late Archaic period, and are there significant changes between the Middle and Late Archaic processes?

- Is there a geomorphic explanation for the relative abundance of Middle and Late Archaic sites in the context area in comparison with the Early Archaic record?

- Are terrains identifiable that may harbor Late Archaic sites, and would sites associated with these terrains be buried or on the surface; are these terrains the same as those harboring Middle Archaic sites?

- If intact terrains of Late Archaic age are present, how would soil-forming processes and more general geomorphic processes have affected internal site structure?

- Can buried soils of Late Archaic age be identified and dated on a regional scale?

Chapter 7

LATE PREHISTORIC STAGE

Stephen M. Kalasz, Mark Mitchell, and Christian J. Zier

GENERAL BACKGROUND

Chronology and Database of the Context Area

The Late Prehistoric stage spans the period from A.D. 100 to 1725 and is divided into three periods: Developmental (A.D. 100 to 1050), Diversification (A.D. 1050 to 1450), and Protohistoric (A.D. 1450 to 1725). Two distinct phases, Apishapa (A.D. 1050 to 1450) and Sopris (A.D. 1050 to 1200), are defined within the Diversification period. This stage therefore largely corresponds to the Ceramic stage and the initial portion of the Protohistoric/Historic stage taxa presented in the previous eastern Colorado plains research context (Eighmy 1984). The current taxonomy replaces the term "Ceramic" with "Late Prehistoric" because the former places undue emphasis on a single technological component of a dynamic and complex segment of prehistory; in fact, ceramics do not occur in the archaeological record of the earliest portion of the Late Prehistoric stage. The Las Animas tradition was also developed previously to categorize selected post-Archaic sites in southeastern Colorado, specifically small sites lacking diagnostic materials sufficient for their assignment to either the "Graneros" or "Apishapa" focus (see Chapter 4). However, this spatially restricted taxon tends to ignore marked similarities and interrelationships among sites in both the South Platte and Arkansas River basins as well as in northeastern New Mexico. According to Gunnerson (1989:13), "Traits diagnostic of the Las Animas tradition would be rock enclosures, cord roughened pottery, and small projectile points. The predominance of non-cord roughened pottery or the predominance of large projectile points would disqualify a component from inclusion in the Las Animas tradition. At present, I would see this more inclusive tradition as being restricted to southeastern Colorado and I would not necessarily assume close cultural relationships among all the components." By this definition, sites such as Lindsay Ranch and Magic Mountain would be excluded on the basis of location despite the presence of Las Animas tradition diagnostic traits (Nelson 1971; Kalasz and Shields 1997). The generic Late Prehistoric stage is applicable to all of eastern Colorado and thus circumvents any spatial preconceptions. Therefore, this taxon describes more appropriately the bridge between a widespread, long-standing hunter-gatherer tradition and the appearance of historically known cultures.

At its commencement, the Late Prehistoric stage was characterized by new technologies superimposed on a well-established Archaic stage mode of existence. As the Late Prehistoric stage progressed, the Arkansas River Basin witnessed important changes in settlement, subsistence, technology, trade, and demographics. As is apparent from Figure 4-1 (see also Appendix A), the great majority of chronometrically dated sites in the basin are associated with this segment of prehistory. Indeed, the sheer volume of Late Prehistoric stage data relative to those available for earlier stages necessitates a deviation from the format followed in the Paleoindian and Archaic chapters. In contrast to previous sections, sufficient data exist to synthesize research at each hierarchical level in the proposed taxonomy. Such synthesis is intended to provide the reader with summaries that become increasingly detailed as one progresses from general Late Prehistoric stage developments to finer grained cultural units such as the Developmental, Diversification, and Protohistoric periods. Phase distinctions (Sopris and Apishapa) currently discernible only within the Diversification period are the ultimate level of description in the following text. This manner of presentation is intended to provide researchers with greater flexibility to access particular kinds of data. Some may require specific information pertaining to the Sopris phase, and others may desire a only a general overview of the Late Prehistoric stage. A degree of redundancy is therefore purposefully built into the text to address more easily a range of research needs. Identical research themes (chronology, population dynamics, technology, site type and locational variability, economy, and architecture) are provided for each taxon, but additional subheadings are placed where the data are adequate to address more specific topics. A discussion of community mortuary practices, for example, is currently appropriate only for the Sopris phase. Overall, this section is hierarchically organized so that the general Late Prehistoric stage synthetic narrative is followed by more detailed, chronologically ordered Developmental, Diversification, and Protohistoric period data. The Diversification period is similarly organized so that the thematic discussion of overall trends is followed by separate detailed descriptions of the two constituent phases, Sopris and Apishapa. Given the profusion of data associated with post-Archaic adaptation in the context area, and the confusion that has sometimes accompanied its interpretation, a major goal of this section is to synthesize and summarize available information at each taxonomic level.

The onset of this stage has long been tied to dates associated with the initial appearance of bow-and-arrow and ceramic technologies. However, the absolute timing of these events has not been well established in the context area. Further, construction of dwellings with stone wall foundations and the introduction of maize horticulture are traditionally associated with the beginning of the Late Prehistoric stage, but more recent excavations indicate that the initial appearance of these attributes may need to be pushed back into the Archaic stage (Rood 1990; Rood and Church 1989; Zier 1989). Although absolute dates are infrequently associated with diagnostic artifacts and features, the few that are available can be used to establish a baseline chronology for the Late Prehistoric stage. On the other hand, undue emphasis on these dates may limit our ability to perceive variability in the adoption and integration of new technologies. Most importantly, the exchanges and/or innovations tied to these events are probably not going to occur at uniform rates across the context area. Indeed, the available data indicate that these technological changes did not appear in the region as a coherent complex. Perhaps for this reason the age given for the beginning of the Late Prehistoric stage varies from A.D. 1 to A.D. 200 to A.D. 450, depending on the investigator (Alexander et al. 1982; Campbell 1969a; Eighmy 1984; Hunt 1975; Lintz and Anderson 1989; Zier 1989). Given the limited data sets, all may be more or less correct, especially given the potential effects of the old wood/heartwood problem on radiocarbon-dated contexts. This timing problem on the eastern plains and foothills of Colorado is often circumvented by proposing a long, chronological buffer or transition between the Archaic and Late Prehistoric stages or within the latter stage itself.

It is first important to review a number of absolute dates discussed in the previous research context for the Arkansas River Basin (Eighmy 1984). The earliest absolute age associated with ceramics and arrow-size projectile points in the context area was recovered from Metate Cave (Eighmy 1984:104; Campbell 1969a:187-193). This single radiocarbon age, 1680 ± 95 B.P. (uncalibrated), or A.D. 270, was obtained from charcoal recovered in proximity to cord-marked pottery sherds and a variety of projectile points including small, triangular, corner-notched Scallorn arrow points (Campbell 1969a:193). Additionally, the Metate Cave interior was circumscribed by a low-standing semicircular wall that, if one assumes the charcoal sample and structure are contemporaneous, represents one of the oldest radiocarbon-dated examples of Late Prehistoric stage stone wall construction in the context area (Campbell 1969a:187). The earliest absolute date for open or free-standing Late Prehistoric stage architecture in the Arkansas River Basin was recovered from the Belwood site (Hunt 1975). This radiocarbon age, 1500 ± 55 B.P. (uncalibrated), or A.D. 450, was obtained from charcoal located at the base of a bell-shaped pit in House 1 (Hunt 1975:6). Earlier Late Prehistoric stage architectural dates are known from northeastern New Mexico occupations adjacent to the context area (Biella and Dorshow 1997a).

The radiocarbon-dated context at the Belwood site was also associated with cord-marked ceramics and the mixture of arrow and dart points long recognized as typical of the early portion of the Late Prehistoric stage. Belwood therefore represents the earliest radiocarbon-dated ceramic association in the context area after Metate Cave.

Relatively few excavations in the 15 years since publication of the previous research context have provided additional insight into the timing of Late Prehistoric stage technological advances. Early dates for pottery and arrow points are suggested by the recovery of radiocarbon data from two sites, 5EP576 and 5EP935, in the Crow's Roost region along Black Squirrel Creek east of Colorado Springs (McDonald 1992; Wynn et al. 1993). At site 5EP576, a two-sigma, calibrated radiocarbon estimate of 976-538 B.C. (raw age of 2640 ± 80 B.P.) was obtained from bone recovered in a stratum designated Level A. A number of small, triangular corner-notched points, similar to the Scallorn type and presumably associated with bow-and-arrow technology, were also collected from this thick, undifferentiated Level A colluvium. A younger but still rather early radiocarbon date is associated with Scallorn points as well as cord-marked pottery at site 5EP935. Charcoal yielding a two-sigma, calibrated radiocarbon age estimate of 88 B.C.-A.D. 315 (raw age of 1890 ± 60 B.P.) was recovered along with these artifacts from another thick, undifferentiated section of colluvium designated Component A. These radiocarbon data from 5EP576 and 5EP935 must be interpreted with caution due to the lack of fine-grained stratigraphic associations between the artifacts and dates. Further, provenience information more specific than that of general component or stratum is not reported for the artifacts.

Pottery and Scallorn points were recovered from stratigraphic Unit Two at Davis Rockshelter, a site located near Black Squirrel Creek on the Monument-Palmer Divide north of Colorado Springs (Dwelis et al. 1996). An early date for the Late Prehistoric stage occupation within Unit Two is indicated by a charcoal sample yielding an uncalibrated radiocarbon age of 1810 ± 60 B.P. (Dwelis et al. 1996:5). However, younger uncalibrated radiocarbon ages of 1420 ± 50 B.P. and 1070 ± 60 B.P. were also obtained from charcoal associated with Unit Two. Artifact associations with the earliest date should not be assumed, because the authors report that the depositional context of the site is complex and that artifacts were disturbed by erosional events and burrowing animals (Dwelis et al. 1996:4). Perhaps for these reasons the provenience of the radiocarbon samples and their spatial relationship to the diagnostic artifacts are not discussed in the article.

Excavations at Recon John Shelter and site 5HF1109 resulted in some reasonably firm associations between radiocarbon ages and artifacts related to the introduction of the bow-and-arrow and ceramics. Site 5HF1109 is situated along a tributary of the Huerfano River southwest of the Wet Mountains near Gardner (Zier et al. 1996b). A small, triangular corner-notched projectile point resembling the Scallorn type was collected in direct association with a small hearth designated Feature 3 (Zier et al. 1996b:67). Charcoal recovered from Feature 3 produced a two-sigma calibrated radiocarbon age range of A.D. 65-395 (raw age of 1820 ± 70 B.P.). Recon John Shelter is situated along Turkey Creek on Fort Carson (Zier 1989; see also discussions of Archaic components in Chapter 6, this volume). A small, crude corner-notched projectile point that was not classified as Scallorn but is nevertheless unquestionably of arrow point size was recovered within 1 m horizontally and 10 cm vertically of a charcoal sample that yielded an uncalibrated radiocarbon age of 1910 ± 90 B.P. (cal 1868 B.P.) (Zier 1989:Tables 5, 17; Figures 32, 48, 51). Further, a cord-marked sherd was collected within 2 m horizontally, and at the same vertical provenience, of another Recon John charcoal sample. The uncalibrated age of 1500 ± 70 B.P. obtained from this sample matches the age of the previously discussed sample associated with cord-marked ceramics at the Belwood site (Zier 1989:Tables 5, 26; Figures 48, 52). However, the Recon John date was calibrated to 1389 B.P. (A.D. 561 [Zier 1989:Table 5]) using the system of

Stuiver and Reimer (1986). Ceramics were recovered from deeper Archaic-stage contexts at Recon John Shelter but they were unquestionably associated with rodent burrows (Zier 1989:192).

The information presented above indicates that the radiocarbon ages associated with points and/or ceramics at Metate Cave, the Belwood site, Recon John Shelter, and 5HF1109 provide the best opportunities for dating the introduction of new technologies that signal the beginning of the Late Prehistoric stage in the Arkansas River Basin. The development of calibration techniques has significantly improved the reporting of radiocarbon age estimates in recent years. There is thus the potential for considerable discrepancy in radiocarbon age interpretations between earlier and more recent archaeological projects. The Metate Cave and Belwood site ages were uncalibrated; those from Recon John Shelter and 5HF1109 are calibrated, but with the use of different programs. To facilitate comparison among these age estimates, all were calibrated through a common program, CALIB version 3.0.3 (Stuiver and Reimer 1993) and the data presented in Table 7-1. The table indicates that the general age range traditionally given for the onset of the Late Prehistoric stage remains valid, but the data also suggest that the advent of bow-and-arrow technology preceded the introduction of ceramics.

Table 7-1. Radiocarbon Dates from Selected Sites that Signal the Beginning of the Late Prehistoric Stage.

Site Name/ No.	Artifact Association	Raw Radiocarbon Age (B.P.)	Calibrated Age		Two-Sigma Calibrated Age Ranges from Probability Distributions (Method A)	
			A.D. /B.C.	B.P.	A.D./B.C.	B.P.
Recon John	Projectile point	1910 ± 90	A.D. 88, 98, 115	1862, 1852, 1835	91 B.C.-A.D. 336	2041-1614
5HF1109	Projectile point	1820 ± 70	A.D. 230	1720	A.D. 65-399	1885-1551
Metate Cave	Projectile point/ceramics	1680 ± 95	A.D. 397	1553	A.D. 134-601	1816-1349
Belwood	Ceramics	1500 ± 55	A.D. 596	1354	A.D. 430-658	1520-1292
Recon John	Ceramics	1500 ± 70	A.D. 596	1354	A.D. 418-666	1532-1284

However, the Archaic-Late Prehistoric shift involves more than the introduction of new technologies; other factors such as increasing sedentism and perhaps an expanded population may have also played a role. It is therefore advantageous to develop other means by which the transition may be discerned. The distribution of absolute ages in general, not just those associated with diagnostic artifacts, provides some valuable insight into the timing of the Archaic-Late Prehistoric stage progression. The compilation of absolute dates for the Arkansas basin listed in Appendix A is presented graphically as a histogram in Figure 4-1. A dramatic rise is apparent after 2000 B.P., or within the approximate temporal range traditionally associated with the onset of the Late Prehistoric stage. The number of radiocarbon dates remains high until approximately 500 B.P., within the general temporal range associated with the onset of the Protohistoric period. These data may signify more intensive Developmental period and Diversification period activity and a concomitant increase in population, or simply that these sites are more likely to be investigated by archaeologists because of their visibility. Factors such as the increased use of stone architecture tend to render Developmental and Diversification sites more conspicuous. It is also a given that Late Prehistoric stage sites are more likely to be preserved in the open, shallow depositional environments typical of southeastern Colorado. Archaic deposits such as those at Recon John and Gooseberry shelters tend to be deeper and therefore more difficult (and expensive) to excavate extensively (Kalasz et al. 1993; Zier 1989). Since younger, shallow occupations such as those at the Cramer and Avery Ranch sites tend to receive the more thorough excavations, greater numbers of features are studied and more radiocarbon data are obtained (Gunnerson 1989; Ireland 1968; Watts 1971; Zier et al. 1988). This matter may be resolved only through additional discoveries of older deposits and subsequent, large-scale excavations.

High-altitude occupation during the Late Prehistoric stage is poorly known. Only limited excavation has been undertaken at Late Prehistoric sites, and so little chronometric data are available that it is difficult to distinguish between components of the Developmental and Diversification periods. The Protohistoric period is almost completely undocumented in the mountainous portions of the context area. For these reasons, high altitude cultural manifestations are included in the stage-level discussions rather than under subsections devoted to the specific periods within the Late Prehistoric stage. The limited database is derived from the Runberg site on Cottonwood Pass in Chaffee County (Black 1986); the Campion Hotel site and site 5LK6 (rather ponderously named the Twin Lakes Dam Overflow site) on Lower Twin Lake in Lake County (Buckles 1979); Water Dog Divide site and site 5CF499 on Monarch Pass (Hutchinson 1990); and the Trout Creek Pass quarry near Buena Vista (Chambellan et al. 1984). Much attention is given the Runberg site (Black 1986) in Chapters 5 and 6. This shallow multicomponent site produced late Paleoindian and abundant Archaic evidence of Mountain tradition occupation. A Late Prehistoric component (designated VI) is present at Runberg as well, manifested as a hearth and "relatively abundant" lithic and ground stone artifacts (Black 1986:116-123). This component is believed to be of Developmental period age based on the presence of a small corner-notched projectile point; this assessment is not supported by chronometric data. A Late Archaic component at the Campion Hotel site is noted in Chapter 6. Buckles (1979:24-87) observes that both Late Archaic and Late Prehistoric projectile points are present, and that the majority are small arrow points. He also observes that the single radiocarbon date of A.D. 160 seems too early for most of the cultural materials (Buckles 1979:24). The site produced abundant lithic artifacts, several ground stone artifacts, a plain ware ceramic sherd, and bone tools and unmodified faunal remains. Nearby site 5LK6 exhibits similarities to the Campion Hotel site (Buckles 1979:97-107). This site also appears to span the Late Archaic-Late Prehistoric boundary, displaying projectile points that overlap stylistically those at the Campion Hotel site. Game drives with associated features, particularly blinds, occur on Monarch Pass; as noted in Chapter 6, there is evidence of Archaic use of these systems as well. The Water Dog Divide site yielded Developmental period and Diversification period dates of A.D. 890 ± 60 and A.D. 1230 ± 60, respectively, while 5CF499 produced a Protohistoric date of A.D. 1600 ± 60 (Hutchinson 1990). The Trout Creek Pass quarry, as noted in Chapters 5 and 6, has produced abundant surface evidence as well as limited radiometric data indicating at least sporadic use beginning in Paleoindian times and extending over the course of the Archaic stage. Surface artifacts consisting of both projectile points and Puebloan ceramics, as well as radiocarbon dates from hearths of A.D. 910 ± 50 and A.D. 1040 ± 50, indicate that the site was utilized during all three periods of the Late Prehistoric stage (Chambellan et al. 1984:69, 72).

Population Dynamics

This section considers further the subject of population growth and/or movements within the Arkansas River Basin during the Late Prehistoric stage. Most importantly, questions pertaining to whether new populations entered or long-standing populations departed the Arkansas

River Basin are addressed. Investigations both in the past and more recently, whether survey or excavation, lead to a common conclusion: prior to the Protohistoric period, the Late Prehistoric stage is characterized by an indigenous hunter-gatherer population that developed out of the preceding Archaic stage with minimal external influences (Andrefsky 1990; Biella and Dorshow 1997a; Campbell 1969a; Eighmy 1984; Gunnerson 1989; Hand and Jepson 1996; Kalasz et al. 1993; Lintz 1984, 1989; Lintz and Anderson 1989; Nowak and Kantner 1991; Zier 1989). This conclusion is supported by recent excavation data from stratified rock shelters with radiocarbon dated deposits that overlap the end of the Archaic stage and the beginning of the Late Prehistoric stage. These results emphasize overall continuity in material culture and adaptation (Zier 1989; Zier and Kalasz 1991; Kalasz et al. 1993). It is further asserted by southeastern Colorado archaeologists, both past and present, that general abandonment of the region on a large scale occurred by the middle of the A.D. fifteenth century. Abandonment of the Arkansas River Basin by this long-lived indigenous culture was followed by, or perhaps corresponds with, an incursion of Athapaskan populations from the north (Campbell 1969a, 1976; Eighmy 1984; Gunnerson 1987, 1989; Lintz and Anderson 1989; Lintz 1989; Kingsbury and Nowak 1980). The arrival of the Athapaskans has traditionally signaled commencement of the Protohistoric period in the area.

In the years between the end of the Late Archaic period and the end of the Diversification period it has been proposed that the context area was characterized by progressive increases in population (Campbell 1969a:398; Eighmy 1984:112; Kalasz 1988:126; Lintz and Anderson 1989:19; Reed and Horn 1995:25,191). Although there are several important caveats, the distribution of absolute dates presented above at least suggests that the onset of the Late Prehistoric stage was accompanied by increases in regional population. Equivocal support for this hypothesis can be found in stratified rock shelters which contain both Archaic and Late Prehistoric components. Although the density of cultural material in Recon John Shelter and Two Deer Shelter suggests that human activity increased during the Developmental period, at Gooseberry Shelter it is during the Late Archaic period that the greatest densities of artifacts occur (Kalasz et al. 1993; Zier 1989; Zier et al. 1996a). As with the radiocarbon age distribution, consideration of certain qualifiers is appropriate for the stratified rock shelter data. It is likely that geomorphic factors such as soil formation processes in this type of setting affect the distribution of artifacts and their interpretation. For example, the accumulation of sediments may occur at different rates depending on a rock shelter's location, and those sites characterized by slower rates may result in greater relative concentrations of archaeological debris (Zier et al. 1996a:200).

Perhaps the most persuasive argument for population increases prior to the Protohistoric period is found in the ubiquity of Diversification period architectural sites, many of which feature multiroom structures (Andrefsky 1990; Gunnerson 1989; Kalasz et al. 1993; Kalasz 1988, 1989; Loendorf et al. 1996; Mitchell 1997; Nowak and Kantner 1990; Reed and Horn 1995; Van Ness et al. 1990; Wood and Bair 1980; Zier and Kalasz 1985; Zier et al. 1988). These rock wall structures are often thought to reflect increasing levels of sedentism and population throughout the context area. Numerous examples of these sites are found across the area including those excavated on Fort Carson (Kalasz et al. 1993; Zier and Kalasz 1985; Zier et al. 1988); along the Apishapa River (Gunnerson 1989); in the Carrizo Creek area (Kingsbury and Gabel 1980; Kingsbury and Nowak 1980; Nowak and Berger 1982; Nowak and Kantner 1990); in the Chaquaqua Plateau area (Campbell 1969a); along the tributaries of the Purgatoire River in the PCMS (Andrefsky 1990; Andrefsky et al. 1990; Loendorf et al. 1996); in the Picket Wire Canyonlands (Reed and Horn 1995); and in the Park Plateau region (Campbell 1984; Lutes 1959a, 1959b; Wood and Bair 1980).

Although the number of Late Archaic and even Developmental period structures pales in comparison with Diversification period structures, site visibility is undoubtedly a factor. Diversification period architecture is often substantial and visible on the surface, yet the few examples of Late Archaic architecture in the context area tend to be basin houses or low, buried rock foundations (Mitchell 1997; Rood and Church 1989; Rood 1990; Shields 1980). Structures that feature substantial above-ground foundations are known in the Developmental period but relatively few have been recorded in the context area; considerably more are known in the adjacent northeastern New Mexico vicinity (Biella and Dorshow 1997a; Hunt 1975; Loendorf et al. 1996). Given the number of Archaic and Developmental period basin houses known from the surrounding plains and intermountain West (Kalasz and Shields 1997; Metcalf and Black 1991; Shields 1998; Tucker et al. 1992), the few examples that have been recorded in the Arkansas River Basin could be related to either sampling and geomorphic factors, or a combination of both. For example, the profusion of Archaic basin houses discovered in Wyoming is probably a function, at least in part, of the numerous energy-related archaeological projects in that region; as noted in Chapter 3 of this volume, a similar level of contract-related excavation data is currently not available in the context area. To summarize, a dramatic increase in population, which peaked in the Diversification period, is certainly indicated based on the current information. However, the potential for discovery of additional Archaic occupations, presumably deeper and more difficult to locate, cannot be discounted.

Technology

Late Prehistoric stage technological trends are largely perceived through observations of the context area's best-represented artifact classes: lithic, ceramic, and bone tool and ornamentation. With regard to pottery, a range of Puebloan and plains ceramics has been recorded in the context area. For the most part it is not known which ceramics recovered from Arkansas basin contexts were imported and which were manufactured locally; confirmation of local manufacture is inhibited by the lack of regional petrographic and elemental analyses. Where such studies have been undertaken, the data indicate that exchange was an important factor in ceramic assemblage content and variability (Mitchell 1997). Wares recorded in the context area are largely restricted to cord-marked, plain, incised, polished, micaceous, corrugated, and painted varieties. Two additional wares, vertically indented and wiped, were reported at the Avery Ranch site (for examples and definitions see Zier et al. 1988 and Hummer 1989; for additional examples of pottery types see Andrefsky 1990; Ellwood 1995; Gunnerson 1989; Jepson et al. 1992; Kalasz et al. 1993; Mitchell 1997; Van Ness et al. 1990; Watts 1971; Wood and Bair 1980; Zier and Kalasz 1985; Zier 1989; Zier et al. 1996a; Zier et al. 1996b). Developmental period pottery is apparently limited to cord-marked wares believed to have been influenced by, or traded from, Central Plains Woodland groups, and local brown wares associated with the upper Purgatoire River region. Known developmental period sites tend to have small, uniform ceramic assemblages; it is also notable that pottery is virtually absent at some Developmental period base camp sites (Hand and Jepson 1996; Loendorf et al. 1996:58-116). In contrast, the Diversification period witnessed the appearance of all ware types noted above. Influences or trade associated with an increasing number of ceramic traditions, including Puebloan, Athapaskan, and Plains Village, are therefore apparent prior to the Protohistoric period (Campbell 1969a:353-354; Ellwood 1995; Hummer 1989).

Current analytical methods do not permit chronological ordering of cord-marked wares on the basis of morphological attributes. Developmental period cord-marked ceramics cannot be confidently distinguished from those that were manufactured during the Diversification period on the basis of construction techniques or style. The distinction between deep and shallow cord marks on Chaquaqua Plateau specimens was employed by Campbell (1969a:354) to differentiate "Woodland cord-marked ware, or deep cord-marked" from "Borger cord-marked ware." Inexplicably, Campbell (1969a:114) offered cord-mark morphology as a means of chronologically ordering this type of pottery despite his assertion that "the variations could have been incorporated into one pot." Similarly, Ellwood (1995:132-133) has more recently drawn a distinction between earlier and later vessels on the basis of deep versus fine or obliterated cord-marking. She does, however, caution that "further observations are required before this hypothesis can be verified" (Ellwood 1995:133). Hummer (1989:366), in discussing ceramics from the PCMS, weighs in on the matter by stating that "both shallow and deep cordmarks can occur on the same vessel; the shallower and sometimes completely obliterated impressions frequently occur near the vessel's base."

Phase-level ceramic distinctions within the Diversification period are better understood than those advanced for the Developmental period. Whereas the Sopris phase is characterized by intensive ceramic exchange with the northern Rio Grande valley, Apishapa phase ceramics exhibit attributes such as crushed rock temper and cord marks that are typical of the Plains Village tradition. Some overlap is apparent in the recovery of cord-marked ceramics at Sopris phase sites and Southwestern sherds at some Apishapa sites. The relationship of the polished wares found on both Apishapa and Sopris sites is a matter that needs further exploration. Both phases are characterized by several sites with large numbers of sherds, including 5LA1211 and 5LA1416, and the Cramer, Snake Blakeslee, Ocean Vista, and Avery Ranch sites (Kalasz et al. 1993; Gunnerson 1989; Ireland 1968; Wood and Bair 1980; Zier et al. 1988). However, there are a number of Apishapa phase architectural sites for which low numbers of ceramics have been reported (Nowak and Kantner 1991:160-161; Loendorf et al. 1996:301, 310).

Micaceous wares are thought to have been produced by Protohistoric period Apaches (Campbell 1969a:355), although as Hummer (1989:368) notes, "Temporal assignment of the micaceous wares is problematical as they could potentially represent ceramics from eastern Puebloan groups (i.e., Taos, Picuris) or various Apachean groups (i.e., Dismal River, Navajo, Jicarilla) or their ancestors...." Investigations in the Carrizo Creek area indicate that Puebloan polychrome trade wares also enter the context area with the advent of the Apachean groups (Kingsbury and Gabel 1980:6-7).

Interpretations of Late Prehistoric chipped stone are comparable to or perhaps even surpass those of ceramics in terms of their complexity. Difficulties arise in comparing chipped stone reduction strategies among Late Prehistoric sites because of substantial variability in the analytical orientation of investigations spanning more than sixty years. Chipped stone analyses range from computer-generated multivariate approaches to highly subjective inspectional analyses. Both have their advantages and disadvantages, but those analyses characterized by minimal or no definition of classes and categories are of little value.

Generally, Late Prehistoric stage chipped stone technology appears to be a continuation of that associated with the Archaic stage; this situation is probably a reflection of their common origin and basic hunter-gatherer tool kit. Lithic data from Archaic and Late Prehistoric deposits at Recon John Shelter, Gooseberry Shelter, and Two Deer Shelter at Fort Carson suggest remarkable uniformity in chipped stone reduction strategies as well as overall tool morphology (Zier 1989; Kalasz et al. 1993; Zier et al. 1996a). Both Archaic and Late Prehistoric occupations at these shelters exhibit the co-occurrence of two disparate reduction strategies, i.e., the production of well-crafted formal bifaces as well as expedient or informal flake tools (Kalasz et al. 1993; Zier 1989).

More specific temporal trends in chipped stone tool form are generally restricted to projectile point morphology. The most obvious is the reduction in projectile point size due to the introduction of the bow-and-arrow. The standard perception that a plethora of large, corner-notched Late Archaic period varieties gradually give way to small, corner-notched varieties during the Developmental period has not changed with more recent investigations (Anderson 1989a:232-233; Zier 1989). The larger, Archaic stage dart points consistently appear in Late Prehistoric stage contexts, albeit in low quantities, and co-occur with presumed arrow points (Dwelis et al.

1996:Figure 6d; Hoyt 1979:Figure 6; Hunt 1975:Figure 6d, e; Loendorf et al. 1996:89; Nowak and Kingsbury 1981:Table 1; Nowak and Berger 1982:9; Rhodes 1984:Figures 60-62; Van Ness 1989:61; Zier 1989: Figures 31, 51, Table 17). The persistence of large, corner-notched styles in Late Prehistoric stage contexts is believed to reflect overlapping use of the atlatl and bow-and-arrow (Campbell 1969a:370; Eighmy 1984:111; Loendorf et al. 1996:226-227). However, other factors such as the collection and reuse of Archaic points as knives or scrapers by Late Prehistoric groups should be further explored. Most Archaic-style point specimens recovered from Developmental period contexts at the Magic Mountain site near Denver exhibited evidence of use wear and resharpening (Kalasz and Shields 1997:144).

Evidence continues to accumulate indicating that the small, triangular corner-notched projectile points of the Developmental period (e.g., Scallorn) are largely replaced by small, triangular side-notched varieties (e.g., Reed and Washita) sometime during the subsequent Diversification period, perhaps the later portion (Anderson 1989a:234; Kalasz et al. 1993:84; Nowak and Kantner 1991:58; Rhodes 1984:Figures 56-59; Zier et al. 1988:Figure 44). Anderson (1989a:234) suggests that small flange-stemmed points reflect the development of a new hafting method designed to facilitate exploitation of the Southern Plains bison herds, which are believed to have dramatically increased in size at approximately A.D. 1000. "The wide base on the flange points may have provided the necessary strength needed for the removal of intact arrows embedded deep in the flesh of large mammals such as bison" (Anderson 1989a:234). The limited evidence available for subsequent Protohistoric period projectile point associations suggests that the small, side-notched point continued to be pervasive (Anderson 1989a:234; Kingsbury and Gabel 1980:9-10). Small, corner-notched point styles are also believed to have been used during the Protohistoric period but the large, dart-sized varieties apparently were not (Anderson 1989a:234).

After chipped stone, ground stone implements are probably the most common class of artifact found in the Arkansas River Basin. In addition to more portable implements such as the typical mano and metate, fixed bedrock and boulder grinding surfaces are well-known in the context area. As with chipped stone, data from stratified rockshelters indicate overall uniformity in ground stone manufacture and morphology through the Archaic stage and subsequent Developmental period occupation. More formally shaped manos and basin metates are certainly present, but most ground stone implements found in the context area appear to represent an expedient tool technology (Gunnerson 1989; Loendorf et al. 1996:107-108; Zier 1989:174), or "...what is perceived as a throw-away attitude toward this class of artifacts" (Van Ness et al. 1990:255). As summarized in a description of ground stone collected along Turkey Creek at Fort Carson, this situation may be due in part to the availability of the most common raw material used for ground stone manufacture: "The raw material for grinding tools -- sandstone -- is so easily obtainable in the area that the maintenance and longevity of such tools does not appear to be of much concern. Even exposed bedrock and talus provide ready surfaces for grinding tasks and are commonly utilized" (Van Ness et al. 1990:255). The dearth of formal patterning in ground stone morphology has to date restricted the discernment of meaningful trends in their use and manufacture during the shift from the Archaic to Late Prehistoric stage. The best-known attempt was associated with Harvard University's excavations at the Magic Mountain site. Although Irwin-Williams (1963) and Irwin-Williams and Irwin (1966) offer their Magic Mountain site ground stone typology as means of discerning temporal trends in tool form, their results have never been independently confirmed. Furthermore, recent investigators have noted some weaknesses in the methods employed to define the Magic Mountain ground stone types (Kalasz and Shields 1997:15-16).

The large, combined ground stone collections from PCMS and Fort Carson demonstrate morphological similarities over broad portions of the context area (Bender 1990; Jepson et al.

1992; Van Ness et al. 1990; Zier et al. 1996a). With the exception of Sopris phase sites (Wood and Bair 1980:152-158), metates do not display the patterned formal shapes, such as the trough form, typical of those found in the Southwest. Although some well-shaped, deep oval basins are known, metates are generally thin, flat slabs that exhibit minimal modification. This trend is apparent with Sopris phase sites as well, but as noted before, trough metates are more common. Late Prehistoric stage manos from the context area, regardless of period or phase association, appear to reflect greater time investment in shaping than do metates. Ground cobbles, also known as manos or handstones, are generally small and ovoid. The length of the grinding surface is generally less than twice the width. Most handstones are less than 12 to 15 centimeters in length and are therefore commonly referred to as "one-hand manos" in the literature. Both unifacial and bifacial varieties are common. Bifacial varieties in particular exhibit margins that are shaped by pecking and battering (Van Ness et al. 1990). The Sopris phase sites of the Diversification period are distinct from those of the Apishapa phase in that two-handed manos are much more common (Mitchell 1997:99). Also of note are the distinctive edge ground or "keeled" mano forms that are common at the PCMS and, apparently to a lesser extent, Fort Carson (Bender 1990; Jepson et al. 1992; Van Ness et al. 1990; Zier et al. 1996a).

Considerable evidence has accumulated demonstrating that a well-developed bone tool and bead industry spans the Archaic and Late Prehistoric stages (see Erdos [1998] for a detailed review of bone and shell bead industries in southeastern Colorado). Awls and tubular bone beads were recovered from both Archaic and Late Prehistoric deposits at Carrizo Rock shelter; all the beads were manufactured from bird bone (Kingsbury and Nowak 1980:22-23). Similarly, bone tools and beads were recovered from both Archaic and Late Prehistoric stage contexts at Recon John Shelter, Moonshine Shelter, and Wolf Spider Shelter (Hand and Jepson 1996:83-91; Tucker 1991; Zier 1989:193-197) (see also Chapter 6, this volume). Most of these artifacts were recovered from Developmental period contexts rather than the underlying Archaic stage deposits. At these sites the bead collection was manufactured entirely from leporid (cottontail and jack rabbit) or indeterminate small mammal bone rather than the bird bone used at Carrizo Rock shelter. Further, all but a few of the awls at Recon John and Wolf Spider shelters were made from indeterminate large mammal or artiodactyl bone. This particular pattern was also noted at Torres Cave in the Chaquaqua Plateau area (Hoyt 1979:14-15). Though awls were made from large or medium mammal bone, beads were manufactured from leporid or indeterminate small mammal elements. The cultural strata at Torres Cave are believed to be primarily Developmental period in age.

As with ceramics, the quantity and variability of bone tools and ornaments increase at some Diversification period architectural and rockshelter sites (Campbell 1969a; Gunnerson 1989; Kalasz et al. 1993; Ireland 1968; Nowak and Kantner 1991:135; Rhodes 1984; Wood and Bair 1980; Zier et al. 1988). The Cramer and Snake Blakeslee sites and Upper Plum Canyon Rock shelter I, all of which have been assigned to the Apishapa phase, feature especially impressive quantities of bone tools, and to a lesser extent, beads (Gunnerson 1989; Rhodes 1984). Sopris phase sites such as the Leone Bluff site and the Sopris site (5LA1415) are similarly characterized by large ceramic assemblages and bone industries (Wood and Bair 1980:163-173). A continuation of earlier production strategies is suggested by the manufacture of beads from small to medium mammal and bird bone and the use of large mammal long bone and rib elements for tools such as awls, wrenches, spatulas, knives, scrapers, and digging sticks. However, the selected Apishapa phase sites with large bone tool and ornament assemblages emphasize the use of bison, whereas the Sopris phase examples do not.

The Late Prehistoric material culture of high-altitude portions of the context area is known from excavation of only a limited number of sites. The assemblages from the Campion Hotel site and site 5LK6, both on Lower Twin Lake, are varied and include lithic, ground stone, and bone artifacts, as well as one ceramic sherd from the former site (Buckles 1979). The lithic collections display a wide range of formal and expedient tool types including projectile points, large bifaces, formal scrapers, burins, chopping tools, and abundant flake tools. Microtools are common, suggesting a continuation of the long-standing microtool industry that characterizes the Mountain tradition from the terminal portion of the Paleoindian stage through the Archaic stage (Black 1991). Lithic debitage is also common and includes many resharpening flakes. Late Prehistoric projectile points at the two sites, though morphologically variable, are noted as similar in style to so-called Hogback points from the foothills. They are small arrow points and exhibit corner notches, long barbs, expanding stems, and frequently, convex blade edges (Buckles 1979:24). Both manos and metates are present at the Lower Twin Lake sites but little information is available. The bone tool assemblage suggests that a well-developed industry was in place. Found were several awls manufactured from mammal long bone, and hollow bone beads derived from unknown elements. The single ceramic sherd from the Campion Hotel site is of an unidentified plain ware, and according to Buckles (1979:62) could be of Ute affiliation. Puebloan ceramics on the surface at the Trout Creek Pass quarry suggest use of this site during Protohistoric times, ca. A.D. 1500-1700 (Chambellan et al. 1984:69).

Settlement and Subsistence Strategies

Most attempts to define the structure of settlement systems and subsistence strategies in the Arkansas River Basin have relied almost exclusively on survey data (Alexander et al. 1982; Andrefsky 1990; Campbell 1969a; Eddy et al. 1982; Jepson et al. 1992; Loendorf and Loendorf 1999; Lutz and Hunt 1979; Reed and Horn 1995; Van Ness et al. 1990; Zier et al. 1996a). Even though conclusions are tentative (see Chapter 4, this volume) and subject to verification through excavation, a number of important trends have been identified. Furthermore, since the publication of the previous research context for eastern Colorado (Eighmy 1984), a number of large- and small-scale excavation projects have been completed at Fort Carson, on the Bucci Ranch in Huerfano County, on Carrizo Ranches property in Baca and Las Animas counties, on the Chaquaqua Plateau, and at the PCMS (Andrefsky et al. 1990; Charles et al. 1996; Kalasz et al. 1993; Loendorf et al. 1996; Nowak and Fiore 1987, 1988; Nowak and Headington 1983; Nowak and Jones 1984, 1985, 1986; Nowak and Kantner 1990, 1991; Nowak and Spurr 1989; Rhodes 1984; Schiavitti et al. 1999; Zier 1989; Zier et al. 1988; Zier et al. 1996a; Zier et al. 1996b; Zier and Kalasz 1985). Excavation data from these projects provide a more detailed view of the wide range of site types identified through survey of the context area. These data therefore fill in some important gaps in the understanding of Late Prehistoric stage settlement, particularly with regard to subsistence and site function. However, the excavated site sample remains meager, and in particular very few large-block excavations have been undertaken. In light of this situation, archaeologists working in the context area are cautioned not to stretch the interpretive value of any single excavated site.

Although considerable new data are available for settlement research in the context area, much of it relates to the Developmental period and the Apishapa phase of the Diversification period. There is little new information about the Protohistoric period acquired since publication of the previous research context, and Sopris phase settlement research has been advanced largely through work in northeastern New Mexico (Biella and Dorshow 1997a; Campbell 1984; Eighmy 1984; Kershner 1984). The lack of information about Protohistoric period settlement systems can be partially attributed to uncertainties about what constitutes artifacts and features diagnostic of that period. Spaced stone rings are frequently thought to be the quintessential indicator of Protohistoric and early Historic occupations. However, data from the Dry Cimarron River valley (Winter 1988), the PCMS (Andrefsky et al. 1990; Loendorf et al. 1996), and the Carrizo Ranches (Nowak and Kantner 1991) suggest that this feature type may have been in use earlier. Similarly, triangular, side-notched Washita points are thought to represent Protohistoric period sites, although they also appear on Apishapa phase sites. The only unequivocally diagnostic artifacts and features are metal projectile points and Biographic-style rock art, both of which are relatively rare.

The Sopris phase of the Diversification period is still represented in the context area primarily by a few prominent architectural sites confined to the Park Plateau. In the years following the major survey and excavation projects at Trinidad Lake and in the Purgatoire and Apishapa highlands (Hand et al. 1977; Ireland 1970, 1973a, 1973b, 1974a, 1974b; Lutz and Hunt 1979; Wood and Bair 1980), there have been a number of energy- and highway-related survey and testing projects on the Park Plateau (Dore 1993; Gleichman 1983; Indeck and Legard 1984; McKibbin et al. 1997; Rood and Church 1989; Tucker 1983). These projects are small in scale when compared to either the earlier Park Plateau projects or military-related investigations to the east and north. They do not have the large site samples conducive to generation of overall settlement syntheses, and are more spatially restricted in their interpretation of site distributions. To date the only major synthetic work pertaining to the Park Plateau and Sopris phase archaeology is a reexamination of pottery collected during previous investigations (Mitchell 1997). In discussing Sopris phase settlement, Mitchell (1997:69) notes that "The Sopris phase began with the appearance of homesteads and hamlets along terraces above the Purgatoire River and its tributaries. Because intensive survey and excavation efforts have been limited to a relatively small portion of the area, little is known about site function variability or the total geographical range of the Sopris phase."

Site Types and Locational Variability

Currently, no other portion of the context area has been subjected to the level of settlement investigation that is associated with Fort Carson, PCMS, and the Picket Wire Canyonlands (Alexander et al. 1982; Andrefsky 1990; Jepson et al. 1992; Kalasz 1988; Loendorf and Loendorf 1999; Reed and Horn 1995; Van Ness et al. 1990; Zier et al. 1996a; also see Chapter 3, this volume). The more recent contract work is a welcome addition to the pioneering settlement research in the 1960s on the Chaquaqua Plateau by Campbell (1969a). Previous and ongoing archaeological investigation in these areas has provided an extensive database for examination of matters related to settlement patterns and settlement-subsistence strategies. All of these studies indicate the pervasiveness of Late Prehistoric stage occupation, and note that this situation may be due to erosional factors, site visibility, or alternatively, increasing population. None, unfortunately, encompasses the nearby Park Plateau or foothill regions of the context area; this situation has inhibited the formation of an overall synthesis of settlement within the Arkansas River Basin.

Campbell's (1969a) work on the Chaquaqua Plateau provided a solid foundation for subsequent research into Archaic and Late Prehistoric settlement in the plains and canyon regions of the context area. Sites recorded through survey were initially divided into types defined on the basis of setting (open or sheltered) (Campbell 1969a:320-343). Further division is based primarily on the presence or absence of features. Sites without fire-related features or architecture were termed utilized areas; these consisted of loci believed to represent quarries and workshops. Surface encampments had no architecture but exhibited evidence of "heating or firing activity" and were often characterized by multiple hearths or roasting pits and large, diverse artifact assemblages (Campbell 1969a:330). Open or unsheltered architectural sites were divided into a number of categories: stone enclosure, slab enclosure, walled or fortified enclosure of stone and slab, stone wall, spaced stone arrangement, spaced stone ring, and ring of earth and stone.

Dating sites primarily by relative means (e.g., diagnostic artifacts such as projectile points and ceramics) and recording their spatial distribution enabled Campbell (1969a:417-419) to form his conclusions regarding Chaquaqua Plateau settlement pattern. Campbell believed that Late

Archaic period occupations were confined to the canyons, and that rockshelters were the preferred habitation settings. During the subsequent Developmental period, bison first played a prominent role in subsistence, and hunting forays into the broad, open plains escalated. Further, a population increase is suggested and free-standing architecture in upper and lower canyon settings replaced rockshelters as winter quarters. Toward the end of the Developmental period, the number of stone enclosures increased and their locations seemed to shift toward lower and wider canyons. Campbell believes that these trends reflected an increased reliance on maize horticulture. Architecture increased sharply in the subsequent Apishapa phase, and population may have reached a peak at that time (Campbell 1969a:419). "Horticulture becomes a fundamental part of the subsistence pattern during Apishapa times ... All large sites and sites with structures are found in the proximity of arable land" (Campbell 1969a:391). The large, multiroom structures located in precarious, "defensive" canyon rim settings are believed to have been built during this time. The gradual abandonment of the region by Apishapa phase populations started in the fourteenth century and was believed to have been brought on by warfare, deteriorating climatic conditions, overpopulation, or some combination thereof. Tipi rings indicative of Protohistoric Apache appear in canyons and mesas during the fifteenth century (Campbell 1969a).

The site types defined for recent survey projects have been based largely on surface lithic assemblages and/or feature types (Alexander et al. 1982; Andrefsky 1990; Jepson et al. 1992; Kalasz 1988; Lutz and Hunt 1979; Reed and Horn 1995; Van Ness et al. 1990; Zier et al. 1996a). However, the manner in which survey data were manipulated to define these site types varies greatly according to project. The largest site sample was generated by surveys of the PCMS in 1983, 1984, and 1987 (Andrefsky 1990). A population of 1,442 sites was divided into 77 functional site types (Andrefsky 1990:XIV-7). Site types were defined on the presence or absence of seven descriptive functional characteristics: wood working, plant and/or seed grinding, hunting and butchering, lithic tool manufacture, architecture, fire features, and a nonspecific function category. Fire feature and architecture functional characteristics are self-explanatory; any site with a structure or a hearth was assigned these functions. The remaining functions reflect the presence of artifacts subjectively assessed to be representative of particular tasks, e.g., any sites with manos, metates, and/or bedrock ground stone features were considered to have the plant/seed grinding function. The distribution of site types was subsequently examined with respect to temporal period and physiographic zone. The results of the study were summarized as follows. "The PCMS data indicate one primary overriding characteristic. That characteristic is simply a continuity through time in settlement and subsistence. There appears to be very little change in what prehistoric people were doing or where they were living within the PCMS area. Such continuity through time is not an altogether surprising situation. Michlovic (1986) suggested that the entire Plains region shows no true cultural evolution and that changes in the artifact assemblage such as pottery and the bow-and-arrow were diffused traits, which were accepted into the population but had little impact on the overall settlement and subsistence systems" (Andrefsky 1990:XIV-22).

Surveys of smaller scale in the Picket Wire Canyonlands and at Fort Carson resulted in settlement pattern studies that were more restricted in terms of the range of physiographic settings (Jepson et al. 1992; Reed and Horn 1995; Van Ness et al. 1990; Zier et al. 1996a). None of these surveys featured the overall diversity and range of physiographic setting that characterized the PCMS investigations, particularly with regard to the broad expanses of gently rolling plains. Viewed together, however, they reveal some simple yet interesting trends in settlement, particularly with respect to architectural sites. Again, it is reiterated that relatively dated Late Prehistoric stage sites are pervasive in these smaller studies. The Fort Carson surveys emphasized locations near or along larger drainages, including shallow canyon settings, that were in relative proximity to the foothills of the Rocky Mountains. In contrast, the Picket Wire Canyonlands survey was situated in the deep canyons of the Purgatoire River well to the east of the mountain front.

Rather than create site types based on specific functional tasks, these surveys emphasized assessments of overall site complexity. The Picket Wire Canyonlands sample was characterized by a mix of architectural and nonarchitectural sites (Reed and Horn 1995:79-81). Applying Binford's (1980) collector/forager terminology, the presence or absence of architecture was used as a basis for classifying sites as residential bases (architectural), field camps (nonarchitectural), and locations (nonarchitectural). Subjective assessments of the number and diversity of artifacts, features, and rock art were used as a basis for additional classification within these major headings, e.g., simple and complex habitation sites were subsequently defined within the residential base grouping. Architectural sites made up a comparatively small percentage of the overall Fort Carson site samples (Jepson et al. 1992; Van Ness et al. 1990; Zier et al. 1996a). Therefore a quantitatively oriented multistage approach was employed that initially emphasized lithic artifacts, the most common class recovered. Sites were distinguished as large or small and simple or complex on the basis of the size and nature of associated lithic assemblages. Variability in ceramics, architecture, and nonarchitectural feature variability was subsequently identified among the lithic site categories. Despite the different approaches to creating site types, the combined data suggest that architectural sites occur more often in the Purgatoire River region than at Fort Carson to the northwest. As discussed in Chapter 4, architecture is usually perceived as a reliable indicator of increased sedentism. For reasons that yet need to be explored, 95 sites in the Picket Wire sample (36 percent of the 263 sites) exhibit architecture (Reed and Horn 1995:Table 6-2). In stark contrast, at Fort Carson just 13 sites (7 percent of the 186 site sample) from the three selected surveys have structures. The 13 sites include Ocean Vista (5PE868), which was recorded as nonarchitectural during the survey (Van Ness et al.1990); architecture was subsequently exposed during testing (Kalasz et al. 1993). It is notable that 52 individual structures (as in rooms) are associated with the 13 Fort Carson architectural sites, while 288 individual architectural units are represented by the 95 Picket Wire architectural sites. This situation minimally suggests that the deep Purgatoire River canyons of the context area are characterized by a greater degree of sedentism or, alternatively, a longer history of semisedentary adaptations.

An earlier study of PCMS settlement patterns was entirely restricted to observations of architectural site types within the Taylor Arroyo drainage basin, a northern tributary of the Purgatoire River (Kalasz 1988). Architecture was relied upon for this settlement study because analyses of lithic and other data sets were, at the time, not yet complete or were fraught with problems related to sampling and analytical methods. Taylor Arroyo sites were therefore classified based on the number and type of architectural unit or "room" level associations. The architectural typology on which the Taylor Arroyo site classification is based was developed to assess the temporal bounds of PCMS structures (Kalasz 1988, 1989, 1990). Complex architectural sites were designated "population coalescence communities," and simpler architectural sites were designated "specialized task communities." The Taylor Arroyo drainage basin encompasses a wide range of PCMS physiographic zones. Moving north to south through the Taylor Arroyo study area, one encounters upland mesas, broad plains grasslands, shallow upper canyons, and deeply incised middle and lower canyons. The confluence of Taylor Arroyo with the Purgatoire River lies approximately 25 km south of the Picket Wire Canyonlands. A particularly high percentage of the Taylor Arroyo architectural sites is relatively dated to the Late Prehistoric stage and, as with the Picket Wire and Fort Carson samples, is believed to have been occupied during the Developmental period or succeeding Apishapa phase. Ninety-four sites (21 percent of the of the Taylor Arroyo site sample of 439) exhibit architecture; this percentage is midway between the architectural site percentages drawn from the Fort Carson and Picket Wire surveys. The Taylor Arroyo study emphasizes that the stone enclosure architectural sites typical of the region's Late Prehistoric stage, including the multiple-room structures, were not restricted to defensive canyon locales as was suggested by Campbell's research. Of the five physiographic zones, only the mesas had no associated architectural sites. However, the trend noted in the Picket Wire Canyonlands settlement study is supported by the Taylor Arroyo research. In terms of acreage, the mesas and plains comprise 92.3 percent of the study area. Although the canyons comprise only 7.7 percent of the total acreage, nearly half of the entire site sample and fully 68 percent of the architectural sites are situated in these settings.

The PCMS, Fort Carson, Chaquaqua Plateau and Picket Wire Canyonlands surveys together underscore a number of settlement trends applicable to a significant portion of the context area. These trends include the pervasiveness of Late Prehistoric settlement in canyon settings, site locations indicative of resource exploitation in all environmental zones, and the presence of a wide range of architectural and nonarchitectural site types, suggesting considerable functional diversity. The pioneering settlement research of Campbell remains valid today in many respects, particularly with regard to the temporal affiliations of architectural sites and their spatial distributions. More recently amassed data corroborate Campbell's settlement study in that there is a strong tendency for architectural sites to be located in canyon settings and to be affiliated with the Late Prehistoric stage. However, as will be discussed in greater detail below, there is much more variability in architectural site location, morphology, and function than had been suggested previously.

Rock art sites are common in the context area, particularly in the dissected canyon country of the lower Purgatoire River region. Because of the imprecision attendant to dating of most rock art (see discussion in Chapter 4), this type of site is described in this general Late Prehistoric discussion rather than in the context of the individual periods within the stage. This Purgatoire Petroglyph Style of rock art is most closely associated with the two earlier periods of the stage. This style, as well as a complementary style of pictographs, was originally defined by Cole (1984:16-24). In a reevaluation of Cole's data, Loendorf (1989:354-359) and Loendorf and Kuehn (1991:280-282) argue that the style should be redefined, and that clearer distinctions should be drawn between Pecked Representational and Purgatoire Petroglyph Style motifs. The central motif of the latter is a full-view anthropomorph. Characteristically, such anthropomorphs are depicted with digitate hands and knobby knees. Some elements are phallic, but few include horns, headdresses, or other cephalic appendages. Large numbers of quadrupeds are frequently depicted in association with these anthropomorphs. Purgatoire Petroglyph quadrupeds tend to have rectangular bodies, straight legs, and poorly formed heads. In some cases antlers are not depicted, yet in others, well-executed branching antlers are shown. Abstract elements, principally meandering curved lines, are also included in this style. An atlatl motif, depicted as a bisected or tailed circle, may also be included. A similar inventory of motifs, executed in red pigments, defines the contemporaneous Purgatoire Painted Style. Both styles are believed to date to the Late Prehistoric stage, from approximately A.D. 100 to 1400. Both are thought to postdate the earliest Pecked Representational Style images. The consistent association between Purgatoire Petroglyph Style rock art and architectural forms dating to the late Developmental or Diversification periods supports a Late Prehistoric assignment for these styles. In any case, elements assignable to the Purgatoire Petroglyph Style, and to a lesser extent the Purgatoire Painted Style, are among the most common rock imagery motifs in the context area. Some of the better known examples include the Zoo Keeper site (Loendorf 1992b), the Cross Ranch site on the PCMS (Loendorf and Kuehn 1991), and the 5LA1023/5LA5840/5LA5841 complex in the Picket Wire Canyonlands (Reed and Horn 1995).

Several rock art styles are associated with the Protohistoric and Historic occupation of the Arkansas River Basin. Among these, the oldest is known as the Rio Grande Style (Cole 1984:25-26; Loendorf 1989:359-361; Loendorf and Kuehn 1991:282-283). This style has also been termed the Regional Style by Faris (1995), who argues that a number of characteristic motif attributes are derived from plains sources, rather than from the middle and northern Rio Grande. The central motifs of the Rio Grande or Regional Style include both outline-pecked and solid-pecked anthropomorphs, often shown with horns or masks; shields and shield-bearing warriors; and a large variety of quadrupeds. Anthropomorphs are frequently depicted bearing weapons. The primary quadruped depicted is the bison, occasionally shown with a heart line. Other motifs include corn plants and herons (Reed and Horn 1995). In some instances images are created through the use of "negative space:" patina is removed from the rock surface surrounding the figure, leaving a dark image on a lighter background. Although it is unclear which elements or attributes of Rio Grande Style imagery can be attributed to middle and northern Rio Grande groups, and which to plains groups, images of this type appear to date to the Protohistoric period, or roughly A.D. 1500 to 1750. Rio Grande Style rock art is generally thought to be the work of Apache artists; significantly, Loendorf and Kuehn (1991) interpret certain anthropomorphs as Apache gan dancers. This interpretation is generally supported by Protohistoric period cation-ratio dates for Rio Grande Style elements. Sites which contain this style of imagery have been recorded on the PCMS (Sue Site) and in the Picket Wire Canyonlands (5OT339 [Reed and Horn 1995]).

The most recent style of aboriginal rock art in the Arkansas River Basin has been termed the Plains Biographic Style (Cole 1984:26-38; Keyser 1977, 1987; Loendorf 1989:361-362; Loendorf and Kuehn 1991:284). This style actually incorporates a variety of types and styles manufactured during the late Protohistoric and Historic periods. The hallmark of this style is the depiction of horses and riders, as well as European and American material culture, principally rifles. The earliest examples are collectively known as Ceremonial Rock Art, and are characterized by the incised depiction of shield-bearing warriors, V-necked anthropomorphs, and rectangular-bodied anthropomorphs (Keyser 1987). Estimated dates for Ceremonial Rock Art in the Northern Plains span the period between A.D. 1000 and 1700. The earliest Ceremonial Rock Art may therefore predate the introduction of the horse to Plains cultures, although relatively crude representations of horses may be important elements of what Keyser (1987:47) terms "proto-biographic" rock art. Some of the formal design motifs of Ceremonial and Rio Grande Style rock art overlap somewhat, including shield-bearing warriors and bison. However, Ceremonial Rock Art is nearly always incised, often deeply, whereas Rio Grande Style elements are generally solid pecked or outline pecked.

Site types and settlement strategies are poorly understood in the mountainous portions of the context area, and definition of overall patterns of settlement must await large-scale inventory of high-altitude areas. Information provided by Buckles (1979) suggests similar locational trends to those of the Archaic stage, and indeed the two excavated sites at Lower Twin Lake with Late Prehistoric components, Campion Hotel site and 5LK6, also have Late Archaic components, suggesting reuse of favored areas. These sites are situated on valley-bottom terminal moraines. The varied artifact assemblages and faunal remains indicate that they served as base camps at which a range of activities occurred including lithic manufacture/maintenance and faunal processing. Although the overall geographical distribution of high-altitude quarrying activity is unknown, it is apparent that the Trout Creek Pass quarry continued to be utilized during the Late Prehistoric stage, and evidently attracted people from outside the immediate upper Arkansas Valley region (Chambellan et al. 1984).

Economy

Late Prehistoric stage subsistence in the Arkansas River Basin is often distinguished from that of the Archaic by the development of a mixed or dual foraging and gardening economy. The degree of interpretive emphasis placed on foraging as opposed to horticulture depends on the investigator. The occurrence of maize has been associated with prehistoric occupations located throughout the eastern plains of Colorado. Campbell (1969a) recovered maize from Late

Prehistoric stage contexts on the Chaquaqua Plateau in quantities he felt were suggestive of increasing reliance on horticultural products. Horticulture there was suggested to have reached its zenith during the Apishapa phase. "There is reason to believe that the part played by gardening may have become more meaningful than foraging as a means of food acquisition" (Campbell 1969a:391). However, Campbell's (1969a:84-87) assessment of the importance of cultigens in Chaquaqua Plateau subsistence strategy is based largely on specimens recovered from just two rockshelters, Pyeatt and Medina.

Although no absolute dates were obtained from the various Trinchera Cave excavations, and associations between stratigraphy and specific artifact assemblages are questionable, the perishable artifacts recovered there provide some insight into the range of the Late Prehistoric stage economy. Maize was certainly a common occurrence, but additional materials such as arrow shafts, cordage, snares, basketry, and a variety of wild plant and game remains attest to the scope of the Arkansas River Basin hunter-gatherer economy (Simpson 1976). These data are supported by the more rigorously controlled excavations at Upper Plum Canyon Rock shelter I (Rhodes 1984).

In the ensuing years, micro- and macrobotanical evidence demonstrating the presence of maize has been recovered from a number of Developmental and Diversification period contexts in the Arkansas River Basin as well as a few that are Archaic in age (see Chapter 6, this volume). The remains of Developmental period cultigens are to date relatively rare occurrences (Kalasz et al. 1993; Zier 1989; Zier et al. 1996b), although they appear to be much more common in Park Plateau macrofloral assemblages than those from elsewhere in the basin (Biella and Dorshow 1997a; Kirkpatrick and Ford 1977; Mitchell 1997; Wiseman 1988). Significantly more evidence is available for Diversification period cultigens, at both Apishapa and Sopris phase sites (Campbell 1969a; Gunnerson 1989; Kalasz et al. 1993; Mitchell 1997; Rhodes 1984; Van Ness 1986; Wood and Bair 1980; Zier and Kalasz 1985; Zier et al. 1988). Although maize is certainly a consistent presence during the Developmental and especially the Diversification period, it does not appear to represent a principal element of the Late Prehistoric stage subsistence strategy.

Botanical remains recovered from a number of sites across the context area were summarized by Van Ness (1986). Included in this compendium were data generated from analysis of 157 pollen and 99 flotation samples. The samples were recovered from 5BA320 in the Carrizo Ranches area (Nowak and Jones 1986), the Avery Ranch site and Recon John Shelter at Fort Carson (Zier and Kalasz 1985), the Triple J site along the rim of Plum Canyon near the Purgatoire River (Baugh et al. 1986), and tested sites in the PCMS (Scott 1984). All of the pollen samples were recovered from the 13 PCMS sites; in addition, 64 of the flotation samples were taken from 19 PCMS tested sites. The Avery Ranch and Recon John Shelter results enumerated by Van Ness (1986) do not reflect the more extensive excavation results published after 1986 (Zier et al. 1988; Zier 1989). To date, this paper remains the only synthesis of botanical data from excavated prehistoric features at spatially and temporally disparate sites in the context area. The site sample represents occupations from both the northern and southern parts of the context area east of the mountains, and those dating to the Archaic as well as Late Prehistoric stage.

As is typical of the context area, samples collected from Late Prehistoric stage contexts dominate the results. Sopris phase sites, however, are not represented within the sample summarized by Van Ness (1986). The results are a dramatic counterpoint to Campbell's (1969a) assessment of the importance of maize horticulture in the Arkansas River Basin. Wild plant remains, especially goosefoot, rather than maize were by far the predominant botanical component of all samples (Van Ness 1986). Of the approximately 8,848 charred macrobotanical remains, 8,239 specimens (93 percent) were goosefoot seeds. Other prominent, charred, wild plant remains included purslane, pigweed, pea family, sunflower, and hedgehog cactus. By contrast, maize remains from the samples are represented by 59 cob or possible cob fragments, 3 kernels, and 1 pollen grain. Most of the maize is associated with the Apishapa phase Avery Ranch site. Van Ness (1986:9) concludes, "It is suggested here that, above all else, more data needs to be collected and data from surrounding regions needs to be integrated. But, based on the evidence available at this time, corn appears to have been of limited importance during the Late Prehistoric of southeastern Colorado." More recent investigators propose that this situation may reflect prehistoric populations that were in the process of cultivating *Chenopodium* and other wild plants (Loendorf et al. 1996:123-125).

Perhaps the species that have not been commonly found in context area micro- and macrobotanical samples are of equal concern to what has been reported. The diverse environmental niches comprising the Arkansas River Basin, especially the canyons, include plants that are ethnographically known as important economic resources. Although a variety of fruits and nuts such as chokecherries, wild plums, currants, and skunkbrush commonly occurs in the region, they are only rarely recovered from archaeological contexts except on the Park Plateau. Whether this reflects a preservation problem has yet to be resolved.

Sopris phase sites, despite their obvious connections to Rio Grande valley Puebloans, display a similar mix of wild plants and domesticates (Mitchell 1997; Wood and Bair 1980). Wild plant remains commonly recovered from Sopris contexts include goosefoot, sunflower, and some species not typically found in other context area archaeological sites such as pinyon and chokecherry (Wood and Bair 1980). Wood and Bair (1980:214) conclude that "the vegetal diet of the Sopris Phase population consisted of predominantly native plant species ... maize is present in small amounts. This may indicate that horticulture was not practiced as a major means of subsistence." Mitchell (1997:99, Appendix C) argues convincingly that maize horticulture, however, was an important activity. As with the Apishapa phase, it remains unresolved as to how extensive a role maize and other cultigens played in the overall Sopris phase subsistence strategy. This matter will be discussed more extensively in the section detailing Sopris phase research. At this point it is important to emphasize that maize has a consistent but limited presence in both Sopris and Apishapa architectural sites.

Considerable data pertaining to Late Prehistoric faunal assemblages have accrued since publication of the previous research context (Eighmy 1984). Abundant and diverse faunal remains have been recovered from rockshelter and open sites, both architectural and nonarchitectural (Andrefsky 1990; Dwelis et al. 1996; Gunnerson 1989; Hand and Jepson 1996; Hoyt 1979; Kalasz et al. 1993; Rhodes 1984; Tucker 1991; Wood and Bair 1980; Zier and Kalasz 1985; Zier et al. 1988; Zier 1989). To date, little or no evidence suggests that game preferences changed dramatically in the shift from Archaic to Late Prehistoric stage (Butler 1992); leporids and large artiodactyls such as bison and deer tend to be predominant components in context-area faunal assemblages. Larger artiodactyls, e.g., bison, tend to be better represented at Late Prehistoric stage sites than those of the Archaic, but most of what is currently known about Archaic occupation, including faunal assemblages, is based on rockshelter studies. In comparison, fauna exploited by Late Prehistoric populations is known from a variety of site types. Investigators have identified a trend at Fort Carson for rockshelters of any age to be associated with higher ratios of small mammal remains, particularly leporids; by contrast, bone assemblages from open sites, both architectural and nonarchitectural, are comprised primarily of artiodactyls (Kalasz et al. 1993:309). This trend holds true with the faunal assemblages recovered from Wolf Spider Shelter, Upper Plum Canyon Rock shelter I, Medina Rock shelter, Pyeatt Rock shelter, Umbart Cave, and Torres Cave; leporids, particularly cottontails, are predominant at these sites (Campbell 1969a; Hand and Jepson 1996; Hoyt 1979; Rhodes 1984). The trend is not apparent in the less substantial faunal collections from Gimme Shelter, Moonshine Shelter, Davis Rockshelter and the open architectural Forgotten site (Andrefsky et al. 1990; Dwelis et al. 1996; Loendorf et al. 1996; Tucker 1991; Wood and Bair 1980:Table XXX).

Bison remains are particularly impressive only among the architectural Apishapa phase sites of the Diversification period. Bison dominates the faunal assemblages of large Apishapa phase settlements such as Snake Blakeslee, Cramer, and Avery Ranch (Gunnerson 1989; Zier et al. 1988). Ocean Vista, an Apishapa phase architectural site situated along Turkey Creek in proximity to the Avery Ranch site, also yielded principally bison (Kalasz et al. 1993:172-212). Of note was a dense concentration of bison bone in and around a shallow pit dug into friable, decomposing bedrock.

Late Prehistoric subsistence data from the high-altitude portion of the context area are extremely sparse, and are largely restricted to faunal assemblages from the Campion Hotel site and 5LK6 on Lower Twin Lake. An emphasis on hunting and activities related to hunting (butchering, lithic tool manufacture) is suggested by these assemblages. Bone is highly fragmented as a result of thorough processing and much is unidentifiable. However, deer is predominant with jack rabbit present as well; limited evidence of fish and snake was also found (Buckles 1979:67-69, 99-103). Game drive systems on Monarch Pass clearly indicate large game procurement during the Late Prehistoric stage (Hutchinson 1990) although it is unknown which species were sought.

Architecture

As touched upon previously, the shift from Archaic to Late Prehistoric is often described partially in terms of greatly increased numbers of architectural sites. Although it is certainly not established to what extent geomorphic factors affect site visibility and preservation, with few exceptions (e.g. Rood 1990; Shields 1980), architecture in the context area is believed to be associated with the Late Prehistoric stage (Kalasz 1990:Table XII-1; Loendorf et al. 1996:Table 7.4). Within the Late Prehistoric stage, examples of Diversification period architecture far outnumber those of either the preceding Developmental period or the subsequent Protohistoric period.

Context-area architecture of any period generally consists of low stone walls. Developmental period architecture ranges from the simple, low stone wall enclosing the rockshelter at Metate Cave to the more complex, open setting structures of the Belwood and Forgotten sites (Campbell 1969a; Hunt 1975; Loendorf et al. 1996). Comparable architecture from roughly the same period is found to the north in the adjacent South Platte context area and to the south in northeastern New Mexico (Biella and Dorshow 1997a; Kalasz and Shields 1997). The Belwood and Forgotten site houses occur later in time than the Metate Cave structure and are characterized by shallow, circular or oval basins circumscribed by contiguous rock wall foundations. These are single-room domiciles with a superstructure supported by the rock foundation and wooden posts. A number of interior hearths and pits are present. Diversification period architecture is characterized by the continuation of contiguous rock wall foundations, but they form larger, aggregated room settlements as well as isolated, single-room structures. True directional change is recognized in Diversification period architecture through the prominent distinctions between Sopris and Apishapa structures (Gunnerson 1989; Kalasz 1990; Mitchell 1997; Nowak and Kantner 1990; Wood and Bair 1980; Zier et al. 1988). Both continue the tradition of contiguous rock walls and wooden posts. Vertical slabs are often associated with Apishapa phase houses although horizontally positioned rock is also common. Horizontally coursed masonry appears to be more prevalent in Sopris phase architecture although, as with Apishapa phase examples, there is considerable variability in wall construction, including occasional use of vertical slabs. However, while the Apishapa structures exhibit walls of a generally circular or curving design and a lack of formalized internal features, Sopris construction displays a characteristic rectilinear foundation and patterned internal feature configurations. Southwestern architectural influences have been vaguely attributed to the Developmental period Belwood site, but in fact are much more pronounced in the Sopris phase. Apishapa phase architecture, on the other hand, has been described as a diluted form of the Plains Village pattern. The purported interregional relationships for the Sopris and Apishapa phases are further supported by associated ceramic assemblages.

More problematic is the presence of spaced stone or boulder walls in the Arkansas River Basin context area. Spaced stone circles resembling classic plains tipi rings are known in the context area and are generally believed to have been built by Athapaskans who arrived after the close of the Diversification period. This premise is supported by a number of tipi ring sites investigated on Carrizo Ranches property, the Apishapa Highlands, and in the Trinidad Lake area (Hand et al. 1977; Kingsbury and Nowak 1980; Kingsbury and Gabel 1980; Lutz and Hunt 1979). However, an earlier presence for this type of architecture certainly cannot be discounted given the data available at present. Furthermore, structures identified as "tipi rings" in the Trinidad area are more likely contiguous rock wall stone enclosures of the Developmental or Diversification period. Also of interest are enigmatic rectilinear foundations excavated both on the Bucci Ranch near the upper Huerfano River and along the upper Purgatoire River (Gleichman 1983; Indeck and Legard 1984; Zier et al. 1996b). Alluvial cobbles/boulders used in the construction of these walls were much more widely spaced than in the contiguous rock walls of the Sopris and Apishapa phases, but like the former they enclose a roughly rectilinear area (Indeck and Legard 1984:Figures 14, 17; Zier et al. 1996b:Figures 15-18). Excavation of the Bucci Ranch example, Structure 1 at 5HF1079, was very limited in scope, but nevertheless melted adobe was found in association (Zier et al. 1996b). Little or no cultural material and no internal features were recovered from similar structures along the upper Purgatoire River at 5LA2190, 5LA2191, and 5LA2193 (Indeck and Legard 1984). The cultural affiliation of these structures cannot be confirmed at present. Radiocarbon age assessments spanning the Diversification period were obtained from the Bucci Ranch structure, as were cord-marked ceramics and small, side-notched points believed representative of Diversification period occupation. There are no absolute dates from the Purgatoire structures, nor were diagnostic artifacts found in direct association.

DEVELOPMENTAL PERIOD

Introduction

The Developmental period of the Late Prehistoric stage in the Arkansas River Basin dates from A.D. 100 to 1050 and therefore largely corresponds with the Early Ceramic period as defined in the previous research context (Eighmy 1984). Although Eighmy's stage/period taxonomy was accepted by a number of regional archaeologists, the long-standing "Woodland" or "Plains Woodland" terminology continues to be employed (Biella and Dorshow 1997a; Butler 1988; Gunnerson 1987; Kalasz et al. 1993; Lintz and Anderson 1989; Mitchell 1997; Zier and Kalasz 1985; Zier et al. 1988). The terms "Plains Woodland" and "Woodland" should be discarded because they promote confusion about the relationship between local developmental sequences and those east of the Arkansas River Basin. The expression "Developmental" is preferred over "Early Ceramic" because it attempts to synthesize a number of pivotal events and processes which occurred during this time and does not focus on a single technological aspect. It is acknowledged that the A.D. 100 date used to introduce this period is skewed toward the earliest possible occurrences of technologies and events that define this taxon. Co-occurrences of the various attributes that characterize the Developmental period probably did not become commonplace until a few hundred years afterward but, until this prospect can be confirmed, the authors choose to err in favor of the earliest dates for arrow points.

In Colorado a number of questionable localized phases or foci such as Graneros, Parker, Hogback, and Franktown were defined for this time period, but similarities among them seem to far outweigh the differences (see Chapter 4, this volume). Butler (1986, 1988) attempts to clarify these taxonomic ambiguities by defining the Colorado Plains Woodland Regional Variant, comprised of the South Platte and Arkansas phases. However, this taxonomy was admittedly biased toward northeastern Colorado sites and, as the name implies, does not address affinities with Park Plateau and adjacent northeastern New Mexico components. In addition, variability among the Arkansas and South Platte manifestations does not appear adequate to justify the establishment of discrete phases.

Recent studies have indicated that a thorough description of Developmental period occupation necessitates the inclusion of Park Plateau components, both in southeastern Colorado and northeastern New Mexico. Archaeological survey and excavation projects have been concentrated in three districts, all of which are located in the central and southern portions of the plateau. In the Trinidad district, which is located along the Purgatoire River west of Trinidad, archaeological research has focused on Trinidad Lake (Baker 1964, 1967; Bair 1975; Dick 1954, 1963; Eighmy and Wood 1984; Ireland 1970, 1971, 1973a, 1973b, 1974a, 1974b; Ireland and Wood 1973; Karhu 1995; McCabe 1973; Mitchell 1997; Wood 1981, 1986; Wood and Bair 1980) and on a variety of energy projects (McKibbin et al. 1997; Tucker 1983; Rood and Church 1989). Several smaller studies have been completed for highway projects (Baker 1965; Blair 1980; Gleichman 1983; Indeck and Legard 1984). One project has examined the highlands north of the Purgatoire River valley (Lutz and Hunt 1979).

Archaeological projects have been conducted in two districts in New Mexico. In the Vermejo district, located along the upper Vermejo River and its major tributaries, large-scale compliance projects have been completed for a series of contiguous coal mines (Biella and Dorshow 1997a; Campbell 1984; Glassow 1984; Kershner 1984). Research in the Cimarron district, located immediately north and west of Cimarron, New Mexico along the lower Cimarron, Ponil, and Vermejo rivers, has been conducted by archaeologists associated with the Philmont Scout Ranch operated by the Boy Scouts of America (Bogan 1941; Fredine 1997; Glassow 1980, 1984; Kirkpatrick 1976; Kirkpatrick and Ford 1977; Lutes 1959a, 1959b; Skinner 1964; Thoms 1976). One small compliance project has also been completed in the Cimarron district (Wiseman 1988).

Few formal cultural taxa have been comprehensively defined for the Developmental period on the Park Plateau. However, a variety of cultural-temporal systems has been used to organize information about the early post-Archaic record in the Cimarron, Vermejo, and Trinidad districts. That the terms "Basketmaker" (Lang 1978), "Neo-Indian" (Thoms 1976), "Archaic" (Wendorf 1960), and "Woodland" (Campbell 1969a) have all been applied to the archaeological record of the first millennium A.D. in northeastern New Mexico and southeastern Colorado reflects a continuing taxonomic ambivalence among archaeologists working in the area, and a number of important culture-historical problems have yet to be fully resolved.

Fortunately, only two cultural-temporal systems have been widely applied in practice. The first such system is derived from the Pecos Classification. During the 1950s, several investigators called attention to architectural and ceramic similarities between sites located along the upper Canadian River and its major tributaries and sites located in the northern Rio Grande valley (Gunnerson 1959; Lutes 1959a, 1959b; Wendorf 1960). Although these investigators considered the Park Plateau manifestations "marginal," they nevertheless saw them as Puebloan at least in the most general sense. Glassow (1980) codified this understanding by developing a period system for the Cimarron district which mirrors the temporal and developmental outlines of the Pecos system. For the Developmental period, Glassow (1980: 70) defines three "phases," a term he considers to be synonymous with "period" (Table 7-2). Glassow (1980, 1984) applied this system to survey and limited excavation data from the Cimarron, Vermejo, and Ponil river drainages west of Cimarron. This system has also been used by Wiseman (1988) and by Campbell (1984).

Table 7-2. Park Plateau Cultural-Temporal System of Glassow (1980).

Phase Name	Dates	Criteria/Characteristics
Escritores	A.D. 900-1100	Kiatuthlanna or Red Mesa Black-on-white
Pedregoso	A.D. 700-900	Radiocarbon dates
Vermejo	A.D. 400-700	Circular masonry architecture
Archaic	pre-A.D. 400	Stemmed dart points

More recent projects conducted in the Vermejo district (Biella and Dorshow 1997a) and Trinidad district (Mitchell 1997) demonstrate that the archaeological record of the Park Plateau does not make a good fit with the Pecos Classification. Particularly for the Vermejo district, researchers have adopted the plains-based terminology devised originally by Campbell (1969a) for the Chaquaqua Plateau of southeastern Colorado (see Chapter 4 of this volume for a more detailed discussion of Campbell's chronology). Accordingly, Dorshow (1997a) defines three Woodland periods spanning the eight centuries between A.D. 200 and 1000 (Table 7-3). This cultural-temporal system has been applied to extensive survey and excavation data from the upper tributaries of the Vermejo River.

Table 7-3. Park Plateau Cultural-Temporal System of Dorshow (1997a).

Phase Name	Dates	Criteria/Characteristics
Terminal Plains Woodland	A.D. 750-1000	Circular masonry architecture; radiocarbon dates
Initial Plains Woodland	A.D. 450-750	Storage cists; semi-subterranean pit structures; corner-notched arrow points; radiocarbon dates
Transitional Archaic/ Plains Woodland	A.D. 200-450	
Archaic	pre-A.D. 200	Dart points; radiocarbon dates

In the Trinidad district relatively few sites that date to the Developmental period have been documented. Here, too, researchers have revealed a certain ambivalence about cultural affiliation. For example, the Running Pit House site excavated in the late 1950s was first attributed to a "Basketmaker" occupation (Ireland 1974a; Dick 1974), and later to the Early Ceramic period (Eighmy 1984). Although a formal phase system has not been proposed for the first millennium in the Trinidad district, researchers have attributed sites that appear to date to that period variously to an undifferentiated "Formative Stage" (Tucker 1983), the "Woodland" period (Baker 1964), or the "Early Ceramic" period (Eighmy 1984; McKibbin et al. 1997).

Despite this terminological proliferation in Colorado and New Mexico, the Developmental period as defined here describes a widespread manifestation characterized by significant homogeneity in settlement, economy, and material culture. The evidence presented below indicates that a modified version of the long-lived, Archaic hunter-gatherer adaptive strategy continued along the eastern flanks of the Rocky Mountains from northeastern Colorado to northeastern New Mexico. Most researchers agree that many early post-Archaic sites in this region can be distinguished from Late Archaic sites on the basis of both architectural and artifactual criteria. The Developmental period is characterized by the widespread appearance of residential architecture, by the first appearance of the bow-and-arrow and ceramic containers, and by the appearance of small-scale maize horticulture. However, spatial and temporal variability is evident within the context of these trends, and near the close of the Developmental period the archaeological record of the Park Plateau begins to diverge from the contemporaneous record on the plains. Current data sets associated with this far-flung manifestation hint at the potential for generating discrete regional phases, but such a step awaits additional excavation and synthesis. Currently it is most important to establish the geographical bounds of Developmental period occupation and common attributes that facilitate future contrast and comparison.

Chronology

Developmental period dates that signal the shift from the Archaic stage to the Late Prehistoric stage in the context area are presented in a previous section of this chapter. That section focuses on the larger body of dated Developmental period components from the Arkansas River Basin and northeastern New Mexico. Excavated occupations with associated absolute dates are emphasized to assess more accurately the Developmental period age range. Also emphasized are those components exhibiting the proposed hallmarks of the Developmental period such as small, corner-notched projectile points, ceramics, and architecture. Important Developmental period sites in the context area are shown in Figure 7-1.

Prominent Developmental period radiocarbon ages from the Arkansas River Basin other than the Park Plateau or high altitude area are presented in Table 7-4. Dates listed to signal the advent of the Late Prehistoric stage (Table 7-1) are repeated in Table 7-4 to facilitate an overall view of Developmental period temporal data restricted to the plains regions of the context area. All raw B.P. dates were submitted to a common calibration program (Stuiver and Reimer 1993) and the results provided in the table. The few high altitude sites with radiocarbon ages falling within the Developmental period temporal range are summarized in the general background section for the Late Prehistoric stage; the raw ages are presented in Appendix A (this volume). Park Plateau dates, primarily those from northeastern New Mexico sites falling outside the boundaries defined for the context area, are believed to be important for a comprehensive study of Developmental period occupation. Therefore, prominent, dated occupations from the Park Plateau region are discussed after presentation of the chronometric data applicable solely to the plains portion of the context area.

Developmental period occupations from the northern margin of the context area were reported at Davis Rockshelter, 5EP2, and 5EP935 along Black Squirrel Creek (Dwelis et al. 1996; McDonald 1992; Wynn et al. 1993). Small, corner-notched points and cord-marked ceramics were recovered from the sites although the stratigraphic associations between artifacts and dates are problematic. As one moves south, a series of dated Developmental period rockshelters was excavated at Fort Carson (Kalasz et al. 1993; Zier and Kalasz 1985; Zier 1989; Zier et al. 1996a). These sites include Recon John Shelter, 5PE909, Gooseberry Shelter, Sullivan Shelter, and Two Deer Shelter. All of the Developmental period components are associated with small, corner-notched projectile points. In addition, cord-marked ceramics were recovered from the

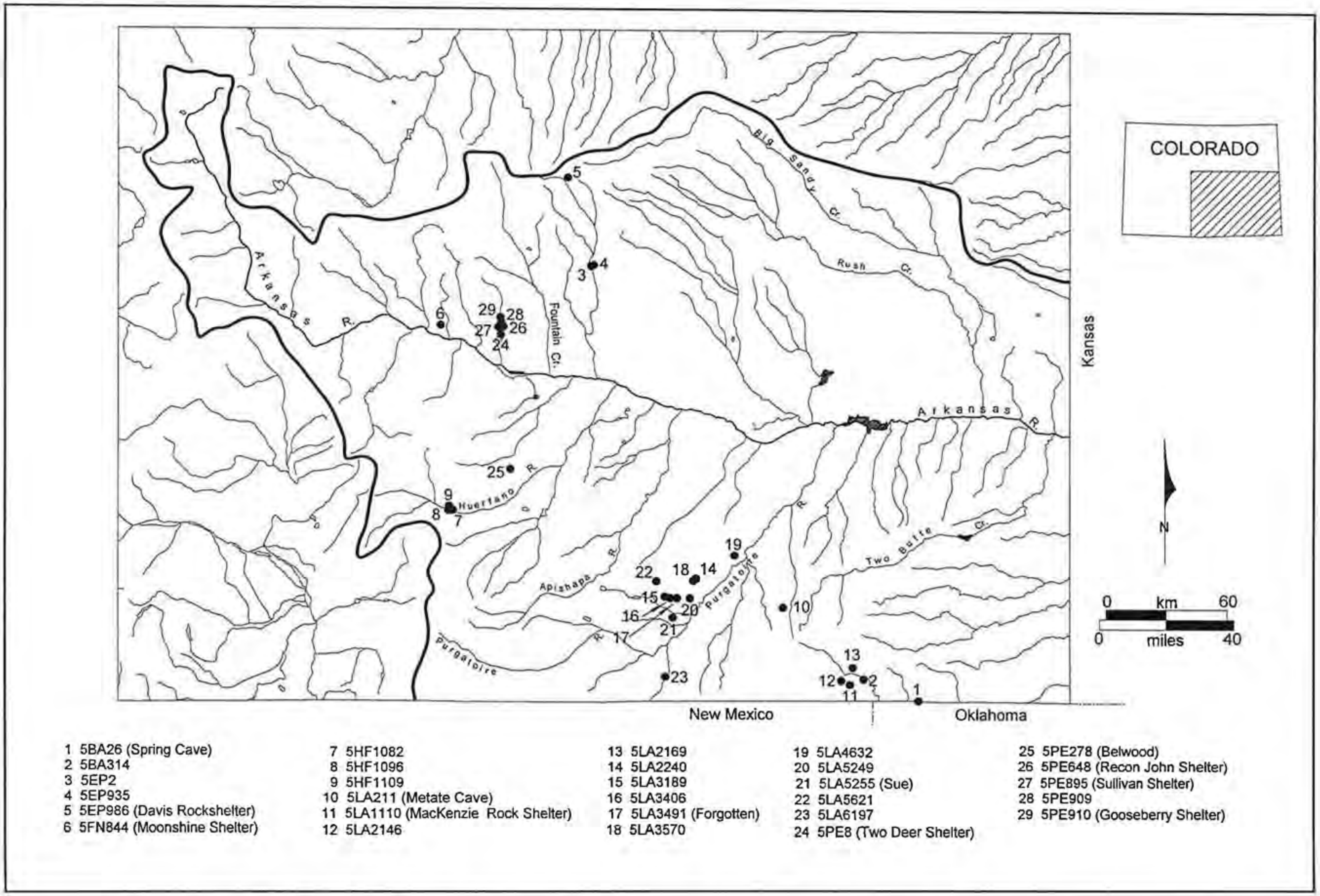


Figure 7-1. Map of Arkansas River context area showing locations of selected Developmental period sites.

Developmental period deposits at Recon John and Gooseberry shelters. Farther south near Canon City, another significant, dated Developmental period rockshelter occupation was reported in the multicomponent Moonshine Shelter (Tucker 1991). Small, corner-notched points were recovered from these deposits but ceramics were not.

Numerous important Developmental period sites are located south of the Arkansas River. The Belwood site along Graneros Creek in the vicinity of Colorado City has long served as the "type site" for the Graneros focus (Eighmy 1984; Hunt 1975; Withers 1954). This site produced small, corner-notched points, cord-marked ceramics, and substantial open-setting architecture. Three open nonarchitectural sites with Developmental period dates (5HF1082, 5HF1096, and 5HF1109) were excavated on the Bucci Ranch near Gardner (Zier et al. 1996b). Of these three sites only 5HF1109 exhibited an artifact diagnostic of the Developmental period, specifically a single, small corner-notched point. Recent excavations on the PCMS provided a wealth of information about this segment of the Late Prehistoric stage (Loendorf et al. 1996). Most notable are the open architectural Forgotten site and the series of small rockshelters with enclosure walls at 5LA3189. The only ceramics from either site are the polished specimens believed associated with a Protohistoric period component at 5LA3189. However, small, corner-notched projectile points were recovered from both sites. Several PCMS sites with Developmental period radiocarbon dates are lacking the "hallmark" artifacts (ceramics, corner-notched projectile points) or, alternatively, do not exhibit clear-cut stratigraphic associations between the radiocarbon samples and such artifacts (Andrefsky et al. 1990; Charles et al. 1996; Lintz and Anderson 1989). These sites include 5LA2240, 5LA3406, 5LA3570, 5LA4632, 5LA5249, 5LA5621, and the Sue site. Of these, multicomponent site 5LA3570 is particularly notable because of the presence of a possible game drive rock alignment and a stone enclosure (Charles et al. 1996).

Table 7-4. Important Developmental Period Radiocarbon Dates from Plains Sites.

Site Name/ Number	Artifact Association	Raw Radio-carbon Age (B.P.)	Calibrated Age		Two Sigma Calibrated Age Ranges from Probability Distributions (Method A)	
			A.D./B.C.	B.P.	A.D./B.C.	B.P.
Recon John Shelter	Point	1910 ± 90	A.D. 88, 98, 115	1862, 1852, 1835	91 B.C.-A.D. 336	2041-1614
5EP935	Point/ ceramics?	1890 ± 60	A.D. 125	1825	A.D 4-315	1946-1635
Recon John Shelter	None	1870 ± 50	A.D. 135	1815	A.D. 58-316	1892-1634
5HF1109	Point	1820 ± 70	A.D. 230	1720	A.D. 65-399	1885-1551
Davis Rockshelter	Point/ ceramics?	1810 ± 60	A.D. 235	1715	A.D. 79-391	1871-1559
5LA4632	None	1810 ± 60	A.D. 235	1715	A.D. 79-391	1871-1559
Wolf Spider Shelter	Point	1800 ± 120	A.D. 239	1711	36 B.C.-A.D. 538	1986-1412
5BA314	Point?	1735 ± 65	A.D. 266, 278, 331	1684, 1672, 1619	A.D. 137-437	1813-1513

Site Name/ Number	Artifact Association	Raw Radio-carbon Age (B.P.)	Calibrated Age		Two Sigma Calibrated Age Ranges from Probability Distributions (Method A)	
			A.D./B.C.	B.P.	A.D./B.C.	B.P.
Wolf Spider Shelter	Point	1690 ± 80	A.D. 389	1561	A.D. 145-548	1805-1402
5PE909	Point	1690 ± 60	A.D. 389	1561	A.D. 233-535	1717-1415
Metate Cave	Point/ ceramics	1680 ± 95	A.D. 397	1553	A.D. 134-601	1816-1349
5BA26	Point	1645 ± 120	A.D. 417	1533	A.D. 126-653	1824-1297
Two Deer	Point	1580 ± 70	A.D. 459, 478, 510, 531	1491, . 1472, 1440, 1419	A.D. 339-636	1611-1314
5HF1082	None	1570 ± 80	A.D. 535	1415	A.D. 267-652	1683-1298
Wolf Spider Shelter	Point	1570 ± 90	A.D. 535	1415	A.D. 260-657	1690-1293
5HF1096	None	1530 ± 50	A.D. 548	1402	A.D. 422-642	1528-1308
5LA3406	None	1530 ± 60	A.D. 548	1402	A.D. 414-652	1536-1298
5LA3570	Point?	1510 ± 50	A.D. 563, 586, 591	1387, 1364, 1359	A.D. 430-652	1520-1298
Belwood	Ceramics	1500 ± 55	A.D. 596	1354	A.D. 430-658	1520-1292
Recon John Shelter	Ceramics	1500 ± 70	A.D. 596	1354	A.D. 418-666	1532-1284
5EP2	Point/ ceramics?	1490 ± 60	A.D. 600	1350	A.D. 430-663	1520-1287
5LA2240	None	1490 ± 60	A.D. 600	1350	A.D. 430-663	1520-1287
Moonshine Shelter	Point	1470 ± 70	A.D. 610	1340	A.D. 430-677	1520-1273
5BA314	Point?	1460 ± 80	A.D. 619	1331	A.D. 426-694	1524-1256
Davis Rockshelter	Point/ ceramics?	1420 ± 50	A.D. 646	1304	A.D. 550-682	1400-1268

Site Name/ Number	Artifact Association	Raw Radio-carbon Age (B.P.)	Calibrated Age		Two Sigma Calibrated Age Ranges from Probability Distributions (Method A)	
			A.D./B.C.	B.P.	A.D./B.C.	B.P.
5LA2146	Point	1410 ± 70	A.D. 651	1299	A.D. 540-773	1410-1177
Recon John Shelter	Point/ ceramics	1400 ± 90	A.D. 654	1296	A.D. 452-790	1498-1160
Gooseberry Shelter	Point/ ceramics	1400 ± 100	A.D. 654	1296	A.D. 437-873	1513-1077
5LA2240	None	1380 ± 60	A.D. 660	1290	A.D. 570-776	1380-1174
5EP2	Point/ ceramics?	1350 ± 60	A.D. 668	1282	A.D. 608-786	1342-1164
5LA3570	Point?	1350 ± 60	A.D. 668	1282	A.D. 608-786	1342-1164
5LA5621	None	1330 ± 70	A.D. 676	1274	A.D. 608-881	1342-1069
5LA2146	Point	1320 ± 70	A.D. 680	1270	A.D. 616-884	1334-1066
Two Deer Shelter	Point	1300 ± 80	A.D. 690	1260	A.D. 616-943	1334-1007
Forgotten	Point	1300 ± 120	A.D. 690	1260	A.D. 544-998	1406-952
Wolf Spider Shelter	Point	1280 ± 90	A.D. 719, 739, 766	1231, 1211, 1184	A.D. 616-973	1334-977
Forgotten	Point	1240 ± 100	A.D. 782	1168	A.D. 634-1011	1316-939
5LA2240	None	1220 ± 60	A.D. 789	1161	A.D. 670-974	1280-976
5LA2169	None	1220 ± 65	A.D. 789	1161	A.D. 667-979	1283-971
5LA2169	None	1220 ± 50	A.D. 789	1161	A.D. 679-962	1271-988
5LA3189	Point	1180 ± 80	A.D. 883	1067	A.D. 670-1017	1280-933
5LA5249	Point?	1170 ± 120	A.D. 886	1064	A.D. 651-1156	1299-794
Recon John Shelter	Point/ ceramics	1150 ± 60	A.D. 891	1059	A.D. 727-1014	1223-936

Site Name/ Number	Artifact Association	Raw Radio-carbon Age (B.P.)	Calibrated Age		Two Sigma Calibrated Age Ranges from Probability Distributions (Method A)	
			A.D./B.C.	B.P.	A.D./B.C.	B.P.
Two Deer Shelter	Point	1130 ± 70	A.D. 896, 914, 955	1054, 1036, 995	A.D. 727-1026	1223-924
5LA2169	None	1130 ± 65	A.D. 896, 914, 955	1054, 1036, 995	A.D. 775-1023	1175-927
Forgotten	Point	1120 ± 80	A.D. 898, 906, 961	1052, 1044, 989	A.D. 718-1037	1232-913
Forgotten	Point	1100 ± 100	A.D. 973	977	A.D. 689-1165	1261-785
5LA2146	Point	1080 ± 40	A.D. 984	966	A.D. 887-1023	1063-927
5LA2240	None	1080 ± 60	A.D. 984	966	A.D. 870-1037	1080-913
Davis Rockshelter	Point/ ceramics	1070 ± 60	A.D. 989	961	A.D. 880-1150	1070-800
5HF1082	None	1040 ± 50	A.D. 1011	939	A.D. 893-1153	1057-797
MacKenzie Rock Shelter	Point?	1010 ± 60	A.D. 1020	930	A.D. 895-1168	1055-782
Sullivan Shelter	Point	990 ± 50	A.D. 1025	925	A.D. 977-1168	973-782
Sue	None	980 ± 50	A.D. 1028	922	A.D. 983-1180	967-770

South of the PCMS, substantial and significant Developmental period remains were reported at Wolf Spider Shelter (5LA6197) along Trinchera Creek. A variety of small, corner-notched points was associated with this component but no ceramics were recovered (Hand and Jepson 1996). Metate Cave, a site recorded by Campbell (1969a) on the Chaquaqua Plateau, produced one of the earlier Developmental period radiocarbon dates associated with small, corner-notched points, ceramics, and an architectural feature. A number of sites on Carrizo Ranches property attest to Developmental period occupation (Nowak and Kantner 1990, 1991). Of particular interest are two rockshelters, 5BA26 and 5LA2146, with radiocarbon-dated Developmental period deposits in association with small, corner-notched points but no ceramics. Developmental period occupations are indicated by radiocarbon dates recovered from two additional rockshelters, 5BA314 and MacKenzie Rock shelter, and open site 5LA2169. The latter site produced a series of radiocarbon dates from a large (ca. 7 m in diameter) hearth area with no associated ceramics or small, corner-notched points. Indeed, this site is a well-known Apishapa phase stone enclosure occupation (Nowak and Kantner 1990:32-34). The hearth is believed to represent an occupation preceding that of the stone enclosures. The two radiocarbon dates recovered from 5BA314 are believed to be associated with disturbed contexts and the date from MacKenzie Rock shelter is from deposits characterized by a mixture of corner- and side-notched points but no ceramics.

By far the most robust body of chronological data from Park Plateau Developmental period sites has been generated for the Vermejo district. Dorshow (1997a) reports 27 radiocarbon dates and one archaeomagnetic date from Developmental period excavation contexts. Obsidian hydration analyses were also undertaken but yielded poor results. These chronometric data indicate that semisubterranean pit structures or house basins were in use at least by about A.D. 160 (Dorshow 1997a: 936). Such structures, many of which are difficult to locate during pedestrian surveys, may have appeared during the Late Archaic period, or perhaps earlier (Wetherbee Dorshow, personal communication to Mark Mitchell, 1998). Bell-shaped storage cists were also in use during this period. These architectural features persist until about the seventh century, when above-ground circular stone masonry structures, reminiscent of both Glassow's Vermejo phase structures and the circular stone enclosures thought to be typical of Developmental period sites in southeastern Colorado (e.g., Hunt 1975), first appear. The mean date for these structures in the Vermejo district is cal A.D. 787 (Dorshow 1997a). Kershner (1984) also reports mid-seventh century dates (uncalibrated) for circular, above-ground masonry structures. This type of residential architecture remained in use until the tenth or eleventh century.

Relative dating techniques have also been applied to Developmental period sites in the Vermejo district. Using a projectile point typology developed by Anderson (1989a) for the PCMS, Dorshow (1997b) identifies two large (dart) point types and seven small point types associated with Developmental period sites. The assemblage is dominated by small to medium-sized corner-notched or stemmed forms, indicating that the use of the bow-and-arrow was widespread. Dorshow's comparison of published dates for these styles with the radiocarbon database of the Vermejo district suggests that many of these projectile points appeared on the eastern flank of the southern Sangre de Cristos earlier than elsewhere in the region. However, these apparently early dates may be attributed in part to the "old wood" problem. The potential magnitude of this problem is illustrated by the results of preliminary tree-ring analyses in the Trinidad district. Cores from live trees indicate that many pinyon pines on the southern end of the plateau may be more than 300 years old (Ronald Towner, personal communication to Mark Mitchell, 1997). Radiocarbon sampling of Diversification period architectural timbers also illustrates the possible effects of the old wood problem (see Diversification period chronology section, this volume). This problem is exacerbated by the difficulty of distinguishing among the many Southern Plains cord-marked ceramic types, making correlations between radiocarbon age determinations and temporally diagnostic artifact classes problematic.

Relatively few absolute dates are available for the Cimarron or Trinidad districts. Glassow (1980:Appendix II) reports four radiocarbon dates, two from Pedregoso phase contexts and two from Vermejo phase structures. The Pedregoso phase dates derive from bell-shaped roasting or storage features and are associated with a few thick, oxidized ceramics. Both dates fall in the middle of the A.D. eighth century, without calibration (1200 ± 80 B.P., or A.D. 750, and 1195 ± 80 B.P., or A.D. 755). One Vermejo phase sample comes from a posthole in the floor of a typically Vermejo phase stone enclosure, and dates to A.D. 510 (1460 ± 50 B.P.). The second sample was excavated by Galen Baker in 1962 from the interior of a Vermejo phase structure. The resultant date, A.D. 1095 (855 ± 50 B.P.), is rejected by Glassow and attributed to the postoccupational intrusion of a tree root. Wiseman (1988) reports two radiocarbon dates from Developmental period sites along the lower Cimarron River. The first, from a Vermejo phase midden, was derived from a scattered carbon sample and may have been associated with maize remains. This sample dates to A.D. 410 (1540 ± 90 B.P.). The second comes from a hearth associated with an arrow point and maize remains, and dates to A.D. 1060 (890 ± 100 B.P.). Although Wiseman assigns this feature to occupation in the late Pedregoso phase or early Escritores phase, the feature is more likely attributable to the early Diversification period.

Gleichman (1983) reports one Developmental period radiocarbon date for the Trinidad district. A charcoal lens exposed in a cutbank yielded a date of A.D. 860 at 5LA2202 (1090 ± 55 B.P.). This site also produced ground stone tools, chipped stone tools (including a possibly corner-notched projectile point fragment) and debitage, and burned bone. The site also exhibited two nonarchitectural stone features, each consisting of cobble concentrations. Mitchell (1997) reports three archaeomagnetic dates which may derive from Developmental period features. All of these samples were collected in 1975 for analysis by Robert DuBois at the University of Oklahoma. The samples were recalibrated by Jeffrey L. Eighmy at CSU using the most recent Southwest Archaeomagnetic Master Curve (Table 7-5).

Table 7-5. Developmental Period Archaeomagnetic Dates.

Archaeomagnetic Date Ranges	Archaeological Context
A.D. 925-1020; A.D. 1275-1475; A.D. 1500-1750	5LA1211, Feature 15. Storage pit not directly associated with an architectural feature
A.D. 925-975; A.D. 1575-1635	5LA1211, Feature 53. Hearth located below the floor of a Sopris phase structure
A.D. 740-790; A.D. 830-875	5LA1416, Feature 90. Hearth located below the floor of a Sopris phase structure and associated with a possible pit house floor

The samples from Feature 53 at 5LA1211 and Feature 90 at 5LA1416 produced the dates with the highest confidence; the age determination for Feature 15 at 5LA1211 is less certain. Several Developmental period radiocarbon dates are also available for Trinidad Lake sites (Table 7-6).

Table 7-6. Developmental Period Radiocarbon Dates from Trinidad Lake Sites.

Radiocarbon Date*	Archaeological Context
A.D. 895 (A.D. 775-1015 [1140 ± 60 B.P.])	5LA1416, Structure 6. Floor fill from semisubterranean pit house; maize sample
A.D. 790 (A.D. 680-905 and A.D. 920-950 [1230 ± 50 B.P.])	5LA1424, Feature B. Floor fill from semisubterranean pithouse which may be from the terminal Developmental period or early Diversification period
A.D. 785 (A.D. 645-995 [1240 ± 90 B.P.])	5LA1416, Feature 20. Storage cist under a Sopris phase jacal structure; maize sample
A.D. 705 (A.D. 655-875 [1290 ± 50 B.P.])	5LA1416, Feature 20. Storage cist under a Sopris phase jacal structure.

* Calibrated curve intercept. Two-sigma calibrated date and conventional radiocarbon age are in parentheses.

Unfortunately, several other terminal Developmental period dates are clearly associated with structures which were in use during the Diversification period. This apparent temporal overlap is likely a consequence of the old wood problem. Carbonate or coal contamination may also be a problem; Wood and Bair (1980:225) rejected a suite of 10 radiocarbon dates as a result of probable sample contamination.

Population Dynamics

The paucity of excavated Developmental period sites both on the Park Plateau and within the larger Arkansas River Basin precludes a detailed discussion of local population dynamics. However, a number of general conclusions may be drawn about population movements and demographics. To date there is no evidence that new populations arrived in eastern Colorado and northeastern New Mexico during the Developmental period. Widespread artifactual and stratigraphic data associated with, for example, rockshelters at Fort Carson as well as open-setting architectural sites in the Vermejo district of northeastern New Mexico and the foothills east of Denver suggests that, in population terms, the Developmental period was a continuation of the Late Archaic period (Andrefsky 1990; Andrefsky et al. 1990; Biella 1997:1031; Kalasz et al. 1993; Kalasz and Shields 1997; Nelson 1971; Zier 1989; Zier and Kalasz 1991). The larger number of Developmental period radiocarbon dates (and sites) may not indicate increasing population, but rather that such sites, particularly those with architecture, were more visible than Archaic stage sites (Biella 1997:1030; Lintz and Anderson 1989). On the other hand, it is equally likely that the Park Plateau, South Platte River Basin, and greater Arkansas River Basin populations participated in what appears to be regionwide demographic expansion.

For the Cimarron district in northeastern New Mexico, Glassow is equivocal on this point. Although his cultural-temporal framework implies connections to the occupation of the Rio Grande valley or San Juan River valley, and he consistently refers to the pre-A.D. 1000 occupants of the southern Park Plateau as "Puebloans," he nevertheless argues that the Vermejo phase "represents an adaptation *very similar* to that of the Early Basketmakers of the San Juan River basin" (Glassow 1980:103 [italics added]). This characterization effectively circumvents the need to explain where the Vermejo phase inhabitants of the district came from.

Glassow also identifies formal artifact attributes that suggest regional cultural continuity. In particular, he notes the large number of tubular bone beads recovered from sites in the Cimarron district. Beads of this type are common among contemporaneous Arkansas River Basin assemblages (Erdos 1998). Glassow's data also suggest that local populations probably increased throughout the Developmental period. Whether this was due to indigenous demographic expansion or migration is not entirely clear, although he does suggest that artifactual and architectural variability in the district might be attributable to "small population units ... continually expanding into the region" (Glassow 1980:77).

So little Developmental period excavation data are available for the Trinidad district that no substantive observations on population dynamics can be made, except to note that occupation during this time appears to be less extensive and less intensive than in the adjacent Vermejo district, the Cimarron district, or the larger Arkansas River Basin. Large, single-room stone enclosures similar to those at the Belwood and Forgotten sites, or to the Terminal Plains Woodland structures in the Vermejo district, appear to be absent from the Trinidad district (Biella and Dorshow 1997a; Hunt 1975; Loendorf et al. 1996). The possible exception is 5LA1411 which overlooks the Purgatoire River, and 5LA1482 which is located north of Raton Pass. Both of these sites are undated and may or may not represent Developmental period occupations (Baker 1965; Ireland 1974a). Based on the lack of some artifact classes (notably ceramic vessels), the Running Pithouse site has also been attributed to the Developmental period (Ireland 1974a; Eighmy 1984).

The lack of such stone enclosures does not, however, preclude the possibility of a Developmental period occupation of the Trinidad district, since the few dated Developmental architectural contexts consist of very shallow basin houses or storage pits that have little or no modern surface expression. This type of ephemeral architecture was also documented at the Belwood site, adjacent to a better-known stone enclosure (Hunt 1975).

Technology

Increased technological diversity is an important factor in distinguishing the Developmental period from the preceding Late Archaic period. Whether because of trade or innovation, this segment of prehistory witnesses the advent of the bow-and-arrow and ceramic containers. The bone and shell industries seen in Developmental period contexts obviously have their antecedents in the Archaic stage. However, these implements and ornaments are evidently more abundant in some Developmental period contexts (primarily rockshelters) and exhibit greater morphological diversity. This situation may reflect preservation and/or sampling factors.

Other than the appearance of arrow-sized points, the Developmental period lithic assemblage is remarkably unchanged from preceding Late Archaic period tools kits (Dorshow et al. 1997; Hand and Jepson 1996; Kalasz et al. 1993; Loendorf et al. 1996; Zier and Kalasz 1991; Zier 1989). The lithic artifact most diagnostic of the Developmental period is the ubiquitous, small, corner-notched arrow point typically referred to as "Scallorn." However, it is emphasized that certain Archaic styles, particularly large corner-notched varieties, are also commonly recovered from Developmental period components (e.g., Dwelis et al. 1996:Figure 6D; Hoyt 1979:Figure 6; Loendorf et al. 1996:Figure 4.35a; Tucker 1991:Figure 7K; Zier 1989:Figure 31F). Chipped stone tool manufacturing strategies are oriented toward the production of formal bifaces and a variety of flake tools. Minimally modified or expedient flake tools typically outnumber formally patterned flake tools such as end scrapers. Cores and core tools are generally representative of freehand percussion or unstandardized flake removal. Debitage analyses indicate that late-stage tool manufacture and tool refurbishment is emphasized at both base camps and limited activity sites. It is apparent that chipped stone arrived at these sites in a considerably reduced state. However, it is emphasized that these conclusions are derived from a site sample skewed toward locales where a variety of domestic tasks was completed. Currently, there is no information pertaining to more specialized lithic procurement or reduction sites of the Developmental period. A variety of local and nonlocal materials was utilized at Developmental period sites. A few are characterized by a dichotomy in the use of exotic (nonlocal) materials and local materials of lower quality (Fredine 1997:77-78; Hand and Jepson 1996; Zier 1989). The former were more often used for finely crafted formal tools, and the latter tended to be used for a wide range of less formal tools.

Ground stone assemblages exhibit the typical context area tendency toward simple flat or shallow basin slab metates and "one-hand" cobble manos (Hand and Jepson 1996). Metates are generally of sandstone and exhibit minimal modification but are sometimes shaped by flaking the edges (Zier 1989). Manos, typically of sandstone, are both unifacial and bifacial; they sometimes exhibit keeled edges (Kalasz et al. 1993; Loendorf et al. 1996). Margins are often pecked or battered, or both. In addition to the "portable" ground stone varieties, Developmental period sites often exhibit bedrock or boulder grinding surfaces (Loendorf et al. 1996).

A major technological change associated with the Developmental period is the use and manufacture of ceramic vessels. Developmental period ceramic assemblages do not approach those of the succeeding Diversification period either in relative abundance or ware diversity. In the context area, ceramics were recovered from Developmental period occupations at Metate Cave, Recon John Shelter, Gooseberry Shelter, Davis Rockshelter, Torres Cave, 5EP935, and the

Belwood site (Campbell 1969a; Dwelis et al. 1996; Hoyt 1979; Hunt 1975; Kalasz et al. 1993; McDonald 1992; Zier and Kalasz 1985; Zier 1989). With the exception of a rim sherd identified as "Dismal River" at Davis Rockshelter, the ceramics from these sites were identified as cord-marked wares with crushed-rock temper. The specimens are believed to reflect conoidal-based jars constructed with a paddle and anvil technique. Cord marks are often obliterated and sometimes exhibit superimposed shallow incisions (Zier 1989). The largest samples are associated with the Belwood site and 5EP935 (121 and >190 sherds, respectively). Several sherds from the Belwood site were noted to exhibit an orange or gray to white slip (Hunt 1975:87), but this is apparently a rare occurrence among Developmental period assemblages. A single sherd recovered from Developmental period deposits at the Magic Mountain site near Denver displayed an interior yellowish orange slip (Kalasz and Shields 1997:Figure 32).

Although few in number, Park Plateau ceramics associated with Developmental period radiocarbon dates are frequently distinct in both technological and stylistic terms from the cord-marked wares associated with Developmental period sites elsewhere in the Arkansas River Basin. For the Cimarron district, Glassow (1980:72) reports "very crude, thick, oxidized pottery" associated with a Pedregoso phase midden dated to the middle of the A.D. eighth century. Similar oxidized, sand-tempered sherds have been recovered from what appear to be terminal Developmental period structures in the Trinidad district (Mitchell 1997). Ceramics of this general description are also associated with later Sopris phase structures (see Sopris phase technology section, this volume). They are technologically distinct from the imported Taos wares characteristic of Sopris phase ceramic assemblages, suggesting continuity in a local Park Plateau ceramic tradition.

A few cord-marked sherds have also been recovered from Developmental period contexts in the Vermejo district of northeastern New Mexico (Habicht-Mauche 1997). However, the difficulty of assigning such sherds to particular types prevents more detailed comparison. Similar problems exist for the Trinidad district, where a few sites have produced cord-marked ceramics. Most of these sherds, however, appear to be associated with later Diversification period occupations. No cord-marked ceramics have been reported from the Cimarron district.

Ornaments and tools of bone and shell are fairly common among Developmental period occupations but assemblages are generally small. Gooseberry Shelter, Davis Rockshelter, and 5EP935 are somewhat notable by the complete absence of bone tools (Dwelis et al.1996; Kalasz et al. 1993; McDonald 1992). On the other hand, relatively large and diverse bone tool and ornament assemblages were recovered from Wolf Spider Shelter and Torres Cave in the southern portion of the context area (Hand and Jepson 1996; Hoyt 1979), and KS60 in northeastern New Mexico (Brown and Brown 1997). Modified bone from these sites largely falls into two general classes: bone tubes made from small mammal (mainly leporid) and to a lesser extent bird bone, and awls made from the split long bones of large mammals (mainly deer). Overall, the Developmental period bone tool industry is much less diverse than that of the Diversification period; in addition to the awl, the latter period is characterized by a number of morphologically diverse large mammal bone tools believed to have functioned as scrapers, knives, fleshers, and handles. As with later Diversification period examples, Developmental period tubular beads are typically scored and snapped bone that display considerable polish; in most instances the ends of the beads are shaped by grinding. However, Brown and Brown (1997:866) cite a number of additional ethnographic uses for bone tubes. Specifically, bone tubes may have been used as bow or wrist guards, tool handles, ceremonial objects, and/or sucking implements used in healing ceremonies or to extract snake venom. Such a wide range of uses for bone tubes may be reflected by the considerable variability in size exhibited by the specimens from Wolf Spider Shelter (Hand and Jepson 1996:Figure 22).

Shell is known from Developmental period occupations at Wolf Spider Shelter, 5LA2146, the Belwood site, Moonshine Shelter, Metate Cave, Torres Cave, the Forgotten site, Recon John Shelter, and the Beacon Hill Burial (5PE9) (Black 1991; Campbell 1969a; Hand and Jepson 1996; Hoyt 1979; Hunt 1975; Loendorf et al. 1996; Nowak and Kantner 1991; Tucker 1991; Zier 1989). Most of the shell is probably representative of indigenous *Unionidae* freshwater mussels procured as subsistence items (Nowak and Kantner 1991:157). However, ground and drilled shell pendants were reported from Wolf Spider Shelter and the Forgotten site (Hand and Jepson 1996:Figure 24; Loendorf et al. 1996:Figure 4.41). A particularly impressive shell necklace with a turquoise pendant was associated with the possibly Developmental period Beacon Hill Burial near Pueblo (Black 1991:Figure 9). Incorporated into the necklace were 92 "spiral-lopped" *Olivella* shell beads that were probably brought in from the Gulf of California region. Other, less spectacular examples of modified shell were reported from Recon John Shelter and Torres Cave (Hoyt 1979; Zier 1989).

Settlement and Subsistence Strategies

Site Type and Locational Variability

Information sets that facilitate examination of Developmental period settlement are derived from both survey and excavation. Extensive surveys of Fort Carson, PCMS, Picket Wire Canyonlands, and Chaquaqua Plateau attest to the pervasiveness of Late Prehistoric stage occupation in the context area as well as the considerable variability in site type and location (Alexander et al. 1982; Andrefsky 1990; Jepson et al. 1992; Kalasz 1988; Loendorf and Loendorf 1999; Reed and Horn 1995; Van Ness et al. 1990; Zier et al. 1996a). However, these investigations are of limited value for settlement discussions restricted to the Developmental period because of the absence of absolute dates that permit more precise temporal controls. As discussed earlier in this chapter, such a deficiency is one of the more pronounced drawbacks of survey-generated data. For example, of the 263 aboriginal sites recorded during the recent survey of the Picket Wire Canyonlands, only three could be assigned solely to the Developmental period based on relative dating of diagnostic artifacts (Reed and Horn 1995:61). In contrast to the larger Arkansas River Basin, the Park Plateau is characterized by a lack of extensive survey data. Most survey projects have tended to focus on limited segments of the landscape, either the major river corridors or the uplands. As a consequence it is difficult to evaluate the degree to which various portions of the plateau were utilized by prehistoric groups during any particular period.

Fortunately, data derived from large- and small-scale excavations of a variety of site types in a number of different environmental settings are available. Many of these investigations were conducted since publication of the previous research context (Andrefsky et al. 1990; Biella and Dorshow 1997a; Campbell 1969a; Charles et al. 1996; Dwelis et al. 1996; Hand and Jepson 1996; Hoyt 1979; Hunt 1975; Kalasz et al. 1993; Loendorf et al. 1996; McDonald 1992; Nowak and Kantner 1990, 1991; Schiavitti et al. 1999; Tucker 1991; Zier and Kalasz 1985, 1991; Zier 1989; Zier et al. 1996a, Zier et al. 1996b). These studies provide the chronometric control and subsistence data necessary for a more comprehensive view of Developmental period settlement-subsistence strategies. The spatial distribution of these radiocarbon dated Developmental period occupations encompasses a widespread series of rockshelter and open setting sites that are both architectural and nonarchitectural in nature.

Rockshelter sites located throughout the context area currently form the greater portion of the Developmental period site sample. These sites are reported along shallow drainages running through grasslands, e.g., Davis Rockshelter (Dwelis et al. 1996) and 5LA3189 (Loendorf et al. 1996); they are situated within shallow, incised canyons characterized by mixtures of riparian and grassland communities, e.g., Gooseberry Shelter (Kalasz et al. 1993), Two Deer Shelter (Zier et al.

1996a), and Recon John Shelter (Zier 1989); and they are located within relatively deep canyons that access numerous environmental niches, e.g., Metate Cave (Campbell 1969a) and Torres Cave (Hoyt 1979). Further, the Developmental period rockshelters exhibit considerable variability in associated features and artifact assemblages; such variability suggests that rockshelters served a number of different functions. The diverse and relatively abundant cultural materials associated with Torres Cave and Metate Cave are indicative of seasonal residences, albeit for small groups of people. Alternatively, the sparse remains recovered from Gooseberry Shelter and Two Deer Shelter suggest more temporary, limited-activity loci.

Open architectural sites are comparatively rare in the greater Arkansas River Basin; currently known examples include only the Belwood and Forgotten sites (Hunt 1975; Loendorf et al. 1996). Two houses are reported at each. Most striking are the disparities between these sites in setting, features, and cultural material. The Forgotten site is situated along a shallow intermittent drainage extending through gently rolling prairie on the PCMS; the Belwood site is located in a mixed ponderosa and juniper community in the vicinity of Graneros Canyon. Although both of these multiple dwelling sites probably represent seasonal residential bases for small groups of hunter-gatherers, only the Belwood site exhibits ceramics, bone awls, and a possible storage pit. The Forgotten site is notable for the presence of a number of hearths, "roasting pits or ovens," and enigmatic tabular sandstone rings (Loendorf et al. 1996). This evidence suggests some variability among the open architectural sites in duration of occupation, site function, and perhaps seasonality. Considerably more architectural sites are known in the southern Park Plateau area of northeastern New Mexico (Biella and Dorshow 1997a; Glassow 1984). These examples are discussed in greater detail below.

Open-setting, nonarchitectural sites in the greater context area as well as the southern Park Plateau are believed representative of "logistical" or specialized task loci within a larger settlement-subsistence system. These types of sites have been rarely excavated and have received only limited investigation in the greater Arkansas River Basin; Park Plateau examples are discussed further below. A unique example of a nonarchitectural open camp, 5EP935, was excavated in the context area east of Colorado Springs (McDonald 1992). This site was characterized by multiple features and diverse cultural debris including relatively abundant pottery. However, 5EP935 is located among low bluffs approximately 100 m from a rockshelter site (5EP2) that also exhibits significant Developmental period occupational remains. Therefore, it is difficult to isolate the functional role of 5EP935 from that of the rockshelter. More typical Developmental period open nonarchitectural sites have received minimal excavation but appear to represent specialized task loci. These sites include 5LA2169 in the Carrizo Creek area (Nowak and Jones 1984), and 5LA2240, 5LA3406, 5LA4632, and 5LA5621 on the PCMS (Andrefsky et al. 1990; Charles et al. 1996; Loendorf et al. 1996). These sites, located in a range of physiographic and biotic settings, are generally characterized by the presence of simply constructed hearths or roasting pits that vary considerably in size. Micro- and macrobotanical evidence is limited to samples from 5LA3406 and 5LA4632. These data in conjunction with the presence of ground stone and the paucity of faunal remains suggest that low-intensity vegetal processing was emphasized at these sites.

To summarize, it is obvious that Developmental period hunter-gatherers operating in the context area exploited resources in a wide range of environmental niches. The variability of site types associated with this spatial distribution suggests that Developmental period settlement-subsistence strategies were complex. The presence of multiple dwellings requiring considerable construction effort indicates that such a strategy incorporated a degree of sedentism and population aggregation. However, the lack of substantial middens suggests no more than temporary, seasonal residence for small bands or extended families. Speculations regarding possibly seasonal movements of Developmental period hunter-gatherer groups are offered by

Andrefsky (1990), Campbell (1969a), and Loendorf et al. (1996). Resolution of these models, however, requires a level of chronometric, subsistence, and seasonality data that is currently not available.

Similar conclusions have been drawn for Park Plateau settlement despite the general lack of comparable data sets spanning a range of environmental zones. Investigators in both the Cimarron and Vermejo districts note that Developmental period sites tend to be located on benches, terraces, or canyon rims above the flood plains of the plateau's major streams. In the Vermejo sample, more Developmental period sites are located near the valley margin, although the district as a whole should be considered an upland. Overall, Vermejo phase settlement patterns were primarily oriented toward the locations of wild seed-bearing plant resources.

Across the Park Plateau, research has tended to focus on residential sites, although a large number of limited activity loci have also been documented. However, most authors indicate that it is difficult to assign such logistical sites to particular temporal periods, either because they tend to lack diagnostic artifacts or because they are unlikely to contain significant subsurface deposits. Therefore, they have not been subjected to extensive excavation. Still, it is likely that the Developmental period occupation of the Park Plateau consisted of a complex network of functional site types. For the Vermejo district, Biella and Dorshow (1997b) note that many sites appear to have been occupied repeatedly, and that even relatively small sites tend to have very generalized assemblages reflecting a range of subsistence activities. This conclusion has also been reached by McKibbin et al. (1997) and others investigating the Trinidad district. Moreover, Developmental period sites were probably occupied by relatively small groups of people. Biella and Dorshow (1997b) note that this inference is true for both residential and nonresidential sites, suggesting that family or task groups may have remained together throughout some or all of the seasonal round.

Biella and Dorshow (1997b) confirm Glassow's observation that Developmental period architectural sites represent semimobile or semisedentary occupations (see Whalen 1994 for a summary of residential mobility studies). Activity diversity is higher among architectural sites than contemporaneous nonarchitectural sites, but most of this diversity can be explained by increased occupational duration. Further, the relatively thin middens associated with residential sites indicate that occupational duration was seasonal. Although topographic and architectural variables suggest that some sites may have been used during the cool seasons, the preponderance of botanical and faunal data indicate warm-season occupations (Biella and Dorshow 1997b).

Economy

A significant body of faunal and botanical data, both from the Park Plateau region and the greater context area, is available for examining Developmental period subsistence practices. Pollen and macrofloral samples indicate that Developmental period diets consisted primarily of wild resources, but that maize was a consistent if not significant segment of the diet. Macrofloral and pollen samples from across the context area and northeastern New Mexico are dominated by wild plant resources (Charles et al. 1996; Edwards 1997; Glassow 1980; Hand and Jepson 1996; Kalasz et al. 1993; Kirkpatrick and Ford 1977; Loendorf et al. 1996; McDonald 1992; Nowak and Kantner 1991; Puseman 1997, cited by Mitchell 1997; Tucker 1991; Van Ness 1986; Zier and Kalasz 1985; Zier 1989; Zier et al. 1996a, Zier et al. 1996b). Major economic taxa recovered include goosefoot, cactus (hedgehog, prickly pear, cholla), purslane, skunkbrush, pigweed, dropseed, and sunflower.

In the greater Arkansas River Basin east and north of the Park Plateau, charred goosefoot seeds are by far the most pervasive botanical remains recovered from Developmental period contexts (Hand and Jepson 1996; Kalasz et al. 1993; Nowak and Kantner 1991:151; Tucker 1991; Zier 1989; Zier and Kalasz 1985; Zier et al. 1996a, Zier et al. 1996b). Other than an unusually high number of charred dropseed grass seeds from Two Deer Shelter (Zier et al. 1996a), quantities of charred remains other than goosefoot are strikingly low. It is currently unresolved whether this situation is due to preservation factors. Low numbers of maize remains are reported from a number of Developmental period contexts in the larger Arkansas River Basin. These include Recon John and Gooseberry shelters at Fort Carson (Kalasz et al. 1993; Zier 1989), 5LA2146 on Carrizo Ranches property (Nowak and Spurr 1989), and 5HF1109 on the Bucci Ranch (Zier et al. 1996b). Although these locations suggest widespread use of maize in the context area during the Developmental period, the sparse remains recovered indicate either a preservation problem or that maize horticulture was practiced only minimally.

On the Park Plateau, macrofloral assemblages from the Trinidad and Cimarron districts of the Park Plateau are generally more diverse than those of the Vermejo district, perhaps reflecting the lower altitude. Puseman (1997, cited by Mitchell 1997) documents nine species or families in 20 samples from sites 5LA1211 and 5LA1416. All 20 are derived from features dated to the Developmental period, or assigned to the Developmental period on the basis of stratigraphic position or assemblage characteristics. Major economic taxa include sunflower, cholla, Indian ricegrass, pinyon pine nut, chokecherry, juniper berry, and yucca. Recovered cultigens included maize and beans. Maize is particularly common, appearing in nine of 10 samples from 5LA1416 and all 10 from 5LA1211. Unfortunately, the sample processing procedures used by the original excavators are likely to have systematically excluded the smallest seeds, including goosefoot and amaranth.

Very similar results were obtained for Vermejo and Pedregoso phase sites in the Cimarron district. Kirkpatrick and Ford (1977) report the charred remains of chokecherry, wild plum, marsh elder, yucca, and pinyon pine nuts and juniper seeds from the Vermejo phase structure at site MP4. In addition to these wild plants, the midden at NP 1E, a Pedregoso phase site, yielded charred seeds from skunkbrush, amaranth, goosefoot, sunflower, and beeweed. Beans and maize were recovered from both sites. Similar results are reported by Toll (1988) for two Developmental period sites along the lower Cimarron River.

Several conclusions can be drawn from these data. First, domestic plants including beans and maize were available to the Developmental period inhabitants of the Park Plateau. What remains unresolved is the degree to which the cultivation of maize or beans was integrated into daily economic practice. Given the characteristics of the associated ground stone assemblage and the locations of Developmental period sites, it is likely that maize was a minor component of the overall diet. Maize remains appear to be somewhat more common in the Trinidad and Cimarron districts, both of which are lower in elevation than the Vermejo district, particularly toward the end of the Developmental period. Dorshow (1995) notes that the frequency of maize decreases over the course of the Developmental period in the Vermejo district. This decrease may not reflect overall trends, however (Wetherbee Dorshow, personal communication to Mark Mitchell, 1998). Differences in maize frequency among the districts may reflect differing horticultural potentials across the Park Plateau.

Of particular interest is the degree of size and morphological variability in Park Plateau maize remains, characteristics that Kirkpatrick and Ford (1977:262) suggest indicate "a wide range of growing conditions and a lack of selection for a specific seed type." Given the semiarid nature of the plateau, and its short growing season, it may have been the case that Developmental period gardeners simply planted seed in favorable locations and invested relatively little time in weeding and cultivation. In this context, Snow (1991) argues that in northern New Mexico and southeastern Colorado the short growing season at elevations above 1830 m (6000 ft) occasionally requires that maize be harvested "green." Such green kernels cannot be used as seed in the following year, and so a dependable source of viable seed must be developed. Thus, a seed exchange network would be required, even if maize or beans constituted a small but consistent component of Park Plateau diets. Small quantities of packaged seed have been recovered from rockshelters throughout the Arkansas and Canadian river basins (Simpson 1976; Mera 1944; Chase 1949; Lintz and Zabawa 1984).

The second conclusion that can be drawn from macrobotanical data concerns paleoenvironmental conditions. Though the relative frequencies of various wild plant remains in archaeological contexts are largely a function of cultural practices, it is also true that all of the important economic taxa are currently available on the plateau. This suggests that some proportion of the recovered plant remains, particularly uncharred specimens, may in fact constitute "noise" in the macrobotanical signal. This may also explain the apparently richer assemblages found in the Cimarron district as compared to the Vermejo district. Differences in soil acidity and precipitation may also be responsible for the relative paucity of macrobotanical materials in Developmental period contexts in the Vermejo district.

A wealth of faunal data is available from Developmental period contexts on both the Park Plateau and in the greater Arkansas River Basin. With regard to the latter region, substantial faunal assemblages in particular are recovered in rockshelters. These sites include Recon John Shelter, Davis Rockshelter, Wolf Spider Shelter, Moonshine Shelter, Torres Cave, and Metate Cave (Campbell 1969a; Hand and Jepson 1996; Hoyt 1979; Zier 1989). Considerably smaller and more fragmentary assemblages are reported from the two open architectural sites, Belwood and Forgotten (Hunt 1975; Loendorf et al. 1996). The latter is characterized by particularly sparse and fragmentary faunal remains, which are believed to be largely representative of small mammals. In contrast, the remains of elk and deer as well as small mammals were recovered from the Belwood site. Again, this disparity may be related to differing site functions as well as preservation. In comparison, much more abundant and diverse remains were recovered from the rockshelters. Small mammals, especially cottontail, jack rabbit, and black-tailed prairie dog, are often prevalent, but large mammals such as deer, and to a much lesser extent pronghorn, bison, and elk, are also present. Other remains include those of bobcat, badger, fox and other canids, beaver, pocket gopher, vole, mouse, woodrat, chipmunk, squirrel, and various birds including owls. Nonmammal remains include frog or toad, crayfish, snake, lizard, and fish. Shell recovered from Developmental period occupations suggests the consumption of indigenous mussels (Nowak and Kantner 1991; Loendorf et al. 1996:115)

Similarly abundant faunal remains have been recovered from Developmental period contexts on the Park Plateau. Faunal data have been reported from both the Trinidad and Vermejo districts, but unfortunately, the bone from the Trinidad district cannot be assigned exclusively to the Developmental period. Data on 14 sites from the Vermejo district indicate that a relatively narrow range of species was utilized (Brown and Brown 1997). Among small mammal species the most important are cottontail and jack rabbit. Deer is the most common large mammal taxon; grouse and turkey are also important. Other taxa, including pocket gopher, vole, and woodrat are present in significant quantities, but the authors consider them intrusive. Pronghorn remains were recovered in small quantities.

Architecture

Examples of Developmental period architecture are known in the South Platte River Basin (Kalasz and Shields 1997; Nelson 1971; Tucker et al. 1992), the Arkansas River Basin (Campbell 1969a; Hoyt 1979; Loendorf et al. 1996; Hunt 1975), and on the Park Plateau (Biella and Dorshow 1997a; Glassow 1980; Kershner 1984; Mitchell 1997; Wood and Bair 1980). Of these, considerably more examples are known outside the boundaries of the Arkansas River context area, in the southern portion of the Park Plateau.

Excluding the Park Plateau, Developmental period architecture in the context area is reported from Torres Cave, Metate Cave, the Forgotten site, and the Belwood site (Campbell 1969a; Hoyt 1979; Loendorf et al. 1996; Hunt 1975). Radiocarbon dates are associated with all but the first site named (see Table 7-4). Torres and Metate caves exhibit typical examples of Late Prehistoric stage rockshelter architecture, consisting of low semicircular rock walls that partition a portion of the shelter's interior. These are crudely constructed structures that do not exhibit evidence of post holes or formal interior features. In contrast, the open-setting structures at the Belwood and Forgotten sites are complex, single-room, shallow-basin houses with circular to oval floor plans and wooden superstructures. External as well as interior features were reported at both sites. Two houses were recorded at the Belwood site. House 1 is the more substantial of the two; it measures 8 m in diameter and incorporates a low slab wall that circumscribes the floor area. No central supports were reported; rather, the seven or eight postholes were arranged along the wall. Interior features included a central hearth and a subfloor, bell-shaped storage pit. House 2 measures 3.5 m in diameter and does not incorporate a rock wall. The floor area is defined by six posts set in a shallow depression; a presumed eastern entrance was described by the arrangement of five postholes. Cord-marked ceramics, bone tools, chipped and ground stone tools, and the remains of both large and small mammals were reported in the vicinity of the structures.

Excavation of two structures at the Forgotten site resulted in a description of architectural elements considerably more detailed than that provided for the Belwood site houses (Loendorf et al. 1996:112-116). House 1 exhibited an oval floor plan that measured approximately 4.0 x 4.5 m. A prepared floor surface was not evident. The structure incorporated an outer wall of upright sandstone slabs (some reaching 70 cm in height) tamped into an excavated trench and shimmed with smaller rock. An inner row of shorter sandstone slabs combined with the outer ring to form a substantial wall that may not have completely enclosed the structure. A entryway was not obvious but a portion of one side of the house may have been open. The investigators speculated that a clay soil mixture tamped around the wall elements was subsequently burned to provide a hardened concretelike foundation for the upright slabs. As with the Belwood site houses, no central supports were evident. Poorly defined post molds suggest that support poles were arranged along the wall and leaned inward. A series of upright slabs set approximately 1 m in from the slab wall exhibited crushed upper edges, suggesting that they functioned as "interior brace stones" supporting the leaning poles. Increased grass pollen levels in the structure suggest that the roof was thatched. Interior features included multiple hearths and "roasting pits or ovens" that would have been sheltered by the high, upright slab walls of the structure. House 2 had a circular floor plan with a diameter of 4.5 m. Structural elements were similar to those of House 1 but the House 2 wall rock was more substantial and less displaced. The multiple rows of sandstone slabs describing the wall of House 2 may have been 30-40 cm thick. Unlike at the Belwood site, subfloor storage pits were not present. A variety of chipped and ground stone tools was associated with the structures but no ceramics were found. Bone was sparse but botanical evidence suggests that goosefoot, cactus, and sunflower were processed in the vicinity of the dwellings.

Considerable data are available regarding the attributes of Developmental period architectural features on the Park Plateau. Moreover, these attributes are variable across the Park Plateau as well as through time. The best-dated architectural sequence comes from the Vermejo district. Biella and Dorshow (1997b) report on four semisubterranean pit structures that date to the period A.D. 160-680. The average date is A.D. 503. These structures are ovoid and enclose areas ranging from 18.9 to 47.6 m^2. One side of each structure was excavated 36 cm to 80 cm into a shallow slope. The opposite side of the basin-shaped floor sloped up to the aboriginal ground surface. The lower portions of the walls were constructed from earth and the superstructure consisted of "wood and thatch walls and post-supported roofs" (Biella and Dorshow 1997b:961). Floor features include large central firepits and small storage pits.

Six above-ground circular stone enclosures have also been excavated in the Vermejo district. In most respects these structures are similar to the circular stone enclosures from the Belwood and Forgotten sites and to Vermejo phase structures from the Cimarron district. The mean calibrated occupational date for these six structures is A.D. 787. Kershner (1984) provides two uncalibrated mid-seventh century dates for a similar though larger structure. In plan view each was roughly circular or oval and between 2.9 and 5.9 m in diameter. Interior floors were unprepared and basin shaped, and contain unprepared fire pits, small floor pits, and deep, bell-shaped refuse and burial pits (Biella and Dorshow 1997b:963). Three of the structures also contained slab-lined wall bins. Most of these architectural features consisted of a single room with superstructures that may have been constructed of brush. However, in one case three such enclosures were contiguous. Some sites also exhibited partially walled "plazas," or activity areas. Most of these structures were associated with external firepits and use surfaces, suggesting that a variety of activities took place outside the enclosure.

Both semisubterranean pit structures and circular stone enclosures were frequently associated with deep bell-shaped cists. Dates for these features span most of the Developmental period. The cists were generally large, measuring as much as 1.7 m in depth. Basal diameters ranged from 1.65 to 1.87 m, and rim diameters ranged from 0.95 to 1.4 m (Biella and Dorshow 1997b:965). All of these features have been burned, either during use or as a means of sealing the walls against rodents and insects.

Although excavation data are limited, both pit structures and stone enclosures have been documented in the Cimarron district. Glassow (1980) defines the Vermejo phase (A.D. 400 - 700) by the presence of circular stone enclosures similar in many respects to Developmental period structures from the Vermejo district, as well as to the Belwood site structures from southeastern Colorado (Hunt 1975). The principal excavated example was roughly 5.5 m in diameter (Glassow 1980:Figure 6). Though somewhat irregular in plan view, the enclosure approximated a circular configuration. The walls were constructed from horizontal stone slabs to a height of at least 1 m. Techniques of roof construction were not clear, although several large postholes were noted in the floor. Other floor features included a variety of cists, pits, and depressions. A radiocarbon date of A.D. 510 (uncalibrated, 1460 ± 50 B.P.) was obtained on roof-support post fragments from a posthole. Most Vermejo phase sites contain only one stone enclosure.

Architectural features associated with other Developmental period phases in the Cimarron district are less well understood. The succeeding Pedregoso phase (A.D. 700 - 900) appears to have included very shallow pit structures excavated into low, sloping terraces, in addition to firepits, linear stone alignments, bell-shaped pits, and scattered posts (Glassow 1980: 72-73). Unfortunately, many of the features were disturbed by subsequent occupations. The relatively thick middens associated with the features have produced a diverse assemblage of artifacts and botanical and faunal remains, including oxidized ceramics and maize cob fragments. Radiocarbon samples were obtained from two bell-shaped pits associated with this midden, both of which date to the middle of the eighth century (A.D. 750, or 1200 ± 80 B.P., and A.D. 755, or 1195 ± 80 B.P.). The apparent inversion of the Vermejo-Pedregoso architectural sequence, as compared to the sequence developed for the Vermejo district, may be attributable to sampling error, owing to the vagaries of radiocarbon dating and the limited excavation data from the Cimarron district.

One of the most unusual architectural features in the Cimarron district has been assigned to the Escritores phase (A.D. 900-1100). This moderately deep, slightly irregular pithouse measured roughly 4.5 m in diameter and included a low bench along one wall, a quadrilateral roof-support post configuration, and an east-facing ventilator. Other floor features included a subfloor human interment, a firepit, and a variety of small postholes or depressions. Although similar to Valdez phase pithouses from the Taos district, the Escritores phase pithouse was less formal. No other Escritores phase structures have been excavated, and the range of architectural variation is therefore unknown. No radiocarbon dates are available for this structure or associated middens, although associated ceramics argue for an occupation in the early Diversification period (post-A.D. 1050). However, the relationship between this structure and other architectural forms of the Developmental or Diversification period is unclear.

Even less is known about Developmental period architectural features from the Trinidad district. Only one excavated structure has been confidently dated to the Developmental period. This feature (Structure 6 at 5LA1416) consisted of a shallow pit with a ramp entryway (Mitchell 1997; Wood and Bair 1980). Floor features included a small firepit and a small subfloor storage cist. A charcoal sample from floor fill dates to A.D. 895 (cal 1140 ± 60 B.P.). Based on associated ceramics, several other somewhat deeper pit structures without ramp entryways (Structures 5 and 6 at 5LA1211) may also date to the late Developmental period. Available archaeomagnetic dates are equivocal on this point, however (Mitchell 1997). At least some shallow pithouses, including one with a ramp entryway, were also occupied during the early Diversification period in the district.

It is perhaps significant that the only other excavated Developmental period structure in the Trinidad district is also a pithouse. The Running Pithouse site is located in Reilly Canyon, a major tributary of the Purgatoire River, and consists of four amorphous "rooms" separated by low partitions and benches (Dick 1974). A variety of postholes was defined, but no other floor features were noted. Although excavation data are limited, it is clear that the structure is unlike either the Escritores phase pithouse of the Cimarron district, or Valdez phase pithouses of the Taos district. It is also unlike the pit structures of the late Developmental or early Diversification period in the Trinidad Lake project area. The artifact assemblage associated with this structure includes corner-notched or stemmed projectile points, bone awls, maize remains, bone beads, and ground stone tools. Significantly, no ceramic artifacts were recovered. For this reason, both Ireland (1974a, 1974b) and Eighmy (1984) place this structure within the first millennium, although its age is not confirmed.

Directions for Future Research

Chronology

It is essential that firm associations between absolute dates and cultural attributes in the Developmental period be established. Although the presence of Developmental period populations is well established in the context area by a number of radiocarbon dates, questions pertaining to the archaeological constituents of such occupation remain unresolved. Larger block excavations permit the recovery of well-dated cultural remains that are crucial for comparison and contrast of the various cultural taxa. Further refinement of the temporal range for the Developmental period must begin with more precise assessments of attributes that distinguish this taxon from the preceding Late Archaic period and subsequent Diversification period. Future large-scale investigations, particularly block excavations, and the development of additional methods for discerning variability in architecture, technology, settlement, and economy, may facilitate more accurate appraisals of these still tenuously defined cultural-temporal groups. Therefore, to a certain degree, chronological research becomes interwoven with the other main themes discussed below. In summary, the acquisition of additional absolute dates, especially those describing the temporal fringes of cultural taxa, will become more meaningful only if accompanied by adequate artifact, subsistence, and feature data.

- What attributes, or combinations thereof, may be used to further distinguish Developmental period occupations from those that are of the Late Archaic period or Diversification period?

- Do occupations situated near the margins of the Developmental period temporal range exhibit mixed assemblages that include materials typically associated with occupations of the Late Archaic and Diversification periods?

Regional differences within the temporal span of the Developmental period must be elucidated. It is highly unlikely that the characteristics that distinguish Developmental period occupation were distributed across the context area at a uniform rate. Pockets of resistance to the introduction of bow-and-arrow and ceramic technology, for example, may have extended well beyond A.D. 100. Similarly, the adaptive mode of the Developmental period may, in certain areas, have extended well into the Diversification period. Identification of these particular situations and related causal factors have important implications for regional chronology building.

- When, and in what portion(s) of the context area, did Developmental period occupation first become recognizable?

- When and where (e.g., north of the Arkansas River versus the southern Park Plateau) did the final representation of a Developmental period occupation occur?

Population Dynamics

The notion that the Developmental period represents a widespread, relatively uniform cultural manifestation characterized by minimal external influences needs to be fully investigated. Currently, large portions of the context area have witnessed only minimal archaeological investigation. The spatial distribution of Developmental period populations may be only roughly drawn, but current evidence indicates that they extended beyond the Arkansas River Basin to the north and south. The eastern and western borders, however, are only poorly known. Analysis of Developmental period occupation should minimally encompass the South Platte River basin, the Park Plateau of southeastern Colorado and northeastern New Mexico, and the plains, foothill, and high altitude regions of the Arkansas River Basin. Evidence of interaction among these various Developmental period populations, and with culture groups from surrounding areas, is known from relatively few sites.

- What attributes or characteristics distinguish context-area occupation during the Developmental period from those of the surrounding regions, particularly with regard to the plains groups located east of the Arkansas River Basin?

- How far west into the upper Arkansas, Huerfano, Cucharas, and Purgatoire River drainages does Developmental period occupation extend?

- To what extent are exotic materials representative of exchange systems present in general contexts of the Developmental period; are they associated with burials?

- What is the evidence for trait diffusion during the Developmental period (e.g., architectural styles, pottery decoration)?

Population growth and aggregation during the Developmental period require further investigation. It remains unresolved whether the greater number of dated Developmental period sites relative to the Late Archaic period reflects a population increase. A number of geomorphological factors, including the erosion of Archaic living surfaces, could also account for this situation. Furthermore, regional variation in this purported population increase has not been addressed adequately. Finally, the degree of population aggregation and concomitant social organization suggested by some Diversification period architectural sites has thus far not been demonstrated by Developmental period groups. Whether this represents some sort of evolutionary cultural process remains to be explored.

- Does the evidence for a Developmental period population increase extend throughout northeastern New Mexico as well as the larger context area?
- Can any regional variation in population numbers be attributed to climatic fluctuations?
- Are there Developmental period architectural sites whose size and assemblage diversity suggest increasing population aggregation and social organization, and are such sites restricted to regions south of the Arkansas River?

The process of defining phases within the Developmental period should be attempted only with adequate data. A number of different site assemblages should be analyzed, especially if the justification is centered on previously held geographical distinctions (e.g., Arkansas River versus South Platte River basin populations, and southeastern Colorado versus northeastern New Mexico populations). Currently, no single, widely accepted phase-level taxonomy is defined for the Developmental period. Furthermore, Developmental precursors to the Apishapa and Sopris phase distinctions defined for the succeeding Diversification period have not been discerned. Developmental period occupation of the upper Purgatoire region, for example, is not well understood. Determining how this expression differed from contemporaneous occupation of northeastern New Mexico, or the eastern plains manifestations that preceded the Apishapa phase, is difficult given available data sets. There is no confirmed evidence that upper Purgatoire groups of this period maintained relationships with the Southwest to the extent that typified the succeeding Sopris phase. However, as reporting improves and more excavation data become available, differences among the various regional populations may become apparent.

- Is there a Developmental period precedent for the extensive interaction with the Rio Grande valley that characterizes the Sopris phase?
- Are the differences seen among Developmental period adaptations in the Arkansas River Basin, as opposed to the southern Park Plateau, sufficient so that phase distinctions can be justified?
- Do Arkansas River Basin and South Platte River Basin occupations exhibit the contrast necessary to define separate phases?

Technology

Ceramic technology and the introduction of the bow-and-arrow are currently among the most prominent attributes used to define the onset of the Developmental period. That said, a number of questions remain regarding these artifact types that need to be resolved. First, solid contextual associations between radiocarbon ages (especially those ranging between 2200 and 1500 B.P.), pottery, and projectile points are still relatively rare. Specifically regarding projectile points, the effect of curating earlier Archaic dart points during the Developmental period needs to be further explored. Although the evidence gathered to date indicates a strong correlation between small, corner-notched points and Developmental period occupations, no ceramics are fully diagnostic of this taxon. That cord-marked Developmental period pottery can be distinguished from similarly decorated Diversification period ceramics on the basis of morphology is yet to be firmly established. Perhaps attributes other than cord marking need to be examined in greater detail. Similar problems with temporal and cultural associations are noted for the oxidized, sand-tempered pottery found on the Park Plateau. Given the small, fragmentary pottery samples associated with most projects, researchers in the context area would benefit greatly from a regional synthetic approach. Such an approach would entail increasing sample sizes by incorporating collections from a number of surveys and excavations. Observations gleaned from larger samples may facilitate discernment of more subtle temporal and regional trends in ceramic construction. For example, it would be particularly beneficial for one or more ceramic analysts to compare a large sample of cord-marked or polished specimens from a number of Arkansas and South Platte River Basin projects.

- Does hafted biface evidence suggest a continuation of atlatl use during the Developmental period, or alternatively, that the Archaic points were simply picked up and modified for use as knives and scrapers?
- Does bow-and-arrow technology generally precede that of ceramics within the context area; are there specific regions where the opposite is true?
- How does Developmental period cord-marked pottery differ from that which was manufactured during the Diversification period?
- What is the morphological range of ceramics recovered from the upper Purgatoire region during the Developmental period, and how does it compare with that associated with southern Park Plateau occupations?

Effort should be made to establish diagnostic patterns of Developmental period lithic tool production and use, and lithic research in the context area would be well served by firmly establishing baseline technological trends. The main point here is that some "big picture" observations need to be considered in conjunction with the interpretation of individual, formally patterned diagnostic tools. Debitage and minimally modified tools should not be overlooked in assessing overall manufacturing and use strategies.

- Does a combined emphasis on bifaces and minimally modified flake tools hold true for all Developmental period sites?
- Is there greater use of expedient tools at Developmental architectural sites than, for example, Archaic rockshelters?
- Are all Developmental period residential bases characterized by late-stage manufacture and tool refurbishment?
- Do all Developmental period ground stone assemblages represent an expedient tool manufacturing strategy?
- Does macro- and microbotanical evidence indicate a correlation between ground stone form and the processing of specific economic items?

Additional source analyses are needed to further establish trade and other forms of interaction during the Developmental period. For both ceramic and lithic studies, petrographic analyses greatly enhance our knowledge of manufacture origins and interregional relationships. Such studies would include source analyses for the rock temper used to manufacture pottery and for obsidian that is commonly used in the manufacture of stone tools. The former may, for example, facilitate the identification of locally manufactured cord-marked pottery as opposed to that imported from surrounding regions. Additionally, further research into lithic procurement sites and quarry locations within the context area is greatly needed. Finally, species identification for shell tools and ornaments can provide important information about exchange patterns.

- How do Developmental period contexts from the upper and lower Purgatoire River regions compare in the sources for temper used in pottery manufacture?
- Does petrographic analysis of rock temper indicate that Developmental period ceramic collections represent highly localized manufacture?
- Does Alibates dolomite occur only in Developmental period contexts south of the Arkansas River; to what extent are "false" Alibates sources represented in southeastern Colorado (i.e., materials similar in appearance to Alibates dolomite from the Texas panhandle)?
- Does all the obsidian associated with Developmental period contexts originate in northern New Mexico?
- How should "local" and "nonlocal" stone sources be defined for Developmental period occupations in various portions of the context area?

Settlement and Subsistence Strategies

Developmental period sites exhibit considerable variability in setting as well as artifact and feature composition. However, sampling bias undoubtedly plays a role in our current perception of Developmental period settlement-subsistence systems. It is important to reiterate that large portions of the context area, particularly the northern expanses, remain unsurveyed. Furthermore, much of the survey information associated with the context area was recovered in the course of a few large-scale projects in the southern region. As is the case with all cultural taxa defined for the context area, excavation data from a variety of site types and environmental settings would greatly benefit Developmental period settlement and subsistence research. Relatively few excavated sites have been relied upon for more detailed interpretations of settlement, and these sites were often subjected only to limited testing. Overall, investigation of the functional and temporal relationships among the various Developmental period site types is still in its infancy. In southeastern Colorado, rockshelter sites in canyon settings have to date been more commonly encountered than architectural sites in open settings. Therefore, a greater number of rockshelter sites has been subject to some level of excavation. However, the few open architectural sites that have been excavated were more exhaustively studied. A single example, the Belwood site, has long been cited in definitions of the Developmental period. In northeastern New Mexico, Developmental period architectural sites have similarly received the lion's share of investigative attention. Throughout the region, open-setting nonarchitectural sites, both with and without fire-related features, have received only minimal attention. Conversely, discernment of regional and temporal variation in rock art sites has been advanced in recent years with improving chronometric and recording techniques.

- Overall, does the range of site types associated with the Developmental period reflect either a collector or forager strategy within Binford's (1980) settlement model; alternatively, is neither strategy particularly relevant for the context area?
- What evidence is there to suggest the extent of Developmental period seasonal rounds?

- Are sites confined to plains drainage systems, or do they extend to higher elevations in the Rocky Mountains?

- Are Developmental period rockshelter and open nonarchitectural occupations generally reflective of short-term, limited-task operations, and are these occupations (particularly the latter) generally associated with a wide range of environmental settings?

- Do Developmental period architectural sites generally represent residential bases characterized by multiple, domestic-task activities and relatively long term occupation?

- Are Developmental period architectural sites more likely to occur in canyon settings?

- What is the range of site types and settings associated with Developmental period rock art?

Comparison should be undertaken of Developmental and Late Archaic economies, and in particular the degree to which the Developmental period economy represents a continuation of that of the Late Archaic period. For both periods, a generalized hunter-gatherer strategy centered on the procurement of nondomesticated plants such as goosefoot and a variety of small mammals (primarily leporids) and artiodactyls was emphasized. Although sparse maize remains have been recovered from both Late Archaic and Developmental contexts, a dual foraging-horticultural economy is generally not associated with either period.

- What evidence is there to indicate that either minor or major economic changes accompanied the shift from the Late Archaic period to the Developmental period?

- Did the distribution of maize became more widespread after the Late Archaic period?

A consensus exists among regional archaeologists that the role of cultigens in the Developmental period economy was relatively minor. However, the possibility for regional variation in the use of maize warrants further examination, particularly with regard to comparisons between northeastern New Mexico and the greater Arkansas River Basin. Related research concerns pertain to the variability in site types associated with maize, and the degree to which maize was distributed through the context area. Although wild plants are firmly established as a staple in the Developmental period diet, a number of questions linked to their use are worthy of investigation. In particular, the pervasiveness of goosefoot should continue to be addressed. Additional avenues of research include regional variation in procurement of wild plants, and determining what types of features are associated with plant processing. Although terms such as roasting pit are applied to features in the context area, there is little agreement on what actually constitutes such an occurrence.

- Was maize more prevalent on the Park Plateau than in other regions during the Developmental period?

- Are Developmental period maize remains primarily present in rockshelters situated along major drainages?

- Is there evidence of Developmental period maize storage facilities?

- Is the presence of maize in the context area the result of trade or a seed exchange system, or both?

- Is the pervasiveness of goosefoot actually the result of preservation factors, i.e., does this plant exhibit a greater capacity to become preserved in archaeological contexts?
- Was goosefoot preferred among Developmental period populations because its growth was more easily encouraged by hunter-gatherers occupying seasonal camps situated in marginal environments?
- Are wild plant remains associated with Park Plateau occupations more diverse than those recovered from plains occupations in the context area?
- What evidence is there for the use of specialized plant processing sites during the Developmental period?
- What is the evidence for storage of wild plants during the Developmental period?
- Are there correlations between feature morphology and wild plant remains?

The faunal record suggests an emphasis on jack rabbits and cottontails in Developmental period subsistence throughout northeastern New Mexico and southeastern Colorado. However, as with plant utilization, there is reason to examine more closely regional and site type variability in faunal assemblages. For example, rockshelters in plains settings have produced most of the largest faunal collections in the Arkansas River Basin. Bone recovery from the few open architectural sites in such settings has been remarkably sparse. In contrast, open setting architectural sites in northeastern New Mexico have relatively large and diverse faunal collections. Furthermore, the bison-oriented assemblages of architectural sites of the subsequent Apishapa phase do not appear during the Developmental period, even on a minor scale.

- What is the evidence for regional and site type variability in Developmental period faunal assemblages?
- Do any Developmental period sites indicate an emphasis on bison procurement?
- Which site types exhibit the most diverse and abundant faunal assemblages?
- What are the primary methods of Developmental period faunal procurement, and is there evidence of game drives?

Establishment of the regional and temporal variability in Developmental period architecture should be a primary research objective. The number of Developmental period architectural sites recorded in the last 15 years has increased significantly, and much data synthesis is needed to interpret adequately the results. It is yet to be firmly established whether architecture of the Developmental period has comparable Late Archaic antecedents, and how Developmental period structures compare with those of the subsequent Diversification period. It is also crucial to verify the relationships among Developmental period structures found in northeastern New Mexico, southeastern Colorado, and the South Platte River Basin. Indeed, information presented in research documents from adjacent areas may suggest additional avenues for investigating architectural origins and links. Currently, the Developmental period architectural sample from southeastern Colorado is small relative to that of the southern Park Plateau. Additional block excavations will undoubtedly provide a solid foundation for interregional comparison of architectural attributes. In addition to overall plan and profile views, the recording of architecture in the context area should minimally include descriptions and/or detailed diagrams of wall construction and slab placement, morphology of internal and external features, the size and alignment of support posts, and the location and composition of associated artifact concentrations.

- When and where did aggregated room structures first appear, and is room aggregation associated only with the Diversification period?
- Are prepared floors and formal interior features associated with Developmental period structures, or are these attributes primarily Diversification period architectural innovations?
- How does architecture of the Developmental period vary within the context area, and between the context area and northeastern New Mexico?
- How does Developmental period architecture in the context area compare with examples from surrounding regions, particularly the South Platte River Basin?

Geomorphology and Paleoclimates

Dramatic departures in paleoclimatic trends are believed not to have occurred during the transition from the Late Archaic to the Developmental period (Archaic stage to Late Prehistoric stage). On balance, the climate was probably somewhat cooler and wetter than that of the present, but comprehensive data from archaeological sites of the Developmental period suggest that floral and faunal communities were essentially modern. Nevertheless, the nature and timing of climatic fluctuations within the period, and their possible effects on human adaptation, are poorly understood. Likewise, geomorphic processes have been described from only a few locations around the context area, and such processes have been dated only in a very broad sense.

- What paleoenvironmental conditions prevailed during the Developmental period, and are significant changes from the Late Archaic period detectable?
- What were the predominant geomorphic processes affecting landscape development in the Developmental period?
- Is the limited evidence of landscape stability from a few localities (e.g., Turkey Canyon at Fort Carson) widespread throughout the context area during this period?
- Are there small-scale episodes of sand dune/sand sheet activation within the Developmental period that might indicate episodes of climatic change?
- What soil formation processes prevailed, and can soils dating to this period be identified on a regional scale?
- If intact terrains of Developmental period age are present, how would soil-forming processes and more general geomorphic processes have affected internal site structure?

DIVERSIFICATION PERIOD

Introduction

The Diversification period of the Late Prehistoric stage dates from approximately A.D. 1050 to 1450 and therefore largely corresponds to the Middle Ceramic period as defined in the previous research context (Eighmy 1984). Two phases, believed to have common origins in the Developmental period, are defined within the Diversification period: the Apishapa phase (A.D. 1050-1450) and the Sopris phase (A.D. 1050-1200). It is emphasized that because large portions of the context area have received relatively little archaeological investigation, particularly the northern expanses, unrecorded but contemporaneous cultural remains may exist that are unrelated to either phase. Furthermore, recorded sites associated with limited data sets may represent manifestations that are not affiliated with either the Sopris or Apishapa phase. The poorly known, spaced stone foundations and enigmatic cobble foundation structures previously discussed in the Late Prehistoric stage architectural synthesis (this chapter) are possible examples of such manifestations. The meager data sets associated with these sites currently restrict further refinement of phase distinctions during the Diversification period.

This segment of prehistory is generally distinguished by the construction of multiroom architectural settlements that are larger and more complex than those of the preceding Developmental period. Diversification period structures were probably occupied for longer periods of time, and used more intensively, than Developmental period structures. The term "Diversification" is applied to this period because the phase distinctions, as well as intraphase variability in such crucial aspects as architecture, emphasize a degree of directional change in the context area that was not apparent previously. Overall, the density and diversity of architecture, features, and associated debris indicate that the context area witnessed peak levels of prehistoric population and sedentism. However, the possible catalysts for these circumstances, such as climatic conditions, increased food production, innovations in storage, stress brought on by drought or warfare, or some combination of these factors, are yet to be fully identified.

The two major phases of the Diversification period, Sopris and Apishapa, are believed by most investigators to have grown from a common origin in the Developmental period (Kalasz 1988; Lintz 1984; Mitchell 1997; Wood and Bair 1980:241; Zier et al. 1988). Alternatively, Schlesier (1994) sees the Sopris phase as an incursion of Athapaskans beginning approximately A.D. 1000. However, the latter thesis relies heavily on scant dental evidence derived from a sample of 13 human mandibles (Wood and Bair 1980:Appendix I). Apishapa phase populations exhibit eastern Plains Village influences expressed by the concept of the Upper Canark Regional Variant (Lintz 1984), and the less widespread Sopris phase maintained social and economic ties with ancestral Pueblo groups in the northern Rio Grande valley (Mitchell 1997). The precise nature of the distinctions between the Sopris and Apishapa phases is yet to be explored fully, and sites which might suggest interaction between the two have not been identified.

Chronology

In the 15 years since publication of the previous research context (Eighmy 1984), numerous radiocarbon, archaeomagnetic, and cation-ratio dates have been obtained from Diversification period sites (see Appendixes A and B). Recent excavations at the Cramer site, Avery Ranch site, and Ocean Vista site, the reexamination of materials from 5LA1416 and the Leone Bluffs site, and various investigations on the PCMS, Chaquaqua Plateau, and Carrizo Ranches property are particularly appropriate for examination of the range of variability that characterized this period (Andrefsky et al. 1990; Gunnerson 1989; Kalasz et al. 1993; Loendorf et al. 1996; Mitchell 1997; Nowak and Kantner 1990, 1991; Rhodes 1984; Zier et al. 1988; Zier and

Kalasz 1985). The absolute dates accumulated in recent years, as well as reexamination of those recovered from earlier investigations, offers some new insight into the shift from the Developmental period to the Diversification period. However, archaeological perception of this shift is still plagued by the same chronological and conceptual problems enumerated throughout this volume. The shift was probably not uniform across the context area, and the chronometric precision necessary to date the transition is undoubtedly compromised by old wood/heartwood factors and/or by the lack of well-defined stratigraphic relationships between absolute dates and occupational surfaces.

Available chronological data are indicative of considerable temporal overlap between Sopris and Apishapa phase occupations. A detailed reexamination of available radiocarbon and archaeomagnetic samples from two major Sopris phase settlements was recently completed by Mitchell (1997). This study considers the stratigraphic relationships of the dates and their associations with relatively dated artifacts such as ceramic types; additional factors such as the old wood/heartwood influence are closely examined. The author concludes that "...it is probable that the occupation of these sites began by at least A.D. 900, and continued until some time shortly after A.D. 1200" (Mitchell 1997:93). Such an all-encompassing, rigorous synthesis has not been accomplished for Apishapa phase architectural sites. Chronological control for Apishapa sites is inhibited by a paucity of large-scale block excavations. Additionally, the shallow deposits typical of Apishapa phase site locations are often characterized by collapsed or intermixed stratigraphy. These conditions have made it difficult to confirm consistently the relationships among individual dates, diagnostic artifacts, and occupational surfaces. Southeastern Colorado investigators have placed the beginning of the Apishapa phase in the A.D. 800-1000 range (Kalasz et al. 1993; Lintz and Anderson 1989; Nowak and Kantner 1991; Zier et al. 1988), but most believe that what is sometimes termed "full-blown" Apishapa culture, or the most obvious expression of the manifestation, begins at A.D. 1000 and starts to disperse by A.D. 1300 (Campbell 1969a:389; Eighmy 1984; Lintz and Anderson 1989:25).

Delineating the shift from the Developmental to the Diversification period is often difficult because of our vague and limited understanding of the differences between them such as corner-notched versus side-notched points, the presence of abundant cord-marked ceramics, and single-room versus aggregated room structures (Gunnerson 1989:12). Perhaps for this reason, as well as those related to the limitations of radiocarbon dating, the beginning of the Diversification period is often presented with a 100- or 200-year buffer as in A .D. "800/1000" or "A.D. 900/1000" (Lintz and Anderson 1989:21; Mitchell 1997; Zier et al. 1988). Given that the Sopris and Apishapa phases are believed not to represent a sudden incursion of new populations into the area, it is reasonable to suggest that the progression from the Developmental to the Diversification period is often subtle and protracted. The "diversification" seen at A.D. 1000 in some portions of the context area may have occurred later or not all in others. Because this shift involved indigenous populations that had occupied the region for centuries, it is likely to have been characterized by considerable overlap in settlement-subsistence strategy and associated architectural forms. Although the larger, more intensively occupied settlements of the Diversification period certainly stand out (e.g., 5LA1416 and the Leone Bluffs site, and Gunnerson's [1989] "Classic Apishapa" sites), differences among other site types of the Developmental and Diversification periods may have been minimal. Echoing Gunnerson's viewpoint (1989:12), the authors believe that many sites within the broader Apishapa or Sopris phase settlement pattern are virtually indistinguishable from those of the Developmental period. This situation necessitates that caution be exercised in assessing dates believed to signal commencement of the Diversification period.

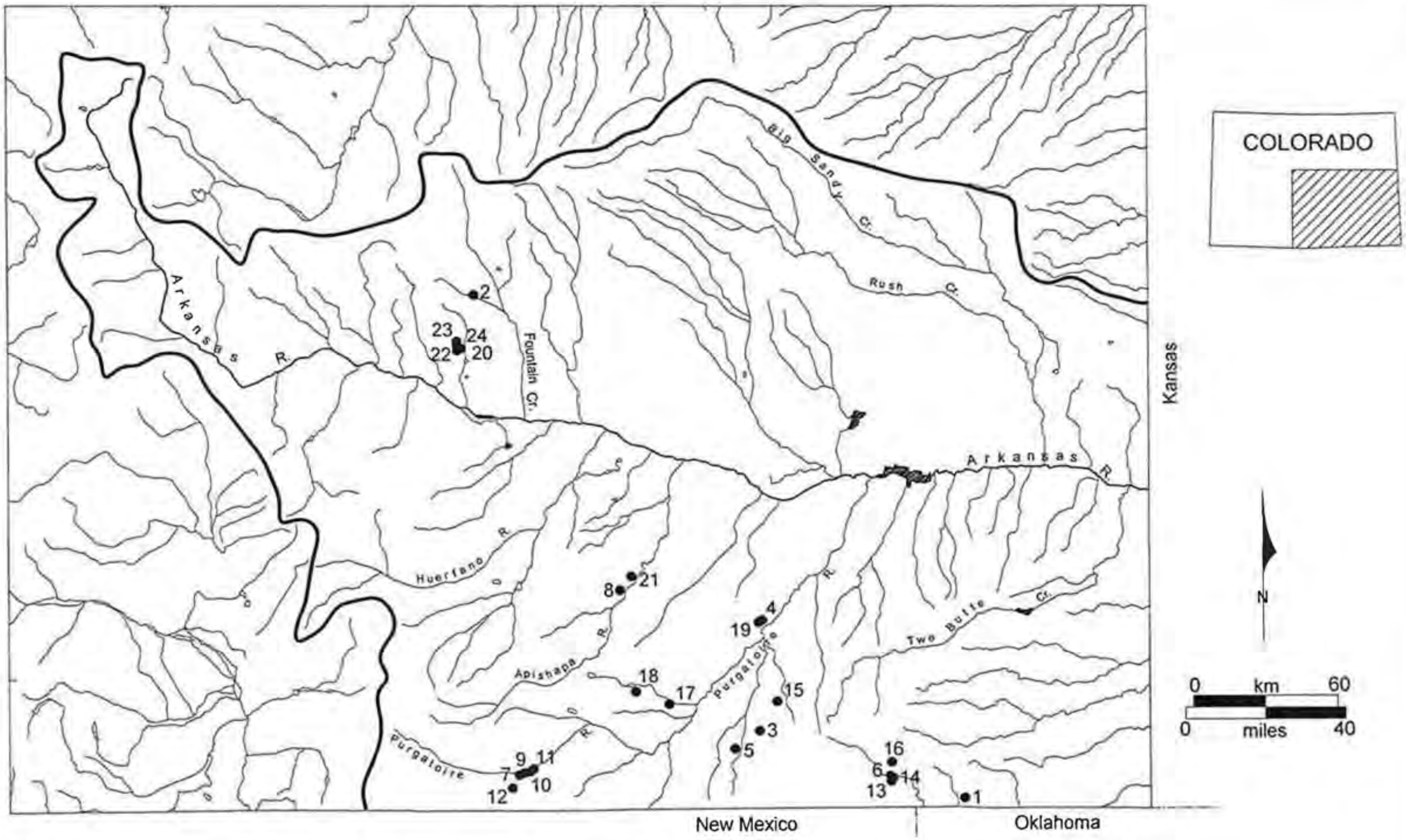
Additional difficulties in chronological ordering are suggested by the wide temporal range, sometimes enduring for several centuries, of absolute dates associated with specific architectural sites of the Diversification period. This phenomenon is particularly evident at Apishapa phase loci such as the Cramer, Mary's Fort, Ocean Vista, and Avery Ranch sites; and the Sopris phase sites of Leone Bluffs and 5LA1416 (Kalasz et al. 1993; Mitchell 1997; Wood and Bair 1980; Zier et al. 1988; Zier and Kalasz 1985). The suite of radiocarbon dates that Gunnerson (1989:53-57) recovered from the Cramer site describes a continuum from approximately A.D. 900 to 1400. However, all but the most recent are rejected on the basis of a presumed problem of old wood/heartwood. A similar conclusion was reached by Zier et al. (1988:255-257) in interpreting the bimodal distribution of radiocarbon dates recovered from the Avery Ranch site; dates earlier than the A.D. 1160-1290 cluster were ascribed to the wood sampling problem noted by Gunnerson (1989). However, Zier et al. (1988) do present the possibility for multiple occupations of the Avery Ranch site beginning approximately A.D. 1000 or earlier. This interpretation was based on the fact that a few Scallorn points, generally indicative of occupation during the Developmental period, were possibly associated with the earlier radiocarbon dates. Subsequent test excavations at the nearby Ocean Vista site similarly revealed the presence of earlier dates and diagnostic artifacts suggestive of multiple components culminating in an Apishapa phase occupation (Kalasz et al. 1993:208). Evidence for multiple components at Ocean Vista was somewhat stronger than that recovered from the Avery Ranch site; two Scallorn points and a calibrated radiocarbon date of A.D. 657 were associated with a common provenience. Still more conclusive evidence for multiple components at large sites of the Diversification period was revealed by the recent re-examination of Sopris phase dates (Mitchell 1997:89-93). Thus, the presence of components of the Developmental period (or earlier) among Diversification period architectural sites may not necessarily reflect false radiocarbon age assessments. Evidence shows that the larger architectural site locations of the Diversification period apparently represent optimal or preferred settings that were occupied repeatedly throughout the Late Prehistoric stage.

The multicomponent phenomenon suggestive of a gradual progression from the Developmental to the Diversification period has significant implications for interpretation of site affiliation in the context area. Given the shallow, rodent-disturbed, often broken stratigraphy typical of Diversification period architectural sites, the intrusion of earlier materials may be a relatively common occurrence (Kalasz et al. 1993; Mitchell 1997; Zier et al. 1988; Zier and Kalasz 1985). Avery Ranch site investigators note that "it is possible that artifact assemblage differences between two major components are indistinguishable due to the relatively short period of time elapsed between the two (ca. two centuries) and/or the similarities in economic adaptations. It is also possible that remnants of two components have become hopelessly mixed as a result of natural and cultural factors (rodent and root disturbance; post-abandonment reuse of living/work space; recent military impact) (Zier et al. 1988:256)." Therefore, as a cautionary note, dated materials reflecting a Developmental-Diversification period continuum may represent the reuse and refurbishment of architectural loci over several centuries. The absence of well-defined stratigraphic relationships in such situations makes it difficult to discern which date reflects the end of one period and which the beginning of the next.

Important Diversification period sites in the context area are shown in Figure 7-2.

Population Dynamics

The profusion of architectural sites that suggest increased populations is described in the Late Prehistoric stage overview, above. That the number of architectural sites reaches its ultimate expression during the Diversification period is well documented (Kalasz 1988:Table 1; Loendorf et al. 1996:Table 7.4; Mitchell 1997:Table 5.2-5.4). For reasons not yet established, populations were assembling at specific sites in much greater numbers than was true during the previous Developmental period. The well-known multiroom, "fortified" enclosures of the Apishapa phase are most prevalent in the Purgatoire and Apishapa river areas; the large Sopris phase settlements



1 5BA24
2 5EP1192 (Windy Ridge)
3 5LA125 (Umbart Cave)
4 5LA330 (Sorenson)
5 5LA768 (Steamboat Island Fort)
6 5LA1053 (Carrizo Rock Shelter)
7 5LA1211 (Leone Bluffs)
8 5LA1247 (Snake Blakeslee)
9 5LA1416
10 5LA1417
11 5LA1424
12 5LA1445
13 5LA1722
14 5LA1725
15 5LA2158 (Upper Plum Canyon I)
16 5LA2169
17 5LA5255 (Sue)
18 5LA5554
19 5LA6028 (Point)
20 5PE56 (Avery Ranch)
21 5PE484 (Cramer)
22 5PE649 (Mary's Fort)
23 5PE868 (Ocean Vista)
24 5PE904 (Woodbine Shelter)

Figure 7-2. Map of Arkansas River context area showing locations of selected Diversification period sites.

are situated farther west along the upper Purgatoire River. Together, these sites are believed to represent the central or core regions of Diversification period population aggregation (Andrefsky 1990; Campbell 1969a; Gunnerson 1989; Kalasz 1988, 1989, 1990; Mitchell 1997; Reed and Horn 1995; Rhodes 1984; Wood and Bair 1980). Campbell (1969a:336) notes that many stone enclosure sites on the Chaquaqua Plateau cover at least an acre and that one in particular, 5LA977, covers 35 acres; these sites typically consist of five to six rooms, but 37 rooms were identified at 5LA977. Gunnerson (1989) mapped seven contiguous rooms at the Snake Blakeslee site, and three large rooms interconnected by "breezeways" or "alleys" at the Cramer site. The size of some of these rooms is striking; the largest room at the Cramer site is 7.5 m wide. These room size data also imply greater population aggregation. Site 5LA1416 and the Leone Bluffs site along the upper Purgatoire River both exhibit six multiroom structures, the number of associated rooms ranging from two to 15 (Mitchell 1997:97).

The geographical boundaries of the Diversification period phenomenon are not firmly established, but both the Apishapa phase and the Sopris phase are widespread. The Apishapa phase is more prevalent across the context area but Sopris phase occupations may be extensive in northeastern New Mexico. The northern extent of Diversification period population aggregation is evidenced by Apishapa phase sites situated along Turkey Creek south of Colorado Springs (Ireland 1968; Kalasz et al. 1993; Watts 1971; Van Ness et al. 1990; Zier and Kalasz 1985; Zier et al. 1988). The southernmost representation involves both the Sopris phase settlements found in the Park Plateau region south of Trinidad, and Apishapa phase "forts" in northeastern New Mexico; the latter are exemplified by an 18-room settlement in the upper Corrumpa River drainage basin (Biella and Dorshow 1997a; Mitchell 1997; Winter 1988; Wood and Bair 1980). Apishapa phase sites extend from just south of Colorado Springs into northeastern New Mexico; Sopris phase settlements are known on the Park Plateau in southeastern Colorado and northeastern New Mexico (Mitchell 1997:94-95).

Available evidence suggests that the settlements in the core area, particularly those of the upper and lower Purgatoire River, represent the greatest levels of prehistoric population aggregation in the Arkansas River Basin. The eastern and western boundaries of the multiroom, multistructure phenomenon are not well established. However, Carrizo Ranches and Apishapa Highlands investigations indicate that Diversification period sites near the eastern and western edges of the context area do not approach those of the Purgatoire and Apishapa River core area in terms of overall size and numbers of structures (Lutz and Hunt 1979; Nowak and Kantner 1990). Similarly, the northern and southern extensions of Diversification period population do not exhibit the level of settlement suggested by the architectural sites in the core area. This statement is tentatively presented with full recognition that large areal expanses within the context area are poorly known archaeologically.

Technology

Unlike the preceding Developmental period, no new technologies were introduced during the Diversification period. In fact, technological trends that are prevalent in earlier assemblages of lithic artifacts, ceramics, and bone tool/ornaments continue with minimal modification in the Diversification period. The most significant change involved ceramics, specifically an increase in the number of different wares. Southwestern or Puebloan pottery in particular becomes widely distributed throughout the context area, although nowhere is it abundant. Puebloan wares constitute a significant and well-represented component of Sopris phase ceramic assemblages, and are reported in lesser density and diversity at Apishapa phase sites across the context area. The local, cord-marked ceramic tradition remains predominant among Apishapa phase sites, and cord-marked pottery is associated in lesser quantities with Sopris phase occupations as well (Wood and Bair 1980). Of note is the Upper Republican trade ware recovered from the Ocean Vista site at

Fort Carson (Kalasz et al. 1993). Ocean Vista is also unusual in that 24 sherds representative of a single Southwestern corrugated vessel were recovered; corrugated pottery is rare among Diversification period sites.

Analyses of Diversification period lithic assemblages indicate a continuation of Developmental period production strategies. Ground stone assemblages are characterized by the same uniformity demonstrated by those of earlier periods in that, although formally patterned tools are known, the overall collections generally reflect an expedient approach toward manufacture. Settlements of the Sopris phase exhibit more formally patterned Southwestern-style trough metates and two-hand manos, albeit in comparatively low quantities (Mitchell 1997; Wood and Bair 1980). Overall, manos remain the most extensively modified and morphologically variable ground stone implement used at this time. Although some chipped stone analyses have been oriented toward formal tools (Gunnerson 1989; Ireland 1968; Watts 1971), other researchers have emphasized the importance of expedient flake tools as well as bifaces for Diversification period populations (Kalasz et al. 1993; Zier et al. 1988; Wood and Bair 1980). Continuing an Archaic stage tradition, chipped stone production strategies at Apishapa and Sopris phase settlements emphasize the manufacture of both minimally modified flake tools and highly patterned bifaces such as projectile points. Both Sopris and Apishapa phase flint knappers evidently preferred a casual or random method of flake removal from unstandardized cores (Kalasz et al. 1993; Wood and Bair 1980; Zier et al. 1988). Increased production of minimally modified flake tools and a corresponding decrease in formal tool (e.g., biface) manufacture has been proposed as correlating with increasing Late Prehistoric sedentism among sites of the North American temperate zone (Parry and Kelly 1987). Although Diversification period settlement in the context area unquestionably reflects increased sedentism, associated chipped stone technologies continue to emphasize production of bifaces as well as expedient flake tools. Biface percentages within several Diversification period assemblages have been shown to equal or exceed those of expedient flake tools (Kalasz et al. 1993; Wood and Bair 1980; Zier et al. 1988; Zier and Kalasz 1985).

The few rigorous debitage analyses undertaken for Diversification period assemblages indicate that tool finishing and refurbishment was emphasized among a variety of site types (Kalasz et al. 1993; Zier et al. 1988; Zier and Kalasz 1985). "Stone apparently arrived at sites either as finished tools which were subject to maintenance, or in unfinished yet portable condition, such as bifaces or small nodules. Depending on the task at hand, flakes produced from the latter items were used primarily with little or no further modification, or were fashioned into a variety of small, stemmed or unstemmed bifacial tools" (Kalasz et al. 1993:300). Evidently, raw materials were significantly reduced at specific sites, such as quarries.

While the foregoing discussion focuses on similarities among lithic artifacts of the Diversification period, there is a potentially important contrast between Sopris and Apishapa chipped stone tool assemblages. The lithic artifact most diagnostic of Apishapa phase occupation remains the small, triangular, side-notched or flange-stemmed projectile point generally termed Reed or Washita in the context area (Gunnerson 1989; Ireland 1968; Kalasz et al. 1993; Rhodes 1984; Watts 1971; Zier et al. 1988; Zier and Kalasz 1985). In contrast, the corner-notched forms typical of the preceding Developmental period are more common in Sopris phase settlements (Wood and Bair 1980:Table X). The current limited databases enable one to speculate that this trend may be related to differing game procurement strategies, i.e., the bison orientation of larger Apishapa phase sites versus the small game and deer orientation of Sopris phase settlements. The proposal that the flanged stem is a modification reflective of increased bison exploitation is worthy of further examination in context area studies (see also Anderson 1989a:234).

Bone tools and ornamentation become more prevalent in the shift from the Developmental to the Diversification period. Besides the awls and rabbit bone tubular beads typical of the general

Late Prehistoric adaptation, considerable morphological variability is seen among Apishapa and Sopris phase tools fashioned from large game long bones (Erdos 1998; Gunnerson 1989; Rhodes 1984; Wood and Bair 1980; Zier et al. 1988). Among the larger architectural sites of the Apishapa phase, this situation perhaps reflects the increased emphasis on bison processing. The associated waste provided abundant raw material for a wide variety of items including task-specific tools. Similarly, Sopris phase settlements were characterized by substantial faunal collections; deer rather than bison, however, were the preferred large mammal quarry.

Settlement and Subsistence Strategies

Site Type and Locational Variability

Architectural sites have traditionally received the greatest investigatory attention related to Diversification period settlement. Although the prominent architectural sites of the Apishapa and Sopris phases reflect important aspects of settlement, at some point archaeologists need to gain greater insight into the full range of morphological and functional site types. The previously discussed large-scale surveys of the PCMS, Fort Carson, and Picket Wire Canyonlands clearly indicate that considerable variability exists in site types and their spatial distribution during the Apishapa phase (Alexander et al. 1982; Andrefsky 1990; Jepson et al. 1992; Kalasz 1988; Loendorf and Loendorf 1999; Reed and Horn 1995; Van Ness et al. 1990; Zier et al. 1996a). Most recent investigators believe this variability reflects a semisedentary settlement pattern characterized by seasonal use of residential bases and specialized resource procurement encampments. This pattern is thus somewhat suggestive of Binford's (1980) collector strategy. Excavation of various site types at Carrizo Ranches, Fort Carson, the Chaquaqua Plateau, the PCMS, and the Picket Wire Canyonlands supports such a model, but there are many gaps in specific information sets because of the relative paucity of block excavations (Andrefsky et al. 1990; Campbell 1969a; Kalasz et al. 1993; Nowak and Kantner 1990, 1991; Reed and Horn 1995; Rhodes 1984). Currently, there is insufficient information to confirm which specific types of resource extraction or processing activities, or both, were accomplished at the smaller Apishapa phase nonarchitectural sites.

The full range of Sopris phase settlement is even less understood than that of the Apishapa phase. Surveys completed in the Trinidad district attest to the variability in site type and location (Gleichman 1983; Lutz and Hunt 1979; McKibben et al. 1997; Tucker 1983). As with the Apishapa phase, smaller nonarchitectural sites in significant densities are situated in the vicinity of the larger Sopris phase residential bases. However, ceramics indicative of Sopris phase settlement are rare among the nonarchitectural site sample. Further, radiocarbon or other absolute date associations are lacking because few of the nonarchitectural sites have been excavated (Indeck and Legard 1984).

Economy

Significant modification of the long-lived, hunter-gatherer strategy is seen during this period, especially with regard to evidence for increased sedentism. While the economic effects of purported climatic deterioration are currently not well understood, it is undeniable that the overall density and diversity of subsistence-related remains is greater during the Diversification period than in earlier times. Differing viewpoints pertaining to maize horticulture were presented in the section summarizing Late Prehistoric stage economy (this volume). Regardless of whether maize played a major or a minor role in Apishapa or Sopris phase subsistence, its presence certainly increases during the shift from the Developmental period to the Diversification period (Campbell 1969a; Ireland 1968; Kalasz et al. 1993; Mitchell 1997; Wood and Bair 1980; Zier et al. 1988). Nevertheless, a variety of wild plant remains and game persists as a primary element of

Diversification period subsistence. The most significant contrast between diets of the Sopris and Apishapa phases is manifested in the latter's greater focus on bison procurement, and the former's preference for leporids and deer (Gunnerson 1989; Kalasz et al. 1993; Ireland 1968; Mitchell 1997; Watts 1971; Wood and Bair 1980; Zier et al. 1988). However, it is emphasized that select Apishapa phase rockshelters such as Upper Plum Canyon Rock shelter I and Woodbine Shelter exhibit faunal assemblages comprised primarily of small mammals (Kalasz et al. 1993; Rhodes 1984).

Although cists and subfloor pits commonly occur at sites of the Developmental period, the Diversification period apparently witnesses increased food storage capabilities. Subfloor pits and cists continue, but additional storage facilities are believed to be represented by small aggregated rooms attached to larger structures. Such facilities are particularly prevalent at Sopris phase settlements (Wood and Bair 1980:Table IV), but increasing evidence suggests that they are also commonly associated with Apishapa phase occupations (Andrefsky et al. 1990:582; Campbell 1969a:229, 398; Ireland 1968:8,16; Kalasz 1988:84-85; Zier et al. 1988:76). The economic implications of increased storage are yet to be resolved. One may speculate as to whether these innovations enabled Diversification period populations to store the quantities of food necessary for a more sedentary existence. Kalasz (1988) suggests that efficiency in food storage techniques among hunter-gatherers facilitated semisedentism in areas strategically located with respect to a range of biotic and hydrological resources. On the other hand, elevated levels of horticulture may have led to expanded storage capacity and stimulated a greater degree of sedentism.

Architecture

Diversification period architecture is generally more complex, variable, and massive than that of the Developmental period. Sopris phase architecture is differentiated from that of the Apishapa phase on the basis of rectilinear walls, adobe or jacal construction, horizontal slab foundations, the presence of mortuary chambers, and formalized interior features such as mud-collared hearths (Mitchell 1997; Wood and Bair 1980). Apishapa phase architecture is found in rockshelter as well as open settings and is characterized by curved rock walls that are more likely to incorporate vertical slabs. So-called barrier walls are also common architectural attributes of this phase. In marked contrast to Sopris phase structures, human interments have not been found with Apishapa phase architecture. Artists' recreations of selected structures of the Apishapa phase and Sopris phase are provided in Figure 7-3.

Like their respective ceramic associations, Sopris phase architectural attributes may reflect Southwestern contacts; those of the Apishapa phase are apparently indicative of Plains Village influences. It is also apparent that Sopris and Apishapa architecture differs substantially from that of either the Southwest or Southern/Central Plains, and each is characterized by considerable morphological variability (Campbell 1969a; Ireland 1968; Kalasz 1988, 1989, 1990; Mitchell 1997; Watts 1971; Wood and Bair 1980; Zier et al. 1988). Neither exhibits a well-defined, standardized post pattern or house form, nor do context-area examples display ventilator shafts, deflectors, benches, or pilasters. Although Sopris and Apishapa architectural forms are distinct, there is some noteworthy overlap between the two in terms of morphological attributes. Both Apishapa and Sopris structures are characterized by highly variable floor areas that typically form shallow basins. The architecture of both phases exhibits wall extensions termed fences, alleys, or plazas (Campbell 1969a:224; Gunnerson 1989:Figure 2; Mitchell 1997:97). Adobe has not been identified in Apishapa phase structures, but daub and clay suggestive of jacal construction and prepared floors are relatively common (Gunnerson 1989:28; Ireland 1968; Kalasz et al. 1993; Zier et al. 1988). The Wallace site, one of the few Apishapa phase architectural sites subjected to extensive excavation, apparently included formally constructed interior floor features; none, however, appeared to be similar to the mud-collared hearths of the Sopris phase (Ireland 1968:14-

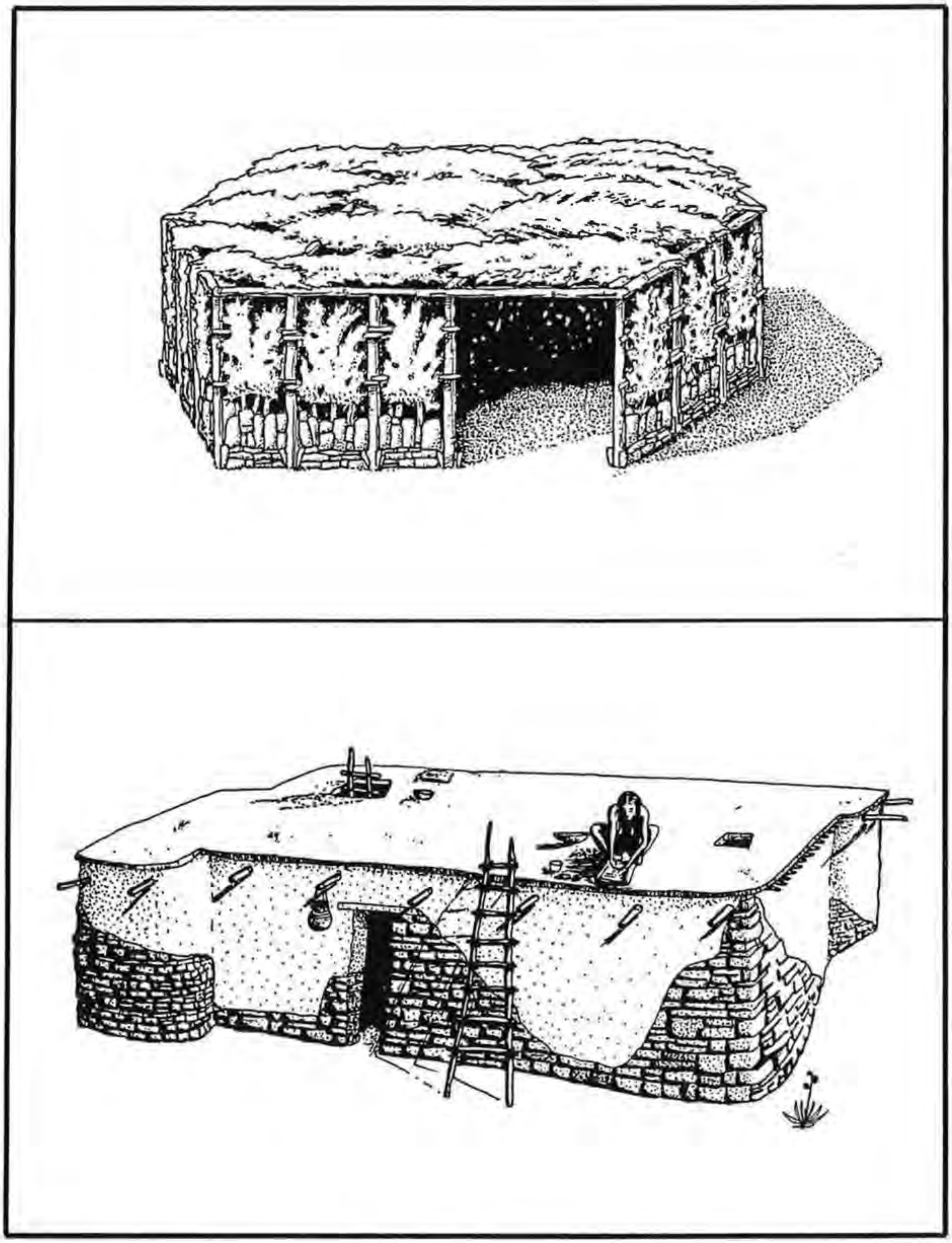


Figure 7-3. Artists' recreations of Apishapa phase architecture (top) and Sopris phase architecture (bottom). (Top drawing by Steven McMath, after Zier et al. 1988:Figure 40; bottom drawing by Bill Tate).

15). Horizontally coursed rock walls and rectilinear rooms are known at Apishapa phase settlements, particularly at the Snake Blakeslee site (Campbell 1969a:224, 237; Gunnerson 1989:69; Ireland 1968:89-90). Alternatively, some Sopris phase pit structures apparently display the circular design more typical of Apishapa phase sites (Wood and Bair 1980:Figures 15, 17, 19). In summary, the variability associated with Apishapa and Sopris sites is profound given the relatively scant and often poorly recorded excavation information associated with each. Additional, rigorous, block excavation of Sopris and Apishapa phase architectural sites is crucial for understanding this complex and important facet of settlement during theDiversification period.

Apishapa Phase

Introduction

Sites have traditionally been recognized as Apishapa phase in affiliation on the basis of unique and sometimes massive stone masonry architecture, often clustering in numbers suggestive of settlements or hamlets. Although data from larger architectural sites and rockshelters were the foundation for Withers' (1954) definition of the manifestation, Eighmy (1984:134) asserts that "since 1954, the concept of an Apishapa Focus or Phase has been consistently used and extended to include nearly all the material mentioned for Middle Ceramic Period in Southeast Colorado." Artifacts as well as faunal and botanical remains have been cited in suggesting that this phase was essentially a less sedentary form of the Plains Village pattern, a series of horticultural settlements common on the eastern Plains from North Dakota to Oklahoma and Texas (Lintz and Anderson 1989; Kalasz 1988). The Apishapa phase would thus constitute the extreme western extent of Plains Village settlement and, as such, demonstrate a greater preference for hunting and gathering than is described for cultures farther east. Perhaps for related reasons, Apishapa phase populations have been perceived as less fully integrated into the typical Plains Village pattern than, for example, the more sedentary populations of the Texas and Oklahoma panhandles (Lintz 1989).

Withers' (1954) original conception of the Apishapa focus was undoubtedly inspired by the "Indian stone enclosures" reported by Renaud in the 1930s and 1940s, and subsequent excavations of such architecture by Chase (Chase 1949; Lintz 1999; Renaud 1942a). These substantial ruins, including the Snake Blakeslee, Juan Baca, and Cramer sites, are located along the Apishapa River, a southern tributary of the Arkansas. Early investigators recognized similarities between the Colorado Apishapa settlements and southern Plains Village sites located along the Canadian River in the Texas panhandle (Campbell 1969a; Chase 1949, 1952; Lintz 1999; Withers 1954). Specifically, it was the Antelope Creek focus of the Panhandle aspect that elicited the most cause for comparison. For a time, the Apishapa focus was subsumed within the Panhandle aspect, and a phylogenetic relationship with the Antelope Creek focus was proposed that involved significant population movements between the two (Campbell 1969a). More recently, Lintz (1978, 1984, 1989) has questioned the application of such a taxonomy. In its place, Lintz (1984, 1986) defined the Upper Canark Regional Variant to dispel the ambiguities surrounding the Panhandle aspect and to clarify the relationships between the Antelope Creek and Apishapa phases (see Chapter 4, this volume). Most importantly, the Upper Canark Regional Variant emphasized local, in situ phase development characterized by distinct geographical boundaries and "relative internal homogeneity in technologies, subsistence patterns, and settlement patterns" (Zier et al. 1988:267).

Past and present perceptions of the Apishapa phase often remain tied to the larger architectural sites and rockshelters (Baugh 1994:277-278; Eighmy 1984:116-121; Gunnerson 1989; Lintz 1989:281; Rhodes 1984; Zier et al. 1988:24). In southeastern Colorado, Gunnerson (1989) separates the more substantial and purportedly later settlements of the Apishapa phase (e.g., Snake Blakeslee and Cramer sites) into the "Classic Apishapa" taxon. However, such a label may be construed as a lingering remnant of the "type site" concept, an abstraction whose time has largely passed. Rather than archetypes, such sites are merely part of a rapidly growing body of evidence epitomizing the magnitude of Apishapa phase variability. Variation among these later plains-inspired architectural sites is seen as symptomatic of intricate and probably fluctuating adaptive processes during the Diversification period. Since the original single-paragraph definition of the Apishapa focus was published (Withers 1954), a vast bank of literature has been produced that elucidates the scope of prehistoric hunter-gatherer settlement-subsistence strategies. Research along these lines is particularly appropriate for contemporary inquiry of the Apishapa phase and suggests that a range of nonarchitectural as well as architectural sites must be included in the taxon (Bettinger 1991; Binford 1980, 1990; Campbell 1969a; Kelly 1995; Lintz 1989:281). Lintz (1989:271), citing Campbell (1969a:20, 393), notes that the three basic kinds of Apishapa sites consist of nonarchitectural surface encampments, rockshelters, and stone enclosures. Recent radiometric and artifactual data also indicate that it is reasonable to assume that a variety of ancillary sites support the larger settlements and provide at least the foundation for a broader meaning of the Apishapa phase. Difficulties arise in positing more profound interrelationships among Apishapa phase site types because archaeologists currently lack the comprehensive view that only rigorous excavation of diverse components can provide. The following information is sufficient only for deciphering the known breadth of Apishapa phase variability and exposing at least a few threads of affinity among the manifestation as a whole. Present deficiencies aside, future research emphasis should be placed on examining the Apishapa phase as a chronologically mutable, yet coherent, network of settlement loci rather than static, isolated horticultural settlements.

Chronology

Lintz's (1989:280) statement remains fitting concerning the Apishapa phase temporal span: "Chronological information about the Apishapa phase is hindered by the delineation of cultural attributes encompassing the phase and, until recently, by relatively few absolute dates." An attempt is made here to define more firmly the temporal range of the Apishapa phase by interpreting radiocarbon dates associated with the proposed hallmarks of the manifestation, i.e., architecture indicative of increased levels of sedentism and population aggregation, cord-marked ceramics, and/or small side-notched points. Selecting components that exhibit all or portions of these attributes requires a subjective level of assessment. Gunnerson (1989:12) proposed that the Apishapa phase should be narrowly defined until archaeologists understand more fully the attributes of the preceding Developmental period. He further asserted that sites assigned to the Apishapa phase should include only those with substantial artifact inventories. The term "substantial" may describe a wide range of assemblages, but it is assumed that Gunnerson's focus was on the larger architectural settlements. However, in recent years a wide range of site types with decidedly Apishapa phase qualities has been investigated that may, as discussed above, facilitate a broader definition of the phase. To achieve the desired goal of examining the Apishapa phase as a coherent network rather than as isolated horticultural settlements, a multiple-stage date selection process is presented. Initially, only the most obvious Apishapa phase components with associated absolute dates are selected. Additional radiocarbon-dated components that have some, but not all, of the typical Apishapa phase characteristics are subsequently added. The latter may represent temporary resource extraction loci and/or sites that received limited investigation. To attain some level of consistency in the sample, only radiocarbon dates believed by the respective investigators to be valid indicators of Apishapa phase occupation are utilized; dates thought to represent contaminated or old wood/heartwood samples are excluded. All of the selected radiocarbon dates are processed through a common calibration program, CALIB 3.03.3 (Stuiver and Riemer 1993).

A number of radiocarbon assays have been obtained recently from the large, open architectural sites for which the Apishapa phase is best known. Such information was not available to the author of the previous research context, who relied primarily on dates from rockshelters on the Chaquaqua Plateau and small architectural sites in the Carrizo Creek area for chronological control (Eighmy 1984:116-119). Calibrated radiocarbon ages from prominent architectural sites associated with abundant artifacts, including ceramics and side-notched Reed/Washita projectile points, are presented in Part A of Table 7-7. These dated components are from the Avery Ranch site, Mary's Fort, and Ocean Vista at Fort Carson (Zier et al. 1988; Zier and Kalasz 1985; Kalasz et al. 1993); Cramer site along the Apishapa River (Gunnerson 1989); site 5LA5554 at the PCMS (Andrefsky et al. 1990); and Steamboat Island Fort on the Chaquaqua Plateau (Campbell 1969a). Multiple radiocarbon ages were obtained from the Fort Carson and Apishapa River sites; earlier ages are excluded from the table because they are thought to represent old wood/heartwood problems or a distinct earlier component. Conversely, only one age each is associated with the PCMS and Chaquaqua Plateau examples.

Single calibrated radiocarbon ages from large, open, aggregated-room architectural sites that have received limited investigations are listed in Part B of Table 7-7; sparse artifact collections that do not include ceramics and/or side-notched projectile points are associated with these components. The Sorenson and Point sites are located in peninsular, "defensive" canyon settings along the lower Purgatoire River (Loendorf et al. 1996); three aggregated-room structures each encompassing between three and 25 rooms were identified at the Sorenson site and a minimum of seven rooms was recorded at the Point site (Loendorf et al. 1996:300-302). Darien's Fort is situated along the upper Dry Cimarron River drainage basin of northeastern New Mexico in a similar defensive setting; the site exhibits long barrier walls and a minimum of six discernible rooms (Winter 1988:36, Figure 4.5).

Part C of Table 7-7 lists calibrated radiocarbon ages from sites that may represent specialized types within the Apishapa phase settlement pattern. This sample is comprised of rockshelters and open architectural sites less substantial than those listed in parts A and B of Table 7-7. Though the artifact assemblages are generally smaller than those of the more prominent Apishapa phase sites, all of these sites are associated with side-notched Reed/Washita points and most have cord-marked ceramics. The Windy Ridge site and Woodbine Shelter are open-setting and rockshelter sites, respectively, at Fort Carson (Kalasz et al. 1993). Woodbine Shelter has a single structure within the dripline; Windy Ridge is nonarchitectural, but several hearths are present. Both are associated with side-notched Reed/Washita points and cord-marked ceramics. A number of stone enclosure and rockshelter components in the Carrizo Ranches area are appropriate for this analysis; summaries of these sites may be found in two volumes by Nowak and Kantner (1990, 1991). Radiocarbon-dated, open stone enclosures with associated side-notched Reed/Washita projectile points were excavated at 5LA2169, 5LA1725, and 5LA1722. Cord-marked ceramics were found only at 5LA1722, and the few pieces were not directly associated with the dated enclosure. Both ceramics and side-notched Reed points were recovered from radiocarbon-dated rockshelter contexts at 5BA24 and Carrizo Rock shelter. A radiocarbon date from maize in Level 1B at Medina Rock shelter on the Chaquaqua Plateau was presented in the previous research context (Eighmy 1984:116). Although the date is an important indicator of general Diversification period occupation in the region, associations with Apishapa phase materials are minimal. No ceramics were recovered and the single, side-notched Washita projectile point was collected from the level above that producing the age assessment (Campbell 1969a:133, 145). Similarly, the radiocarbon dates recovered from Pyeatt Rock shelter on the Chaquaqua Plateau and Gimme Shelter at the PCMS were not associated with either ceramics or small side-notched points (Andrefsky et al. 1990; Campbell 1969a). In fact, 14 small, corner-notched Scallorn points, a hallmark of the preceding Developmental period, were associated with the Pyeatt Rock shelter date (Campbell 1969a:Table 10). These dates are therefore excluded from

Table 7-7. However, radiocarbon dates strongly associated with Reed/Washita points are available from the nearby Upper Plum Canyon Rock shelter I and Umbart Cave (Campbell 1969a; Rhodes 1984). Cord-marked ceramics were also found at Umbart Cave. Finally, a Reed/Washita point was recovered in proximity to a radiocarbon-dated hearth at the Sue site on the PCMS (Andrefsky et al. 1990).

Table 7-7. Radiocarbon Dates from Apishapa Phase Sites.

SiteName/ Number	Raw Radiocarbon Age (B.P.)	Calibrated Age		Two-sigma Calibrated Age Ranges from Probability Distributions (Method A)	
		A.D./B.C.	B.P.	A.D./B.C.	B.P.
Part A					
Ocean Vista	940 ± 70	A.D. 1046, 1097, 1115, 1144, 1153	904, 853, 835, 806, 797	A.D. 983-1256	967-694
Ocean Vista	890 ± 50	A.D. 1168	782	A.D. 1025-1276	925-674
Avery Ranch	790 ± 70	A.D. 1263	687	A.D. 1051-1373	899-577
Steamboat Island Fort	775 ± 85	A.D. 1276	674	A.D. 1043-1394	907-556
Avery Ranch	740 ± 60	A.D. 1284	666	A.D. 1213-1391	737-559
Avery Ranch	730 ± 90	A.D. 1286	664	A.D. 1162-1408	788-542
Avery Ranch	680 ± 70	A.D. 1298	652	A.D. 1229-1411	721-539
Avery Ranch	670 ± 80	A.D. 1300	650	A.D. 1225-1427	725-523
Cramer	660 ± 60	A.D. 1302	648	A.D. 1269-1411	681-539
Avery Ranch	640 ± 100	A.D. 1307, 1360, 1379	643, 590, 571	A.D. 1221-1446	729-504
5LA5554	570 ± 60	A.D. 1403	547	A.D. 1295-1444	655-506
Mary's Fort	560 ± 70	A.D. 1405	545	A.D. 1292-1455	658-495
Cramer	540 ± 90	A.D. 1410	540	A.D. 1288-1616	662-334
Part B					
Point	1030 ± 90	A.D. 1014	936	A.D. 820-1218	1130-732
Darien's Fort	1010 ± 70	A.D. 1020	930	A.D. 890-1203	1060-747
Sorenson	930 ± 50	A.D. 1052, 1085, 1121, 1139, 1156	898, 865, 829, 811, 794	A.D. 1013-1226	937-724

SiteName/ Number	Raw Radiocarbon Age (B.P.)	Calibrated Age		Two-sigma Calibrated Age Ranges from Probability Distributions (Method A)	
		A.D./B.C.	B.P.	A.D./B.C.	B.P.
Part C					
Windy Ridge	1080 ± 70	A.D. 984	966	A.D. 789-1153	1161-797
Upper Plum Canyon I	1050 ± 80	A.D. 1005	945	A.D. 819-1168	1131-782
5LA2169	960 ± 60	A.D. 1037	913	A.D. 983-1222	967-728
Woodbine Shelter	880 ± 60	A.D. 1176	774	A.D. 1022-1281	928-669
5LA1722	850 ± 50	A.D. 1218	732	A.D. 1041-1283	909-667
Windy Ridge	840 ± 70	A.D. 1222	728	A.D. 1028-1293	922-657
Sue	720 ± 70	A.D. 1288	662	A.D. 1213-1401	737-549
5LA2169	695 ± 90	A.D. 1294	656	A.D. 1182-1424	768-526
5LA1725	630 ± 50	A.D. 1310, 1353, 1385	640, 597, 565	A.D. 1285-1417	665-533
Carrizo Rock shelter	600 ± 55	A.D. 1328, 1333, 1395	622, 617, 555	A.D. 1290-1434	660-516
5BA24	600 ± 150	A.D. 1328, 1333, 1395	622, 617, 555	A.D. 1165-1641	785-309
Umbart Cave	590 ± 110	A.D. 1398	552	A.D. 1239-1611	711-339
Upper Plum Canyon I	570 ± 50	A.D. 1403	547	A.D. 1300-1439	650-511

The data presented in Table 7-7 indicate considerable temporal overlap among the three groups of assays. Viewing the earliest two-sigma extremes among dates from different regions, e.g., Darien's Fort, Point, and Ocean Vista, these data suggest that the aggregated room phenomenon typically associated with the Apishapa phase was widespread by roughly A.D. 900-1000. Considerably more radiocarbon data show that larger architectural sites with substantial and diverse assemblages, e.g., Cramer, Avery Ranch, Mary's Fort, and Steamboat Island Fort, were established later, ca. A.D. 1150-1250. The two-sigma extremes of the latest age assessments suggest that the aggregated room settlements extended to ca. A.D. 1500. Given the limited amount of absolute age data and the vagaries of the radiocarbon method, the temporal range of A.D. 1050-1450 currently seems reasonable for the Apishapa phase. The smaller, possibly more specialized sites have age assessments distributed throughout the temporal range of the Apishapa phase. Woodbine Shelter, Windy Ridge, and Ocean Vista, three neighboring Fort Carson sites, have age assessments that closely approximate one another. These data suggest that functionally different sites were included within a common Apishapa phase settlement pattern. Furthermore, three age assessments that nearly match are associated with large architectural sites extending from the northernmost extent of Apishapa phase settlement (Mary's Fort), through the area south of the Arkansas River (Cramer), to the Purgatoire River region (5LA5554). There is thus at least the suggestion of a contemporaneous network of large residential bases distributed over a wide area.

Population Dynamics

Interregional Contacts. Similarities in settlement-subsistence strategy and artifact classes, particularly ceramics, suggest a connection between Apishapa and Plains Village populations east of the context area (Zier et al. 1988:267). Campbell (1969a:500-510) proposed that a widespread thirteenth century drought drove Apishapa phase populations southeast to found villages of the Antelope Creek phase. Lintz (1978), however, convincingly refuted the Apishapa-to-Antelope Creek developmental sequence. The author demonstrated through analysis of architecture and available radiocarbon dates that the two phases were more or less contemporaneous and highly dissimilar with regard to house construction. The respective Apishapa and Antelope Creek populations are therefore believed to have had unique local origins and developmental sequences. The Apishapa phase developed in situ from a long-lived indigenous hunter-gatherer population that gradually–probably over the span of several centuries–adopted an increasingly sedentary lifestyle.

The view of Apishapa phase isolation advanced by Lintz (1989:284-286) is not entirely supported by currently available data. As is discussed below, ceramics that are unquestionably trade wares are reported at several Apishapa phase sites. Further, there is considerable variability among cord-marked ceramics, and in most cases it is not known which are locally manufactured and which are exotic. Collared rims reminiscent of Upper Republican forms, for example, were recovered from both the Cramer and Avery Ranch sites (Gunnerson 1989:40; Kalasz et al. 1993:102-103). Shell ornamentation is a common occurrence among Apishapa phase sites, but these materials are generally recovered in low numbers, and species identification is spotty due to their often fragmentary condition (Campbell 1969a:89; Ireland 1968; Nowak and Kantner 1991:157; Rhodes 1984). Freshwater mussels are most often recovered but *Olivella* shell traded from the gulf regions is reported from the Chaquaqua Plateau, Kenton Caves in the Oklahoma panhandle, and the Beacon Hill Burial near Pueblo (Campbell 1969a:89; Black et al. 1991; Simpson 1976). Chipped stone of Alibates dolomite, presumably quarried in the Texas panhandle region, is reported in relatively low quantities on the Chaquaqua Plateau and Carrizo Creek areas, at the PCMS, and along the Apishapa River (Andrefsky 1990; Campbell 1969a; Gunnerson 1989; Nowak and Kantner 1990, 1991; Rhodes 1984). Obsidian is consistently reported in low quantities but only minimal sourcing of context area samples has been undertaken. A single flake from site 5LA3570 was sourced to Polvadera Peak in the Jemez Mountains of northern New Mexico (Charles et al. 1996:7.31); a hydration date of A.D. 1281 ± 49 was obtained for the sample. This meager information tends to support previous speculation that obsidian was traded from northern New Mexico sources (Campbell 1969a; Zier and Kalasz 1985; Zier et al. 1988).

Although Apishapa phase architecture is extremely variable and such features have only rarely been fully excavated, a few specific examples exhibit Plains Village attributes (see Architecture discussion, below). Most notable are the bison bone shim used for a post support at the Avery Ranch site and the four roof posts forming a square around a central hearth within Room A at the Cramer site (Gunnerson 1989; Zier et al. 1988). Traits such as side-notched points and grit-tempered, cord-marked pottery are well documented indicators of Apishapa-Plains Village interaction. Further, some of the more formalized bone tools, particularly the so-called spatulate tools from the Avery Ranch and Cramer sites, have a decidedly Plains Village quality (Zier et al. 1988:261; Gunnerson 1989).

In sum, current data largely support Lintz' assessment of the Apishapa phase as relatively isolated from Plains Village and Southwestern Pueblo influence. However, certain types of counter evidence, although sparse, appear with sufficient regularity that one cannot entirely dismiss the notion of significant interregional interaction. Furthermore, the scarcity of such evidence may simply reflect the dispersed, semisedentary nature of Apishapa phase settlement. Simply put, it was probably much easier to accumulate trade goods at centralized residential locations occupied year-round than at the seasonal Apishapa phase habitations.

Population Aggregation and Community Organization. Apishapa phase architectural sites, or "villages," have been cited as evidence of a widespread population increase during the Diversification period (Campbell 1969a). However, greater population aggregation at specific sites rather than higher overall numbers may be a reasonable explanation for this phenomenon. Alternatively, increased site visibility due to substantial above-ground architecture is a possible factor in the apparent ubiquity of Apishapa phase components.

Furthermore, the proposition that Apishapa phase architectural sites represent true villages defined by multiple households forming a community social structure is open to question. On the one hand, Campbell (1969a:398) notes that "villages are large enough to contain units of lineage or band size, and because of the clustering of enclosure sites at particular locales there is a hint of intervillage cooperation that may have given rise to tribal units." The purportedly increased populations associated with Apishapa phase villages were believed to be the result of greater reliance on cultivated plants, e.g., maize (Campbell 1969a:398). Indeed, the potential for a level of sedentism approaching that of the Plains Village horticultural settlements was inferred: "It is possible that the larger villages may have been occupied year-round by some inhabitants, but it is unlikely that villages were occupied continuously for more than a few generations" (Campbell 1969a:393). Alternatively, Lintz (1989:284-285) argued that there was little evidence to support such claims: "The clustering of enclosure sites which has been thought to underlie village cooperation assumes site contemporaneity which has not been demonstrated, and the cultigens are believed to have contributed a minimal, albeit important, supplement to a foraging diet .... In contrast, the absence of grave goods, the random arrangement of structures at sites, the lack of apparent specialized structures, suggests that the Apishapa had little to no apparent status differentiation and little overall community organization..."

Further resolution of this matter, as is often the case with Apishapa phase research, must await additional large-scale excavation of architectural sites. Although Lintz's arguments remain valid, past and more recent data may be used to support partially Campbell's assertions of higher levels of social organization. The vagaries of radiocarbon dating, including the heartwood/old wood factors, restrict more precise temporal delineations of occupation. However, the plethora of overlapping radiocarbon dates associated with Apishapa phase architectural sites clustering along Turkey Creek at Fort Carson is highly suggestive of contemporaneity (see Appendix A, this volume; Kalasz et al. 1993; Zier and Kalasz 1985; Zier et al. 1988). Further support of architectural site contemporaneity is provided by cross-dating Cramer site absolute dates with Southwestern ceramics recovered from Snake Blakeslee (Gunnerson 1989). Both are part of a series of sites located along the Apishapa River south of its confluence with the Arkansas River. Overall, the number of radiocarbon assays from Apishapa phase sites in the context area is rapidly approaching the 92 figure that Lintz (1989) cites as evidence of Antelope Creek phase village contemporaneity. More rigorous examination of structure and room contemporaneity probably requires dendrochronological data that are currently not available.

The manner in which grave goods, status differentiation, and social organization are interrelated among Apishapa phase occupations remains problematic. Black (1997:32) notes that "...the use of mortuary data in the study of social ranking is fraught with difficulties (e.g., Trinkaus 1995:54-55)." Mortuary chambers have not, as yet, been discovered among Apishapa phase sites, and graves that are unquestionably associated are lacking. However, human interments dating to the preceding Developmental period are well known along the Front Range and many are associated with grave goods (Black et al. 1991; Black 1997; Buckles et al. 1963; Jepson and Hand 1999). There is thus a well-established tradition in the region of human interments with grave goods, and this tradition likely continued into the Apishapa phase. Furthermore, a burial with shell disk beads was situated in proximity to a possibly Apishapa phase structure at 5HF1171 near Walsenburg (Black 1997:16). Finally, burials with grave goods are reported from the Kenton Caves, but cultural assignment of these materials remains tenuous (Lintz and Zabawa 1984).

The "random arrangement of structures at sites, and the lack of apparent specialized structures" is cited by Lintz (1989:284-285) as additional evidence of the lack of village-level social organization among Apishapa phase populations. It seems apparent strictly on the basis of the massive walls associated with the Snake Blakeslee and Cramer sites that some degree of communal social organization was necessary for their construction (Gunnerson 1989:Figures 3 and 15). Gunnerson (1989:130) suggests that the Cramer structures represent a contemporaneous architectural complex. The overall regularity of the wall construction, the number of rooms sharing walls, and rooms connected by "fences or alleys" tend to support Gunnerson's hypothesis. Recent investigations at Avery Ranch emphasized the spatial distribution of cultural debris and features for discerning a possible relationship between site plan and social organization (Zier et al. 1988:265). Data provided by earlier DU excavations were incorporated with the later excavations in an attempt to gain a more complete understanding of overall site structure. The following interpretation is weakened, however, by the assumption of room contemporaneity established by radiocarbon rather dendrochronological data. Figure 7-4 is a plan view of the Avery Ranch site features discussed in the narrative presented herein:

> The Avery Ranch site displays a symmetry of architectural unit layout and activity area location that may be more than accidental. This symmetry is striking if one accepts the interpretation of Structure 1 as a communal, walled multifunctional activity area and Structure 2 and DU Features 1-2 as residential units. A midline bisecting the site into northern and southern halves may be drawn eastward from the projection of the Turkey Canyon rim, through Structure 1 and the DU Features 3-4-5 activity area. Activity loci along this axis are functionally diverse and almost certainly communal. Architectural data suggest that an entryway in the Structure 1 wall opened eastward along the axis. To the north of the midline and lying along the southwest/northeast-trending canyon rim is one residential unit, Structure 2, with a south wall entryway facing inward toward the central site area. To the opposite (south) side and located along the northwest/southeast-trending segment of rim a similar distance from the midline is the second residential locality, DU Features 1-2. Whether this architectural unit featured an inward-facing north entryway is unknown. The geographical site center is approximated by the location of the major bison processing area, DU Features 3-4-5. Smaller activity areas represented by hearths of various sizes and configurations are scattered around the eastern edge of the site, to the east of architectural and major activity zones. This layout suggests strongly the presence of two nuclear or extended family units, spatially segregated for residential purposes but sharing two work areas. One area is tied directly to animal processing, while the second is generalized and multifunctional. The latter area, Structure 1, may be regarded as the focus of communal activities at the site. The possibility that family groups not residing at the Avery Ranch site also participated in bison killing and butchering must also be acknowledged, considering the massive quantities of faunal remains at the site [Zier et al. 1988:265].

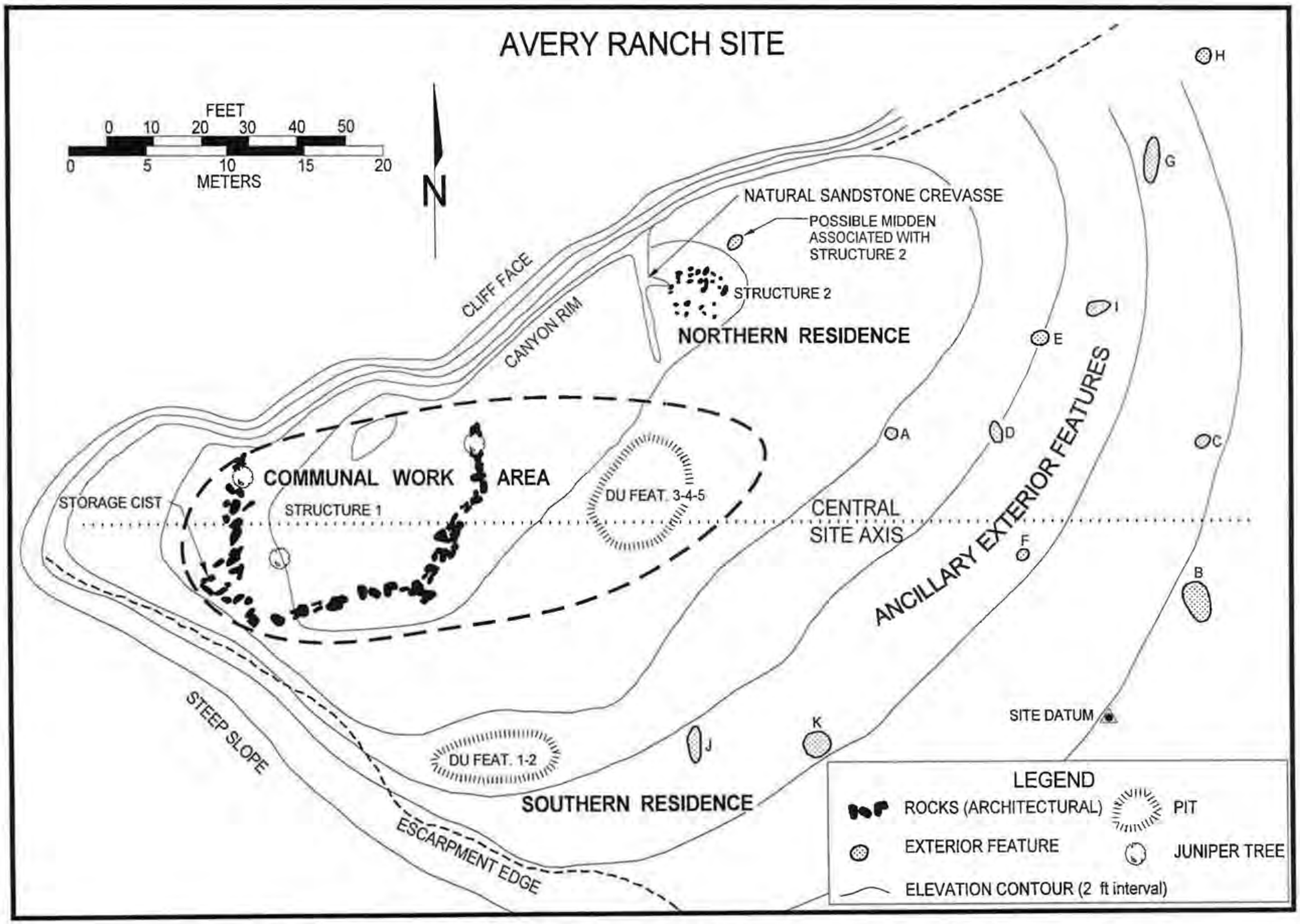


Figure 7-4. Plan view of Avery Ranch site showing relative locations of residential and communal areas (modified from Zier et al. 1988:Figure 10).

The latter statement is supported somewhat by the proximity of other Apishapa phase architectural sites along Turkey Creek, specifically Mary's Fort and Ocean Vista, which have radiocarbon ages similar to those of the Avery Ranch site. Mary's Fort is located within a mile Avery Ranch to the south, and Ocean Vista within a mile to the north (Kalasz et al. 1993; Zier and Kalasz 1985; Zier et al. 1988).

Further tentative evidence of the nonrandom arrangement of architectural sites is provided in the recent survey of Picket Wire Canyonlands (Reed and Horn 1995:106-110). Although those authors acknowledge that site contemporaneity cannot be confirmed with survey data, the regular and predictable patterning of "complex" and "simple" habitation sites along the Purgatoire River is believed to be due to social factors as expressed by central place theory (Flannery 1976, cited in Reed and Horn 1995:106-107). "We can conclude that, in general, the expected linear settlement pattern occurs along the Purgatoire River, and that central place principles hold true with regard to Complex Habitation Sites" (Reed and Horn 1995:110). However, the investigators also found that the distribution of artifacts and features within architectural sites exhibited little or no evidence of spatial patterning. These data "may indicate either liberal cultural norms regarding the distribution of major site activities or may be due to methods of analysis" (Reed and Horn 1995:110).

In sum, the arguments of Lintz and Campbell concerning the Apishapa phase "village" concept and social organization have their merits and drawbacks. The term "village" is not an appropriate descriptor of Apishapa architectural sites if it is meant to connote sedentary horticultural communities. However, the evidence presented above suggests that Apishapa phase settlement was characterized by considerable social organization despite a semisedentary lifestyle.

Abandonment. Warfare, drought, and concomitant food stress have all been offered as possible factors in the dispersal of Apishapa phase populations that evidently began in the A.D. fourteenth century (Campbell 1969a:491; Lintz 1989). Interdisciplinary studies indicate that the so-called Great Drought of the late thirteenth century Southwest also affected the Southern Plains (Hall 1982; Lintz 1984; Schuldenrein 1985). Schuldenrein (1985:226) asserts that, "the inescapable conclusion is that the middle to late Holocene alluvial events at the Fort Carson - Pinon Canyon Maneuver Site bear closer affinity to developments in the arid Southwest and Southern Plains than they do to Western or Central Plains." The implication of such conditions for Apishapa populations is presumed to be significant in light of the demographic upheaval posited for roughly contemporaneous Southwestern groups. Based upon studies of prehistoric Puebloans, Zier et al. (1988) suggest that populations tend to aggregate in times of stress. The level of aggregation seen among the more substantial architectural sites may reflect increased competition for fewer resources during drought-related adversity of the late Diversification period. "As sedentism develops, pressure on specific resource-rich areas grows. Environmental deterioration may critically reduce the carrying capacity of those areas, triggering drastic demographic response. The hypothetical trend toward greater population integration suggests that larger sites and site complexes date to the latter portion of the Middle Ceramic (Apishapa) period, a notion that is largely untested through chronometric dating on an area-wide basis" (Zier et al. 1988:269). Lintz (1989:285-286) suggests that the relative isolation of Apishapa phase groups and their failure to develop external trade and/or alliance networks led in part to their collapse. Goods obtained through such alliances may have "expanded their resource capabilities" and buffered the worst effects of local drought conditions and Athapaskan incursion (Lintz 1986:19-20).

The so-called defensive nature of many Apishapa phase settlement locations may reflect the presence of warring factions in the context area. However, the relationships among warfare, drought, and the fourteenth century population dispersal are currently unresolved. Further, there is little or no evidence to indicate if the purported strife was strictly intraregional, or if it reflects the incursion of external groups such as northern Athapaskans. Winter (1988:77) believes the pervasiveness of historic and protohistoric warfare in the Dry Cimarron River valley has its antecedent among prehistoric populations, specifically as reflected in the region's Apishapa "forts." Interestingly, Winter (1988) believes physiography to have played a major role in the persistence of this conflict. Access to the rich and diverse canyon resources is thought to constitute the primary reason for dispute. However, there is no artifactual or other data to support the notion that these settings were in fact defensive in nature; they would be effective in the event of short-term raids but would be less than ideal for long-term sieges. It is proposed here that at least some of these sites that appear defensive may have constituted either sacred precincts or elite residences.

Current perception of what became of Apishapa phase groups following their abandonment of the region lies largely in the realm of informed speculation. The Caddoan connection cited by Gunnerson (1989:13), as based on the research of Hughes (1974), is presently the most popular supposition. "Given the disruptive droughts in late prehistoric times, I suggest that the Arikara, Pawnee and Wichita tribes all received increments of the Apishapa people. In fact, the Pawnee have a tradition, collected before 1889, that their ancestors came from the southwest where they lived in stone houses (Grinnell 1961:224). Could these include the stone slab structures of the Apishapa?" (Gunnerson 1989:13). Schlesier (1994:356-359) suggests that the Apishapa, along with populations of the Antelope Creek phase and Buried City complex, were driven east by Lipan Apaches sometime shortly after A.D. 1300. The author proposes that their descendants were the Teya groups encountered by the Coronado expedition in 1541 (Schlesier 1994:357-358). The Teya were Caddoan buffalo hunters whose camps were located "around the northeastern edge of the Texas panhandle and below the North Canadian River in western Oklahoma" (Schlesier 1994:358). The hypotheses of Gunnerson and Schlesier have yet to be tested adequately with archaeological data.

Technology

Apishapa phase technological attributes in many respects compare favorably with those of sites of the Plains Village pattern to the east. Although Plains Village implements such as bison scapula hoes and alternately beveled knives are absent or relatively rare occurrences at Apishapa phase sites, other characteristic attributes such as the production of cord-marked ceramics, the use of a variety of patterned bone tools (e.g., spatulate tools and bone wrenches), and the manufacture of small, side-notched projectile points, are typical of both manifestations. Lintz (1984:51) suggests that Apishapa phase tool assemblages, particularly chipped stone, are more generalized than those of Plains Village settlements to the east. Antelope Creek assemblages are characterized by a greater percentage of highly patterned tools (e.g., the bison scapula hoe and diamond beveled knives) believed used for specialized functions (Lintz 1989:279). Zier et al. (1988:268) suggest that this dichotomy may underscore fundamental differences between hunter-gatherer and horticultural subsistence strategies. However, it is emphasized that, with few exceptions, the relationships between specific tool forms and adaptive strategies have not been examined to the extent that any overall behavioral trends can be assumed. Other than the propensity for bison scapula hoes, two-hand manos, and trough metates to be associated with horticultural occupations, ethnographic and archaeological data indicate that highly patterned tools do not necessarily equate with specialized tasks or increased sedentism (Parry and Kelly 1987; White and Thomas 1972).

Ceramic assemblages recovered from Apishapa phase sites range from remarkably uniform to highly variable. Hummer (1989:371) notes that ceramic diversity of the Diversification period in the PCMS "...may be due to the intermediate location of the study area between Southwest and Southern Plains and Central plains groups engaged in active trade relationships." Although trade ware quantities are minuscule in comparison with those of nearby Sopris phase components, their presence is becoming increasingly evident among Apishapa phase sites across the context area. Trade ware is known primarily from ancestral Puebloans, Plains Village manifestations, and possibly, the Sopris phase hamlets. Differentiation between locally and nonlocally manufactured pottery remains a problem, especially among the cord-marked pottery styles that are predominant at Apishapa phase sites. Cord-marked ceramics have been assessed as Borger or Stamper types based on subjectively determined similarities with southern Plains Village styles, particularly those of the Antelope Creek phase (Campbell 1969a:113-117; Eighmy 1984:116-117; Simpson 1976:155-156). Recent analysts have resisted the Borger or Stamper Cordmarked affiliation. For example, none of the PCMS, Fort Carson, Cramer, or Snake Blakeslee cord-marked ceramics are described as Borger or Stamper (Gunnerson 1989; Hummer 1989; Jepson et al. 1992; Kalasz et al. 1993; Van Ness et al. 1990; Zier and Kalasz 1985; Zier et al. 1988). Hummer (1989:330-331), citing Christopher Lintz (personal communication 1985), notes that PCMS Cordmarked Category 4 specimens exhibit Plains Village attributes but they do not resemble ceramics of the Antelope Creek phase: "...even though diagonal punctated rims and quartz temper are characteristic of Borger Cordmarked pottery, the paste texture and cordmarking patterns of Cordmarked Category 4 sherds are dissimilar." Instead, specimens of this category were believed to most closely resemble generalized Upper Republican wares without collared rims, particularly the Cambridge Tool-Impressed Lip Variety (Hummer 1989:330-331). The collared rims and surface treatment (polish) indicative of Upper Republican styles such as Frontier ware were also noted on cord-marked specimens from the Avery Ranch and Ocean Vista sites at Fort Carson (Kalasz et al. 1993:102-103; Watts 1971:88; Zier and Kalasz 1985:169). This pottery was thought to be a trade item.

Although Plains Village stylistic influences such as cord marking are prevalent, questions regarding local and nonlocal manufacture for the most part await petrographic and source element analysis (Hummer 1989). However, such analyses undertaken for ceramics of the Developmental period in the South Platte River Basin indicate that there is a well-established tradition of local manufacture of cord-marked pottery in the eastern plains and foothills of Colorado (Johnson and Parker 1992; Ellwood and Parker 1995). Given the demographic stability of the region prior to the Protohistoric period, it is reasonable to assume that this tradition continued in the Apishapa phase. Gunnerson (1989:71) has defined a local, cord-marked type, Munsell Gray, that is associated with a number of his "Classic Apishapa" sites. Comparison of Munsell Gray specimens with cord-marked categories from Fort Carson, Picket Wire Canyonlands, Carrizo Creek area, and the PCMS, have yet to be undertaken.

Puebloan ceramic types were recovered, albeit in low quantities, from Snake Blakeslee, Trinchera Cave, Wallace, Ocean Vista, Avery Ranch, Steamboat Island Fort, and Umbart Cave (Campbell 1969a; Gunnerson 1989; Ireland 1968:23; Kalasz et al. 1993; Simpson 1976; Zier et al. 1988). Black-on-white varieties identified as Rowe, Talpa, and Santa Fe were recovered from the Snake Blakeslee site (Gunnerson 1989; Ireland 1968:88). Curtis Schaafsma noted that all were local variations of a common theme that appeared in the Taos/Picuris, Pecos, Santa Fe, and Galisteo areas (among others) and may thus be easily confused with one another (Schaafsma 1989: Appendix III). A sherd identified as Santa Fe Black-on-white was also recovered from Trinchera Cave (Simpson 1976). Puebloan corrugated pottery was recovered from the Avery Ranch and Ocean Vista sites at Fort Carson (Ireland 1968; Kalasz et al. 1993:106-109), and at Umbart Cave and Steamboat Island Fort on the Chaquaqua Plateau (Campbell 1969a). An enigmatic, vertically indented sherd reminiscent of Southwestern corrugated utility wares of the Pueblo IV period was also recovered from the Avery Ranch site (Zier et al. 1988:187).

Cultural affiliations as well as attribute similarities among various categories of plain, incised, and polished wares associated with Apishapa phase components are difficult to ascertain. Although the difficulties may be ascribed in large part to small and fragmentary samples, some confusion is introduced when attributes emphasized for these particular ware determinations differ according to analyst. For example, similarities among a number of attributes have suggested that Plain Ware categories from Fort Carson sites, including Avery Ranch and Ocean Vista, represent unmarked portions of cord-roughened vessels (Kalasz et al. 1993; Zier and Kalasz 1985:137; Zier et al. 1988:178). Alternatively, Plain Category 3 specimens from a later analysis in the same area are noted to resemble Polished Categories 2 and 3 from the PCMS (Hummer 1989; Sanders 1990; Van Ness et al. 1990:270). PCMS Polished Category 2 in turn includes smoothed over corrugated sherds most similar to the Polished Ware, Polished Blind-corrugated, and Polished Indented Blind-corrugated varieties recovered from Sopris phase occupations on the Park Plateau (Hummer 1989:340; Wood and Bair 1980:184-185). Reanalysis of the PCMS ceramic collection found that three previously unclassifiable sherds from the Apishapa phase architectural site 5LA5554 were also assignable to Polished Category 2 (Andrefsky et al. 1990:976-977; Sanders 1990:XI-32). Additionally, Polished Category 2 specimens are reported from Carrizo Creek sites such as Carrizo Rock shelter (Nowak and Kantner 1991:135). Incised Category 2 sherds from the Avery Ranch site were believed to be similar to the Polished Ware identified at Sopris phase sites but "paste texture, temper, and color characteristics ... are also within the ranges of those traits for Cord-marked Category 1, suggesting that the Incised Category 2 vessel was locally made" (Zier et al. 1988:185). However, the same analysis of Avery Ranch ceramics also included two categories of Polished Ware that were believed to represent a mixture of locally and nonlocally produced specimens (Zier et al. 1988:179-182). Polished, plain, and incised wares of the context area present a confusing yet intriguing classificatory problem that is potentially crucial for further elucidation of Apishapa, Sopris, and possibly Puebloan interaction. Past confusion could be alleviated by consistent application of attributes used in defining wares.

Apishapa phase lithic analyses vary greatly in orientation. This situation is not necessarily a drawback since the various analysts may have differing research goals. Together, the analyses suggest a number of recurring themes in Apishapa phase lithic technology. The following summary is somewhat biased in that it is derived from sites evidencing the most intensive occupation. This level of activity is associated with rockshelters such as Upper Plum Canyon Rock shelter I, Medina Rock shelter, 5BA24, and Carrizo Rock shelter, and larger architectural sites such as Avery Ranch, Ocean Vista, Cramer, and 5LA5554 (Andrefsky et al. 1990; Campbell 1969a; Gunnerson 1989; Ireland 1968; Kalasz et al. 1993; Nowak and Kantner 1991; Rhodes 1984; Watts 1971; Simpson 1976; Zier et al. 1988). Specialized lithic activities such as quarrying or procurement are poorly known for the Apishapa phase (Nowak and Kantner 1990:46-55). Studies of the larger samples associated with residential bases are therefore suitable only for limited interpretation of Apishapa phase lithic assemblages. These data indicate the predominance of a range of bifacial forms, expedient flake tools, slab metates, and cobble manos. Material types associated with Apishapa collections are extremely variable; this situation is believed to represent the procurement of stone from a variety of local sources as well as lower quantities acquired through trade (e.g., Alibates dolomite and obsidian). Cores (as in flaked cobbles and nodules) are generally reported in relatively low numbers and reflect unstandardized or random flake removal. Manuports are rare or absent, as are massive stone tools such as formalized choppers and/or grooved mauls. However, larger bifaces are sometimes noted as serving a chopper function, and cores or core tools, although few in number, often exhibit use wear. Similarly, many of the unifacial flake tools or scrapers reported are of sufficient heft to have been employed for heavy-duty tasks.

Chipped stone generally arrived at residences in a considerably reduced state or was exhaustively reduced by the time the occupants left the site. Debitage analysis further indicates an emphasis on late-stage tool manufacture and refurbishment. It is therefore currently assumed that initial stages of reduction occurred primarily at other site types such as quarries or the myriad sites in the context area recorded as "lithic scatters" (for specific examples see Jepson et al. 1992:244-

246; Nowak and Kantner 1990:46-58, 1991:110-111; Van Ness et al. 1990:314-353; Zier et al. 1996a:202-238). Bifacial blanks or simply large flakes may have been an end product of the reduction strategies carried out at procurement sites, but this notion needs to be explored further. Recent study has promoted the utility of unfinished bifaces as highly portable cores readily available for further reduction into more finely crafted implements and/or detachment of flakes suitable for expedient tools (Kelly 1988). It is therefore notable that Apishapa phase biface collections typically include a significant number of early/middle-stage unstemmed specimens (Gunnerson 1989:Figure 32, 47; Kalasz et al. 1993:Figure 8; Rhodes 1984:Figure 63; Watts 1971:Figure 5; Zier et al. 1988:Figures 45-46). Besides serving as cores, it is obvious from the bone-handled specimen recovered at Upper Plum Canyon Rock shelter I that these less elaborately flaked bifaces representing earlier stages of reduction also served effectively as tools (Butler 1985; Rhodes 1984:208-212).

As discussed above, flake tools typically constitute a major portion of Apishapa lithic collections, and all but the more formally patterned examples (e.g., end scrapers) have often been overlooked analytically. Recent studies have shown that context-area flake tool collections exhibit considerable variability in size, thinning, retouch, and use wear. Such variability suggests that these tools could be used for a wide range of tasks (Andrefsky 1990:IX-192–207; Kalasz et al. 1993). Further, it is obvious from the following statement that there is a fine line drawn between modified flakes and tools identified as various forms of scrapers. As Gunnerson (1989:47) notes, "Moreover, it was not until the stone specimens were closely examined in the laboratory that we discovered how many scrapers there were." As with bifaces, variability should be viewed among the nonbifacial flake tool class as a whole prior to distinguishing and providing additional analysis for the more formal varieties.

A number of more formalized lithic tool forms have been recovered from Apishapa phase sites. Although small, corner-notched Scallorn points continue to appear at Apishapa phase sites in low numbers, the small, side-notched Reed/Washita form is ubiquitous and often present in considerable quantities. Reed/Washita points are currently known as the lithic artifact most diagnostic of the Apishapa phase. Large, stemmed bifaces believed to have functioned as knives, drills, and possibly scraping implements have also been reported (Kalasz et al. 1993; Rhodes 1984; Zier et al. 1988). Formal, stemmed drills commonly occur, notably flange-stemmed or T-shaped varieties, but they are generally reported in low numbers. Similarly, more formal scrapers, spokeshaves, burins, and gravers are typically sparse. Perhaps the less formally patterned flake tools and bone or shell implements may have sufficed for many common domestic tasks. Diamond-beveled knives and so-called "guitar pick" scrapers typical of Plains Village assemblages to the east are absent or rarely reported (Gunnerson 1989:44).

The pervasiveness of so-called one-hand manos and flat slab or shallow basin metates is well documented among Apishapa ground stone collections. In one instance slabs were thin enough to have been classed as "palettes" (Rhodes 1984). Ground stone is typically of sandstone but a variety of quartzitic and granitic stream cobbles was also used. The expediency of manufacture often described for context-area ground stone in general is fitting for the Apishapa phase. The description of Cramer site manos is particularly apt: "One gets the impression that pieces of rock of approximately the desired shape and size were selected, and that little or no effort was expended in shaping" (Gunnerson 1989:50). Bifacial manos and metates were common but not predominant; the former also sometimes evidence ground or "keeled" edges (Bender 1990; Kalasz et al. 1993). Other types of modification, including pecking, battering, and flaking, are often present but vary greatly according to individual specimen. Battered end facets are common attributes of manos and suggest that ground stone implements may have been used for flint knapping (perhaps splitting cobbles), hide-working, bone marrow extraction, metate rejuvenation, and/or seed preparation (Rhodes 1984; Zier et al. 1988). In addition to manos and metates, shaft abraders or smoothers very similar to the Antelope Creek phase example illustrated by Lintz (1989:Figure 3M) are also reported at some Apishapa sites (Gunnerson 1989; Rhodes 1984; Zier et al. 1988). Flat and basin bedrock grinding facets are well known at Apishapa phase sites in canyon settings. Stone pendants and slate gorgets are also possibly associated with the Apishapa phase (Andrefsky et al. 1990:Figure 20; Lintz and Zabawa 1984).

The Apishapa phase bone tool and ornament industry is best described by the large and diverse samples recovered from the Cramer, Snake Blakeslee, Upper Plum Canyon Rock shelter I, and Avery Ranch sites (Gunnerson 1989; Rhodes 1984; Watts 1971; Zier et al. 1988). These implements are sufficiently variable to have greatly supplemented the lithic industry, and indeed the two industries may have overlapped in terms of function, particularly with regard to tasks requiring perforation. Although the bison scapula hoes typical of Plains Village occupations have not been found at Apishapa phase sites, a number of other patterned bone tools and ornaments are associated. A great variety of tools is believed to have functioned as punches, awls, wrenches (also referred to as shaft straighteners), spatulas, hide grainers, scrapers, reamers, fleshers, polishers, flakers, paint spreaders, digging sticks, and knives. Also of note are the bone tool handles reported from Cramer, Snake Blakeslee, and Upper Plum Canyon Rock shelter I sites. A wide range of bone elements was used for tools, with large mammal ribs and long bones preferred. Bison bone was particularly evident among the Snake Blakeslee and Cramer site assemblages. Ornamental bone consists of disk and tube beads. For these items the bones of birds, small mammals (mainly leporids; metapodials and long bone elements), and medium mammals such as canids were preferred. The ends of the cut bone tubes are often ground and beveled, and exhibit considerable polish.

Other items believed to have been manufactured by Apishapa phase artisans include shell tools and ornaments (mostly of freshwater mussels), stone pipes and disk beads, juniper and plum seed beads, fire basins and drill bits, *Phragmites* "cigarettes," pigment stones, and a possible pendant fragment of turquoise from the Avery Ranch site; additional perishable items are known from a few unique rockshelters with possibly Apishapa phase affiliations (Campbell 1969a; Gunnerson 1989; Ireland 1968; Lintz and Zabawa 1984; Nowak and Kantner 1990, 1991; Rhodes 1984; Simpson 1976; Zier et al. 1988). A wealth of materials was recovered from Kenton Caves in the Oklahoma panhandle but cultural assignment of specific items is inhibited by the lack of excavation records and absolute dates. A summary of the Kenton Caves investigations, which occurred primarily in the 1920s and 1930s, is found in Lintz and Zabawa (1984). Those authors note that the later occupation of Kenton Caves may be affiliated with southeastern Colorado manifestations of the Diversification period. In particular, the proximity and similar environmental context of Campbell's Chaquaqua Plateau study area and the presence of cord-marked pottery and Reed/Washita points are suggestive of regional ties. It is also apparent that the Kenton Caves are of considerable antiquity and many of the perishable remains could be associated with pre-Apishapa occupation. Similarly, Trinchera Cave produced an abundant assemblage of perishable items but again, cultural assignment is restricted by disturbed, intermixed deposits and a lack of well-defined stratigraphic relationships and radiocarbon dated contexts (Simpson 1976). Alternatively, Upper Plum Canyon Rock shelter I, and to a lesser extent Medina Rock shelter, are characterized by more rigorously controlled excavations associated with radiocarbon dates (Campbell 1969a; Rhodes 1984). Because of better preservation, the rockshelters offer a more complete view of Apishapa phase material culture and economy (economic implications are addressed in a later section). Noteworthy perishable items include long bows, arrow shafts, basketry, woven grass or prairie dog skin bags, yucca and leather sandals, twined mats, cordage, knotted yucca, wooden needles, pegs, hairpins, rabbit fur blankets, and a feather bundle tied with yucca fiber. The skin and woven plant material bags were evidently used to carry or store maize and gourd seeds. Carrying straps were commonly incorporated into these items (Lintz and Zabawa 1984:169-170).

Settlement and Subsistence Strategies

Geographic Distribution of Sites. Evidence suggestive of widespread Apishapa phase occupation continues to accumulate. Lintz (1989:280) notes that the geographical distribution of Apishapa phase populations "seem to coincide with the mesa and canyon-land topography denoted by massive areal exposures of Cretaceous period Dakota sandstone and Graneros shales corresponding to the Raton Mesa portion of the Raton section of the Great Plains." The geographical limits of the Apishapa phase may be depicted tentatively by a line drawn from the northwestern corner of the Oklahoma Panhandle, through John Martin Reservoir to Fort Carson south of Colorado Springs; this boundary would then proceed south along the Rocky Mountain foothill region to the Cimarron River valley of northeastern New Mexico. Since publication of the previous research context (Eighmy 1984), a number of Apishapa phase components have been reported at or near the perceived northern and southern extent of the manifestation. Test excavations at Mary's Fort, Ocean Vista, Windy Ridge, Woodbine Shelter, and 5PE63, as well as the survey recording of large, surface, multiple-room sites such as Sullivan Butte and Susie's Place West, were completed at Fort Carson (Kalasz et al. 1993; Van Ness et al. 1990; Zier and Kalasz 1985). The information from these studies supplements earlier data from the Avery Ranch and Wallace sites indicating that high population levels during the Apishapa phase occurred well north of the Arkansas River but south of the Palmer Divide (Ireland 1968; Watts 1971; Zier et al. 1988). Along the perceived southern boundary, Winter (1988:76-77) reports "fortified" Apishapa phase villages and barrier walls in the Dry Cimarron River valley of northeastern New Mexico. Excavation of additional sites is necessary to elucidate the chronological and cultural relationships between sites in central/southern Colorado and northeastern New Mexico. However, the similarities currently seen suggest that Apishapa phase populations ranged for approximately 190 km (118 mi) along a broad north/south axis.

Additional Apishapa phase components in the core or south-central area are reported through survey, testing, and excavation. A number of multiple-structure architectural sites were recorded during recent surveys of the PCMS and Picket Wire Canyonlands (Andrefsky 1990; Kalasz 1988; Reed and Horn 1995). Important Apishapa phase data were recovered through a recent investigation of sites along the Apishapa River, particularly the excavations at the Cramer site and analysis of materials recovered from Snake Blakeslee (Gunnerson 1989). Also of interest was the test excavation of site 5LA5554 along Van Bremer Arroyo at the PCMS (Andrefsky et al. 1990). This unusual architectural site was characterized by 35 morphologically variable rooms, both aggregated and isolated, as well as an extremely dense and diverse artifact assemblage. Included in the collection were small, side-notched points, cord-marked ceramics, and a bison-dominated faunal assemblage typical of the Apishapa phase. In contrast to most Apishapa phase sites of this size, 5LA5554 is situated some distance from any deeply incised canyon country. In consideration of its basalt dike (hogback) location and piled rock room construction, the site appears most similar to the Developmental period Lindsay Ranch site near Golden (Nelson 1971). Finally, the excavation of Upper Plum Canyon Rock shelter I produced a wealth of information to enhance our understanding of the Apishapa phase, particularly with regard to perishable items (Rhodes 1984).

The eastern and western extent of Apishapa phase populations is known from fewer investigations. The eastern limits are known primarily through investigation by CC in the Carrizo Creek region (Nowak and Fiore 1987, 1988; Nowak and Headington 1983; Nowak and Jones 1984, 1985, 1986; Nowak and Kantner 1990, 1991; Nowak and Spurr 1989), and perhaps the Kenton Cave materials in the Oklahoma panhandle (Lintz and Zabawa 1984; Lintz 1989). Although the Carrizo Creek site data certainly indicate significant Apishapa phase occupation, the quantities of debris and architecture are not comparable to those of the "Classic Apishapa" sites of the core region (Gunnerson 1989; Nowak and Kantner 1990:xi). Similarly, large Apishapa phase architectural site locations have not yet been confirmed along the foothills of the Rocky Mountains. Surveys near Canon City and along the Cucharas and Huerfano rivers west of Walsenburg do, however, suggest at least the presence of Apishapa phase occupation in these areas (Campbell 1969a:429-435; Lutz and Hunt 1979; Renaud and Chatin 1943).

Site Type and Locational Variability. Archaeological investigations undertaken throughout the region since publication of the previous research context (Eighmy 1984) corroborate the results of Campbell's (1969a) research in demonstrating considerable variability in Apishapa site types and settings (Andrefsky 1990; Andrefsky et al. 1990; Gunnerson 1989; Jepson et al. 1992; Kalasz et al. 1993; Nowak and Kantner 1990, 1991; Reed and Horn 1995; Rhodes 1984; Van Ness et al. 1990; Zier and Kalasz 1985; Zier et al. 1988; Zier et al. 1996a). However, architectural sites and rockshelters in canyon settings have generally been employed to define Apishapa phase settlement primarily because of their visibility. Campbell (1969a:22) acknowledged the effect of this sampling bias: "Obviously, the larger sites with structures of more permanent construction materials are more readily detected and therefore, are among the first to be discovered and investigated. Also, extensive sites are more apt to provide a greater quantity of materials needed for description and comparative purposes. Hence, attention to this type of site may have led to a disproportionate concentration on these, which in turn may have directed attention from other sites that could well be more typical of the culture. Economical and expeditious research would, for practical purposes, certainly be required to investigate those individual sites that promise to produce the maximum amount of evidence." It is apparent from Campbell's study, as well as the substantial Picket Wire Canyonland, PCMS, CC, and Fort Carson efforts, that the Apishapa phase probably encompassed a range of architectural and nonarchitectural sites in a variety of environmental niches. The major problem in interpreting this variability lies in determining which sites are of Apishapa phase affiliation. This is always a difficult proposition with survey data because it is characterized generally by a lack of precise chronological and stratigraphic information.

Although by no means extensive, excavation data acquired in the last 15 years have expanded archaeologists' perceptions of Apishapa phase settlement. These data permit some modification of Campbell's (1969a) pioneering and still widely cited assessment of such matters. Campbell's settlement model was greatly influenced by three major assumptions: that Apishapa phase groups were more concerned with farming than hunting and gathering; that settlement systems were centered around canyons and major drainages; and that there was a predilection for defensive habitation locales. A key element of the model involves the observation that because of a subsistence strategy oriented increasingly toward horticulture, "all large sites and sites with structures are found in the proximity of arable land (Campbell 1969a:391)." Though the definition of arable land can be debated, Campbell believed that wide, lower-canyon settings with expansive terrace deposits were preferred for the large horticultural villages. He also asserted that many of these site locations were defensive in nature; that is, they were situated in canyon settings that were difficult to access. Linear alignments of slabs believed representative of walls barring the approach to these sites were advanced as an additional defensive component. Rockshelters were perceived as foraging stations used before planting and after harvest. Their locations were thus influenced by water sources and the presence of diverse vegetation communities. Open nonarchitectural sites (termed campsites) were observed in all physiographic zones. Canyon campsites were believed to be associated with farming activities, while smaller, noncanyon campsites represented so-called hunting stations (Campbell 1969a:398).

Recent studies continue to emphasize the importance of canyon settings. This is not surprising given that these deeper drainage incisions are among the most prominent physiographic features on the plains of southeastern Colorado. Besides the terrace deposits believed representative of arable land, the canyons are characterized by permanent water sources, sheltered locales, and the most diverse vegetative communities with the densest concentrations of economic species. Such settings would have been ideal for semisedentary hunter-gatherers who store food (Testart 1982; Kalasz 1988), as well as the horticultural villages that Campbell described. Although it remains accurate to posit canyons as the preferred setting for Apishapa phase residences, this descriptor actually encompasses considerable environmental variability. The geomorphology and biotic constituents of context-area drainage systems change dramatically from the headwaters through the rolling plains to the deeply incised lower canyons.

Apishapa phase architectural sites range from isolated structures to loci with multiple large aggregated room structures. Large architectural sites of this phase with dense and diverse cultural materials suggestive of residential base occupations are now known in a number of disparate canyon/drainage system niches. These sites continue to be found in the deep, wide, lower-canyon segments described by Campbell (1969a) as well as the shallow incisions of the upper canyon reaches (Andrefsky 1990; Andrefsky et al. 1990; Gunnerson 1989; Kalasz et al. 1993; Reed and Horn 1995; Van Ness et al. 1990; Zier and Kalasz 1985; Zier et al. 1988). It is reiterated that site 5LA5554 is a large architectural site situated on a basalt dike or hogback paralleling the shallow, noncanyon portion of Van Bremer Arroyo (Andrefsky et al. 1990). Furthermore, Apishapa phase architectural sites are reported in both defensive (e.g., Steamboat Island Fort, Darien's Fort, Sullivan Butte) and nondefensive (e.g., Cramer, Avery Ranch, Ocean Vista) settings (Campbell 1969a; Gunnerson 1989; Kalasz et al. 1993; Van Ness et al. 1990; Winter 1988; Zier et al. 1988). Smaller, prehistoric, open architectural sites, including isolated structures, are known throughout the context area. Most, however, are associated with survey projects and therefore lack the chronological information necessary to confirm their Apishapa phase affiliation. The CC investigations in the Carrizo Creek vicinity provide most of the data about these kinds of sites (Nowak and Kantner 1990). They are thought to have served as seasonal habitations where a range of hunting, gathering, and limited horticultural activities were accomplished (Nowak and Kantner 1990:36). This site sample is noted to be distributed primarily along the high benches or rims of canyons, although a single example was located on a bluff in the open plains. Two of the sites exhibit barrier walls.

Apishapa phase rockshelters were often situated in proximity to the open architectural residential bases, but the functional relationship(s) between the two settlement types remains unclear. Recent investigators are mixed in their support of Campbell's interpretation of a less intensive, specialized task function for rockshelter sites within the overall Apishapa phase settlement pattern (Kalasz et al. 1993:240; Nowak and Kantner 1991:153-155; Rhodes 1984:280). Rockshelters most often are characterized by the diverse assemblages and features associated with the larger architectural sites; the differences usually lie in the sheer volume of debris. For example, Woodbine Shelter is situated along Turkey Creek in proximity to two residential bases with architecture, the Avery Ranch and Ocean Vista sites; radiocarbon dates associated with these three sites correspond closely and are suggestive of contemporaneity (Kalasz et al. 1993:144-145; Zier et al. 1988:252). Although faunal and macrobotanical remains (including maize), pottery, projectile points, and substantial architecture are associated with all three sites, the assemblage at Woodbine shelter pales in comparison to the open sites in terms of overall quantity of material. Also, the shelter is associated primarily with small mammal remains and the two open sites primarily with bison. It is reiterated that many of the large, open architectural Apishapa phase sites in the context area display a specific economic orientation toward bison processing (Gunnerson 1989; Ireland 1968; Kalasz et al. 1993; Zier et al. 1988). The previously discussed trend for rockshelters to be strongly correlated with small mammal procurement certainly holds true for the Apishapa phase, but notable exceptions include the Sue site and Gimme Shelter (Andrefsky et al. 1990). The former is a deeply stratified multicomponent site. A transition from small game to large game procurement is evident in the vertical distribution of faunal remains;

large mammal bone, including bison, occurs in the uppermost levels. At Gimme Shelter large mammal bone was by far predominant.

As with Woodbine Shelter, diverse yet relatively insubstantial assemblages were recovered from Apishapa occupations such as Carrizo Rock shelter, 5BA24, Medina Rock shelter, Pyeatt Rock shelter, and the Sue site (Andrefsky et al. 1990; Campbell 1969a; Nowak and Kantner 1991). The Upper Plum Canyon Rock shelter I assemblage is somewhat anomalous (Rhodes 1984). Excavation produced some remarkably high numbers of artifacts: 140 ground stone artifacts, 459 chipped stone artifacts (including 30 projectile points), 108 beads, 21 pieces of modified shell, and more than 8,000 faunal remains. However, no ceramics were recovered. Despite the relatively abundant and diverse cultural debris, these data prompted the investigator to conclude that "in all, the recovered materials indicate that the shelter was most probably used by small hunting and processing task groups for short periods during the fall, winter, and early spring" (Rhodes 1984:280). The disparity between the assemblages at Woodbine Shelter and Upper Plum Canyon Rock shelter I suggests that the function of Apishapa phase rockshelters warrants further examination.

The absence of Apishapa phase hallmarks such as ceramics or Reed/Washita points necessitates the exclusion of Gimme Shelter, Pyeatt Rock shelter, and Medina Rock shelter from the table of radiocarbon-dated sites used to establish an age range for this phase (see Chronology section and Table 7-7, above). However, the radiocarbon dates from these three sites correspond well with those from nearby sites that exhibit the required diagnostic artifacts. Three sites are included in the discussion here because of indications that they served unique functions. All are located in tributary canyons of the Purgatoire River and exhibit diverse assemblages typical of Apishapa phase shelters. Pyeatt and Medina rock shelters are unique in the context area because they produced substantial maize remains; most of the maize associated with Campbell's Chaquaqua Plateau study was recovered from these two sites. A variety of wild plant remains was also found. Although the volume of these materials suggests some sort of warehouse function, it is notable that no storage features were found at either site. Storage features were recorded at Gimme Shelter but the only evidence of maize was associated with a single pollen wash from ground stone. In contrast, abundant wild plant seeds, especially those of goosefoot and amaranth, were reported from the site. Rock-lined bins or cists such as those recorded at Gimme Shelter are fairly rare in context-area rockshelters; furthermore, there is no confirmed evidence that they served as storage facilities for maize.

Although most rockshelters of the Apishapa phase are characterized by lower quantities of debris suggestive of relatively unintensive occupation (Campbell's [1969a] "foraging stations," for example), Trinchera Cave and Kenton Caves are notable exceptions (Lintz and Zabawa 1984; Simpson 1976). The cultural material from these sites was apparently substantial and diverse by any Apishapa phase standards, including those set by the larger, open architectural sites. Interpretation of occupation at Kenton Caves and Trinchera Cave is hampered by disturbed deposits and/or incomplete records. By all accounts, however, there is a clear possibility that Apishapa phase groups used these shelters (in fact, each site encompasses a series of shelters). The cultural debris reported from these sites appears comparable in all respects to that of open architectural residences such as the Cramer and Avery Ranch sites.

Open-setting nonarchitectural sites with an Apishapa phase affiliation confirmed through excavation are rare. Use of a local quarry by Apishapa groups was documented at 5BA22 but several rockshelters were also present within the site boundaries (Nowak and Kantner 1990:111). Windy Ridge at Fort Carson is believed to have functioned as a specialized task field camp (Kalasz et al. 1993). This site is situated in an open setting within a shortgrass prairie along a shallow, intermittent drainage. Like many Apishapa phase shelter sites, Windy Ridge is characterized by a diverse collection that includes low quantities of chipped stone, ground stone, ceramics, plant remains, and faunal remains. However, no perishable items, bone tools, or shell artifacts were recovered. Several very simply constructed, rock-filled hearths were recorded; associated macrobotanical samples yielded low densities of charred wild plant seeds (primarily goosefoot) and cultigens (maize). The faunal collection consisted primarily of large, unidentifiable artiodactyls and bison, again in small amounts. Based on testing data, it appears that a variety of domestic tasks was undertaken at this site but the levels of such activities were very restricted. Rather than a specialized processing area, Windy Ridge appears to be an overnight stop for a small Apishapa group.

Economy. The perception that Apishapa phase groups employed a dual foraging/horticultural economy requires further examination. The definition of such an economy is sufficiently vague to encompass quite a range of subsistence strategies. Representing the far end of a scale depicting increasing reliance on cultigens, Campbell (1969a) asserted that Apishapa phase settlements on the Chaquaqua Plateau were sedentary farming communities. In contrast, recent investigators tend to downplay the importance of horticulture among Apishapa phase populations (Gunnerson 1989:52; Kalasz 1988; Lintz 1989:282; Nowak and Kantner 1991:157-160; Zier et al. 1988:268). There is still no evidence of Apishapa phase horticultural villages that were occupied year-round. "Given the absence of substantial middens at most architectural sites, it is difficult to envision permanent year-round habitation and a maize-beans-squash horticulture subsistence base ... architectural sites do tend to occur in association with major watercourses, however, which often provide expanses of potentially arable bottom lands (Kalasz et al. 1993:23)." Zier et al. (1988:268) advance the notion of a fundamental hunter-gatherer economic pattern within the Apishapa phase: "Horticulture is certainly in evidence at Apishapa sites, but maize appears not to have been a critical resource; beans and squash have not been found." Similarly, Lintz (1989:268) believes that Apishapa subsistence practices "...reflect a combination of generalized foraging and minimal horticultural activities."

The Apishapa phase clearly falls somewhere between two extremes in the North American settlement-subsistence pattern: small, nomadic foraging bands and sedentary horticultural communities (Kalasz 1988:3). Recent studies have emphasized the considerable variability in adaptive strategy that is encompassed by the terms "forager" and "hunter-gatherer" (Bettinger 1991; Kelly 1995). Given past fluctuations in the context area's arid climate and the diversity of physiography, hydrology, and biotic resources, the adoption of a fluid, dynamic hunter-gatherer strategy with a variable emphasis on sedentism and mobility may have been a distinct advantage for Apishapa phase groups. With such an economy, it may be true that "the greatest range of cost effective options is not necessarily associated with simple mobile bands or complex, sedentary societies, but with those groups intermediate between these two typological extremes" (Lightfoot 1983:199). Because the availability of resources such as bison likely fluctuated throughout the Diversification period, it is presumed that the Apishapa phase economy did not remain static. Certain options may have been emphasized over others in response to climatic or other conditions. It remains to be verified, however, whether economic factors in part led ultimately to the dispersal of Apishapa phase populations.

As is the case with trade items, maize is consistently found in low quantities at Apishapa phase sites across the context area. Campbell's (1969a:Table 10) interpretation of increased reliance on horticulture is based largely on the unusually large quantity of maize remains (including 244 cobs) recovered from Medina Rock shelter and, to a lesser extent, Pyeatt Rock shelter. Maize remains are known from open-setting architectural sites as well as rockshelters. In addition to the previously discussed rockshelters, such remains (either micro- or macrobotanical) were recovered from the following Apishapa phase contexts: Upper Plum Canyon Rock shelter I, Gimme Shelter, Trinchera Cave, and possibly 5BA320 in the Purgatoire River and Carrizo Creek vicinities (Andrefsky et al. 1990; Nowak and Jones 1986; Rhodes 1984; Scott 1984; Simpson 1976); at the Snake Blakeslee site along the Apishapa River (Gunnerson 1989; Ireland 1968); and at Woodbine Shelter, 5PE63, and the Wallace, Avery Ranch, Ocean Vista, Windy Ridge, and Pictograph sites north of the Arkansas River in the vicinity of Turkey Creek (Ireland 1968; Kalasz et al. 1993; Watts 1971; Van Ness et al. 1990; Zier et al. 1988). Although maize is conspicuously sparse along the Apishapa River relative to the area north of the Arkansas River, this situation may reflect sampling disparities. It must be emphasized that, whereas numerous flotation samples have been processed from the latter area, none was derived from the Apishapa River investigations. The question also arises as to whether maize was grown in the region or arrived through trade. Maize in skin pouches and grass packets was recovered from the few rockshelters with conditions permitting the preservation of perishable items; these items may thus represent transport containers or "carrying cases" that facilitated trade in cultigens (Kalasz 1988:32; Lintz 1989:283; Lintz and Zabawa 1984). Subsequent investigators have emphasized further the need to examine the possibility of context-area maize trade (Nowak and Kantner 1991:159-160; Snow 1991). Conversely, the common occurrence of cobs and cob fragments at Apishapa sites would seem to imply that maize was grown locally.

Wild plant remains from Apishapa phase contexts are often abundant and diverse. Macrobotanical evidence gathered to date indicates that charred goosefoot seeds are the most prevalent vegetal food items in the context area (Andrefsky et al. 1990; Kalasz et al. 1993; Scott 1984; Van Ness 1986; Zier et al. 1988). Other wild plant remains from Apishapa phase contexts include purslane, tansy mustard, pea family, gromwell, sedge, globe mallow, sunflower, pigweed, various grasses (including Indian ricegrass), yucca, cactus (both hedgehog and prickly pear), chokecherry, hackberry, wild grape, wild plum, wild gourd, pinyon, juniper, and skunkbrush (Andrefsky et al. 1990; Kalasz et al. 1993; Lintz 1989; Lintz and Zabawa 1984; Nowak and Kantner 1990, 1991; Scott 1984; Simpson 1976; Van Ness 1986; Zier et al. 1988). These data are inconclusive in interpreting site seasonality because of the potential for storing plant remains. For example, although goosefoot seeds may have been harvested in the late summer or early fall, processing and/or consumption may not have occurred until later in the winter or early spring (Zier et al. 1988:264).

Faunal remains from Apishapa contexts have not in all cases been analyzed (Ireland 1968; Nowak and Kantner 1990, 1991), but current data are indicative of a modest trend for small mammals, particularly leporids and prairie dogs, to be prevalent at rockshelters (Campbell 1969a; Kalasz et al. 1993; Rhodes 1984). Conversely, large mammals (particularly bison) are predominant at open-setting sites. Butler (1997) presents data suggesting that rabbit was preferred over large mammals among Apishapa populations, but the study is based on scant presence/absence observations and does not address the perceived functional differences between rockshelters and open-setting sites. Small mammals were obviously an important part of Apishapa phase subsistence, and throwing sticks, snares, and cordage recovered from certain rockshelters probably attest to the means of their procurement (Lintz and Zabawa 1984; Rhodes 1984; Simpson 1976). Feature 10 at 5LA3570 in the PCMS is interpreted as a game drive, but additional investigation would be required to determine if the site was associated with bison procurement (Charles et al. 1996:7.12-7.14). Bison processing loci include architectural sites such as Avery Ranch, Cramer, Snake Blakeslee, and Ocean Vista, as well as the smaller, nonarchitectural, field camp operation at Windy Ridge (Gunnerson 1989; Kalasz et al. 1993; Watts 1971; Zier et al. 1988). Bone element analysis suggests that bison were generally field butchered at a nearby kill site and certain carcass segments transported to the architectural sites for further processing (Hamblin 1989:199-252; Zier et al. 1988:239-251). Large quantities of fragmentary bone at these sites indicate that the various elements were shattered to extract marrow. Unfortunately, the fragmentary condition of Apishapa phase bison remains has to date precluded recovery of intact mandibles necessary for conclusive interpretations of seasonality. Avery Ranch site investigators offer the following speculation: "Bison may be hunted at any time of the year that they are available and may be taken in large or small numbers. However, bison herding behavior is such that conditions for mass kills are most favorable during the fall of the year. The Avery Ranch site faunal assemblage is thus suggestive of a fall kill, although this notion is by no means conclusive" (Zier et al. 1988:264).

Other faunal remains recovered in lesser quantities from Apishapa phase contexts, and which may or may not represent subsistence items, include large mammals such as deer, pronghorn, and bighorn sheep; medium mammals such as fox and other canid, badger, beaver, bobcat, skunk, and porcupine; a variety of small mammals such as chipmunk, mouse, woodrat, kangaroo rat, ferret, ground squirrel, and pocket gopher; avian species such as eagle, hawk, owl, turkey, Cooper's hawk, sparrow hawk, sandhill crane, lesser prairie chicken, pigeon, meadowlark, and magpie; and a variety of other animals such as prairie rattlesnake, milk snake, Great Plains ratsnake, lizard, turtle, toad, bullfrog, and crayfish. Fish are conspicuously absent but evidence of indigenous freshwater mussels is common. Mussels served as a subsistence item, and the shells were modified for use as tools and ornaments. The greater portion of the preceding list was generated by the Cramer site and Upper Plum Canyon Rock shelter I excavations, which to date have produced the most diverse and substantial Apishapa phase faunal collections (Rhodes 1984; Hamblin 1989:Tables A-1, A-2). The presence of hawk, eagle, and owl bone at the Cramer site is believed to be indicative of religious or ceremonial pursuits rather than food consumption (Hamblin 1989:207).

Architecture. An overall synthesis of Apishapa phase architectural variability such as that completed for Antelope Creek phase structures (Lintz 1984) is not possible. There are few instances in which Apishapa phase architectural sites have been excavated sufficiently to permit a comprehensive view of structural elements. The architectural typology developed by Kalasz (1988, 1989, 1990) is based on surface-recorded structures confined to a relatively small portion of the context area. Although the purpose of the study was to examine the temporal sensitivity of PCMS architectural classes and categories through observations of wall and room morphology, its conclusions were restricted by a paucity of absolute dates. At best, this typology is useful for introducing some standardization in the recording and subsequent classification of architecture found during survey. To a lesser extent, the study offers some insight into architectural variability and settlement pattern as observed by the spatial distribution of specific architectural forms (Kalasz 1988).

Apishapa phase architecture occurs in both rockshelter and open settings. Isolated and aggregated room structures are common in open settings; rockshelters typically exhibit single rock walls aligned along the dripline or, less often, bisecting the interior. The jacal structure reported at Trinchera Cave is unique but the cultural affiliation is not confirmed (Simpson 1976). Other examples of rockshelter architecture typical of the Apishapa phase include 5BA24, Umbart Cave, Pyeatt Rock shelter, Gimme Shelter, Upper Plum Canyon Rock shelter I, and Woodbine Shelter (Andrefsky et al. 1990; Campbell 1969a; Kalasz et al. 1993; Rhodes 1984). Woodbine Shelter is somewhat unusual in that the single architectural unit is a massive, slab enclosure tucked within the dripline (Kalasz et al. 1993:224-240). Further, a wood post indicative of a brush superstructure was exposed within the enclosure. A brush superstructure not associated with a rock wall is suggested by an arrangement of post holes reported at 5BA24 (Nowak and Kantner 1991:114). The superstructure is described as a layer of decayed vegetal matter extending away from a line of some 60 postholes; a corresponding series of notches for the poles was reportedly situated along the "roof line" (Nowak and Kantner 1991:114). In contrast, at Gimme Shelter the architecture appears to be largely related to the construction of slab-lined storage pits (Andrefsky et al. 1990:539-583).

Apishapa phase structures in open settings have been more extensively excavated than those associated with rockshelters. These morphologically diverse examples, ranging from small isolated units to large aggregated room structures, are reported in numerous, widespread locations across the context area. Such architecture may have morphological antecedents in structures that appeared during the preceding Developmental period. Prominent open-setting architectural sites include Darien's Fort, Steamboat Island Fort, Sorenson, 5LA2169, 5LA1725, 5LA5554, Cramer, Snake Blakeslee, Juan Baca, Canterbury, Munsell, Avery Ranch, Mary's Fort, Ocean Vista, and Wallace (Campbell 1969a; Gunnerson 1989; Ireland 1968; Kalasz et al. 1993; Kingsbury and Nowak 1980; Loendorf et al. 1996; Nowak and Berger 1982; Watts 1971; Winter 1988; Zier et al. 1988; Zier and Kalasz 1985). Although the distribution of these sites describes an immense area encompassing much of the plains portion of the context area, the number of fully excavated sites is insufficient to allow adequate assessments of spatial trends in architectural morphology. It is obvious that the imposing, palisade-style, rock-walled structures of the Snake Blakeslee and Cramer sites are unique in the context area. Gunnerson (1989:129) contends that at Snake Blakeslee this situation was prompted by the massive exposures of cliff face sandstone. Wall construction therefore "simply reflects the abundance of such material, readily available at the site in various shapes and sizes, plus the scarcity of large trees .... In brief, architectural styles were opportunistic, utilizing available materials and adapting construction techniques to immediate conditions." In contrast, the Cramer site was believed to have been built as a fully integrated complex including a sizable primary room whose presence "could be interpreted as an attempt to construct a Plains earthlodge utilizing rock for the walls and four roof supports" (Gunnerson 1989:130). The perceived dichotomy between architectural construction techniques at the Snake Blakeslee and Cramer sites may have led Gunnerson (1989:120) to conclude, "I am convinced that in some cases there are definite cultural traditions represented while elsewhere there was little more than the opportunistic use of readily available building material - rock that occurred or broke naturally into pieces of convenient size." Lintz (1989:282) saw a similar serendipitous approach to Apishapa phase construction: "Considerable variability in room form, size, feature content and construction methods reflect different jerry-rigged procedures or adaptive solutions used to address local problems." Somewhat analogous to Gunnerson's assessment of Cramer site architectural layout, Zier et al. (1988:265) asserted that architectural components at the Avery Ranch site reflected a planned design (previous discussion). Clarification of these generalized observations of Apishapa phase architecture awaits additional large-scale excavation.

Excavations completed since publication of the previous research context (Eighmy 1984) permit a tentative summary of specific architectural attributes of the Apishapa phase. First, use of the term "masonry" to describe the rock wall foundations of many Apishapa phase structures is stretching the definition. Whether it is due to postabandonment collapse or not, many walls have the appearance of rock piles rather than purposely arranged slabs. Then again, the painstakingly set vertical slab walls of the Cramer site undoubtedly required considerable investment of effort in their construction (Gunnerson 1989). Excavations undertaken thus far indicate that, despite their variable nature, the distinctive curving rock walls of the Apishapa phase are used primarily to buttress some sort of wood pole and brush (or perhaps hide) superstructure (Gunnerson 1989; Ireland 1968; Kalasz et al. 1993; Zier et al. 1988). Apishapa architecture is most often associated with canyon rims or bluffs overlooking drainages; such settings are generally characterized by shallow soil deposits that offer only spotty opportunities for excavation of deep postholes. Bedrock cracks and crevices exposed in the thin soil mantle are sometimes used in conjunction with slab shims to brace the poles. Some house poles may be supported entirely by excavated pits but others are associated with rock collars situated around their base. A bison bone shim supplemented the rock collar at the Avery Ranch site (Zier et al. 1988:Figure 29). The number of poles and their configuration varies greatly among Apishapa phase structures. Structure 2 at the Avery Ranch site (see Figure 7-3) is estimated to have employed 21 poles around its outer edges; no central support posts were present (Zier et al. 1988). A similar situation is evident at Houses 1 and 7 at the Wallace site (Ireland 1968). In contrast, certain structures at the Cramer and Wallace sites exhibit central roof supports (Gunnerson 1989; Ireland 1968). A four-post arrangement reminiscent of Plains Village structures is exposed in Room A at the Cramer site and possibly House 3 at the Wallace site; these are, to date, rare occurrences among Apishapa architecture. The large communal processing area believed to be represented by Structure 1 at the Avery Ranch site exhibited no posts, but only a relatively small portion of the wall area was excavated (Zier et al. 1988).

Most of the rock associated with Apishapa phase walls consists of wedged and/or shimmed slabs that supply the bulk necessary to stabilize the overall structure. Where possible, pits and/or trenches were excavated in the soil to provide footings for the rock; clay-filled basins supporting wall slabs are reported at the Cramer site (Gunnerson 1989:26-27). Rocks may be set horizontally or vertically; the degree to which each is emphasized varies from site to site (Gunnerson 1989; Ireland 1968; Kalasz et al. 1993; Nowak and Headington 1983; Nowak and Kantner 1990:30-37; Zier et al. 1988). Substances identified as daub or clay are associated with a variety of Apishapa phase structures (Gunnerson 1989; Ireland 1968; Kalasz et al. 1993; Zier et al. 1988). The fact that these materials sometimes exhibit stick or grass impressions and are situated above the house floor suggests superstructures with some sort of earthen coating; an especially extensive and pronounced layer of daub was reported at the Ocean Vista site (Kalasz et al. 1993). Structures have been recorded with and without definable entryways; all of the Wallace site structures exhibited east- or southeast-facing entryways (Ireland 1968). Apishapa walls generally display some degree of curvature, but overall structure shapes vary considerably, as do room sizes. Room sizes range from those measuring a few meters across to large, possibly communal work areas at the Cramer and Avery Ranch sites that are 7 to 15 m in diameter (Gunnerson 1989; Kalasz 1990; Zier et al. 1988). This variability is believed to reflect differing room functions, but as Lintz (1989:282) notes, "few studies have addressed the functional issue by rigorously examining room attributes and contents." Tool diversity indices were employed for a limited view of variability in room functions at the Avery Ranch site. The analysis suggested the presence of discrete domiciles versus areas where communal processing tasks were accomplished (Zier et al. 1988).

Overall, the interior features associated with Apishapa structures are sparse and rudimentary in comparison with those of Plains Village (e.g., Antelope Creek phase) and Sopris phase affiliation. Floors are irregular or shallow basins sometimes plastered with clay mixtures; uneven surfaces smoothed with packed daub are also reported (Gunnerson 1989; Ireland 1968; Zier et al. 1988). Apishapa phase structures commonly exhibit interior fire-related features, some of which are recorded as formal central hearths (Gunnerson 1989; Ireland 1968; Nowak and Kantner 1990:30-37). Most interior hearths are shallow, irregularly shaped features characterized by little effort invested in their construction. Interior subfloor features such as bell-shaped pits or slab-lined storage cists have only rarely been recorded (Ireland 1968:16). A slab-lined feature interpreted to be a probable storage cist was excavated at the Avery Ranch site. The feature abutted the Structure 1 wall exterior (Zier et al. 1988). Finally, clay-lined basins believed to have served as vessel supports are reported at the Wallace site (Ireland 1968).

Sopris Phase

Introduction

The Sopris phase of the Diversification period was first defined by Dick (1963). His initial formulation placed the Sopris phase within the Upper Purgatoire complex, presumably under the expectation that additional temporally contiguous phases would later be defined. Although the origin of the term "complex" is uncertain, it was likely used in the Trinidad district to emphasize the observed differences between sites located along the lower reaches of the

Purgatoire River and those of the Trinidad district proper. Subsequently, Baker (1964) proposed the St. Thomas phase to describe the earliest sites of the Diversification period in the upper valley. However, based on new excavation data as well as on a reexamination of previous work, Ireland (1971) demonstrated convincingly that this construct was not supported by adequate data and should be abandoned. As is discussed below, Wood and Bair (1980) later expanded the definition of the Sopris phase to include effectively all early Diversification period manifestations in the upper Purgatoire River valley. In practice, then, the term "Upper Purgatoire complex" has come to be synonymous with the term "Sopris phase." The latter designation is retained here, owing to the ambiguous nature of the term "complex."

Dick (1963) defined the Sopris phase primarily on the basis of architecture and ceramics. Structures are rectangular or subrectangular, contain two to 10 rooms, and are constructed from masonry and adobe in varying proportions. Floor features include slab-lined cists and basin hearths with raised adobe collars. Some structures contain ground-level entryways. The ceramics associated with these structures include polished wares; cordmarked wares; Sopris Plain, an indigenous culinary ware; Taos Gray (Plain, Incised, and Punctate varieties); and Taos or Kwahe'e Black-on-white wares. Burials are generally located beneath structure floors or in abandoned rooms. Dick also provides a "laundry list" of chipped stone and bone tool types, including corner-notched, side-notched, and unnotched projectile points; various types of ground stone tools; splinter awls; and tubular bone beads.

In practice, sites have been assigned to the Sopris phase when they contain either rectilinear stone masonry architecture or Taos Incised or Taos Black-on-white sherds. Sites that exhibit these characteristics have been documented along the main stem and major tributaries of the Purgatoire River; in the highlands south and west of Trinidad, Colorado and Raton, New Mexico; along the Vermejo, Ponil, and Cimarron rivers on the southern tip of the Park Plateau; and along both the eastern and western margins of Fisher Peak, south of Trinidad. Site locations include ridges and promontories, benches and high river terraces, and valley bottoms. Sites are located in both open and sheltered settings, although all known habitation structures are located in open settings.

Several other cultural-temporal systems have been used to organize early and middle Diversification period archaeological data in the Vermejo and Cimarron districts. For sites in the Vermejo district, Biella and Dorshow (1997a) adopt the term "Late Prehistoric Period" to describe the relatively few sites that date to that period in their Ancho Canyon/York Canyon project area. In part, this terminology reflects the continuing taxonomic ambivalence of researchers working in the area, and the difficulty of reconciling Southern Plains and Southwest taxonomic systems. Although early researchers highlighted the ceramic and architectural similarities among sites located on the Park Plateau and those located in the northern Rio Grande valley, later research has tended to emphasize local continuity and cultural, if not social and economic, connections with sites in the Plains.

For the Cimarron district, Glassow (1980) utilizes a cultural-temporal system that is based on the Pecos Classification, and is a continuation of the Developmental period sequence for the district (Table 7-8). Two phases or periods, plus portions of another, are defined for the Diversification period.

Table 7-8. Cultural-Temporal System of Glassow (1980) for Cimarron District.

Phase Name	Dates	Criteria/Characteristics
Cimarron	A.D. 1200-1300	Cimarron Plain; Taos Neck-banded, Incised, Punctate; Santa Fe Black-on-white
Ponil	A.D. 1100-1250	Taos Incised or Punctate
Escritores	A.D. 900-1100	Kiatuthlanna or Red Mesa Black-on-white

No radiocarbon dates are available from the Cimarron district for these phases, and the ceramic chronology for the northern Rio Grande has been reevaluated and modified since Glassow developed this sequence (Cordell 1989). Although portions of the Escritores phase fall within the Diversification period, this reevaluation suggests that the Ponil phase is the first phase of the Diversification period in the Cimarron district; Escritores phase manifestations are discussed in the Developmental period section. Glassow (1980, 1984) applied this system to extensive survey and limited excavation data from the Cimarron district and portions of the Vermejo district.

Intensive excavation efforts began in the Trinidad district in 1952 (Dick 1954; Lintz 1999) under the direction of Haldon Chase who had received funding from TSJC (see Chapter 3 summary). Chase, a pioneer in the archaeology of the Apishapa phase, concentrated his work in the Trinidad district on the Sopris site (5LA1415), a large masonry structure which was later considered by Herbert Dick (1963) to be the "type site" for the phase. The archaeological program at TSJC expanded when Dick replaced Chase in 1953, and work began on the ACOE Trinidad Lake Flood Control project. Dick initiated an extensive survey of the reservoir pool area and continued the excavations at the Sopris site begun by Chase in 1952. Between 1954 and 1977, at least 18 Sopris phase structures were excavated. Including Chase and Dick, these excavations were directed by seven different principal investigators, all of whom were associated with TSJC. Four additional structures are known to have been excavated, but the results of these projects have never been reported.

The results of the Trinidad State investigations are reported by Baker (1964, 1967), Dick (1954, 1963, 1974), Dore (1993), Hand et al. (1977), Ireland (1970, 1974a, 1974b), Ireland and Wood (1973), Mitchell (1997), and Wood and Bair (1980). Summaries and discussions of these data are provided by Bair (1975), Ireland (1971), McCabe (1973), and Mitchell (1998). Important data have also been generated by compliance investigations for highway and energy-related projects elsewhere in the Trinidad district (Baker 1965; Gleichman 1983; Indeck and Legard 1984; Lutz and Hunt 1979; McKibbin et al. 1997; Rood 1990; Rood and Church 1989; Tucker 1983).

Significant data on Diversification period sites in the Cimarron district have been reported by Glassow (1980, 1984), and Lutes (1957, 1958, 1959a, 1959b, 1960). In the Vermejo district, Campbell (1984), Kershner (1984), and Biella and Dorshow (1997a) provide valuable insight into Diversification period manifestations.

Chronology

Dick's (1963) preliminary chronology, which was based exclusively on production dates for northern Rio Grande black-on-white trade wares, placed the Sopris phase occupation of the Trinidad district within the thirteenth century (A.D. 1225-1275). Both Baker (1964) and Ireland (1971) suggested that the phase probably began earlier, perhaps as early as A.D. 1000. Subsequent revisions of the northern Rio Grande ceramic chronology (Peckham and Reed 1963; Wetherington 1968), as well as a suite of 10 archaeomagnetic dates from the Trinidad district, persuaded Wood and Bair (1980) to further modify this framework. Coupled with a preliminary analysis of Sopris phase architectural forms, they proposed three subphases which included the Initial Sopris (A.D. 1000-1100), the Early Sopris (A.D. 1100-1150), and the Late Sopris (A.D. 1150-1225). Breternitz (1969) reports two radiocarbon dates which generally support this chronology, although the large standard deviation of both assays limits their utility. Owing to the likelihood of contamination, all 10 radiocarbon dates reported by Wood and Bair (1980:226) were rejected.

To define better the Sopris phase chronology, 34 samples from five sites were submitted for radiocarbon assay (Mitchell 1997). All of these samples consisted of either large architectural timbers or corncobs, and were chosen from floor or floor-fill contexts of structures, or from discrete nonarchitectural features such as storage pits or hearths. The original archaeomagnetic data were also recalibrated using the most recent Southwestern Archaeomagnetic Master Curve (Eighmy and Doyel 1987; Mitchell 1997). These data are summarized in Tables 7-9 and 7-10.

Table 7-9. Radiocarbon Dates from Sopris Phase Sites.

Site/Structure	Conventional Age (B.P.)	Calibration Curve Intercept (A.D.)	2-Sigma Calibrated Date (A.D.)	Context
5LA1416/Str. 1	740 ± 70	1280	1180-1395	Stone masonry structure; floor
5LA1416/Str. 1	780 ± 60	1265	1170-1300	Stone masonry structure; floor
5LA1416/Str. 3	830 ± 50	1225	1055-1090 1150-1285	Adobe structure; floor
5LA1416/Str. 1	890 ± 50	1175	1025-1260	Stone masonry structure; floor fill
5LA1445	910 ± 50	1165	1020-1245	Stone masonry structure; floor fill
5LA1417/Fea. A	920 ± 50	1065-1075-1155	1015-1235	Stone masonry structure; floor fill
5LA1211/Str. 2	920 ± 50	1065-1075-1155	1015-1235	Jacal structure; floor
5LA1416/Str. 1	930 ± 60	1055-1090-1150	1000-1245	Stone masonry structure; floor fill
5LA1417	940 ± 60	1045-1105-1115	995-1235	Stone masonry structure; floor
5LA1416/Str. 2	950 ± 50	1040	1000-1215	Jacal structure; subfloor pit*
5LA1416/Fea. 90	950 ± 60	1040	990-1225	Hearth below adobe structure*
5LA1416/Str. 1	960 ± 50	1035	995-1205	Stone masonry structure; floor

Site/Structure	Conventional Age (B.P.)	Calibration Curve Intercept (A.D.)	2-Sigma Calibrated Date (A.D.)	Context
5LA1416/Str. 5	960 ± 50	1035	995-1205	Mortuary pit; fill**
5LA1417/Fea. A	960 ± 60	1035	985-1220	Stone masonry structure; floor
5LA1211/Str. 3	980 ± 50	1030	985-1180	Adobe/stone masonry structure; floor fill
5LA1417/Fea. A	990 ± 60	1025	970-1195	Stone masonry structure; floor
5LA1424/Fea. B	990 ± 60	1025	970-1195	House pit; floor fill
5LA1211/Str. 3	990 ± 50	1025	980-1175	Adobe/stone masonry structure; floor fill
5LA1211/Str. 2	1000 ± 50	1020	975-1170	Jacal structure; floor
5LA1211/Str. 3	1010 ± 60	1020	990-1040	Adobe/stone masonry structure; floor
5LA1211/Str. 4	1020 ± 50	1015	990-1035	Jacal structure; floor
5LA1416/Str. 1	1040 ± 50	1005	895-1045 1105-1115	Stone masonry structure; floor
5LA1416/Fea. 31	1040 ± 40	1005	960-1035	Bell-shaped pit; basal fill
5LA1445	1060 ± 60	995	880-1045 1105-1115	Stone masonry structure; floor fill
5LA1416/Str. 2	1080 ± 60	985	865-1035	Jacal structure; roof beam
5LA1416/Str. 1	1090 ± 60	980	855-1035	Stone masonry structure; floor fill
5LA1417/Fea. A	1130 ± 80	905-920-950	705-1035	Stone masonry structure; floor
5LA1416/Str. 6	1140 ± 60	895	775-1015	House pit; floor fill**
5LA1416/Str. 2	1190 ± 50	875	705-980	Jacal structure; post
5LA1416/Str. 1	1200 ± 50	865	695-975	Stone masonry structure; floor fill

Site/Structure	Conventional Age (B.P.)	Calibration Curve Intercept (A.D.)	2-Sigma Calibrated Date (A.D.)	Context
5LA1211/Str. 2	1210 ± 50	855	690-970	Jacal structure; floor fill
5LA1424/Fea. B	1230 ± 50	790	680-905 920-950	House pit
5LA1416/Str. 2	1240 ± 90	785	645-995	Jacal structure; subfloor pit* (**)
5LA1416/Str. 2	1290 ± 50	705	655-875	Jacal structure*

* Sample may be from a disturbed provenience.
** Radiocarbon age determined from corncob; conventional age includes $^{12}C/^{13}C$ correction

Table 7-10. Archaeomagnetic Dates from Sopris Phase Sites.

Site/Structure	Archaeomagnetic Date Ranges (A.D.)	Context
5LA1416/Fea. 90	740-790 830-875	Hearth below adobe structure
5LA1211/Fea. 15	925-1020 1275-1475 1500-1750	Extra-architectural storage pit
5LA1211/Fea. 53	925-975 1575-1635	Hearth below jacal structure
5LA1416/Str. 3	935-1025 1175-1500 1500-1700	Adobe structure
5LA1416/Fea. 79	950-1010 1310-1400 1650-1700	Extra-architectural storage pit
5LA1211/Str. 6	1000-1050 1300-1400 1675-1725	House pit
5LA1211/Str. 2	1025-1350	Jacal structure
5LA1416/Fea. 31	1125-1150	Extra-architectural storage pit
5LA1211/Fea. 59	1300-1400 1675-modern	Extra-architectural hearth

In addition to these absolute dates, recent attempts to refine the cultural chronology for the northern Rio Grande provide important information about the timing of the Sopris phase (Boyer et al. 1994; Crown 1990). Data from Valdez phase sites near Taos, New Mexico, demonstrate that the imported culinary wares so common on early Diversification period sites along the eastern slope of the Sangre de Cristo Mountains, and by which the Sopris phase is largely defined, could not have been produced prior to about A.D. 1050. Mitchell's (1997) examination of ceramic technology and composition demonstrates further that the Taos culinary wares recovered from Sopris phase sites were in fact produced in the Taos district, and not manufactured locally. Taken together these data indicate that Sopris phase sites on the Park Plateau postdate the middle of the eleventh century.

Ceramic cross-dates can also be used to bracket the probable abandonment of communities in the upper Purgatoire River valley by Sopris peoples. This evidence is negative: the complete lack of the carbon-painted Santa Fe Black-on-white, as well as the paucity of corrugated gray ware jars, indicates that the district was abandoned before A.D. 1200. This is the widely accepted date for the initial production of such vessels in the northern Rio Grande valley (Cordell 1979, 1989). As will be discussed in greater detail below, sherds of these types are known from the Cimarron district, suggesting that the Diversification period occupation was somewhat longer-lived there. On the other hand, the radiocarbon and archaeomagnetic data suggest that at least some structures in the Trinidad district may have been remodeled or reused after A.D. 1200. Three of the 34 radiocarbon dates have calibration curve intercepts in the thirteenth century.

Several conclusions can be drawn from these data. First, some of the structures and features documented in the Trinidad district predate the Diversification period. Generally, the earliest dates come either from shallow pit structures or from features that occupy the lowest stratigraphic position at each site. Some of these dates are associated with a few indigenous brown ware ceramics, and none is associated with Taos culinary wares. The notion that semisubterranean pit structures are one of the earliest architectural forms in the district, a suggestion first proposed by Eighmy and Wood (1984), is supported by excavation data from the Running Pit House site (Dick 1974). All of these structures and features therefore predate the Sopris phase. On the other hand, these data also demonstrate the potential magnitude of the old wood problem. For example, the calibrated, two-sigma date ranges for the eight samples from Structure 1 at 5LA1416, all of which derive from large, architectural elements and from floor proveniences, span a period of seven centuries. Given that the use life of Structure 1 is unlikely to have exceeded 50 or 75 years, even with extensive remodeling, it is apparent that some of these samples derive from old or reused logs.

The second conclusion is that the Trinidad district witnessed a "construction boom" early in the eleventh century. Calibration curve intercepts for 19 of the 34 dated samples fall in the century between A.D. 950 and 1050. Given the statistical nature of radiocarbon samples, and the potential problems associated with old or reused wood, it is apparent that the beginning of the Sopris phase was relatively abrupt. Combined with the recent ceramic data from the Taos district, this suggests that the Sopris phase began at or immediately after A.D. 1050. However, by themselves these data do not indicate whether this major construction episode predates or postdates the initiation of intensive contact and ceramic exchange with the northern Rio Grande area.

Third, as is discussed in greater detail below, it is not possible to distinguish discrete subphases on the basis of architectural form or construction technique or materials. The radiocarbon data indicate that stone masonry, jacal, and adobe structures were all constructed and used more-or-less simultaneously.

Taken together, these chronological data indicate that the Sopris phase in the Trinidad district dates to the period between A.D. 1050 and A.D. 1200, and further that the subphase distinctions proposed by Wood and Bair (1980) should be abandoned. However, these data also demonstrate that the district was occupied prior to the Sopris phase (see the Developmental period chronology section for a detailed discussion), and it may have been reoccupied during the thirteenth century. There is also limited chronological data to suggest that the Sopris phase in the Cimarron district persisted somewhat longer than in the Trinidad district.

Population Dynamics

As noted above, it is clear that the number of known Sopris phase structures far exceeds the number of Developmental period structures in the Trinidad district. A similar observation can be made for the Cimarron district (Glassow 1980). Moreover, these structures appear to have been constructed over a relatively short period of time. Whether this period of intensive construction was accompanied by a population increase, or simply by population aggregation, is a matter of conjecture. Certainly later stone masonry and adobe structures leave much more visible remains. In addition, data from the Vermejo district (Biella and Dorshow 1997a) and Cimarron district (Glassow 1980) suggest that significant shifts in settlement patterns may have characterized the late Developmental and early Diversification periods on the Park Plateau.

Conversely, later structures tend to be somewhat larger than their predecessors, and contain more storage space. Moreover, many of these structures show evidence of having been remodeled and expanded during the time they were occupied, suggesting that either the size or productivity of the individual households increased during the Sopris phase. In the Trinidad district, although the overall size of particular structures appears to have increased substantially through their uselife, much of this increase can be attributed to an increase in storage space. The ratio between storage and habitation floor space increased to a maximum of roughly 3:1 and 4.5:1 at two of the most completely excavated structures. Smaller structures tend to have a more equal distribution of space, although the smaller artifact assemblages associated with many suggests that they may have been in use for shorter periods of time. These data may indicate that increases in productivity, and hence the need for larger storage spaces, account for some of the increase in structure size and, therefore, archaeological visibility.

Glassow (1980), however, notes that the number of sites attributable to the early and middle Diversification period (which he defines as the Ponil and Cimarron phases) was greater than the number of Vermejo phase sites. All three of these phases are defined on the basis of architectural remains that are likely to have been equally visible during archaeological survey. By itself, this indicates that the early Diversification period population of the Cimarron district likely exceeded the early Developmental period population. However, much of Glassow's survey area is located in portions of the landscape that appear to have been favored by later inhabitants. Similarly, data from the Vermejo district suggest that the Developmental period inhabitants of the southern Park Plateau may have favored higher-elevation localities. If cultural continuity between the Developmental and Diversification periods can be assumed, then it is also possible that the apparent increase in, and aggregation of, later populations was partly a product of significant shifts in settlement patterns. Given this possibility, as well as the potential for differential recognition of different architectural types, it is likely that it will be difficult to establish a demographic "profile" for this portion of the context area.

In purely theoretical terms, however, increased storage capacity either creates the conditions for, or is symptomatic of, demographic increase. If Diversification period households relied to a greater extent on domestic gardens, then it is at least possible that population increased. However, to the extent that such demographic choices are based on the perceived stability of the available resource base, increased reliance on cultigens may not have stimulated population growth. Both Snow (1991) and Kirkpatrick and Ford (1977) observe that maize cultivation may have been relatively risky in north-central and northeastern New Mexico. These conclusions are supported by archaeological data as well as by modern climatic records (see also Cordell 1979).

Given the geographic limitations inherent in the database, particularly for the Trinidad and Vermejo districts, it is not now possible to determine whether the onset of the Sopris phase was accompanied by an increase in population. The differential visibility of later architectural types, the possibility of significant shifts in settlement patterns at the close of the Developmental period, and the uncertainties about the dietary role played by maize or other cultigens, prevent adequate resolution of this issue.

Community Organization. Both mortuary and architectural construction data support the inference that Sopris phase structures functioned as the residential bases of distinct households. Three basic interment patterns can be identified for the phase. Most burials (20 of 31 cases) were recovered from domestic contexts. Typically these consist of single, primary, flexed interments located beneath structure floors. Burials were frequently placed in prepared pits. Stratigraphic evidence indicates that the associated structures were inhabited after the interments were made.

Single, flexed, primary burials not directly associated with living spaces have also been reported (seven of 31). Some of these were recovered from the immediate vicinity of habitation sites, though others were located well away from permanent architecture. Because all of these burials were recovered by chance (either in archaeological backhoe trenches, or during the course of unrelated construction activities) it is difficult to evaluate the relative frequency of this type of burial. Given the structure-specific nature of many Sopris phase excavations, it is likely that this sort of interment was more common than available data might suggest.

Multiple human burials have also been recovered from a specially prepared mortuary pit (four of 31). Structure 5 at 5LA1416 consisted of a large pit containing a prominent central hearth, a low perimeter "bench," and five burial niches, one of which was empty. The central hearth appears to have received little use. Sherds from several of the burial niches, as well as from the fill of the pit, can be reconstructed into a portion of a single vessel, suggesting that the pit was intentionally backfilled over a relatively short period of time.

The clear association between human burials and living spaces argues for the importance of household-based lineage groups. A number of researchers have suggested that the context of interment of the dead has a relationship to the legitimization of control over, and access to, particular resources, including labor (Goldstein 1976). For the Sopris phase, the direct association of human remains with habitation structures suggests that descendants emphasized the biological and social continuity of the household by retaining "ownership" of the dead. On the other hand, the evidence for nondomestic interments argues for the existence of multiple social relationships.

As noted above, most Sopris phase structures were constructed in a series of discrete episodes. Typically, a single, large habitation room formed the nucleus of the structure. Later, other smaller storage and habitation rooms were added, or the primary room was partitioned. This pattern of episodic construction suggests a continuity of labor investment in particular facilities, and the maintenance through time of the social arrangements which those facilities supported. It also suggests that either the number of occupants residing in the structure or the per-occupant productivity of the household was increasing during the phase. Since most of the later rooms appear to be storage rooms the latter explanation seems more likely. Although the uselife of Sopris phase structures is not known, it is reasonable to conclude that the observed construction patterns reflect continuing investment in the facilities that sustained household activities.

Without question, significant problems are associated with the definition of prehistoric community organization, particularly in the absence of integrative architectural features or activity areas. Despite the lack of such structures in the Trinidad district, several lines of evidence suggest that Sopris phase households were organized into a dispersed rural community. As discussed above, chronometric data indicate that at least some of the structures in the district are archaeologically contemporaneous. Absolute contemporaneity is more difficult to establish, particularly without studies of use life and structure abandonment, although the relatively short duration of the phase implies that at least some of the structures were in use concurrently. The notion that some of these sites may have been occupied contemporaneously is also supported by the clustering of radiocarbon dates at the close of the tenth century and the opening of the eleventh century. Analysis of artifacts associated with these structures indicates that they were functionally equivalent, suggesting that most played a structurally equivalent role in the settlement system. Moreover, ceramic exchange data indicate that most households in the district participated in the Rio Grande trade system. Given the likelihood that such exchange was formalized (Mitchell 1998), it is reasonable to assume that it also entailed suprahousehold coordination, if not control.

Violence and Social Collapse. Although the data are meager, there are indications that conflict may have marked the end of the Sopris phase and contributed to the abandonment of the Trinidad district. At 5LA1418, the disarticulated bones of three individuals were found scattered throughout the fill of the masonry structure. At 5LA1416, one individual, in whose cervical vertebrae a projectile point was embedded, was interred above burned roof fall in an uncharacteristic extended position. Moreover, the majority of Sopris phase structures were destroyed by catastrophic fires.

Although the causes of this apparent conflict are not known, paleoenvironmental and human osteological data do not suggest that a significant population/resource imbalance characterized the twelfth century. On the other hand, ceramic evidence for rapid community transformation during this period (Mitchell 1997, 1998) does suggest that the suprahousehold community organization in the valley may have collapsed. General abandonment of the upper Purgatoire River valley appears to have occurred near the end of the twelfth century, followed during the thirteenth century by the abandonment of the Cimarron district.

Cultural Affiliation. Stratigraphic, chronometric, and assemblage attribute data indicate that the Sopris phase was most likely the continuation of an indigenous Developmental period sequence, and not of ancestral Pueblo demographic or political expansion during the Pueblo II period. A few researchers have also argued that the Sopris phase may be related to Athapaskan expansion into the Southwest (e.g. Schlesier 1994; Turner 1980). Although the timing of the Athapaskan migration is uncertain, Sopris phase material culture, settlement patterns, economic systems, and mortuary practices are foreshadowed in Developmental period data from the Park Plateau, again suggesting cultural continuity between about A.D. 200/500 and 1200/1300. Moreover, if the Sopris phase population of the Park Plateau was ancestral to the ethnographically known Jicarilla, as Schlesier (1994: 324ff) suggests, then the apparently unambiguous data indicating a two- or three-century abandonment of the southern Park Plateau must be explained.

Data are available, however, that provide several tentative insights into Sopris phase cultural affiliations. Probable construction dates for the masonry and adobe structures associated with the Sopris phase suggest that the intensive interaction network between the Trinidad district and the Taos district began during the eleventh century. This conclusion is supported by eleventh century dates for Taos Gray and Taos Black-on-white ceramics from the southern end of the plateau (Campbell 1984; Biella and Dorshow 1997a). Given that ancestral Pueblo groups appear to have arrived in the Taos district at that same time (Boyer et al. 1994), the nearly simultaneous appearance of trade wares on the eastern slope of the Sangre de Cristo Mountains suggests that the well-documented ceramic exchange network of the late eleventh and early twelfth centuries may have been preceded by an earlier network. The content, intensity, or directionality of that earlier network is not known, however.

The pervasiveness and intensity of exchange in the 11th and 12th century across the Sangre de Cristo Mountains (Mitchell 1997, 1998) provides clues to the abandonment of the southern Park Plateau. This abandonment, and the collapse of the exchange network, appears to have occurred about the same time that large-scale, community aggregation became an important social process in the northern Rio Grande valley. The social relationships that were the basis for the Trinidad-Taos exchange may have been disrupted by the shifts in household size and composition that accompanied community aggregation. At the same time, Taos Pueblo origin accounts indicate that some of the members of that multicultural society originated on the Plains (Jeffrey L. Boyer, personal communication to Mark Mitchell, 1997; Ellis and Brody 1964; Wetherington 1968). Although meager, these data may imply that the symbiotic interaction that began between the Sopris phase inhabitants of the Park Plateau and the ancestral Pueblo inhabitants of the northern Rio Grande valley in the eleventh century culminated in the thirteenth century with the merger of those two formerly distinct groups (Albers 1993).

Technology

Considerably more information is available about Sopris phase technology. The most intensively studied artifact class is ceramics, owing no doubt to the chronological and cultural implications of particular wares and types. As noted above, the most distinctive element of Sopris phase artifact assemblages is Taos culinary wares. These generally consist of large (25-30 cm tall) incised ollas. The vessels tend to be narrowly globular in shape, with low, sloping shoulders and convex to flat or slightly concave bases. Rims are straight to slightly excurvate and undecorated. Shoulder and neck decoration consists of parallel rows of incised lines, vertical and horizontal rows of chevron-shaped punctations and, occasionally, obliterated wide fillets. The bases and lower bodies are generally undecorated, but frequently exhibit basket impressions. Some examples carry no decoration, although the vessel exterior is smoothed. Strap handles or solid lugs are frequently attached near the top of the decorated field.

In the culinary ware samples analyzed by Mitchell (1997), virtually all of the sherds identified as Taos Plain or Taos Incised on the basis of technological or stylistic attributes were compositionally similar to vessels recovered from the Taos district, and distinct from locally produced wares. Significantly, these sherds make up one-third to one-half of all sampled floor assemblages, indicating that ceramic exchange was both widespread and important. These data are also supported by petrographic analyses of sherds from the Vermejo district (Habicht-Mauche 1997), as well as general observations from the Cimarron district (Lutes 1959a, 1959b; Glassow 1980) and farther south along the eastern slope of the Sangre de Cristo Mountains (Gunnerson 1959).

Despite the clear importance of culinary wares manufactured in the Taos district, the Sopris phase ceramic assemblage is also notable for its diversity. Typical assemblages from structures include Taos Black-on-white bowls, polished bowls or jars, cord-marked jars, and locally manufactured jars, in addition to the ubiquitous Taos Plain or Taos Incised ollas. Some black-on-white sherds from Trinidad district contexts have been identified as Red Mesa, Kwahe'e, or Gallup. However, given the generally small and eroded nature of most sherds, these assignations should be treated with caution. Moreover, confusion surrounds the identification and dating of these types in the Rio Grande valley (Cordell 1979; Levine 1994; Mitchell 1997). Most cord-marked sherds have been identified as Stamper Cordmarked, an type attributed to the Optima focus of the Texas panhandle (Butler and Hoffman 1992). They also appear to be similar to

Borger Cordmarked, a related Antelope Creek type. However, evidence from Trinchera Cave indicates that at least some cord-marked sherds were manufactured in the Arkansas River Basin (Simpson 1976). Whether the cord-marked sherds from Sopris phase sites were produced locally is not known, although on the basis of macroscopic analysis they are dissimilar from Sopris Plain. It is possible that they were produced by Apishapa phase potters.

The origins of polished ceramics in the Trinidad district are unknown and no detailed analysis has been undertaken. Wood and Bair (1980:185) suggest that they were produced locally, although the limited compositional data reported by Mitchell (1997), as well as comparisons with sherds and vessels recovered from elsewhere in southeastern Colorado and from the Taos district, indicate that this is almost surely not the case. Although relatively few polished sherds have been recovered from Sopris phase sites, their occurrence tends to be concentrated, suggesting that they may have been used by a limited number of households. Several polished ware types have been noted among Sopris phase assemblages, including blind indented corrugated and smudged. As noted in an earlier discussion about Apishapa phase ceramics, various authors have observed similarities among polished wares recovered from Apishapa phase sites along the lower Purgatoire River and polished wares from Sopris phase sites (e.g., Hummer 1989:340; Wood and Bair 1980:184-185), suggesting contact and interaction between the two groups. Alternatively, polished ceramics may reflect a common connection with a more distant trading partner.

Locally produced wares do, however, make up a significant proportion of the total Sopris phase assemblage. Wood and Bair (1980) assert that it is extremely difficult to distinguish between Sopris Plain, a locally produced type, and Taos Plain, an imported type. This problem was also encountered by earlier investigators, and as a consequence, ceramic classifications for Trinidad district sites frequently include the terms "Sopris Plain/Taos Incised" or "Taos Incised (Local Manufacture)." However, technological, stylistic, and compositional analyses reported by Mitchell (1997) clearly demonstrate that the two types can in fact be reliably distinguished on the basis of their macroscopic properties. Locally produced vessels are generally smaller, and seldom contain incised decorative elements. When decoration is present, it consists of fingernail punctations and uneven parallel lines. These decorations are imitative of Taos designs but are executed with different tools and in a much more tentative fashion. Technologically, Sopris Plain is likely to have been constructed from self-tempered clays and fired in an oxidizing to neutral atmosphere. Temper particles consist of rounded grains as large as two or three millimeters in diameter; such particles are frequently visible on the vessel surface. Vessel walls tend to be thick (up to 10 mm). Most or all Sopris Plain vessels were manufactured by a paddle-and-anvil technique; anvil marks are frequently evident on interior surfaces. These locally produced vessels account for just under half of most structure floor assemblages.

The increase in the number and variety of ceramic vessels has important implications for Sopris phase economic and social practices. The use of ceramic vessels is generally associated with intensive resource processing. Pottery is necessary for effective bone-grease preparation and has been associated with an increase in maize utilization. Stiger (1998) also notes that various wild plant seeds cannot be consumed without thorough heating. The dramatic increase in the number of sherds associated with early Diversification period sites on the Park Plateau therefore implies that a wider range of resources may have been utilized, and that the available plant and animal resources both may have been exploited more intensively.

The diversity of the ceramic assemblage also has implications for Sopris phase social practices. That a very large percentage of the total sherd assemblage comes from imported vessels indicates that interregional exchange was an important element of Sopris phase society. Although trade with the Rio Grande valley was of primary importance, the presence of cord-marked sherds, occasionally comprising a substantial percentage of the total assemblage, indicates that at least some Sopris phase households maintained contact with Southern Plains groups. This observation is supported by the recovery of several alternately beveled knives made from Alibates dolomite, material and artifact types closely associated with Antelope Creek communities in the middle Canadian River valley. The presence of polished wares in Sopris phase assemblages, as well as in other Diversification period assemblages from the Arkansas River Basin, may represent yet another vector of trade and interaction.

Much less attention has been focused on chipped stone artifacts from Sopris phase sites. Despite the lack of detailed analyses, several general observations may be made. Many chipped stone tools consist of unmodified or informally modified flakes struck from unprepared cores. Formally prepared bifaces make up a relatively small percentage of the total assemblage. The vast majority of both informal tools and unutilized flakes were made from locally available material. Argillite (hornfels or silicified shale) and basalt are abundant, both as secondary cobble deposits adjacent to the main stem and tributaries of the Purgatoire, and as primary deposits adjacent to basalt dikes and sills (McKibbin et al. 1997). Flake assemblages from habitation structures contain relatively few examples with cortex, suggesting that initial reduction took place at a more distant location.

Projectile point morphologies are highly variable. Most would generally be considered representative of the small, corner-notched to stemmed Scallorn variety, particularly examples with a large length-to-width ratio. Many of these points have three or more notches. Triangular, side-notched or square-stemmed Washita points are rare or entirely absent. Triangular, unnotched Fresno or Chaquaqua points (or bifaces) are relatively common, although fewer in number than Scallorn types. Larger dart points, generally of the Trinity or Ellis types, are also present in Sopris phase assemblages. It is unknown whether these represent the continued use of the atlatl or were scavenged and reused as knives. Such formal tools are disproportionately constructed from imported, higher-quality silicious material types. Alibates dolomite is moderately well represented, as is obsidian from several New Mexican sources (Shackley 1997). For the total chipped stone assemblage, somewhat larger percentages of unidentified quartzite and chert types are also present.

The ground stone tool assemblage contains a wide variety of morphological types. Metates can be grouped into three categories: slab metates that are normally thin, frequently unmodified, and lightly utilized; basin metates that are somewhat thicker, more formally patterned and often heavily utilized; and trough metates that are normally massive and intensively utilized, occasionally to exhaustion. Grinding surfaces vary from amorphous and flat on slab metates, to slightly or deeply concave on basin metates, to deep and rectangular on trough metates. Among these three types, slab and basin metates occur in roughly equal proportion, and trough metates are much less common. The two former types are functionally linked to the processing of wild seeds and plant parts, and the latter type is usually used for maize grinding. Material types include relatively soft sandstones to harder quartzites. A large percentage of the trough metates are made from vesicular basalt slabs, the porous structure of which aids in the preparation of maize kernels.

Mano types are similarly diverse. Morphology ranges from unmodified round to slightly oblong river cobbles which exhibit relatively little utilization, to long, rectangular, shaped slabs. Small, nearly circular to slightly oblong manos are the most common type. Many of the slightly larger manos, which have a length to width ratio of roughly 2:1, were intentionally shaped and utilized on both faces. The largest manos are typically thin slabs of schist with a length-to-width ratio of three or more to one. The latter variety are intentionally shaped and utilized on both faces. As with metates, smaller unprepared or "expedient" manos have been associated with the preparation of wild seeds, plant parts, meat, and pigments. Larger, and in particular longer manos have been linked to the preparation of maize meal. Taken together, these data suggest that although wild floral resources may have comprised the bulk of Sopris phase diets, maize was also an important component.

Sopris phase sites also contain a rich bone and antler tool assemblage. Awls, generally made from the long bones of large mammals, are among the most common bone tool type. They vary in size and degree of finishing from small, sharp, carefully ground splinter awls, to large unprepared metapodial awls with relatively blunt tips. Bone shaft wrenches, antler tine flakers, and bone rasps and gouges have also been documented. Conspicuously absent are the scapula hoes and tibia digging sticks ordinarily associated with Southern Plains horticulturalists. Most bone tools were made from deer and cottontail bones, the two most common species represented in the entire faunal assemblage.

Bone, shell, and stone beads are also common components of the artifact assemblage. The most common types are tubular and round beads made from either cottontail long bones, or large bird bones. Shell beads cut from *Olivella*, a marine genus, have also been recovered, primarily from mortuary contexts. Necklaces made from cylindrical bone beads are also common grave goods. Lesser numbers of shell beads and pendants, frequently made from *Glycymeris*, have also been documented. Beads of these varieties have also been documented in early Diversification period contexts in the Cimarron district (Glassow 1980), in the Vermejo district (Brown and Brown 1997), as well as elsewhere in context area (Erdos 1998). Beads of these types are relatively rare in contemporaneous northern Rio Grande contexts (Green 1976; Mick-O'Hara 1994).

Settlement and Subsistence Strategies

Geographic Distribution of Sites. Information about the geographic extent and physiographic distribution of Sopris phase sites is limited by land ownership patterns on the Park Plateau. However, sites that contain either rectilinear stone masonry architecture or Taos culinary or decorated ceramics are widely distributed across the southern half of the plateau. In the Trinidad district, Sopris phase manifestations are best known from ACOE property around Trinidad Lake. However, probable Sopris phase habitation sites have been documented along tributaries of the Purgatoire River and in the uplands away from the stream (e.g., McKibbin et al. 1997). Sopris phase sites are also known to exist east of Trinidad, on the eastern side of Raton Mesa. Baker (1964, 1965) and Campbell (1969a) note several such sites on both sides of Raton Pass. In the Vermejo district, Campbell (1984) reports on Sopris phase habitation structures (see also Kershner 1984). Several large, Sopris phase hamlets have also been observed in the district (Wetherbee Dorshow, personal communication to Mark Mitchell, 1998).

In the Cimarron district, Glassow (1980, 1984) defined several phases that span the early Diversification period. In particular, the Ponil phase, and perhaps portions of the Cimarron phase, have very close artifactual and architectural similarities with the Sopris phase. The single, excavated Ponil phase structure (NP-1/Area 2) (Lutes 1959a, 1959b) easily fits within the range of variation of the better known Sopris phase structures in the Trinidad district. The structure also contained a comparable lithic, bone, and ceramic assemblage. In addition, rockshelters containing Sopris phase artifact assemblages have been excavated in the district (Bogan 1941; Skinner 1964). The succeeding Cimarron phase, dated on the basis of ceramic cross-dates to the century between A.D. 1200 and 1300, was a continuation of architectural and artifactual patterns established during the Ponil phase (Glassow 1980; Gunnerson 1987). In particular, Cimarron phase architectural forms and ceramic assemblages correspond to those of the Sopris phase, although the presence of Santa Fe Black-on-white and corrugated culinary wares suggests that at least a portion of the Cimarron phase postdates the Sopris phase in the Trinidad district.

Finally, Gunnerson (1959) alludes to the presence of sites with similar ceramic assemblages south of the Park Plateau along the eastern slope of the Sangre de Cristo Mountains from Las Vegas, New Mexico north through the Mora River valley. So little information is available about these sites that the cultural relationships between them and those of the Park Plateau are uncertain.

Given the close correspondence between Ponil phase sites in the Cimarron district and Sopris phase sites in the Trinidad district, it is reasonable to extend the boundary of the Sopris phase to include sites of the early to middle Diversification period in the Vermejo and Cimarron districts. Although it may be the case that the Ponil phase type site is not generally representative of unexcavated Ponil phase sites, it is more likely that the Ponil and Sopris phases are coincident cultural constructs. Because the Sopris phase is more completely defined, and is better dated, it is more broadly applicable than the Ponil phase. Taken together, these data indicate that the Sopris phase was a widespread and persistent cultural phenomenon. Between approximately A.D. 1050 and 1200 or 1300, residents of the eastern slope of the Sangre de Cristo Mountains pursued a dual economic strategy that emphasized both hunting/gathering and gardening, and maintained intensive social and economic contacts with ancestral Puebloans living in the northern Rio Grande valley.

Site Types and Locational Variability. The most extensive study of settlement patterns of the early Diversification period has been conducted in the Cimarron district. Using data collected from the Vermejo, Ponil, and Cimarron drainage basins, Glassow (1980) proposes that settlement on the southern Park Plateau shifted toward lower elevations at the close of the Developmental period and the opening of the Diversification period. He argues that Ponil and Cimarron phase habitation sites are located closer to alluvial bottom lands where simple, garden irrigation might have been practiced. This general trend intensified through time: the locations of later sites tend to be more strongly correlated with the locations of side canyons and alluvial terraces (Glassow 1980:103). Glassow suggests that these locations are more favorable for *akchin* fields, which take advantage of subsurface water drainage patterns, as well as for simple irrigation works.

These conclusions are supported in a general way by evidence from the Vermejo district. The upland terrain which dominates that district appears to have been used more intensively by Developmental period groups (Biella and Dorshow 1997a). Although several components from the early Diversification period have been identified there, most consist of rockshelter occupations without substantial architecture. One excavated Sopris phase site within the Vermejo district is located on a low bench immediately above the main stem of the Vermejo River (Campbell 1984:454). The conclusion that later sites tend to be located at lower elevations within major drainages is also confirmed by more recent investigations, which indicate that the uplands were less heavily used during the Diversification period (Wetherbee Dorshow, personal communication to Mark Mitchell, 1998).

Data regarding settlement location from the Trinidad district are more meager. The geographically concentrated nature of archaeological research conducted in the valley provides a limited view of the distribution of habitation sites. Despite this problem, several block surveys conducted in the uplands have generally not located the stone masonry structures characteristic of the Sopris phase. These projects have, however, encountered abundant evidence that the uplands were heavily utilized for resource procurement and processing activities. It is reasonable, therefore, to conclude that habitation sites of the early Diversification period tend to be located at lower elevations and nearer to major drainages. Among identified habitation sites, most are located in open settings, including terraces and low benches, adjacent to the Purgatoire River and its principal tributaries. On the other hand, several known habitation sites are located on rocky promontories well away from what would ordinarily be considered arable land. Whether this was the result of a shift in settlement location is not known, particularly given that Developmental period habitation sites in the Trinidad district appear to consist primarily of shallow house pits with little modern surface expression.

Relatively little is known about the functional variability of Sopris phase sites. The survey-level site recognition criteria discussed above tend to emphasize habitation sites at the expense of other site types and are therefore unlikely to reveal the full range of functional or morphological site types. Although several nonarchitectural sites have been assigned to the Sopris phase on the basis of projectile point morphology, no detailed chipped stone analysis has been undertaken in the district (Indeck and Legard 1984; Lutz and Hunt 1979; Tucker 1983). Still, a large number of chipped and ground stone scatters have been recorded on terraces adjacent to the Purgatoire River (Blair 1980; Dore 1993; Gleichman 1983; Hand et al. 1977; Indeck and Legard 1984; McKibbin et al. 1997), as well as in the uplands away from the river corridor (Lutz and Hunt 1979; Rood and Church 1989; Tucker 1983).

Unfortunately, most of the sites identified in these investigations cannot be assigned to a particular temporal period. Lutz and Hunt (1979:187) observe that chronological control is "extremely weak," and as a consequence were unable to determine which among the many sites they recorded might be attributable to the Sopris phase. Similarly, Tucker (1983) indicates that only 5 percent of the 132 prehistoric components identified for the Raton Basin project could be assigned to either the Developmental or Diversification period, and that only 14 percent of the sites could be attributed to any temporal period. Similar results were obtained by McKibbin et al. (1997). Despite this lack of chronological control, it is nevertheless clear that the uplands as well as the main river corridors of the southern Park Plateau were intensively and extensively utilized by various prehistoric groups.

Several researchers have offered a variety of schemes to classify site types. Using a model derived from Great Basin ethnography and ethnohistory, Lutz and Hunt (1979) distinguish between "short-term specialized activity areas" and "base camps." They subdivide these categories into four types on the basis of site size, assemblage characteristics, and environmental factors. The detailed nature of this model can be evaluated against the data gathered by McKibbin et al. (1997). A site diversity analysis conducted for upland and terrace sites located in the Lorencito drainage basin suggests that these sites were utilized for a variety of tasks through time (McKibbin et al. 1997). Given the likelihood of multiple occupations at these sites, a functional system of site classification such as that proposed by Lutz and Hunt (1979) may be difficult to implement. Additional chronological control will be required to determine which among the many recorded chipped and ground stone scatters in the valley represent Sopris phase limited activity loci. In any case, it is likely that residential sites formed one element of a larger settlement network that included a range of morphological and function site types. Additional excavation data from temporary field camps, such as rockshelters, may help clarify the structure of the Sopris phase settlement system.

Among Sopris phase habitation sites, two morphological types have been identified. A homestead, which consists of single, habitation structures and associated features, is more common and occurs in a wider variety of topographic settings. The second type, termed "hamlet," contains multiple archaeologically contemporaneous habitation structures and tends to be confined to locations on or immediately adjacent to permanent water courses. Sites of the latter type are sometimes referred to as "villages." Insufficient data are available to determine whether homesteads and hamlets represent similar functional types. It may be that some of the "homesteads" actually functioned as field houses. The relative paucity of the artifact assemblage associated with this type of structure might support this idea, although it may also be that homesteads were simply occupied for shorter periods of time. Additional analysis of assemblages will be required to determine the functional differences, if any, between these two types of architectural sites.

Economy. Like many other Diversification period communities in the Arkansas and Canadian River basins, the Sopris phase inhabitants of the Park Plateau practiced a dual subsistence strategy. Both direct and indirect evidence suggests that hunting, gathering, and maize horticulture were important components of the economy. Maize remains, including kernels that appear to have been dried for storage, cobs, and cupules have been recovered from hearths, storage pits, and surface structures at most, but not all, Sopris phase sites (Ireland 1970, 1974a, 1974b; Mitchell 1997; Puseman 1997). Domesticated beans have also been recovered from 5LA1416 (Puseman 1997). Squash seeds have been recovered from an early Diversification period context in at least one rockshelter in the Cimarron district (Bogan 1941). Similar results have been obtained from macrobotanical studies conducted on the southern end of the plateau for both Developmental (Kirkpatrick and Ford 1977) and early Diversification period contexts (Toll 1988).

Wild plant resources were also important. Edible portions of numerous native plant species, including weedy annuals such as goosefoot, amaranth, purslane, and sunflower; grasses, and in particular Indian ricegrass; cacti (prickly pear, hedgehog); yucca; shrubs (chokecherry, bitterbrush, skunkbrush); and trees (juniper, pine) have been identified at archaeological sites in both the Cimarron and Trinidad districts. Variable sample collection and preparation procedures make comparisons difficult, although goosefoot has been identified as one of the most important wild plant resources in the region (Gleichman 1992; Van Ness 1988).

The storage of both wild and cultivated plant resources was an important component of Sopris phase economic strategies. All excavated Sopris phase structures, with the exception of those built directly on bedrock, contain both interior and exterior storage pits. At least some above-ground rooms attached to habitation structures may also have functioned as storage facilities. The large volume of storage space associated with sites suggests that surplus production may have been significant. The management and allocation of this surplus probably had important consequences for organizational strategies. Interestingly, a comparison of macrobotanical data sets from several sites indicates that domestic crop production may not have been equally important for all households. Extensive water-screening of samples from the structural fill at 5LA1425 failed to recover maize remains (Ireland 1974a), although such remains were widely distributed among structures and features at 5LA1416 (Puseman 1997). This disparity may indicate that different economic choices were made by individual households.

Artifact data also provide indirect evidence for the composition of Sopris phase diets. For example, the abundance of projectile points at Sopris phase sites indicates, at least in a general way, that hunting was an important component of the economy. More than 500 projectile points were recovered from the excavation of Structure 3 at 5LA1416. By comparison, just 13 projectile points were recovered from two contemporaneous pithouses in the Taos district (Moore 1994). Preliminary analyses of faunal remains associated with 11 structures have been undertaken. These studies reveal that both large and small game animals are represented in the faunal assemblage. Dominant species include deer and cottontail rabbits, although bison, pronghorn, beaver, badger, and jack rabbit were also exploited. A variety of carnivores has also been identified, including bobcat, mountain lion, coyote, and bear. Birds, including eagle, hawk, crane, and owl, were utilized, although wild turkey is relatively uncommon. By comparison, several contemporaneous pithouse sites in the Taos district contained more limited faunal assemblages dominated by small mammals, turkeys, and in limited quantities, deer (Mick-O'Hara 1994).

Preliminary analysis of ground stone indicates that both large and small manos, as well as slab, basin, and trough metates occur at Sopris phase sites. The characteristics of this assemblage suggest that throughout the Sopris phase, the processing of native plant species was important, and further, that maize processing is also significant. As noted above, the large and well-preserved bone tool assemblage does not include the scapula hoes or tibia digging sticks so characteristic of Southern Plains Village economies.

Finally, a recent osteological analysis of human remains from the Trinidad district provides additional indirect clues to the composition of Sopris phase diets. Karhu (1995:23) argues that the frequencies of dental hypoplasias, cribra orbitalia, and porotic hyperostosis among Sopris phase individuals contrast with the frequencies of those conditions observed among individuals from large, maize-dependent communities. The degree to which these conditions can be considered proxies for horticultural dependency is uncertain, however (Stuart-Macadam 1992; Holland and O'Brien 1997). It may be the case that low to moderate levels of porotic hyperostosis reflect a semisedentary, residential pattern rather than low levels of maize dependency, although diet may have been an important factor as well.

Architecture. Sopris phase architecture is morphologically variable. At 5LA1416, for example, excavations have uncovered the remains of horizontally laid, plastered stone masonry structures; an adobe structure; and several jacal structures of various configurations. 5LA1416 also contained at least one shallow house pit with a sloping ramp entryway. A similar range of architectural types has been observed at other sites in the Trinidad district.

Among these architectural forms, house pits are the most enigmatic. As discussed previously, radiocarbon and archaeomagnetic dates suggest that at least some of these features predate the Sopris phase; others appear to have been occupied during the Sopris phase (e.g., 5LA1424, Feature B [Ireland 1974b]). Their extreme heterogeneity makes characterization difficult. Some contain collared hearths and storage pits, and others do not. Two appear to have had ramp entryways. Some are little more than single- or multiroom amorphous pits without lined or prepared hearths. Little information is available about the superstructures of these buildings. Still, despite this heterogeneity, it is clear that none resembles what might be considered typical ancestral Pueblo pit structures. Trinidad district house pits are smaller and shallower, and lack ventilator shafts, wing walls, deflectors, benches, or pilasters. Given that house pits in the Trinidad district have no obvious surface manifestations, their frequency or range of morphological variation is not known.

Other Trinidad district architectural features, all of which have been attributed to the Sopris phase proper, are somewhat more patterned. The modal architectural type is a rectangular or subrectangular, multiroom surface structure, constructed from heavily mortared, horizontally laid stone slabs or blocks (see Figure 7-3). Frequently, other types of construction materials, including vertical stone slabs, jacal, and adobe, were also used. In at least one case an entire structure was constructed from adobe, although the precise method of its construction is not known. Individual structures range from two to 10 or 15 rooms in size, although most structures contain two to four rooms. Roofs were massively constructed from a log-and-pole lattice, and at least some interior walls were plastered. Floor features include collared hearths, ash pits, and bell-shaped storage pits. Subfloor human interments are also common among the larger structures.

Many of these buildings were constructed in a series of discrete episodes. Most began as a single large room, to which other smaller rooms were later added. Individual rooms vary in size from more than 40 m^2 to less than 2 m^2. Room functions were variable; the largest generally contain the typical suite of floor features including hearths and storage pits; such features, however, are also sometimes found in smaller rooms. At some sites, extended walls or "fences" formed small plazas or communal work areas. Nonarchitectural features, including post alignments, storage pits, and fire pits, are common outside these structures. Some of the bell-shaped extramural storage features were very large, measuring more than 1 m deep and 1.5 m in diameter at the base.

A number of smaller, circular jacal structures have also been excavated. These consist of a shallow basin over which a waddle-and-daub superstructure was constructed. Some contained collared hearths similar to the larger masonry and adobe structures, although associated storage features appear to have been smaller and less numerous. Additional storage rooms appear not to have been added to these structures.

The available chronometric data are insufficiently fine grained to establish an architectural type sequence for the district. Wood and Bair (1980) proposed that the Initial Sopris subphase was characterized by the construction of pithouses, jacal surface structures, and "campsites"; the Early Sopris subphase by jacal and adobe structures; and the Late Sopris subphase by masonry structures. The data presented here indicate that all of these structural types, with the exception of some house pits, are at least archaeologically, if not precisely, contemporaneous (see also Lutes 1959a, 1959b). In at least one instance, portions of an adobe wall were documented beneath a masonry room; however, the inference that masonry structures, as a type, postdate adobe structures is not supported by radiocarbon dates. In addition, extra-architectural storage or roasting features cannot be seriated into a type sequence. Bell-shaped pits, many of them large, appear to have been associated with both the Developmental and early Diversification periods.

The chronological data presented above indicate that architectural variability among structures in the district is not the product of temporal differences and, furthermore, it is unclear to what this variability should be attributed. Whether interstructural variability reflects functional distinctions or was the result of social differences among the inhabitants is not known. Although assemblage inventories suggest that many of the structures were functionally equivalent (Wood and Bair 1980:227), it is possible that the largest multiroom structures functioned in part as community (not necessarily communal) storage facilities. The ratio of "storage" to "habitation" rooms, as defined by the presence or absence of hearths, approaches 1:3 and 1:4.5 among the largest structures (Structure 1 at 5LA1416 and Structure 3 at 5LA1211, respectively). Alternatively, at least some of the smaller, single-structure sites may have functioned as field houses. However, differences in assemblage size and diversity between the largest and smallest structures may simply reflect duration of residency, rather than functional differences.

There is also evidence that, in at least some cases, the differences between structures may have been related to social factors. Differences in the frequencies of various imported ceramic vessels may indicate that individual households formed exchange partnerships with households or communities in different regions (Mitchell 1997, 1998). These differences may reflect shifting social identities within the Sopris phase community in the Trinidad district, and ultimately the "creolization" of some households (Lightfoot and Martinez 1995). Variations in the size and storage capacity of individual structures may also be a reflection of heterogeneous social roles, and specifically of the degree to which individual households were able to mobilize communal labor.

Directions for Future Research

Chronology

Firm temporal boundaries for the Diversification period need to be established. Cultural attributes that distinguish the Diversification period from the preceding Developmental period and the subsequent Protohistoric period may be more explicitly defined through additional associations of chronometric dates and archaeological assemblages. Further, it is imperative that attempts be made to assess materials from a full range of morphological and functional site types in defining occupation of the Diversification period (see below). Past investigations have emphasized larger architectural sites in such definitions.

- What attributes, or combinations thereof, form the "hallmarks" or primary determinants of Diversification period occupation in the context area?

- At what time and in what geographical area did occupation attributable to the Diversification period first become evident? Similarly, what and where is the final manifestation of the Diversification period?

Temporal and cultural relationships between and among Apishapa and Sopris phase occupations require elucidation. Comparison of attributes has not been emphasized in interpreting this segment of prehistory, despite the common origin and proximity of the Sopris and Apishapa phases. Such a comparison would currently be limited primarily by the meager data associated with early Diversification period components. A number of research questions need to be addressed as additional data become available.

- Does the Sopris phase begin and end earlier than the Apishapa phase?

- What is the extent of regional variation in the temporal ranges of these two phases, e.g., are the dates for the Sopris phase identical in both the Arkansas River Basin and northeastern New Mexico?

- Are dates for the Apishapa phase occupation of the Purgatoire River area earlier than those associated with Apishapa phase components north of the Arkansas River?

- Are both the Sopris and Apishapa phases essentially contemporaneous, Southern Plains manifestations developing from a common origin that differ largely in their adoption of diffused traits?

- Are occupations during the early Diversification period characterized by mixtures of Apishapa and Sopris phase attributes?

- Does Apishapa and Sopris phase rock art suggest a common origin?

Population Dynamics

Considerable portions of the context area remain largely unknown archaeologically, and the extent of occupation during the Diversification period is not firmly established. Current data suggest that occupation does not spill over into the Denver Basin north of the Palmer Divide. The northernmost architectural sites attributed to the Apishapa phase are located just south of Colorado Springs. However, expanses of the context area east of Colorado Springs and south to the Arkansas River are poorly known. Similarly, the southern and western edges of Diversification period occupation in northeastern New Mexico and along the foothills of the Rocky Mountains are only vaguely defined.

- Is there evidence of large-scale Apishapa or Sopris phase occupation in the Canadian and Cimarron river drainages of northeastern New Mexico?

- How far west in the Arkansas, Huerfano, Cucharas, and Apishapa drainage basins does Apishapa phase occupation extend?

- How far west in the upper Purgatoire River drainage does Sopris phase occupation extend?

It remains to be confirmed whether all occupation of the Diversification period in the Arkansas River Basin is related to either the Apishapa or Sopris phase. More data are necessary to determine if distinctions seen among context-area sites are the result of variability within Apishapa and Sopris phase settlement, or the presence of additional, unrelated hunter-gatherer groups.

- Did groups entirely unrelated to either the Apishapa or Sopris phase inhabit the Arkansas River Basin and/or southern Park Plateau during the Diversification period?

- Are spaced stone circles or "tipi rings" and boulder foundation structures evidence that other culture groups inhabited the context area during the Diversification period?

Inter- and intraregional relationships among Diversification period populations require further definition. Although connections between Rio Grande pueblos and Sopris phase populations are well established, Apishapa phase interaction with other groups including those of the Sopris phase is poorly understood. Furthermore, little is known of the degree of contact among settlements within each of the phases.

- What is the evidence for interaction among Sopris and Apishapa phase populations?

- Is there evidence for Apishapa phase interaction with Upper Republican groups as well as Antelope Creek phase populations; if so, does the Upper Canark Regional Variant concept as currently defined remain viable in light of such evidence?

- What is the evidence for intersettlement trade and alliances within the Apishapa and Sopris phases?

- Is there rock art evidence suggesting the delineation of cultural boundaries?

The purported population increase during the Diversification period requires further investigation. Although the visibility of architectural sites has been cited as a possible factor in the large proportion of sites assigned to this segment of prehistory, the situation may also be attributable to a general increase in population. Alternatively, it is speculated that population numbers may have remained stable but groups became increasingly aggregated or concentrated in specific areas during parts of the year. Thus, population density patterns rather than overall population volume may have changed during the Diversification period.

- Are the largest architectural sites of the Diversification period later than those with fewer rooms and/or structures?

- Are all site types, not just those with architecture, more prevalent in the Diversification period?

- Do large numbers of Diversification period sites tend to be restricted to relatively small portions of the overall context area?

- Are Diversification period occupations in stratified, multicomponent rockshelters more often characterized by assemblages suggestive of larger populations?

Considerable research is required to elucidate matters pertaining to the abandonment of the context area by Diversification period populations. Widely ranging factors, most of which are interrelated, have been offered as possible explanations for the abandonment of the context area during the fourteenth and early fifteenth centuries. Possible catalysts include deteriorating climatic conditions, isolation, increasing competition for limited resources, warfare, population incursions, and assorted combinations thereof. Of these, debate is most often centered around the arrival of Athapaskan groups and the drought conditions that so dramatically affected the Southwest in the thirteenth century.

- Was abandonment during the Diversification period gradual or sudden, and how did this process vary regionally?
- What is the evidence for interaction among Diversification period and Athapaskan populations, and did this include warfare?
- What is the evidence for interaction among Apishapa and Sopris phase populations, and did this include warfare?
- Do the so-called Apishapa phase forts, purportedly built for defensive purposes, actually represent sacred precincts or elite residences?
- Does archaeological and/or ethnographic evidence suggest that Apishapa populations dispersed to regions east of the context area?

Technology

Lithic technological emphases of the Diversification period need to be identified and subsequently compared with those of surrounding regions and other cultural taxa of the context area. It is reiterated that baseline production and use strategies should be identified for the Diversification period in addition to patterned diagnostic tools. Debitage analyses including quantifiable measures such as size grading and tool analyses that incorporate a number of well-defined morphological variables facilitate such technological assessments. Behavioral aspects of lithic technology that facilitate the discernment of changing sedentism and mobility patterns have only recently been addressed for the Diversification period. The large samples often associated with sites of this time offer expanded opportunities for such research. The following questions should merely be considered examples given the myriad avenues of research applicable to this topic.

- Does the emphasis on unmodified or minimally modified flake tools and bifaces apply to all Diversification period sites?
- Does the relative proportion of expedient to formal tools differ from the preceding Developmental period?
- Do lithic assemblages of the Diversification period exhibit fewer patterned tools than, for example, Antelope Creek phase villages to the east?
- What is the evidence for regional variation in context-area raw material availability and how does this affect lithic technology?
- Does the relative proportion of expedient to formal tools vary according to site type in the Diversification period?

- Are all architectural sites of the Diversification period characterized by assemblages oriented specifically toward late stage reduction and tool refurbishment?

- Which site types of the Diversification period show evidence of early and middle-stage biface production perhaps representative of "gearing up" for seasonal rounds?

Comparison of Apishapa and Sopris phase technologies as well as regional variation among both should be stressed in future research. Sites of the two prominent phases of the Diversification period are often situated in proximity to one another and are hypothesized to have a common origin within a long-standing hunter-gatherer tradition. However, as has been noted elsewhere, rigorous comparison of Apishapa and Sopris phases has been lacking. The larger artifact samples associated with these sites offer ideal opportunities to assess technological relationships (or lack thereof). In particular, the ceramic assemblages recovered from Apishapa and Sopris phase sites warrant further attention. The same comparisons may be applied to regional variation within each of the phases, e.g., technological differences between the Apishapa phase occupations along the Purgatoire River and those north of the Arkansas River have yet to be addressed.

- How do the polished and cord-marked wares recovered from Apishapa and Sopris phase occupations compare; are they manufactured locally, and are they indicative of trade/interaction among the two phases?

- Are Southwestern trade wares more pervasive among Apishapa phase occupations south of the Arkansas river; alternatively, are cord-marked wares imported from Plains Village contexts more prevalent among Apishapa phase occupations along Turkey Creek?

- What are the implications of projectile point differences exhibited by Apishapa and Sopris phase occupations, e.g., are the side-notched Reed/Washita points more likely to be associated with Apishapa phase bison procurement?

- Are small, corner-notched points (e.g., the Scallorn type) relatively more prevalent among Sopris phase occupations in the Purgatoire River region than in other portions of the context area?

- Do Apishapa and Sopris phase occupations share common clay and/or chipped stone sources?

- Are Sopris phase ground stone assemblages characterized by more formally patterned tools and greater time invested in their manufacture than those of the Apishapa phase?

- How do Apishapa and Sopris phase bone and shell tools and ornaments compare?

- Do the formal bone tools found in Apishapa and Sopris contexts have precedents in the Developmental period?

Aspects of Diversification period technology indicative of interregional and intersettlement relationships should be further explored. Several interesting research directions are applicable to this wide-ranging topic. Particularly important are data that may elucidate matters related to the question of Apishapa phase isolationism and Sopris phase interaction (or lack thereof) with regions other than that of the Rio Grande pueblos. Additional source analyses for ceramics, shell, and lithic artifacts are crucial for resolving the following questions. Furthermore, research in the context area has reached a point where sufficient data have accumulated to identify previous collections that may facilitate current examinations of specific topics. For example, Southwestern corrugated ceramics are relatively rare occurrences among Diversification period occupations. Two such occurrences are reported from the excavations at the Avery Ranch site in the 1960s and the Ocean Vista site in the 1980s. These are roughly contemporaneous sites located in proximity to one another. A detailed comparison of the corrugated sherds from the two sites by a single ceramicist may provide important insight into relationships between the two sites and trade with the Southwest. Such reanalysis of combined collections may facilitate addressing some of the questions presented here.

- Which cord-marked, polished, and plain wares recovered from Diversification period occupations reflect local manufacture; which cord-marked wares are trade items?
- Does all obsidian associated with Diversification period occupation originate from northern New Mexico sources?
- How widely distributed is the Alibates dolomite from the Texas panhandle, and is it more likely associated with the Diversification period rather than Developmental period; is it more likely associated with the Apishapa phase than the Sopris phase?
- Does shell from exotic sources tend to be associated more often with Sopris rather than Apishapa phase occupations?

Settlement and Subsistence Strategies

Future research efforts should focus on determining the full range of variability of Diversification period site types. Although past Diversification period research has generally emphasized large architectural sites and rockshelters, recent investigations indicate that the taxon encompasses considerable variability in site types that is suggestive of a wide functional range. However, the extent of this variability and its ultimate implications for settlement patterns have yet to be adequately explored. Architecture, for example, was not built solely for large residential bases; a number of isolated, single structures are also known. Architectural sites and rockshelters appear to encompass a wide range of functions during the Diversification period. Although little is known of the function of open, nonarchitectural sites, these too exhibit considerable variability in size and in feature and artifact composition. Overall, it is most important to conceptualize Late Prehistoric settlement in general, and Diversification period settlement in particular, as dynamic; settlement patterns undoubtedly changed through time in response to environmental and cultural factors. Therefore, this topic is inextricably tied to chronology. Much of the site type data presently available have been acquired through survey, and this information is therefore limited in its utility for assessing more precisely site functions and temporal variability. Although additional survey is important, excavation data will greatly facilitate resolution of many of the questions presented below.

- Is there evidence that both Sopris and Apishapa settlement systems conform to the collector strategy proposed by Binford (1980), or is there a better model?
- Do Apishapa and Sopris phase settlement systems include architectural sites representative of both limited-activity field houses and residential bases where a number of tasks were completed?
- What are the various functions of rockshelters in the Diversification period settlement system; are there rockshelters that represent relatively long term residential bases?

- What is the functional range of open nonarchitectural sites?

- Do lithic procurement and manufacturing sites of the Diversification period generally include materials suggesting that other domestic tasks (e.g., plant processing) were accomplished at these locales in conjunction with the stone tool production?

- Does early and middle-stage lithic production ever occur at Diversification period residential bases?

The range of feature morphology and function and correlations between specific feature types and site types of the Diversification period needs to be more fully investigated. Research oriented toward features that are directly related to the construction of architecture or situated within structures is discussed in a subsequent section. Narrative presented here is largely concerned with nonarchitectural features such as rock art, hearths, roasting pits, human interments, and storage facilities. Again, the paucity of excavation data has restricted studies pertaining to this topic; much of the more detailed information about feature morphology is derived from the larger architectural sites.

- Are exterior, fire-related and storage features at Sopris phase sites more formally constructed than those associated with Apishapa phase sites?

- Are the large concentrations of fire-cracked rock and ash often recorded as roasting pits associated with Diversification period sites; what is their specific function(s), and are they more prevalent among Apishapa phase contexts than those of the Sopris phase?

- How does feature morphology vary among architectural sites, rockshelters, and open nonarchitectural sites?

- What is the evidence for Apishapa phase burials, and where are they found in relation to architectural residential bases?

- Does feature morphology vary on a regional basis in the Apishapa and Sopris phases, e.g., do Sopris phase occupations in the southern Park Plateau have a greater range of feature types than those in the Trinidad district?

- What is the morphological range of storage features in the Diversification period, and how do such features vary according to phase and/or region?

- How does feature morphology in the Diversification period correlate with specific subsistence items?

- Is Diversification period rock art distinguishable from earlier and later examples, and how does Apishapa phase rock art compare or contrast with that of the Sopris phase?

Past studies of settlement in the Diversification period, particularly those concerned with the distribution of Apishapa phase architectural sites, have emphasized canyon settings. Although the so-called defensive positions of Apishapa phase sites have been prominently featured in descriptions of Diversification period settlement, the largely contemporaneous Sopris phase is generally not associated with defensive canyon settings. In actuality, the term "canyon setting" encompasses a wide array of environmental niches in the context area, and Diversification period sites are distributed throughout. Furthermore, recent investigations have revealed the presence of both architectural and nonarchitectural sites located at some distance from canyon incisions.

- Is there a dichotomy in the subsistence orientation of Apishapa phase residential bases located in shallow as opposed to deep canyon settings, e.g., are bison remains more strongly associated with the shallow canyon sites with easier access to broad expanses of open plains?
- Do field camps of the Diversification period extend into higher elevation, foothill locales?
- Do open nonarchitectural sites tend to be more widely distributed through a range of environmental settings than architectural residential bases?

Much remains to be learned about regional, temporal, and phase-level variation in the role and distribution of cultigens during the Diversification period. Although domesticated beans are currently known only in Sopris phase components, maize was widely distributed through the context area and the Park Plateau of northeastern New Mexico. However, currently available data suggest that its importance in the overall subsistence strategy of populations during the Diversification period may have differed according to region and perhaps phase. As with variability in site types, this facet of settlement-subsistence strategy during the Diversification period is presumed to have a temporal component; the role and distribution of maize probably changed through time.

- Was maize more prevalent among Sopris phase than Apishapa phase occupations?
- Were domesticated beans associated only with the Sopris phase?
- Is there a correlation between elevation of sites and quantity of maize remains?
- Is maize most abundant in southern Park Plateau sites in comparison with the greater context area?
- Was maize distributed through the context area by trade and/or a seed exchange system?
- What is the evidence for maize storage, and does it vary according to phase and/or region?
- Is maize more prevalent in occupations of the Diversification period than in those of the preceding Transitional phase; does use of maize increase over the course of the Diversification period?

Temporal, regional, and phase-level variation in the diversity and role of wild plants in the subsistence strategy of Diversification period sites requires additional investigation. Weedy annuals, particularly charred goosefoot seeds, appear to have been the preferred subsistence item among Diversification period populations. However, little is known about regional and phase-level differences in wild plant use. Furthermore, the influence of preservation factors in standard botanical analyses must ultimately be addressed. Preservation conditions vary considerably according to site-specific environments, and in most situations, fleshy plant parts do not preserve as well as charred seeds. Although largely untested, protein residue analysis may provide important data that supplement micro- and macrobotanical studies.

- Is the prevalence of goosefoot in components of the Diversification period due to preservation rather cultural factors?

- Is goosefoot more conducive than other weedy annuals to rudimentary horticulture in a variety of environmental settings?

- What is the evidence for regional and temporal variation in wild plant procurement during the Diversification period?

- What are the differences, if any, between Apishapa and Sopris phase wild plant utilization?

- What evidence exists for wild plant storage; what is the range of wild plant storage facilities and do such features vary according to phase and/or region?

Faunal assemblages from the Diversification period require additional study as well. A mixture of small mammal and medium to large artiodactyl procurement continued to be pervasive during the Diversification period, although a wide range of ancillary foods such as freshwater mussels obviously supplemented the diet. Emphases on particular types of animals vary considerably by site. Overall, leporids and deer appear to be the most commonly occurring faunal remains, but certain large, architectural settlements of the Apishapa phase are evidently more strongly oriented toward bison procurement and processing. Whether the variation reflects regional, seasonal, or temporal factors, or some sort of combination thereof, awaits further examination.

- Are the large Apishapa architectural sites located in shallow or tributary canyon settings oriented toward seasonal bison procurement and processing?

- Do the bison-oriented components tend to be associated with a specific temporal range within the Diversification period, and are they restricted to regions north of the Purgatoire River?

- Do rockshelters, regardless of phase association, tend to be more often associated with small mammal and leporid procurement?

- Is there evidence for Sopris phase bison procurement?

- What is the evidence, if any, for regional variation in faunal procurement during the Diversification period, e.g., are the faunal remains associated with components south of the Purgatoire River more or less the same as those north of the Arkansas River?

Comparison of architectural styles of the Diversification period with those of the preceding Developmental period is necessary. Such comparison is inhibited by the lack of Developmental period architecture from the larger context area; most examples are known from the southern Park Plateau region of northeastern New Mexico. The rudimentary, basin house form was present during the Developmental period as well as the Apishapa and Sopris phases of the Diversification period. However, interior storage pits were apparently more common in Sopris phase and Developmental period houses than in Apishapa phase structures. Isolated structures were common in the Developmental and Diversification periods, but the latter period also includes massive multiroom structures and ancillary barrier walls. These temporal trends in architecture have many implications for discerning changes in settlement pattern that ultimately tighten the definition of the Diversification period.

- Are the auxiliary wall segments, referred to variously as barrier walls, fences, and/or alleyways, associated only with architectural sites of the Diversification period?

- Are aggregated room structures associated only with the Diversification period; if so, are they more prevalent during the latter half of the Diversification period?

- Are prepared floors associated only with the Diversification period?

- Is wall construction using horizontal slabs associated only with architecture of the Diversification period?

Much remains to be learned of the reasons for the substantial variability seen in architecture of the Diversification period. Architecture in the context area includes the enigmatic rectilinear cobble wall structures, the circular slab walls of the Apishapa phase, and the subrectangular to rectangular, horizontal slab walls of the Sopris phase. However, within these basic frameworks considerable variability is reported that remains largely uninterpreted. Structures are noted to vary in attributes such as room size, wall construction, floor preparation, structure shape, and interior and exterior features. Architectural sequences are currently prohibitive because available chronometric data indicate that this variability was roughly contemporaneous. Future investigations may expose the relationship between the variability and such factors as functional differences (e.g., storage versus communal work areas) and/or community organization (e.g., status).

- What evidence for room contemporaneity exists within the large, multiple-structure sites of the Diversification period?

- Is the variation in room size and construction related entirely to functional considerations, e.g., are the largest rooms communal work areas and the smallest, storage facilities?

- Do any or all Diversification period architectural sites reflect planned community organization?

- Are there regional trends in architecture that are not attributable to phase-level distinctions, e.g., is aggregated room architecture, regardless of phase, more pervasive along the Purgatoire River than in other portions of the context area?

- Are the cobble wall foundations found in the upper Purgatoire and Huerfano river drainage basins related, and what is their relationship to Apishapa and Sopris phases?

Detailed comparison of architecture of the Apishapa and Sopris phases is crucial for elucidating settlement and perhaps interregional relationships of the Diversification period. Such comparison is inhibited by the substantial variability seen within each of these phases, i.e., no standard structural form is discernible for either the Apishapa or the Sopris phase. Currently, a compendium of architectural attributes must be assessed to determine patterns or trends that are more likely associated with a particular phase. Such trends may have important implications for interpretation of sedentism, mobility, and community organization of the Diversification period. Furthermore, these architectural data may generate more precise indications of the manner in which architectural attributes originating in surrounding regions diffused into the context area.

- Are storage rooms more likely associated with Sopris phase architecture?

- Are isolated, single-room structures more likely associated with Apishapa phase settlement?

- How do Apishapa and Sopris phase superstructures compare?

- Are mortuary chambers associated only with Sopris phase architecture, and does this reflect greater levels of social organization and sedentism or simply that Apishapa settlements tend to be built in areas where bedrock is near the surface?

- Are "barrier wall" segments more prevalent among Apishapa phase than Sopris phase components?

- Do Sopris phase architectural attributes e.g., rectilinear foundations, collared hearths, storage bins, and heavily mortared horizontally laid slabs, compare in any way with Plains Village manifestations to the east, such as the Antelope Creek phase?

- How does Apishapa phase architecture compare with that of the various Plains Village manifestations?

- Does wall construction of the Sopris phase exhibit the variability that is typical of Apishapa phase structures?

Geomorphology and Paleoclimates

Convincing evidence exists for climatic deterioration during the Diversification period from both within and outside the context area. Conditions became more xeric after ca. A.D. 1000, with strong implications for demographic changes ending in apparently regional abandonment at the end of the period. Despite the consensus that exists among archaeologists and geomorphologists alike about directional climatic change during this period, the specifics of such change are poorly understood. Research remains to be undertaken about the timing, intensity, and exact nature of paleoclimatic change, the geographic expression of such change, and the implications for human adaptation.

- When did the climate begin to change, and was the transition from mesic to xeric conditions gradual or abrupt?

- Do paleoclimatic data suggest widespread drought conditions in the context area by the A.D. fourteenth century?

- Did xeric conditions intensify during the course of the Diversification period, or did conditions become static after an initial paleoclimatic shift?

- What other geomorphic processes were predominant during the period besides eolian activity?

- Can paleosols be identified that are associated with the Diversification period, particularly in higher, moister areas where the effects of climatic deterioration might have been less severe?

- Is the post-A.D. 1000 increase in eolian activity seen at specific locales in fact widespread through the context area?

- Do sand dunes and sand sheets that developed during the Diversification period display the same association with human settlement that is evident in such deposits of earlier age?

- Could the absence of archaeological sites after ca. A.D. 1450 reflect, at least in part, the loss of terrains due to paleoclimatic conditions and related geomorphic processes?

- What relationship exists between the so-called Great Drought of the late thirteenth-early fourteenth century Southwest and the paleoclimate of the context area during the Diversification period?

- Did climatic change affect the numbers and distribution of bison in the plains portion of the context area during this period?

PROTOHISTORIC PERIOD

Introduction

The final period of the Late Prehistoric stage is assigned a temporal range extending from A.D. 1350(?)/1450 to A.D. 1725. Previously, the definition of the Protohistoric period has involved subjective measures of European and aboriginal interaction, i.e., the temporal range is said to encompass the time between the initial contact of Spanish and Native American cultures, and the onset of regular interaction among them (Lintz and Anderson 1989:27). For the Arkansas River Basin, it is believed more appropriate to describe the onset of the Protohistoric period via the possibly overlapping dates associated with Apishapa phase abandonment and the arrival of Athapaskan groups. Neither event is well documented in the context area, but the timing may become more refined through the acquisition of additional chronometric data. The date of the transition from the Protohistoric period to historical events was given as A.D. 1750 in the previous research context (Eighmy 1984), but as Gunnerson (1987:113) notes, this date is somewhat arbitrary. Historical records for European/aboriginal contact in the region extend back to the Coronado Expedition of 1540-1542. However, these earlier data are meager and often placed within the realm of regional ethnohistorical research, for which there are several summaries available (Carrillo 1999; Eddy et al. 1982; Hanson and Chirinos 1989; Jones et al. 1998; Weber 1990). The date of A.D. 1725 presented here to represent the terminus of the Protohistoric period coincides largely with the withdrawal of various Apachean (i.e., Athapaskan) bands from southeastern Colorado (e.g., Carlana, Penxayes, Cuartelejos, Palomas) and concomitantly, an increase in Spanish expeditions and Comanche incursions. That many of these southern Athapaskan bands eventually became subsumed within a single taxon, "Jicarilla Apache," has as much to do with the difficulties involved in verifying their individual identities as recognizing any broad affinities among them (Jones et al. 1998:62). Apachean withdrawal was evidently provoked by the advent of the Comanche, whose efforts to control the Arkansas River Basin were ultimately successful. Beginning shortly before 1700, historical records for the Southern Plains expand dramatically through accounts of the Oñate, Zaldivar, Ulibarri, and Valverde expeditions. These chronicles indicate that the various Apachean groups were harassed by the Comanche and their Ute allies as early as 1706, and by 1719 were well into the process of being pushed into eastern New Mexico and west-central Texas (Carrillo 1999; Weber 1990).

The ethnohistory of the Arkansas River Basin is well summarized in a number of recent documents (Carrillo 1999; Eddy et al. 1982; Hanson and Chirinos 1989; Jones et al. 1998; Weber 1990); this section emphasizes the poorly known archaeological sites of the Protohistoric period. Such sites have been regarded previously as "undefined Apachean" or "Southern Plains Apache" manifestations that resulted from the migration of Athapaskan groups from west-central Canada

(Gunnerson 1987; Lintz and Anderson 1989:29). The terms "Apachean" and "Athapaskan" as used for Protohistoric period occupation in the context area have become interchangeable. The cultures related by their common Athapaskan linguistic stock included those known historically as the Navajo, Mescalero Apache, Chiricahua Apache, Kiowa Apache, and Jicarilla Apache. Of these, it is the last group named and its predecessors that evidently play the most prominent role in the later Protohistoric occupation of the context area. Overall, these groups are characterized by considerable variability in adaptation, likely because of their propensity for interacting with, and adopting certain elements of, neighboring cultures. However, Athapaskans are speculated to have entered the context area during the Late Prehistoric stage as aceramic, nomadic bands that used dog travois and whose subsistence centered on foraging and bison hunting. In actuality there is little or no archaeological data pertaining to prepottery Athapaskans in the context area. To date, investigators have established no criteria for distinguishing such sites from those of earlier, or perhaps contemporaneous, indigenous hunter-gatherer populations. During the course of the Protohistoric period, some Athapaskans evidently evolved into a more sedentary populace that practiced a dual foraging-gardening subsistence strategy and manufactured pottery.

The most prominent archaeological manifestation of Protohistoric Apachean occupation in the Central Plains is the Dismal River aspect (Gunnerson 1987:102-107). Dismal River architectural settlements or "villages" are known primarily from locales in Nebraska and western Kansas, where these people interacted with Caddoan groups. However, the Dismal River aspect is believed to extend into the Arkansas River Basin since it may include a regional settlement phenomenon termed "El Cuartelejo" (the far quarter) by seventeenth and early eighteenth century Spanish explorers (Carrillo 1999; Gunnerson 1987). Rather than a single massive community, El Cuartelejo is currently seen as a series of Plains Apache "rancherias" situated north of the Arkansas River and extending from Horse Creek in Crowley County, Colorado to Scott County, Kansas (Carrillo 1999). These settlements figure prominently in regional historical accounts because of their role as refugia for Taos and Picuris Puebloans fleeing from Spanish oppression (e.g., the Pueblo Revolt of 1680 in New Mexico). To date, however, archaeological sites that are confirmed to be affiliated with El Cuartelejo have not been identified in the context area. Apachean sites fronting the Sangre de Cristos and extending into the mesas and canyons of southeastern Colorado and northeastern New Mexico are posited to represent an Athapaskan cultural variant distinct from the Dismal River aspect (Brunswig 1995). This division, probably comprised of a number of bands, has been termed Jicarilla or Sangre de Cristo Apache and was influenced by contact with Rio Grande Puebloans (Brunswig 1995; Gunnerson 1987). The level of admixture and interaction among these Apachean groups is currently unknown.

Chronology

The estimated time of the Southwestern Athapaskan entrada remains controversial. Avonlea materials, presumed to be associated with the Athapaskan predecessors of the Plains Apache, date between A.D. 400 and 1250 on the Northwestern Plains; associated chronometric data achieve a peak from roughly A.D. 800 to 1000 (Brunswig 1995:174-175; Frison 1991:111). In the Southwest, most investigators believe that linguistic and archaeological evidence is indicative of an early sixteenth century arrival (Brunswig 1995; Carrillo 1999; Gunnerson 1987; Jones et al. 1998:59). The time segment between approximately A.D. 1250 and 1550 is murky with regard to Apachean archaeology. In discussing the Dismal River aspect, Gunnerson (1987:102) notes that "although Apachean sites of the 1500s have not yet been identified, they are certain to exist." Most sites referred to as Protohistoric Apachean are identified on the basis of micaceous pottery, the dating of which is not firmly established in the context area (Hummer 1989:367-368). Rock art offers much potential for identifying Protohistoric components but such data are currently limited to relatively few sites (Loendorf 1989; Loendorf and Kuehn 1991). Most significantly, there is little radiocarbon information indicative of Protohistoric period occupation in the Arkansas River Basin (see Appendix A). The more prominent examples are summarized here.

An association between early Apachean occupation and stone circle or "tipi ring" sites has been suggested for tributaries of West Carrizo Creek Canyon in Las Animas County (Kingsbury and Nowak 1980; Kingsbury and Gabel 1980). Charred bone recovered from a hearth situated within 2 m of a tipi ring at 5LA1052 produced a radiocarbon age assessment of A.D. 1350 ± 55 (Kingsbury and Nowak 1980:66). Furthermore, ceramics identified as Pueblo IV trade ware (San Lazaro Glaze polychrome) were recovered from another nearby tipi ring site, 5LA1721. A date range of A.D. 1490 to 1515 was ascribed to the manufacture of this type of pottery (Kingsbury and Nowak 1980:66). Charcoal samples recovered from an enigmatic rectilinear Structure 1 at 5HF1079 on Bucci Ranch property produced a range of Late Prehistoric stage radiocarbon age assessments (Zier et al. 1996b; see synthesis of Late Prehistoric stage, this volume). Although the associated diagnostic materials indicated a Diversification period occupation, the latest radiocarbon date was a conventional age of A.D. 1430 ± 60, suggesting the possibility for a Protohistoric period component. Apachean pottery (Ocate Micaceous) was collected from site 5HF1093, approximately one mile distant from the structure.

A conventional radiocarbon date of A.D. 1435 ± 65 was recovered from an unusual burned rock feature at the Louden site near Mesa de Maya in Las Animas County (Greer 1966). The investigator noted similarities to mescal and/or sotol pits in western Texas and southern New Mexico, but no diagnostic Apachean artifacts were recovered. A tipi ring was associated with the site but its affiliation has not been established. Conventional radiocarbon age assessments of A.D. 1530 ± 80 and A.D. 1550 ± 95 were obtained from bone associated with the interment of a young female at the Chubbuck-Oman site in Cheyenne County, Colorado (Tipton 1967). The only artifacts recovered from this burial were 42 *Olivella* shell beads. Cultural affiliation was tentatively attributed to the "Upper Republican Horizon" (Tipton 1967:20) A conventional radiocarbon age assessment of A.D. 1580 ± 60 was obtained from near the surface at the Sue site at the PCMS (Loendorf and Kuehn 1991). Interestingly, although the Apachean pottery associated with this date was noted as similar to Hummer's Polished Category 1, a type comparable to Dismal River pottery (Loendorf and Kuehn 1991; Loendorf et al. 1996), it is listed as Ocate Micaceous in Brunswig's report on Apachean ceramics (Brunswig 1995:Appendix A). This matter is discussed in greater detail in the Technology section, below. A rockshelter component believed to be related to the radiocarbon-dated Protohistoric occupation at the Sue site was recorded at 5LA3189 (Loendorf et al. 1996:167-189). This site is situated along Burke Arroyo, a drainage in proximity to Van Bremer Arroyo, along which the Sue site is located. Two types of Apachean pottery, Micaceous Category 3 and Micaceous Category 5, were recovered from 5LA3189. These types are possibly representative of pronounced differences in manufacture origin. Micaceous Category 3 is believed to be comparable to Dismal River pottery, but Micaceous Category 5 sherds suggest the presence of a globular "Jicarilla bean pot" (Loendorf et al. 1996; Hummer 1989:359-362). Also situated along Van Bremer Arroyo in relative proximity to the Sue site are two spaced stone circle sites with associated ceramics believed to be representative of Apachean occupation (Andrefsky et al. 1990). Both of the sites, 5LA5254 and 5LA5256, are associated with Polished Category 1 sherds that compare favorably with Dismal River pottery (Hummer 1989; Sanders 1990). Additionally, a blue glass trade bead was recovered from 5LA5254. Together, these PCMS sites constitute evidence of significant Apachean occupations possibly dating to the late sixteenth century.

In contrast to virtually all other research, Schlesier (1994:331, Figure 14.2) sees a continuum of Athapaskan occupation within the context area through the latter half of the Late Prehistoric stage. Schlesier believes that an Avonlea migration prior to A.D. 1000 resulted in the Sopris phase occupations beginning ca. A.D. 950. As stated earlier in the document, this thesis is based primarily on scant skeletal evidence from the Sopris phase. Thirteen burials, primarily from 5LA1416, were examined for the frequency of triple-rooted first molars, a trait for which high percentages are associated with Athapaskan populations. Turner (1980:Appendix I) found this characteristic among 23.1 percent of the first molars associated with the 13 Sopris mandibles and concluded, "These calculations suggest that there is reason to suspect the Colorado sample might be Athabascan, and that it would be worthwhile for the archaeologists to assess affinity using other recovered materials with this possibility in mind." Other forms of data have failed to corroborate such an affinity (see Sopris phase discussion, this chapter).

Protohistoric sites in the context area are shown in Figure 7-5.

Population Dynamics

Brunswig (1995:172-175) summarizes Athapaskan migration in an article that reviews Apachean ceramics from a variety of regions including eastern Colorado. The author suggests that Late Prehistoric Avonlea assemblages from southern Wyoming and northeastern Colorado represent the immediate predecessors of the Protohistoric Apacheans. By the late sixteenth century, according to Brunswig, Apacheans were well established throughout the Central and Southern Plains and the Southwest. Furthermore, a number of divisions or "culture pattern variants" are apparent within the overall Plains Apache phenomenon that may represent highly variable band-level expressions. This variability is, in part, thought to reflect regionally based differences in the acquisition of traits from neighboring culture groups (Brunswig 1995:191; Gunnerson 1987). Based largely on morphological variation among ceramic assemblages, investigators have recently identified three "hypothetical culture pattern variants": an eastern Dismal River variant adopting traits from neighboring Caddoan groups, a western Dismal River variant influenced by Shoshonean groups of the central Rocky Mountains, and a variant labeled Sangre de Cristo or Jicarilla Apache that is characterized by significant interaction with Rio Grande Puebloans (Baugh and Eddy 1987; Brunswig 1995).

Brunswig (1995:Appendix A) identified 22 sites in the context area with pottery diagnostic of two Apachean variants, the western Dismal River and Sangre de Cristo. A map in the report shows that the western Dismal River pottery is largely restricted to the northern and western portions of the context area, and that Sangre de Cristo Micaceous pottery is primarily distributed within and south of the Purgatoire River region (Brunswig 1995:Figure 2). However, this sample includes only a portion of the 1983-1984 PCMS site sample from which Apachean-like pottery was recovered. The PCMS sites listed in Appendix A of Brunswig's 1995 report include only those with Polished Category 1 specimens; excluded are PCMS sites associated with micaceous ware specimens that Hummer believed were comparable to Apachean ceramics (Brunswig 1995; Hummer 1989). Furthermore, whereas Hummer (1989) and Sanders (1990) compare Polished Category 1 to Dismal River aspect pottery, Brunswig (1995:Appendix A) lists these sherds as Ocate Micaceous. This possible oversight is discussed in greater detail in the Technology section below. Campbell's (1969a:116-117) Chaquaqua Plateau micaceous pottery sites are also excluded from Brunswig's study, but this situation can be attributed to the limited ceramic descriptive data. Although Brunswig provides an important and useful synthetic report on Apachean ceramics and population dynamics, some of the basic data sets need to be reexamined. The Purgatoire River region may be characterized by greater interaction and movement among the various Apachean cultural variants than is suggested by Brunswig's work.

The context area is characterized by relatively few archaeological manifestations that are confirmed as Protohistoric Apachean. Although ceramic research indicates that two Apachean variants are represented, major settlements associated with either are currently unknown in the Arkansas basin (Brunswig 1995). Two of the more prominent concentrations of Apachean

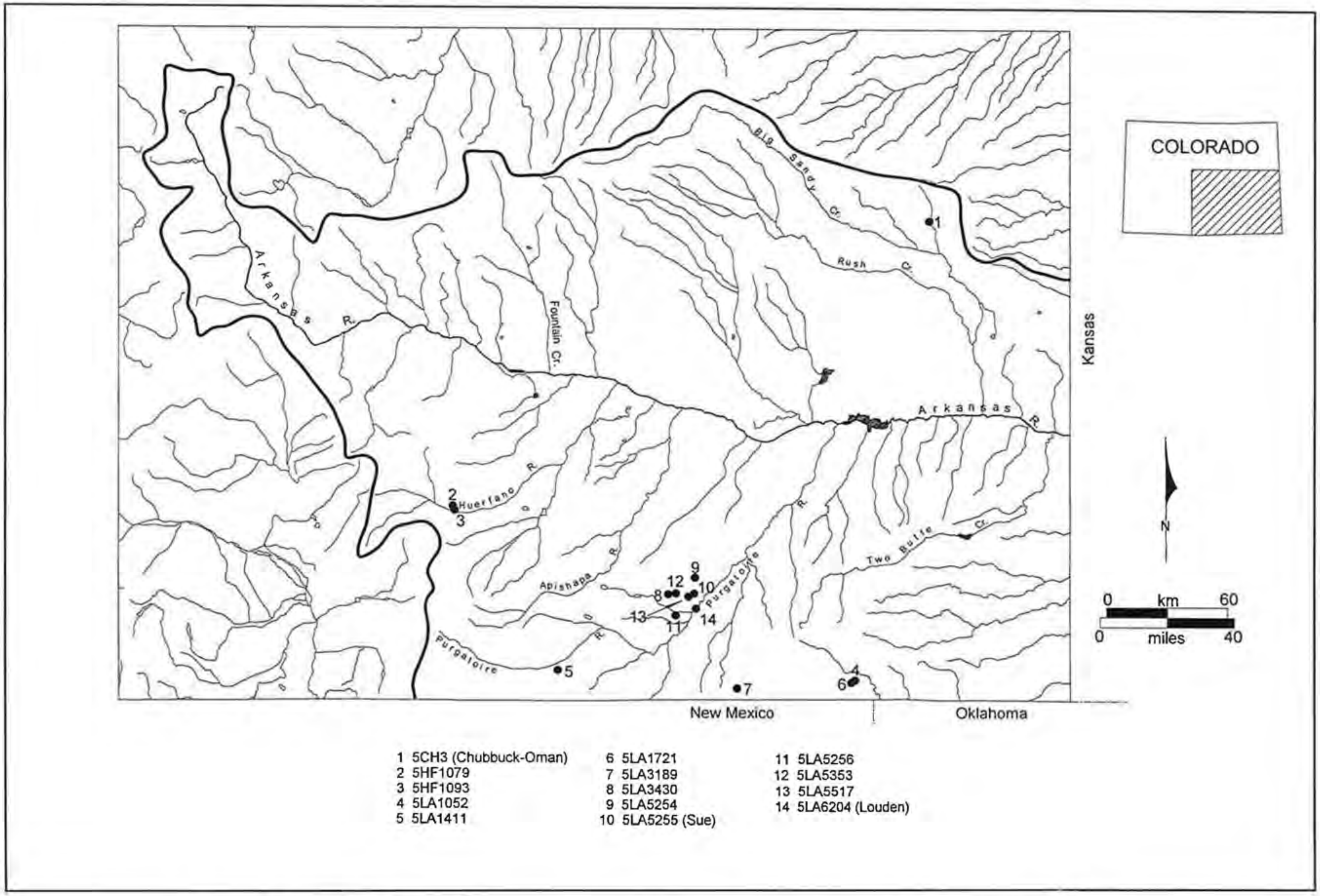


Figure 7-5. Map of Arkansas River context area showing locations of selected Protohistoric period sites.

occupation are currently known from the West Carrizo Creek region and in the Van Bremer/Burke Arroyo vicinity within the PCMS (Andrefsky et al. 1990; Loendorf 1989; Loendorf et al. 1996; Kingsbury and Nowak 1980). These occupations are characterized primarily by a series of tipi ring and/or rockshelter sites indicative of temporary residences for plains nomads traveling through the context area. Protohistoric components in the context area have sparse artifact and feature assemblages that are suggestive of short-term, limited activity occupations (Andrefsky 1990; Andrefsky et al. 1990; Campbell 1969a; Greer 1966; Kingsbury and Nowak 1980). The major Apachean residences of this period are known to the north and east in Nebraska and Kansas, and to the south in northeastern New Mexico. The latter include the Glasscock and Sammis sites in the region of Cimarron, New Mexico, and Ojo Perdido near Las Vegas, New Mexico (Gunnerson 1987). Dismal River aspect sites in Nebraska and Kansas include White Cat Village and the Lovitt site (Gunnerson 1987). Gunnerson (1987:103) identifies Cedar Point Village as a Dismal River settlement; this site is located in northeastern Colorado near Limon. Wood (1971:81) notes that such an assessment of Dismal River affiliation "is perhaps the most plausible one, choosing from among the cultures in eastern Colorado now known to us, but it is not an especially defensible one." The comparative paucity of Protohistoric residential bases in the context area may be due to sampling bias, i.e., large expanses are yet to be investigated.

Technology

Relatively few artifacts are associated with the meager sample of Protohistoric period sites recorded in the context area. The presence of Avonlea lithic and/or ceramic assemblages has not been confirmed in the Arkansas River Basin. Lithic and bone tool morphologies associated with Apachean sites correspond to those of the preceding Diversification period. Points recovered from Apachean sites in the context area include a variety of Archaic forms (possibly curated) as well as small, triangular, unnotched and side-notched points such as Fresno, Reed, Washita, and Haskell types (Andrefsky et al. 1990; Campbell 1969a; Kingsbury and Nowak 1980; Loendorf et al. 1996). Currently, pottery is the artifact class believed most diagnostic of this particular segment of Arkansas basin prehistory (Baugh and Eddy 1987; Brunswig 1995; Gunnerson 1987). Several different sources for Apachean pottery recovered from the context area are identified in recent studies (Baugh and Eddy 1987; Brunswig 1995; Hummer 1989). Sangre de Cristo Micaceous pottery influenced by interaction with Rio Grande Puebloans is perceived as distinct from Dismal River Gray Ware that evidences attributes derived largely from Caddoan groups (Baugh and Eddy 1987; Brunswig 1995).

Types are defined within both the Sangre de Cristo Micaceous and Dismal River Gray Ware ceramics (Brunswig 1995; Hummer 1989). Ocate and Cimarron Micaceous pottery are believed to be associated with earlier and later components, respectively, of the Sangre de Cristo Apache culture pattern variant. These ceramics are heavily micaceous and are constructed by a combination of coiling and hand forming. They are often globular pots exhibiting striations indicative of thinning by corncob scraping (Brunswig 1995:188-189). Hummer (1989:354) notes that the high density of mica in these sherds may be reflective of either the use of residual micaceous clays or micaceous rock temper. Dismal River pottery includes Lovitt Plain and Lovitt Simple-stamped, two types that are distinguished from one another by the presence or absence of decoration (Brunswig 1995:183). These ceramics have lesser amounts of mica than the Sangre de Cristo Micaceous pottery and are hand formed by a paddle-and-anvil technique (Baugh and Eddy 1987; Brunswig 1995). Although these distinctions seem clear-cut, several complications are attached to interpreting cultural affiliation through the presence of micaceous pottery.

> Geological and ethnographic studies indicate that numerous Plains and Puebloan tribes used the same clay and temper sources to manufacture similar looking vessels, particularly after A.D. 1550 (Warren 1981). Helene Warren (personal communication 1985) warns

against trying to identify even Ocate Micaceous without petrographic analysis [Hummer 1989:351].

> Helene Warren (personal communication, March 15, 1975), contradicting Gunnerson's position, notes that currently there are no known characteristics which distinguish Pueblo micaceous utility pottery from Apache-made micaceous utility pottery [Thoms 1976:29].

As discussed previously, some confusion is evident in the classification of Apachean ceramics recovered from the context area. In his report on Apachean ceramics, Brunswig (1995:Appendix A) notes that both Lovitt Plain ceramics affiliated with the western Dismal River variant and Ocate Micaceous ceramics associated with the Sangre de Cristo or Jicarilla Apache variant have been recovered from sites in the Arkansas River Basin. A map showing the spatial distribution of these Apachean pottery types across Colorado and surrounding regions is based on data presented in Appendix A of the article (Brunswig 1995:Figure 2). The map demonstrates that Ocate Micaceous is prevalent within the southern portion of the context area in the Purgatoire River region. One may therefore infer that the Apachean groups in this region are largely related to the Sangre de Cristo or Jicarilla variant that was influenced by Rio Grande Puebloans. However, the Purgatoire River region pottery listed in Brunswig's Appendix A is dominated by sherds recovered from PCMS sites in Las Animas County. As noted above, only the PCMS Polished Category 1 specimens reported by Hummer (1989:332-336) are listed in Brunswig's Appendix A. Although Hummer notes that this type evidences similarities with Dismal River Lovitt Plain pottery, Brunswig lists these specimens as Ocate Micaceous in Appendix A. Furthermore, all of the PCMS ceramics assigned to Micaceous Ware categories (Hummer 1989:350-363) were overlooked in Brunswig's research (Brunswig 1995:Appendix A). It is actually Micaceous Category 1 that Hummer (1989:353) believes to be most similar to Ocate Micaceous. Also recovered from PCMS sites were Micaceous Category 2 specimens comparable to Cimarron or Taos Micaceous, Micaceous Category 3 specimens comparable to Dismal River pottery from the Central Plains, Micaceous Category 5 specimens thought to represent a single Jicarilla bean pot, and Micaceous Category 6 specimens representative of a single Lovitt Micaceous vessel affiliated with the Dismal River aspect. (Note: These sherds are now believed to represent pottery traded from the Southwest [Baugh and Eddy 1987; Brunswig 1995].) Thus the possibility exists for greater variability among Apachean pottery types in the Purgatoire River region than is shown by Brunswig's report. This in turn suggests that the Purgatoire River region may have indeed represented an intermediate location characterized by considerable interaction (e.g., trade networks) among various Central Plains and Southwestern bands (Hummer 1989:371).

Settlement and Subsistence Strategies

Site Type and Locational Variability

Archaeological data and historical accounts from surrounding regions indicate that the term "Apachean" may encompass a range of settlement-subsistence strategies. These include the tipi rings associated with nomadic bands using dog and horse travois, as well as the more sedentary, so-called Apache "rancherias" of El Cuartelejo and "pueblos" of northeastern New Mexico (Gunnerson 1987; Weber 1990). The few archaeological sites in the Arkansas basin with radiocarbon dates and purported Apachean ceramics currently do not permit a viable assessment of Protohistoric settlement pattern. Ethnohistoric accounts suggest that Penxaye and Cuartelejo Apaches were living in horticultural villages along the Purgatoire and Arkansas river regions of the context area (Carrillo 1999; Hanson and Chirinos 1989; Jones et al. 1998; Weber 1990). Archaeological manifestations of such settlements, however, are yet to be found. Protohistoric site assemblages that do reflect the larger and longer-term residences of either the Dismal River aspect or the Sangre de Cristo Apache variants are known to the north, south, and east of the context area.

Most Protohistoric Apachean sites in the Arkansas River Basin are identified on the basis of associated pottery, rock art, and often, the presence of stone circles or tipi rings. Although stone circle sites are fairly common in the Arkansas River Basin (e.g., Andrefsky 1990; Andrefsky et al. 1990; Campbell 1969a:340-343; Hand et al. 1977; Kalasz 1988, 1990; Kingsbury and Nowak 1980), they can be reliably assigned a Protohistoric affiliation in only a limited number of cases. Some of tipi ring sites are massive; 72 spaced stone structures were recorded at 5LA5372 at the PCMS but no ceramics were associated. Two of the more prominent, context-area tipi ring concentrations with ceramics and/or radiocarbon dates suggestive of Apachean occupation are known from the PCMS and the West Carrizo Creek regions (Andrefsky 1990; Andrefsky et al. 1990; Kingsbury and Nowak 1980) Apachean ceramics were also recovered in or near rockshelters at the Sue site and 5LA3189 in the PCMS (Loendorf and Kuehn 1991; Loendorf et al. 1996). In general, Protohistoric sites in the context area are associated with sparse artifact and feature assemblages suggestive of specialized, seasonal round-oriented resource procurement along major drainage courses (Andrefsky et al. 1990; Campbell 1969a; Hand et al. 1977; Kingsbury and Nowak 1980; Loendorf and Kuehn 1991; Loendorf et al. 1996). The watercourse sites tend to be in areas where the drainages form shallow incisions in open plains or at canyon headwaters.

The large numbers of Apachean micaceous sherds recovered from the Sopris phase architectural settlements, 5LA1211 and 5LA1416, present a somewhat anomalous situation (Wood and Bair 1980). The occurrence of Apachean occupations in the vicinity of, but approximately 300 years after, two major settlements of the Diversification period is unusual. The area from which 370 micaceous sherds were recovered at 5LA1211 (Area D) was interpreted to represent a ceramic dump that was in use for 900 years (Wood and Bair 1980). However, the presence of an Apachean ceramic dump implies some sort of semisedentary settlement in the area that is unconfirmed.

Economy

As with settlement patterns, much of the meager Protohistoric economic information from the Arkansas River Basin has been gleaned from historical accounts rather than archaeological investigation. The earliest Athapaskan groups were purportedly characterized by a nomadic hunting and foraging economy emphasizing bison procurement (Friedman 1982; Gunnerson 1987). Although hunting (primarily bison) and gathering remained the most prominent aspect of Apachean subsistence, it is evident that horticulture was adopted by at least some bands during the course of the Protohistoric period. Various accounts of Spanish expeditions attest to the variety of foods consumed by Apachean populations. In summarizing the Onate expedition of 1601, Friedman quotes the following passage from the chronicle: "At some places we came across camps of people of the Apache nation, who are the ones who possess these plains, and who having neither fixed place nor site of their own, go from place to place with the cattle [bison] always following them" (Bolton 1908:253, cited in Friedman 1982:237). Little more than one hundred years later, as the Ulibarri expedition of 1706 passed through Purgatoire River region, "they found that the Penxayes planted on the banks of the Santa Ana [Purgatoire] raising corn, beans, and pumpkins"; south of the Arkansas River near present-day Holly, "they met a Penxaye woman and girl gathering cherries" (Schroeder 1974:338, cited in Weber 1990:XVII-11).

Direct archaeological evidence for Apachean diet in the context area is limited to a single flotation sample from a spaced stone circle site (5LA5353) in the PCMS (Andrefsky et al. 1990). An Apachean affiliation for this site is suggested by the presence of Micaceous Category 2 sherds comparable to Cimarron Micaceous pottery (Hummer 1989; Sanders 1990). Charred *Chenopodium/Amaranthus* seeds were recovered from a darkly stained area (Feature 9) associated with the micaceous sherds. Indirect evidence for subsistence includes the ground stone and projectile point collections from a number of other sites (e.g., 5LA1052, 5LA1727, 5LA3189, 5LA5254, 5LA5255, 5LA5256) where an Apachean component is believed to be present (Andrefsky 1990; Andrefsky et al. 1990; Loendorf and Kuehn 1991; Loendorf et al. 1996; Kingsbury and Nowak 1980). Together these sparse data are indicative of an emphasis on hunting and wild plant processing.

Architecture

Archaeological and ethnohistorical data demonstrate that considerable morphological variability characterizes Apachean structures recorded throughout the Southwest and the plains (Gunnerson 1987:Figures 20-23). This variability, expressed both temporally and spatially, is believed reflective of the diverse settlement strategies employed by the various Apachean bands throughout the Protohistoric period. There appears to be a major architectural division between the portable tipis of the Plains Apache nomads and the structures associated with the more sedentary "rancheria" or "pueblo" communities of the Central Plains and northeastern New Mexico Apache. The latter range from semisubterranean earth lodge-like structures of the Dismal River aspect to adobe walled multiroom structures of the Glasscock site in northeastern New Mexico (Gunnerson 1987).

Protohistoric architecture in the Arkansas River Basin, as understood at present, is largely limited to the circular, noncontiguous arrangements of rock known as spaced stone circles or tipi rings. These spaced stone walls are generally believed to be associated with the conical pole and hide structures (tipis) of plains nomads. The circular arrangement of rock was purportedly the result of their use as weights to hold down lodge coverings (Kehoe 1960; Kingsbury and Gabel 1980). Alternatives to this traditional view, e.g., that the rings represent gaming circles, vision quest structures, and dance circles, have been well summarized in previous reports (W. Davis 1982; L. Davis 1983; Frison 1991; Mulloy 1952). The extreme range in floor area exhibited by PCMS spaced stone enclosures may be used to support the hypothesis that these structures represent a variety of functions (Kalasz 1988, 1990). Nevertheless, context-area tipi rings are typically affiliated with the domiciles of plains nomads. Previous studies of tipi rings have addressed the possibility that temporal distinctions in tipi ring morphology are discernible through size observations (Kalasz 1990:XII-19; Kehoe 1983; Mobley 1983; Wilson 1983). Differing size ranges are inferred to be attributable to "dog period" versus "horse period" occupations, i.e., larger lodges tended to be associated with the latter because of their increased carrying capacity. Such distinctions, however, are unconfirmed.

Examples of possibly Apachean tipi ring sites in the Arkansas River Basin include 5LA1052 and 5LA1721 in the vicinity of West Carrizo Creek Canyon; 5LA3430, 5LA5517, 5LA5254, 5LA5256, and 5LA5353 at the PCMS; and 5LA1411 in the upper Purgatoire region (Andrefsky et al. 1990; Hand et al. 1977; Hummer 1989; Kingsbury and Gabel 1980; Kingsbury and Nowak 1980). Of these stone circle sites, all but 5LA3430 and 5LA5517 have been subjected to limited testing or excavation. The Apachean affiliation ascribed to the West Carrizo Creek tipi rings is based on the associated radiocarbon age assessment of A.D. 1350 ± 55 and the presence of Pueblo IV polychrome pottery (Kingsbury and Gabel 1980). Two of the PCMS sites situated along Van Bremer Arroyo, 5LA5254 and 5LA5256, are associated with Polished Category 1 sherds that are comparable to Dismal River aspect pottery (Andrefsky et al. 1990; Hummer 1989; Sanders 1990). A glass trade bead was also recovered from 5LA5254. However, diagnostic points collected from these two tipi ring sites at the PCMS suggest artifact curation and/or the presence of earlier components. Micaceous ceramics indicative of Sangre de Cristo Apache occupation or trade were recovered from the remaining four tipi ring sites discussed herein. Micaceous Category 2 sherds comparable to Cimarron Micaceous pottery were recovered from 5LA5353 along Taylor Arroyo in the PCMS (Andrefsky et al. 1990). Two spaced stone circle sites recorded through survey in the PCMS also were associated with micaceous pottery; Micaceous Category 1 sherds similar to Ocate Micaceous pottery was recovered from site 5LA3430, and Micaceous Category 2 sherds similar to Cimarron Micaceous ceramics were recovered from 5LA5517 (Andrefsky 1990:Appendix G; Hummer 1989). Finally, Ocate Micaceous ceramics were recovered from 5LA1411 in the upper Purgatoire region (Hand et al. 1977).

The possibility that spaced stone circles or tipi rings are much older than the Protohistoric period must also be considered. Although only a few radiocarbon dates are currently associated with such structures in the context area, on the Northwestern Plains, tipi rings begin to appear during the Middle Archaic period (Frison 1991). In addition to the single date from the West Carrizo Creek example, a radiocarbon age assessment of A.D. 780 ± 120 was obtained from a hearth within a spaced stone circle at PCMS site 5LA5249 (Andrefsky et al. 1990; Kalasz 1990:XII-13). This date from the Developmental period is therefore considerably earlier than that associated with the arrival of the Athapaskans in the Arkansas River Basin. These data indicate that considerably more chronometric data are required to resolve questions about tipi ring or spaced stone circle cultural affiliation.

Directions for Future Research

Chronology

Of the three periods assigned to the Late Prehistoric stage, it is the Protohistoric period that suffers most from a lack of chronometric data. Furthermore, although pottery is most often used to affix a Protohistoric affiliation to context-area sites, a number of issues need to be addressed. Most significantly, the earliest Athapaskan migrations into the context area were evidently aceramic and thus may not be associated with diagnostic artifacts. Questions also arise as to whether the micaceous ceramics attributed to Apachean manufacture can be distinguished from those produced by Rio Grande Puebloans. Other feature and artifact classes to date have been of little use in identifying Protohistoric occupation. Early European goods are rarely encountered, and lithic and bone tool assemblages apparently do not differ significantly from those of earlier periods. The only features that have been previously associated with Protohistoric groups are the so-called tipi rings or spaced stone circles. However, these structures were probably in use much earlier than the Protohistoric period and were undoubtedly associated with later Historic occupations as well.

- When did Athapaskan groups arrive in the context area?
- Did Athapaskan migration into the Arkansas River Basin temporally overlap the occupations of the Diversification period?
- How can the earliest Athapaskan sites be distinguished from other Late Prehistoric stage sites?
- Can earlier Athapaskan sites be distinguished from those of later, Apachean occupations?
- What, if any, are the temporal distinctions between sites with Sangre de Cristo or Jicarilla Apache affiliation and those with Dismal River aspect affiliation?

Population Dynamics

The distribution of various Apachean pottery types and their association with tipi rings is indicative of significant movement and interaction among various Apachean bands within the context area. Most noteworthy is the variety of pottery concentrated within several PCMS sites. Both Sangre de Cristo pottery originating in the Southwest and the Dismal River pottery of the Central Plains were recovered from this relatively small area in Las Animas County, Colorado. These data support the view that the intermediate location of the Purgatoire River region between the plains and Southwest may have been particularly conducive for establishing and maintaining trade or other relationships. Protohistoric site locations may represent nomadic groups passing through the area during the course of seasonal rounds or, alternatively, trade forays sent from larger settlements in the Central Plains, Southern Plains, and the Southwest. Research into these topics is restricted by an inability to identify the affiliation of various Apachean sites. A greater emphasis on petrographic source analyses of both ceramic and lithic collections would greatly benefit research of population movements, and perhaps band origins. Furthermore, advances in rock art analysis may facilitate the identification of Apachean bands that were present in the Arkansas River Basin.

- What is the extent of Sangre de Cristo or Jicarilla Apache occupation in the Arkansas River Basin?
- What evidence exists for Cuartelejo Apache settlement in the context area?
- To what extent do cultural attributes of Central and Southern Plains Apaches overlap those of the Sangre de Cristo or Jicarilla cultural pattern variant in the Arkansas River Basin?
- How far do Apachean trade networks extend as indicated by the presence of exotic materials and/or artifacts?

Technology

Technological aspects of Protohistoric period adaptation are poorly understood. Three factors contribute greatly to this situation. First, relatively few sites are confirmed as Protohistoric in affiliation; second, these few sites are most often associated with small artifact samples; and third, Athapaskans have been inclined to adopt attributes of neighboring cultures. Therefore, few Protohistoric collections are available for technological analyses, and distinctive assemblage attributes and/or individual artifacts are difficult to discern. Projectile point morphologies that are exclusively diagnostic of Apachean bands have not been identified. The effects of artifact curation must be considered, since a range of Archaic and Late Prehistoric stage point types has been recovered from Protohistoric sites. Currently, ceramics constitute the only class of artifact seen as diagnostic of Apachean occupation. However, the difficulties involved in distinguishing Apachean-manufactured pottery from that produced by neighboring cultures using identical clay sources are acknowledged. Overall, petrographic analyses for both lithic and ceramic assemblages would greatly enhance technological research of the Protohistoric period.

- What clay and lithic sources were utilized by Protohistoric period groups present in the Arkansas River Basin?
- What are the baseline technological trends in Apachean lithic tool production, e.g., are minimally modified flake tools emphasized over formal bifaces?

- Are so-called two-hand manos and trough metates associated with Protohistoric period occupation in the Arkansas River Basin?

- What attributes distinguish Apachean bone and shell tool/ornament assemblages from those of other cultures?

- Which projectile point form is most characteristic of Protohistoric period occupation?

- Can Apachean micaceous pottery consistently be distinguished from that manufactured by Rio Grande Puebloans?

Settlement and Subsistence Strategies

Research about the spatial distribution of various settlement types of the Protohistoric Apachean is currently restricted by the simple lack of sites that can be reliably assigned to this period. Although more permanent settlements are known to occur in surrounding regions, Protohistoric sites in the context area suggest an association with highly mobile bands. Arkansas River Basin Apachean sites tend to be tipi rings and rockshelters distributed along major watercourses, but are generally not associated with deep canyon settings. The Van Bremer Arroyo/Burke Arroyo sites at the PCMS, for example, are situated in areas where the drainages flow through rolling, open plains. Both rockshelter and tipi ring occupations with associated Apachean ceramics have been recorded in proximity to one another in this same PCMS locale. However, contemporaneity has not been established by chronometric data, and furthermore, any functional distinctions among these sheltered and open sites cannot be confirmed with available data sets. Regional differences (e.g., Purgatoire River vs. Arkansas River locales) in site type and site location need to be examined adequately. The discernment of large-scale regional distinctions among context-area Apachean sites is currently restricted to ceramics.

- What is the evidence for the presence of more sedentary, long-term, residential bases in the Arkansas River Basin during the Protohistoric period, and are such sites restricted to a particular region?

- What is the range of variability in site location during the Protohistoric period?

- What is the functional relationship, if any, between rockshelter and tipi ring sites in the context area?

- What regional variability is apparent in Protohistoric period settlement patterns within the context area?

Archaeological and ethnohistorical data indicate that although Apachean subsistence was primarily oriented toward hunting bison and gathering of various wild plant foods, horticultural activities increased throughout the Protohistoric period. Much of this information, however, is obtained from areas surrounding the Arkansas River Basin. Little subsistence information is available for Protohistoric sites in the context area. Although hunting and gathering can certainly be inferred from materials associated with context-area sites of this period, evidence suggestive of horticulture has not been recovered. The lack of comprehensive faunal data notwithstanding, there are currently no indications that bison procurement and processing was emphasized in the context area during the Protohistoric period.

- How closely does archaeological evidence correspond to early historical accounts of Apachean subsistence practices?

- What is the evidence for Protohistoric bison procurement and processing sites in the Arkansas River Basin?
- What is the range of wild plant resources utilized by Protohistoric period populations?
- What is the evidence for Protohistoric horticulture in the Arkansas River Basin?
- What, if any, are the regional differences in the Protohistoric period economy within the context area?

Overall, Protohistoric period Apachean architecture exhibits considerable morphological variability. Central Plains and northeastern New Mexico settlements include more permanent structures that resembled semisubterranean plains earth lodges and adobe-walled "pueblos," respectively. For reasons not yet established, Protohistoric structures in the Arkansas River Basin are restricted to spaced rock walls believed to be reflective of tipi locations. However, such architecture may also be associated with functions not related to temporary domiciles; furthermore, these types of structure may have considerable temporal depth. Additional block excavation and analysis would be required to define the full range of morphological variability associated with spaced stone walls. Further investigation will also result in expansion of the meager chronometric database that exists for this unique form of architecture. Questions pertaining to the variety of functions associated with such structures, and their temporal range, can then be addressed adequately.

- Are forms of Apachean architecture other than spaced stone circles present in the Arkansas River Basin?
- When did tipi rings or spaced stone circles first appear in the Arkansas River Basin?
- Are earlier, spaced stone circles smaller than those of later, Apachean occupations, i.e., is there a distinction in tipi rings of the dog and horse travois era?
- What is the evidence to indicate that spaced rock walls were associated with functions other than holding down the lodge covers of tipis?

Geomorphology and Paleoclimates

Because of the significant demographic changes in the context area during the Diversification period–and particularly at the end of the period, when regional abandonment apparently occurred–the importance of paleoclimatic reconstruction during Protohistoric times remains high. It is unknown if climatic amelioration rendered the area habitable once again, or if Protohistoric nomads were simply better adapted to a marginal environment than were semisedentary peoples of the Diversification period.

- How is the so-called Little Ice Age manifested in the context area?
- What is the timing of the onset of cooler and wetter climatic conditions, and does it correspond with Protohistoric reoccupation of the context area?
- What geomorphic processes were predominant during the Protohistoric period, and how widespread were they in the context area?

- Do recent landforms correspond to the Little Ice Age, e.g., stream terrace deposits, that might be consistently associated with Protohistoric site locations?

- Did reversion to a more mesic climate affect the numbers and distribution of bison in the plains portion of the context area?

Chapter 8

NATIVE AMERICAN INTERPRETATIONS AND CONCERNS

Mary W. Painter

SUMMARY OF PREVIOUS AGENCY CONSULTATIONS IN THE REGION

Nine federal and state agencies with landholdings or other interests in the Arkansas River context area were solicited for information regarding past Native American consultations. These agencies are the BOR, U.S. Fish and Wildlife Service, BLM - Royal Gorge Resource Area, USDA Forest Service - Pike/San Isabel National Forests and Comanche/Cimarron National Grasslands, ACOE, Fort Carson/Directorate of Environmental Compliance and Management, NPS - Midwest Archeological Center, and CDOT. Responses were received from the Royal Gorge Resource Area, Pike/San Isabel National Forests, Comanche/Cimarron National Grassland, Fort Carson, NPS, and CDOT. Information provided by these agencies has been incorporated into the text as appropriate.

Although CRM activities have increased markedly in the last 30 years, most of the study area remains uninventoried. Not surprisingly, Native American consultations have been few, and the information resulting from those that have occurred should not necessarily be regarded as applicable to southeastern Colorado as a whole. Nonetheless, two studies have emerged that identify certain tribes having traditional historical ties to the context area. The reports also include discussions of particular Native American concerns in dealing with archaeological sites and describe factors that may aid in the recognition of potential sacred sites and/or traditional cultural properties (TCPs).

Stoffle et al. (1984) conducted ethnographic and ethnohistoric research at the PCMS in Las Animas County. More than 600 newspaper articles were reviewed, and information was gathered from various Native American tribal representatives who were invited to visit 14 known sites on the PCMS. In cooperation with the tribal representatives, ethnobotanical research was conducted that included the translation of Native American terms used for certain plants found on the PCMS. The research records for the project include slides of the field trips and sites visited, tapes of oral interviews, and a computerized index of the research data.

More recently, Fort Carson commissioned a study designed to 1) identify Native American tribes that may have traditional ties to lands now known as Fort Carson and the PCMS, 2) identify proper tribal contacts, 3) update and/or expand previous ethnographic and ethnohistoric research, and 4) provide recommendations for future consultation. The resulting report by Jones et al. (1998) provides an in-depth review and then builds on the work of Stoffle et al. (1984) to further identify and describe the historic use of premilitary reservation lands and surrounding territories in southeastern Colorado by seven Native American groups: Jicarilla Apache, Southern Ute, Comanche, Cheyenne, Arapaho, Kiowa, and Kiowa-Apache. The report serves as the primary source for the remaining chapter narrative.

DISCUSSION OF NATIVE AMERICAN ISSUES AND CONCERNS

At the PCMS, Native American concerns regarding ancestral territories were expressed on two levels. One was a general concern for Native American sacred sites, springs, mountains, shrines, and cemeteries wherever they may be found in the region. Another was concern for specific sites located within the PCMS (e.g., rock art sites, Native American-identified ceremonial sites). In addition, with the exception of the Apachean groups that utilized the area for a long period of time, the PCMS is regarded by the Native American consultants as a peripheral area as opposed to a core territory and thus was subjected to intertribal use. This would mean that knowledge of the area was merely general and not as detailed as might be expected of a core area. Although the Jicarilla Apache were unable to send a tribal representative to the PCMS, the tribal council expressed a strong concern for the Purgatoire River area (also known as the Picket Wire Canyonlands) as well as some of the rock art sites in the PCMS. The Native Americans who participated in the on-site visits at the PCMS voiced individual (personal) concerns regarding burials, the preservation of rockshelters and rock art, and the protection in situ of plants used for ceremonial and medicinal purposes. Wild food gardens consisting of plants known to have been used for food, fuel, and medicine and that include some "unusual" plants have been identified on the PCMS (Jones et al. 1998:40, after Stoffle et al. 1984:182-184). Certain information may have been withheld by some tribal representatives due to a general distrust of the research process and/or a reluctance to share information concerning the religious significance of some sites (Jones et al. 1998:42).

The Jicarilla Apache occupied eastern Colorado longer than any other Native American group, from at least A.D. 1525 to 1850 (Jones et al. 1998:59-66). The tribe attaches religious significance to Pikes Peak and the Cave of the Winds in Colorado Springs because the locations play a role in their creation mythology. Other locations sacred to the tribe include La Veta Butte, Blanca Peak north of La Veta Pass, and Huerfano Butte south of Pueblo (Jones et al. 1998:67). As noted above, the tribe has also expressed concern for the Purgatoire River area.

Although the Ute had occupied the mountainous regions of Colorado for some time, their entry into southeastern Colorado was relatively late (beginning ca. A.D. 1600) with occupation continuing sporadically to about A.D. 1850 (Jones et al. 1998:79-83). Traditional Ute ties to the land are based primarily on a network of trails held sacred because they were originally established by the Ute forebears. For the Ute, literally following in their ancestors' footsteps is considered to be a sacred experience. Although precise routes are now difficult to determine, several allegedly traversed southeastern Colorado and some led to sacred sites such as the Garden of the Gods and Manitou Springs northwest of Fort Carson. Pikes Peak, the Continental Divide area north of Monarch Pass, and certain locations in the vicinity of Cripple Creek may also be regarded as Ute sacred areas (A. E. Kane, personal communication to CAI 1998; M. Weimer, personal communication to CAI 1998).

The Comanche did not enter southeastern Colorado until the early 1700s (Jones et al. 1998:96). Throughout various tribal and governmental conflicts, alliances, and treaties, they continued to occupy the area until they were ultimately subdued by the U.S. military in 1875. The central focus of Comanche religion is the individual acquisition of spiritual strength and guidance through vision quests. A vision quest site is usually a solitary place, preferably on a south-facing slope or hill with views to the east and west. The Comanche attach great spiritual significance to their weapons, the most important of which are the bow-and-arrow followed by the shield. The shield gradually evolved into a symbol of power that provide both physical and spiritual protection.

The Cheyenne may have entered southeastern Colorado in the late 1600s, but their permanent occupation of Colorado did not occur until the early 1800s (Jones et al. 1998:111). By the 1830s, the Southern Cheyenne were trading at Bent's Fort on the Arkansas River and were closely allied with the Arapaho. Within the context area, a combined Cheyenne-Arapaho encampment along Sand Creek (also called Big Sandy Creek), east of the present community of Eads, was attacked in November of 1864 by the Third Colorado Cavalry under the command of Colonel John M. Chivington with the loss of some 200 lives, all but a few of whom were Native

Americans (Johnson 1994:74; Jones et al. 1998:114). As part of an ongoing effort to identify the exact site of the massacre, NPS - Midwest Archeological Center is consulting with the Northern and Southern Cheyenne and the Arapaho to obtain oral traditions about the site (D. D. Scott, personal communication to CAI 1999). With the signing of the Medicine Lodge Treaty in 1867, the Southern Cheyenne and Arapaho tribes were removed to reservation lands in Oklahoma. Cheyenne religion holds that supernatural power is found in nature and the Cheyenne express this power through specific ceremonies and rituals performed for the individual as well as the tribe.

The Arapaho probably entered Colorado in the late 1700s and, along with the Cheyenne, were trading at Bent's Fort by 1835. During the 1840s and into the 1850s, both tribes ranged from the North Platte River in Wyoming south to the Arkansas River in Colorado. The signing of the Medicine Lodge Treaty in 1867 resulted in the removal of both tribes to present-day Oklahoma. The Arapaho believe that waterfalls are indicators of the Great Spirit and therefore Manitou Springs, located west of Colorado Springs, is a sacred site. In Historic times, the Ute shared this belief and, even though the two tribes were enemies, both considered Manitou Springs to be neutral ground (see also Zier et al. 1997:II-104–II-108). The Sun Dance was the single most important ceremony of the Arapaho and was practiced in a form that was probably the most elaborate and severe of all the plains tribes.

The Kiowa were a far-ranging tribe that probably entered Colorado in the late 1700s (Jones et al. 1998:136). Kiowa encampments may have been established in southeastern Colorado by the early 1800s. The Kiowa were organized into military societies that focused on warfare, raids, and revenge. They did not believe in a single Great Spirit or an afterlife but achieved spiritual knowledge through dreams and visions. They practiced a nonmutilating form of the Sun Dance prior to their removal to a reservation in southwestern Oklahoma in 1867. A map of the Kiowa range published in a Kiowa ethnography (Jones et al. 1998:145, after Mooney 1898:Plate LXXIII) indicates that a Sun Dance was performed in the vicinity of the PCMS south of the Arkansas River and west of the Purgatoire River. Purification rights that involved the use of sweat lodges were also practiced by the Kiowa.

The Kiowa-Apache were a culturally and linguistically distinct group that attached themselves to the Kiowa as a dependent band. Little is known about their ethnographic history. They held a place in the Kiowa camp circle and accompanied the Kiowa on their migration from the Northern to the Southern Plains, where they lived until their removal to a reservation in Oklahoma. Except for dancing groups, the tribe had no distinct rituals of its own but later joined with the Kiowa in performing the Sun Dance and peyote rite.

TRADITIONAL CULTURAL PROPERTIES AND THE ARKANSAS RIVER CONTEXT AREA

Traditional cultural properties comprise a category of site that may be eligible for inclusion in the NRHP. In addition to field and file research, the identification and significance of these properties requires extensive consultation with Native Americans who represent the various communities that most value the properties and understandably harbor strong desires to maintain continuity in their traditional beliefs and practices. Jones et al. (1998:160-180) offer detailed information on the complex process and cooperative effort that leads to the nomination of a TCP to the NRHP. Guidelines for evaluating and documenting TCPs are presented by Parker and King (1992), and are not repeated here. The Colorado SHPO has no formal policy for recording or evaluating TCPs beyond the federal guidelines cited above. Information concerning the locations of the few specific sites identified around the state as TCPs is severely restricted. The SHPO plans to develop, in consultation with concerned partners, a formal policy for limiting access to this information.

No TCPs have been enrolled on the NRHP in the Arkansas River context area. For Fort Carson, however, Jones et al. (1998:162) recognize three broad categories of property that can be regarded as potential TCPs and may be used by archaeologists as a guide throughout the context area to localities or districts most likely to be found significant in this sense.

The first category is comprised of individual site types and includes rock art sites, locations where tribal ceremonies have been conducted, burials, sites of Protohistoric age, and living/food processing areas. The latter type is most apt to be found significant as a TCP if associated with certain living plant species known to have been used for food or medicine. Aboriginal burials do occur in the context area but very few have been found. Little is known of traditional burial practices, particularly those predating the Late Prehistoric stage. Thus, the current database is inadequate to allow prediction as to where burials are likely to occur.

The second category of potential TCPs consists of areas of traditional use. These areas can sometimes be identified by the presence of one or more specific sites, but the TCP boundaries may extend well beyond the site boundaries. Wild food gardens are one example of a potential, traditional use area.

The third category of potential TCPs consists of landscape features. Such features may be associated with particular tribal activities such as vision quests, and can include high points, rock outcrops, and watercourses. Cultural remains do not necessarily have to be present for a landscape feature to be evaluated as a TCP, but they may assist in the identification of such features.

Chapter 9

MANAGEMENT CONSIDERATIONS AND SUMMARY

Christian J. Zier

EVALUATION OF SITE SIGNIFICANCE

One of the principal objectives of the Arkansas River prehistoric context is to provide a procedural framework for future investigations (see Chapter 1). Investigators engaged in academic research and other work of a noncompliance nature (i.e., non-CRM studies) need not grapple with issues of site significance in the legal sense, but should find the synthetic aspects of the document, as well as the many specific statements about research directions and perceived data gaps, useful nonetheless.

From the perspective of federal and state historic preservation law, which mandates significance evaluation and, as appropriate, mitigative activity for significant properties, the document furnishes a partial basis for site assessment. Properties are considered significant if they qualify for inclusion on the National Register of Historic Places (NRHP). The legal "Criteria for Evaluation" are enumerated in 36 CFR Part 60, which states that "the quality of significance ... is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association" and that meet one or more of a set of individual criteria. Three of these criteria are oriented toward the evaluation of historic properties and are thus not applicable to prehistoric archaeological sites. Criterion d, however, acknowledges the significant qualities of properties "that have yielded, or may be likely to yield, information important in prehistory or history." In practice, to qualify for NRHP inclusion, a site must exhibit physical integrity and must meet one or more of the criteria for eligibility.

Criterion d is somewhat vague–perhaps intentionally so, for to attempt to specify all of the kinds of sites that are important would be to risk omitting certain types of properties, and could result in exclusion of unique sites. Neither was the significance evaluation process intended to be open-ended. It could be reasonably argued that most archaeological sites have the potential "to yield information important in prehistory." However, the NRHP was designed to be an exclusive, rather than an all-inclusive, list of properties, and significance must be demonstrated on an individual basis in accordance with the merits of a particular site.

Attaching a site's research potential–its likelihood to yield important information–to the major research questions and specific data needs of the context area minimizes the ambiguity inherent in the evaluation process while establishing a firm, defensible basis for significance assessment. In essence, a site that is physically intact and has the potential to produce data applicable to context-area research questions and data gaps may be judged significant. Use of this document can in no way be regarded as a means of circumventing standard site documentation practices, for example (as appropriate) surface recording and mapping, artifact collection and analysis, and test excavation. To identify a site's specific research potential requires that the data collection process be thoughtfully and comprehensively carried out, and that a firm basis for comparison and contrast with other resources in the context area be established.

It is clear that each site must be assessed on the basis of its specific attributes as they relate to 1) NRHP significance criteria, 2) physical integrity, and 3) data potential with respect to research questions posed in this document and organized by theme. General statements may be made, however, about the probable significance of individual site types, and these statements may be utilized as management guidelines. Types of sites that are *likely* to be significant are:

- Paleoindian and Early Archaic sites
- Protohistoric sites
- Human burials
- Intact rock art sites
- Sites of any age with in situ buried deposits
- Stratified multicomponent sites
- Intact architectural sites of any age
- Complex lithic procurement sites (quarries)
- Communal kill and/or processing sites
- Unique prehistoric sites of any kind

Types of sites that are *unlikely* to be significant are:

- Isolated artifacts
- Isolated nonarchitectural features
- Scatters or concentrations of artifacts that are confined to the surface
- Sites of any type that are damaged by natural or human-induced processes to the extent that physical integrity is compromised
- Eroded or damaged (including vandalized) rock art sites, or rock art sites that consist solely of abstract incisions

SUMMARY

The Arkansas River Basin context provides a comprehensive overview and synthesis of the culture history of the area's indigenous inhabitants; offers a much-refined and significantly modified cultural-taxonomic framework for archaeological study; and establishes a basis for site evaluation through identification of research themes and data needs. The document's contribution to site management encompasses not only legal considerations, specifically the eligibility criteria of the NRHP, but also significance in the broader anthropological sense.

A great many individual research questions have been proffered within the confines of temporally and thematically ordered discussions of context-area prehistory. The archaeological research potential of the Arkansas River Basin is enormous. It is therefore deemed appropriate to close with general observations about the directions that future research should take.

- Well under 2 percent of the context area has been archaeologically surveyed, and the distribution of inventoried tracts within the area is far from representative. Survey coverage is skewed very strongly in favor of the plains portion of the context area, and in particular the Arkansas River corridor and certain of its lower tributaries such as the Purgatoire River and Turkey Creek. Fundamental settlement characteristics are virtually unknown across broad expanses of the area, including most of the foothills and higher mountains as well as plains uplands far from permanent streams. Intensive block surveys of these poorly understood regions are badly in need.

- The history of archaeological investigations in the context area does not include a great deal of excavation. Much of the excavation that has been conducted has been of a limited-scale, often evaluative nature. Furthermore, the sites that have been studied tend to be concentrated in the same areas where survey coverage has been greatest, and the majority of excavations have targeted Late Prehistoric components. Important advances of the many archaeological themes discussed in this document will not be possible until comprehensive excavation is undertaken at sites that represent the widest possible geographical and temporal ranges.

- The boundaries of the context area, which of necessity combine physiographic and political criteria, are arbitrary with respect to prehistoric human behavior patterns. It is therefore essential that future researchers in the upper Arkansas River Basin undertake studies of comparison and contrast, not only with the archaeological phenomena of the context area but with those in all adjoining regions.

- Establishment of a regional chronology is fundamental to the examination of cultural adaptation and change, for without a firm temporal footing the relationships between and among sites are unknowable. The chronology of the context area during the earlier half of the total presumed span of human occupation–ca. 11,500 B.P. to 5000 B.P.–is poorly established at best, and only for the final two millennia of the sequence can it be regarded as well documented. Chronology building must be a priority of archaeologists working anywhere in the context area, and should consist not only of the amassing of radiometric dates but the application of cross-dating techniques as well, including development of a comprehensive projectile point chronology with temporal depth and geographical breadth.

- Perhaps the most neglected field of research in previous archaeological investigations in the context area has been geomorphology. It is quite likely, for example, that the great gaps in the chronological record (above) can be explained in geomorphic terms–but the data are currently too sparse to support such an assertion. Extensive geoarchaeological work needs to be conducted in virtually all parts of the context area and should have as primary goals 1) mapping and dating of Late Quaternary deposits, 2) establishment of a stratigraphic framework representing the history of landscape evolution, 3) physical and chronological correlation of human occupational evidence with the geomorphic record, and 4) chronologically fine grained paleoclimatic reconstruction for both the high- and low-altitude sectors of the area.

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APPENDIX A

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA

Mary W. Painter

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5CH1 Olsen-Chubbuck	10,150±500	A 744	radiocarbon	Wheat 1972; Butler 1981	Bison hoof bone
5CF358 Runberg	8840±100	Beta-14921	radiocarbon	Black 1986	Feature 5, hearth
5CF358 Runberg	8650±110	Beta-14185	radiocarbon	Black 1986	Feature 11, hearth
5LK372	8365±190	UGa 4168	radiocarbon	Arthur 1981	Level 3-4, charcoal
5CF358 Runberg	7980±120	Beta-14182	radiocarbon	Black 1986	Feature 6, hearth
5CF358 Runberg	7740±140	Beta-14922	radiocarbon	Black 1986	Feature 8, Level 5A, hearth
5PE910 Gooseberry Shelter	4930±210	Beta-40888	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 8, charcoal from hearth within shelter
5LA6197 Wolf Spider Shelter	4900±90	Beta-77459	radiocarbon	Hand and Jepson 1996	Mitigation Pit 2, charcoal from storage pit
5EP576	4690±270	Beta-26578	radiocarbon	McDonald 1992; Wynn et al. 1993	Bone; secondary butchery
5PE648 Recon John Shelter	4400±80	Beta-24248	radiocarbon	Zier 1989, 1996; Zier and Kalasz 1991	Levels 39-42, detrital charcoal adjacent to shelter
5LA6197 Wolf Spider Shelter	4300±70	Beta-66970	radiocarbon	Hand and Jepson 1996	Test Pit 3, Feature 1, bulk soil

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LK159 Dead of Winter	4210±80	QL 1233	radiocarbon	Buckles 1978	Hearth, Feature 1
5PE648 Recon John Shelter	4050±120	Beta-24247	radiocarbon	Zier 1989, 1996; Zier and Kalasz 1991	Levels 31-34, detrital charcoal adjacent to shelter
5CF84 Trout Creek Quarry	3910±90	Beta-9183	radiocarbon	Chambellan et al. 1984	Pit
5LA6197 Wolf Spider Shelter	3900±100	Beta-66971	radiocarbon	Hand and Jepson 1996	Test Pit 2, Feature 2, hearth
5PE910 Gooseberry Shelter	3890±90	Beta-40887	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 7, charcoal from hearth within shelter
5LK372	3825±190	UGa 4170	radiocarbon	Arthur 1981	Level 3-4, charcoal
5LA3242	3780±100	Beta-49622	radiocarbon	Loendorf et al. 1996	Hearth in Level VIII of cutbank profile ca. 235 cm bpgs
5PE648 Recon John Shelter	3680±100	Beta-24249	radiocarbon	Zier 1989, 1996; Zier and Kalasz 1991	Levels 47-50, detrital charcoal adjacent to shelter
5LA5264	3590±90	Beta-8001	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 6, Test Unit 1, Level 4, hearth
5PE648 Recon John Shelter	3530±100	Beta-24245	radiocarbon	Zier 1989, 1996; Zier and Kalasz 1991	Levels 20-22, detrital charcoal adjacent to shelter

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA2158 Upper Plum Canyon I	3520±60	Beta-9452	radiocarbon	Rhodes 1984	Rock shelter I; Unit C5, hearth
5CR1 Draper Cave	3520±70	UGa 736	radiocarbon	Hagar 1976; Butler 1981	Charcoal
5CF18	3510±125	I 7909	radiocarbon	Buckles 1975b; Black 1986	Feature 1; hearth, 10-30 cm bpgs
5LA5403	3500±350	W Fu1e	obsidian hydration	Lintz 1985; Andrefsky et al. 1990	Test Unit 4, Level 3, obsidian flake, B.P. date calculation year is 1984 (year of analysis)
5CR1 Draper Cave	3480±65	UGa 737	radiocarbon	Hagar 1976; Butler 1981	Charcoal
5CF358 Runberg	3480±100	Beta-14920	radiocarbon	Black 1986	Feature 2, cobble-lined hearth
5LA5264	3370±130	Beta-8002	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 9, Test Unit 1, Level 6, hearth
5EP2158	3280±60	nr[2]	radiocarbon	Carey 1993	Hearth
5LA2190 Veltri	3160±160	Beta-27980	radiocarbon	Rood and Church 1989; Rood 1990	Feature 1 (hearth) associated with Feature 2 (structure). Bulk soil sample.
5LA1055	3140±60	DIC 323	radiocarbon	Kingsbury and Nowak 1980	Rockshelter, hearth

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5PE8 Two Deer Shelter	3070±120	Beta-48398	radiocarbon	Zier et al. 1996a; Zier 1996	Test Pit 1, Level 19, charcoal within shelter
5FN349	3050±60	UGa 3518	radiocarbon	Engleman and Shea 1980	General level charcoal
5LA5402	3000±300	W Fu1d	obsidian hydration	Lintz 1985; Andrefsky et al. 1990	Rockshelter 1, Test Unit 5, Level 8, obsidian uniface, B.P. date calculation year is 1984 (year of analysis). Artifact is heat-altered, thus date should be regarded as questionable.
5LA3242	2980±60	Beta-49621	radiocarbon	Loendorf et al. 1996	Possible roasting pit
5FN12	2900±90	I 7908	radiocarbon	Buckles 1974, 1980; Butler 1981	Basin-shaped, unlined firepit weathering from Piney Creek Alluvium deposits
5CF358 Runberg	2840±80	Beta-14179	radiocarbon	Black 1986	Feature 4, cobble-lined hearth
5LK221 Campion Hotel	2840±130	RL 1018	radiocarbon	Buckles 1979; Butler 1981	Feature 2, hearth
5CF555	2770±60	Beta-38800	radiocarbon	Hand 1991	Feature 3, hearth
5LA3570	2750±80	Beta-79751	radiocarbon	Charles et al. 1996	Feature 11, hearth
5EP576	2640±80	Beta-26579	radiocarbon	McDonald 1992; Wynn et al. 1993	Bone

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5LA6197 Wolf Spider Shelter	2630±70	Beta-77458	radiocarbon	Hand and Jepson 1996	Mitigation Pit 4, Feature 5, hearth
5PE910 Gooseberry Shelter	2600±90	Beta-40671	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 3, charcaol from hearth within shelter
5LA5855 Snakeweb Shelter	2580±50	Beta-68890	radiocarbon	Nowak and Morton 1998	Rockshelter
5HF246	2540±580	Beta-9177	radiocarbon	Legard 1983	Feature 2, hearth, dating results received after release of final report were confirmed by CDOT, 10/20/98
5FN348	2530±70	UGa 3522	radiocarbon	Engleman and Shea 1980	General level charcoal
5LA5383	2500±250	W Fu1b	obsidian hydration	Lintz 1985; Andrefsky et al. 1990	Test Unit 2, Level 2, retouched obsidian flake recovered 15 cm below a hearth (Feature 10), B.P. date calculation year is 1984 (year of analysis)
5LA5255 Sue	2470±80	Beta-7102	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 5, hearth
5FN395	2435±90	UGa 3517	radiocarbon	Engleman and Shea 1980	Hearth
5PE8 Two Deer Shelter	2430±90	Beta-48400	radiocarbon	Zier et al. 1996a; Zier 1996	Test Pit 1, Feature 2, hearth within shelter

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5CF555	2350±50	Beta-38801	radiocarbon	Hand 1991	Feature 2, hearth
5BA30 McEndree Ranch	2350±65	DIC 1254	radiocarbon	Shields 1980	Feature 3, hearth
5LA5855 Snakeweb Shelter	2340±60	Beta-68889	radiocarbon	Nowak and Morton 1998	Rockshelter
5FN349	2320±70	UGa 3519	radiocarbon	Engleman and Shea 1980	General level charcoal
5LA5598	2290±140	Beta-26793	radiocarbon	Loendorf 1989	Feature 2, pit within stone enclosure
5EP2158	2270±80	Beta-98073	radiocarbon	W. R. Arbogast, pers. comm. 1998	Hearth at present ground surface
5EP935	2230±80	Beta-39965	radiocarbon	Wynn et al. 1993	Charcoal, Level 19, lower component
5LA2190 Veltri	2200±70	Beta-27981	radiocarbon	Rood and Church 1989	Feature 5, post mold
5BA30 McEndree Ranch	2170±55	DIC 1258	radiocarbon	Shields 1980	Feature 2, hearth
5PE8 Two Deer Shelter	2170±80	Beta-48399	radiocarbon	Zier et al. 1996a; Zier 1996	Test Pit 1, Levels 21-22, charcoal within shelter
5PE910 Gooseberry Shelter	2160±130	Beta-40670	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 4, charcoal from hearth within shelter

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA

Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5OT430	2110±100	Beta-70057	radiocarbon	Mueller et al. 1994; Zier 1996	Feature 1, upper component, hearth in center of large stone scatter, organic sediment
5EP45	2100±60	Beta-48393	radiocarbon	Zier et al. 1996a; Zier 1996	Test Pit 1, Level 3, charcoal within shelter
5OT430	2090±60	Beta-70056	radiocarbon	Mueller et al. 1994; Zier 1996	Feature 1, upper component, hearth in center of large stone scatter, organic sediment
5HF1109	2060±70	Beta-77624	radiocarbon	Zier et al. 1996b; Zier 1996	Feature 5, hearth
5LA1053 Carrizo Rock Shelter	2040±70	DIC 757	radiocarbon	Kingsbury and Nowak 1980	Hearth
5OT430	2000±90	Beta-70058	radiocarbon	Mueller et al. 1994; Zier 1996	Feature 1, lower component, hearth in center of large stone scatter, organic sediment
5CF589 Ruby Mountain	1980±80	Beta-37998	radiocarbon	Weimer 1991	Feature 1, hearth
5LA22 Medina Rock Shelter	1970±100	GAK 672[4]	radiocarbon	Campbell 1969a; Butler 1981	Firepit
5CF554	1930±50	Beta-38798	radiocarbon	Hand 1991	Feature 9, hearth
5LA6568	1930±60	Beta-102658	radiocarbon	Schiavitti et al. 1999	Unknown

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA2405	1920±70	Beta-44099	radiocarbon	Loendorf et al. 1996	Feature 7, hearth
5PE648 Recon John Shelter	1910±90	Beta-24246	radiocarbon	Zier 1989, 1996; Zier and Kalasz 1991	Levels 25-26, detrital charcoal adjacent to shelter
5EP935	1890±60	Beta-39964	radiocarbon	Wynn et al. 1993	Charcoal, Levels 14-15, upper component
5OT219	1890±80	nr[2]	radiocarbon	Kelly 1984	Feature 3, charcoal
5EP2158	1890±80	Beta-98074	radiocarbon	W. R. Arbogast, pers. comm. 1998	Hearth at present ground surface
5HF1100	1880±50	Beta-45801	radiocarbon	Arbogast and Zier 1991; Zier 1994, 1996	Feature 1, hearth
5BA320	1870±70	Beta-11019	radiocarbon	Nowak and Jones 1985	Raised mound hearth A, Level 3
5PE648 Recon John Shelter	1870±50	Beta-24242	radiocarbon	Zier and Kalasz 1985, 1991; Zier 1989, 1996	Cutbank Locality 2, charcoal adjacent to shelter
5LA2190 Veltri	1860±130	Beta-27979	radiocarbon	Rood and Church 1989	Feature 3, hearth
5CF554	1860±50	Beta-38799	radiocarbon	Hand 1991	Feature 6, hearth
5EP3011	1860±40	Beta-119027	radiocarbon	Arbogast et al. 1998	Feature 1; hearth in cutbank

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5PW2 Clay Creek	1850±100	I 7907	radiocarbon	Buckles 1979, 1980; Butler 1981	Firepit exposed in Piney Creek Alluvium deposits
5LA6294	1850±60	Beta-113729	radiocarbon	Nowak and Morton 1998	Hearth materials associated with, but not located within, a rockshelter
5FN844 Moonshine Shelter	1840±80	Beta-29702	radiocarbon	Tucker 1989, 1991	Feature 2, hearth
5HF1109	1820±70	Beta-77625	radiocarbon	Zier et al. 1996b; Zier 1996	Feature 3, hearth
5LA4632	1810±60	Beta-78661	radiocarbon	Charles et al. 1996	AMS date for general charcoal collected in Test Unit 2, Level 7
5EP986 Davis Rockshelter	1810±60	Beta-28510	radiocarbon	Dwelis et al. 1996	Charcoal
5LA6197 Wolf Spider Shelter	1800±120	Beta-77456	radiocarbon	Hand and Jepson 1996	Mitigation Pit 1, Feature 3, hearth
5LA6595	1800±80	Beta-103152	radiocarbon	Schiavitti et al. 1999	Unknown
5LK6	1790±110	RL 225	radiocarbon	Buckles 1973	Feature 1, firepit
5HF1100	1770±50	Beta-62771	radiocarbon	Zier 1994, 1996	Feature 2, hearth
5LA5855 Snakeweb Shelter	1760±60	Beta-50820	radiocarbon	Nowak and Morton 1998	Rockshelter

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA

Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5BA314	1735±65	UGa 4649	radiocarbon	Nowak and Headington 1983	Rockshelter 5, charcoal
5OT430	1730±80	Beta-70055	radiocarbon	Mueller et al. 1994; Zier 1996	Feature 2, hearth, organic sediment
5LA6197 Wolf Spider Shelter	1690±80	Beta-774457	radiocarbon	Hand and Jepson 1996	Mitigation Pit 1, charcoal, Level 6 (possible secondary deposit)
5PE909	1690±60	Beta-40664	radiocarbon	Kalasz et al. 1993; Zier 1996	Test Pit 3-4, Level 4, charcoal within shelter
5LA211 Metate Cave	1680±95	GX 718	radiocarbon	Campbell 1969a; Butler 1981	Charcoal
5EP2158	1680±70	Beta-98072	radiocarbon	W. R. Arbogast, pers. comm. 1998	Hearth at present ground surface
5HF1100	1660±60	Beta-62769	radiocarbon	Zier 1994, 1996	Feature 3, hearth
5BA26 Spring Cave	1645±130	I 3505	radiocarbon	Nowak and Kantner 1990	Rockshelter
5BA22	1645±130	I 5305	radiocarbon	Nowak and Anderson 1972	Hearth
5LA6294	1610±80	Beta-92062	radiocarbon	Nowak and Morton 1998	Hearth materials associated with, but not located within, a rockshelter
5LA1211	1605±80	I 9747	radiocarbon	Wood and Bair 1980; Butler 1981	Feature I-75, post

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5PE8 Two Deer Shelter	1580±70	Beta-48397	radiocarbon	Zier et al. 1996a; Zier 1996	Test Pit 1, Level 12, charcoal within shelter
5LA6197 Wolf Spider Shelter	1570±90	Beta-66969	radiocarbon	Hand and Jepson 1996	Test Pit 1, Level 5, charcoal
5HF1082	1570±80	Beta-77622	radiocarbon	Zier et al. 1996b; Zier 1996	Feature 21, hearth
5LA1416	1545±80	I 9752	radiocarbon	Wood and Bair 1980; Butler 1981	Feature 79
5LA3406	1530±60	Beta-49618	radiocarbon	Loendorf et al. 1996	Feature 1, hearth remnant
5HF1096	1530±50	Beta-77623	radiocarbon	Zier et al. 1996b; Zier 1996	Feature 2, hearth
5FN316	1525±60	UGa 3520	radiocarbon	Engleman and Shea 1980	General level charcoal
5LA3570	1510±50	Beta-78658	radiocarbon	Charles et al. 1996	AMS date of charred material collected from a stratigraphic soil profile location in a cutbank
5LA6603	1500±60	Beta-100214	radiocarbon	Schiavitti et al. 1999	Unknown
5PE648 Recon John Shelter	1500±70	Beta-24244	radiocarbon	Zier 1989, 1996; Zier and Kalasz 1991	Level 11, detrital charcoal adjacent to shelter
5PE278 Belwood	1500±55	GX 325	radiocarbon	Hunt 1975	House 1, bell-shaped pit, charcoal

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5EP2	1490±60	Beta-19347	radiocarbon	McDonald 1992	Charcoal, Levels E-F
5LA2240	1490±60	Beta-7996	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 3, Level 1, hearth
5FN844 Moonshine Shelter	1470±70	Beta-29703	radiocarbon	Tucker 1989, 1991	Feature 5, hearth
5BA314	1460±80	UGa 4648	radiocarbon	Nowak and Headington 1983	Rockshelter 5, charcoal
5LA6071	1450±50	Beta-57960	radiocarbon	Gambrill 1992; Jepson 1995	Feature 1, hearth
5LA6294	1440±60	Beta-113728	radiocarbon	Nowak and Morton 1998	Hearth materials associated with, but not located within, a rockshelter
5LK372	1440±80	UGa 4166	radiocarbon	Arthur 1981	Level 3-4, charcoal
5PE2158	1420±90	Beta-100433	radiocarbon	W. R. Arbogast, pers. comm. to CAI, 1998	Trench at dripline of small rockshelter
5EP986 Davis Rockshelter	1420±50	Beta-61745	radiocarbon	Dwelis et al. 1996	Trench 1N-4E, base of Stratigraphic Unit 2, charcoal
5LA2146	1410±70	Beta-18520	radiocarbon	Nowak and Fiore 1987	Rock shelter 2

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5LA1416	1410±80	I 9762	radiocarbon	Wood and Bair 1980; Butler 1981	Trench 1
5PE648 Recon John Shelter	1400±90	Beta-11898	radiocarbon	Zier and Kalasz 1985, 1991; Zier 1989, 1996	Test Pit 1, Level 11, charcoal adjacent to shelter
5LA5383	1400±140	W Fu1c	obsidian hydration	Lintz 1985; Andrefsky et al. 1990	Test Unit 3, Level 7, obsidian flake, B.P. date calculation year is 1984 (year of analysis)
5PE910 Gooseberry Shelter	1400±100	Beta-40668	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 2, charcoal from hearth within shelter
5LA6595	1390±90	Beta-100211	radiocarbon	Schiavitti et al. 1999	Unknown
5LA2240	1380±60	Beta-7998	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 59, Level 3, hearth
5PE868 Ocean Vista	1360±110	Beta-40663	radiocarbon	Kalasz et al. 1993; Zier 1996	Test Pit 1, Level 3, charcoal within possible structure
5EP2	1350±60	Beta-19348	radiocarbon	McDonald 1992; Wynn et al. 1993	Charcoal, Levels E-F
5LA3570	1350±60	Beta-78659	radiocarbon	Charles et al. 1996	AMS date of charred material collected from a stratigraphic soil profile location in a cutbank

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA5855 Snakeweb Shelter	1350±60	Beta-42373	radiocarbon	Nowak and Kantner 1991	Rockshelter
5LA5621	1330±70	Beta-49626	radiocarbon	Loendorf et al. 1996	Feature 1, hearth
5LA1211	1325±80	I 9748	radiocarbon	Wood and Bair 1980; Butler 1981	Feature I-75, beam
5LA2146	1320±70	Beta-18521	radiocarbon	Nowak and Fiore 1987	Rock shelter 2
5LA1416	1315±80	I 9750	radiocarbon	Wood and Bair 1980; Butler 1981	Feature 7
5PE8 Two Deer Shelter	1300±80	Beta-48396	radiocarbon	Zier et al. 1996a; Zier 1996	Test Pit 1, Level 11, charcoal within shelter
5LA5320 Gimme Shelter	1300±130	W Fula	obsidian hydration	Lintz 1985; Andrefsky et al. 1990	Test Unit 97N-101E; obsidian biface recovered from hearth fill (Feature 8) 34 cm below surface, B.P. date calculation year is 1984 (year of analysis)
5LA3491 Forgotten	1300±120	I-16, 511	radiocarbon	Loendorf et al. 1996	Feature 18, charcoal lens at base of pit
5LA1416	1290±50	Beta-111427	radiocarbon	This volume	Structure 2 subfloor, F20 fill, jacal structure
5LA1053 Carrizo Rock Shelter	1290±55	DIC 325	radiocarbon	Kingsbury and Nowak 1980	Rockshelter, hearth

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5LA1211	1285±80	I 9749	radiocarbon	Wood and Bair 1980; Butler 1981	Feature 59, beam
5LA1416	1285±80	I 9764	radiocarbon	Wood and Bair 1980; Butler 1981	Hearth
5LA6197 Wolf Spider Shelter	1280±90	Beta-66968	radiocarbon	Hand and Jepson 1996	Test Pit 1, general charcoal from Level 2
5LA5503	1275±130	W Fu1f	obsidian hydration	Lintz 1985; Andrefsky et al. 1990	Structure 1, Test Unit 1, Level 1, obsidian projectile point, B.P. date calculation year is 1984 (year of analysis)
5LA5855 Snakeweb Shelter	1270±50	Beta-50819	radiocarbon	Nowak and Morton 1998	Rockshelter
5LA1416	1260±80	I 9763	radiocarbon	Wood and Bair 1980; Butler 1981	Floor
5LA5855 Snakeweb Shelter	1260±60	Beta-42374	radiocarbon	Nowak and Kantner 1991	Rockshelter
5LA6266	1250±60	Beta-70062	radiocarbon	Mueller et al. 1994	Feature 1, hearth, organic sediment
5LA1416	1240±90	Beta-109935	radiocarbon	This volume	Structure 2, F20 fill, corncobs from jacal structure
5LA3491 Forgotten	1240±100	I-16, 520	radiocarbon	Loendorf et al. 1996	Feature 22, hearth

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5EP2200 OAHP Burial 99	1230±50	Beta-81526	radiocarbon	Arbogast et al. 1996	Charcoal in center of burial, Level 4B
5LA1424	1230±50	Beta-111440	radiocarbon	This volume	Feature B, 30C'/23, housepit
5LA2169	1220±50	UGa 3633	radiocarbon	Nowak and Kingsbury 1981	Feature 3, hearth; possibly associated with stone enclosure
5LA5846 Carved Rock	1220±130	Beta-33309	radiocarbon	Loendorf and Kuehn 1991	Charcoal; Test Pit 1, Level 4
5LA5846	1220±150	Beta-33310	radiocarbon	Loendorf and Kuehn 1991	Charcoal; Test Pit 1, Level 5
5LA2240	1220±60	Beta-8000	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 48, Level 3, hearth
5LA2169	1220±65	UGa 5035	radiocarbon	Nowak and Jones 1984	Stone enclosure, hearth
5LA3491 Forgotten	1210±100	I-16, 514	radiocarbon	Loendorf et al. 1996	Feature 16, hearth
5LA1211	1210±50	Beta-113774	radiocarbon	This volume	Structure 2, 1-75, jacal structure
5FN56	1200±50	Beta-60764	radiocarbon	Arbogast 1993	Charcoal from hearth buried adjacent to rock art panel
5LA1416	1200±50	Beta-113764	radiocarbon	This volume	Structure 1, 151/18-24, stone masonry structure

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5PE649 Mary's Fort	1200±70	Beta-11900	radiocarbon	Zier and Kalasz 1985; Zier 1996	Test Pit 2, Level 3, charcoal within stone enclosure
5EP2256	1200±40	Beta-88775	radiocarbon	Arbogast et al. 1996	Feature 2; hearth
5LA1416	1185±80	I 9751	radiocarbon	Wood and Bair 1980; Butler 1981	Feature 90
5LA1416	1185±25 1098±23	nr[2]	archaeomagnetic[3]	Wood and Bair 1980; Mitchell 1997	Feature 90, charcoal
5LA1416	1190±50	Beta-111429	radiocarbon	This volume	Structure 2 post, F17/G28, jacal structure
5LA3189	1180±80	Beta-49623	radiocarbon	Loendorf et al. 1996	Stratum III charcoal associated with rock wall
5LA5249	1170±120	Beta-7099	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 13; Test Unit 1, Level 4, hearth
5LA3186	1160±70	Beta-49619	radiocarbon	Loendorf et al. 1996	Feature 2, hearth±roasting pit
5PE484 Cramer	1160±70	Beta-31549	radiocarbon	Gunnerson 1989	Sample 77-6, 7; bone, Room A, northeast side
5PE648 Recon John Shelter	1150±60	Beta-24243	radiocarbon	Zier 1989, 1996 Zier and Kalasz 1991	Level 5, detrital charcoal from water screen sediment
5EP2200	1150±90	Beta-81525	radiocarbon	Arbogast et al. 1996	Charcoal associated with human burial, Level 3

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5LA1416	1140±60	Beta-109933	radiocarbon	This volume	Structure 6, E1/2 18-30, corncobs from housepit
5LA6592	1140±60	Beta-100208	radiocarbon	Schiavitti et al. 1999	Unknown
5LA2169	1130±65	UGa 5036	radiocarbon	Nowak and Jones 1984	Hearth
5PE8 Two Deer Shelter	1130±70	Beta-48395	radiocarbon	Zier et al. 1996a; Zier 1996	Test Pit 1, Level 9, charcoal within shelter
5LA1417	1130±80	Beta-111436	radiocarbon	This volume	Feature A, 23M/12-18, stone masonry habitation
5LA6603	1130±80	Beta-100215	radiocarbon	Schiavitti et al. 1999	Unknown
5LA6569	1130±100	Beta-100207	radiocarbon	Schiavitti et al. 1999	Unknown
5LA6568	1130±130	Beta-102657	radiocarbon	Schiavitti et al. 1999	Unknown
5LA3491 Forgotten	1120±80	I-16, 515	radiocarbon	Loendorf et al. 1996	Feature 20, hearth
5EP2020	1100±60	Beta-64175	radiocarbon	Wynn et al. 1994	Feature 1, hearth
5LA6294	1100±60	Beta-92061	radiocarbon	Nowak and Morton 1998	Hearth materials associated with, but not located within, a rockshelter
5EP2016	1100±60	Beta-96231	radiocarbon	Espinoza et al. 1997	Large hearth, 2 samples taken from same feature (see 1060±60 date)

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5PE484 Cramer	1100±70	Beta-21324	radiocarbon	Gunnerson 1989	Sample No. 79; charcoal, Room A, southeast side
5LA3491 Forgotten	1100±100	I-16, 512	radiocarbon	Loendorf et al. 1996	Feature 17, slab-covered hearth
5LA2202	1090±55	DIC 2330	radiocarbon	Gleichman 1983	Charcoal lens exposed in cutbank
5HF289	1090±50	Beta-4636	radiocarbon	Chenault 1982	Roasting pit; dating results received after release of final report were confirmed by CDOT 10/20/98
5LA1416	1090±60	Beta-95666	radiocarbon	This volume	Structure 1, 15J/18-24, stone masonry habitation
5EP1192 Windy Ridge	1080±70	Beta-40669	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 3, hearth
5LA2146	1080±40	Beta-23804	radiocarbon	Nowak and Fiore 1988	Rockshelter 2
5LA2240	1080±60	Beta-7999	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 4, Test Unit 5, Level 2, hearth
5LA1416	1080±60	Beta-111428	radiocarbon	This volume	Structure 2 roof, F17/G28, jacal habitation
5EP750	1070±70	Beta-12799	radiocarbon	Gooding 1985	Hearth; midden
5EP986 Davis Rockshelter	1070±60	Beta-28511	radiocarbon	Dwelis et al. 1996	Trench 6N-10E, Stratigraphic Unit 2, charcoal

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5EP773 Red Creek Burial	1070±70	Beta-12861	radiocarbon	Butler et al. 1986	Hearth associated with burial
5CF373 Water Dog Divide	1060±60	Beta-24185	radiocarbon	Hutchinson 1990	Charcoal
5EP2016	1060±60	Beta-96232	radiocarbon	Espinoza et al. 1997	Large hearth, 2 samples taken from same feature (see 1100±60 date)
5LA1445	1060±60	Beta-113776	radiocarbon	This volume	2B/18, stone masonry habitation
5LA6294	1050±50	Beta-113731	radiocarbon	Nowak and Morton 1998	Hearth materials associated wtih, but not located within, a rockshelter
5LA2158 Upper Plum Canyon I	1050±80	UGa 4240	radiocarbon	Rhodes 1984	Rock shelter I; Units B6-B7, hearth
5PE56 Avery Ranch	1050±70	Beta-20653	radiocarbon	Zier et al. 1988, 1990; Zier 1996	Structure 1, Test Pit 6, Level 2, charcoal within stone enclosure
5LA1416	1040±40	Beta-95667	radiocarbon	This volume	Feature 31, C30/basal fill, storage pit
5CF84 Trout Creek Quarry	1040±50	Beta-9182	radiocarbon	Chambellan et al. 1984	Hearth
5HF1082	1040±50	Beta-77621	radiocarbon	Zier et al. 1996b; Zier 1996	Feature 5, hearth
5LA1416	1040±50	Beta-113772	radiocarbon	This volume	Structure 1, R2/19H/24-30, stone masonry habitation

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA6028 Point	1030±50	Beta-37703	radiocarbon	Loendorf and Kuehn 1991; Loendorf et al. 1996	Charcoal from shovel test within an architectural feature
5LA1211	1030±250	I 1906	radiocarbon	Wood and Bair 1980; Butler 1981	Charcoal
5LA1416	1020±110	I 9753	radiocarbon	Wood and Bair 1980; Butler 1981	Fill
5LA6568	1020±80	Beta-102656	radiocarbon	Schiavitti et al. 1999	Unknown
5HF1079	1020±70	Beta-77619	radiocarbon	Zier et al. 1996b; Zier 1996	Structure 1, charcoal within stone enclosure, Level 5
5LA1211	1020±50	Beta-113768	radiocarbon	This volume	Structure 4, 21M/12-18, jacal habitation
5LA5403	1010±70	Beta-8010	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 1 (structure), Test Unit 1, Level 2, charcoal
5EP2020	1010±50	Beta-58277	radiocarbon	Arbogast et al. 1993	Feature 1, hearth
5LA1110 McKenzie Canyon Rock Shelter	1010±60	DIC 758	radiocarbon	Kingsbury and Nowak 1980	Rockshelter, hearth
5EP1603	1010±60	Beta-88778	radiocarbon	Arbogast et al. 1996	Feature 3, hearth
5LA1211	1010±60	Beta-111430	radiocarbon	This volume	Structure 3, R1/230/fl, adobe/stone habitation

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LK372	1005±80	UGa 4165	radiocarbon	Arthur 1981	Level 2, charcoal
5OT124 Ancell	1000±70	Beta-33113	radiocarbon	Black et al. 1990; Black et al. 1991	Charcoal associated with human burial
5LA1211	1000±50	Beta-113773	radiocarbon	This volume	Structure 2, 1-75/R2/floor, jacal habitation
5LA1211	1000±25 345±30	nr[2]	archaeomagnetic[3]	Wood and Bair 1980; Mitchell 1997	Feature 53
5LA1211	1000±250	W 1910	radiocarbon	Wood and Bair 1980; Butler 1981	Charcoal
5PE895 Sullivan Shelter	990±50	Beta-40667	radiocarbon	Kalasz et al. 1993; Zier 1996	Test Pit 4, Level 6, charcoal within shelter
5LA1211	990±50	Beta-111433	radiocarbon	This volume	Structure 3, 230/5" > fl, adobe/stone habitation
5LA1417	990±60	Beta-111439	radiocarbon	This volume	Feature A, 23M/18-20 floor, stone masonry habitation
5LA1424	990±60	Beta-111437	radiocarbon	This volume	Feature B, 30C'/22, housepit
5LA5255 Sue	980±50	Beta-7103	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 17, Test Unit 1, Level 15, hearth
5LA1211	980±50	Beta-111432	radiocarbon	This volume	Structure 3, A4/R5/23R/12-18, adobe/stone habitation

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5LA1211	978±48 575±100 325±125	nr[2]	archaeomagnetic[3]	Wood and Bair 1980; Mitchell 1997	Feature 15
5LA1416	970±30 595±45 275±25	nr[2]	archaeomagnetic[3]	Wood and Bair 1980; Mitchell 1997	Feature 79, charcoal
5LA1416	970±45 613±163 350±100	nr[2]	archaeomagnetic[3]	Wood and Bair 1980; Mitchell 1997	Structure 3, Feature 77
5LA1416	960±50	Beta-95664	radiocarbon	This volume	Structure 1, 18H/24-30, stone masonry habitation
5LA1416	960±50	Beta-109934	radiocarbon	This volume	Structure 5, 6-5/42-54, corncobs from mortuary pit
5LA6603	960±50	Beta-103154	radiocarbon	Schiavitti et al. 1999	Unknown
5LA2169	960±60	UGa 3632	radiocarbon	Nowak and Kingsbury 1981	Stone enclosure, charcoal
5LA1417	960±60	Beta-111443	radiocarbon	This volume	Feature A, 24M/12-18, stone masonry habitation
5LA1416	950±50	Beta-111426	radiocarbon	This volume	Structure 2 subfloor, F20 fill, jacal structure
5LA1416	950±60	Beta-113766	radiocarbon	This volume	Feature 90, adobe habitation, hearth fill

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA1417	940±60	Beta-111442	radiocarbon	This volume	Feature A, 23M/12-18, stone masonry structure
5LA6599	940±60	Beta-100212	radiocarbon	Schiavitti et al. 1999	Unknown
5PE868 Ocean Vista	940±70	Beta-40673	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 4, charcoal within bison bone bed
5PE56 Avery Ranch	940±80	Beta-11212	radiocarbon	Zier and Kalasz 1985; Zier et al. 1988, 1990; Zier 1996	Structure 1, Test Pit 5, Level 4, charcoal within stone enclosure
5LA1725	930±225	DIC 1434	radiocarbon	Kingsbury and Nowak 1980	Stone enclosure, charred mammal bone in hearth fill
5PE484 Cramer	930±50	Beta-21325	radiocarbon	Gunnerson 1989	Sample F83; charcoal, Room B, north side
5LA330 Sorenson	930±50	Beta-37702	radiocarbon	Loendorf et al. 1996	Hearth
5PE56 Avery Ranch	930±60	Beta-11211	radiocarbon	Zier and Kalasz 1985; Zier et al. 1988, 1990; Zier 1996	Structure 1, Test Pit 5, Level 3, charcoal within stone enclosure
5LA1416	930±60	Beta-113767	radiocarbon	This volume	Structure 1, 151/24-30 3" > floor, stone masonry structure

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA1211	925±25 600±50 250±25	nr[2]	archaeomagnetic[3]	Mitchell 1997	Structure 6, Feature 51
5LA1211	920±50	Beta-95665	radiocarbon	This volume	Structure 2, 1-75/R2/Floor, jacal structure
5LA1417	920±50	Beta-111435	radiocarbon	This volume	Feature A, 22N/12-18, stone masonry structure
5PE56 Avery Ranch	920±70	Beta-20657	radiocarbon	Zier et al. 1988, 1990; Zier 1996	Structure 2, Feature 4, base of unburned juniper post, architectural remnant
5LA5305	920±80	Beta-8004	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Rock shelter 2, Feature 12, Test Unit 20, Level 2, charcoal from wall structure
5CF84 Trout Creek Quarry	910±50	Beta-9181	radiocarbon	Chambellan et al. 1984	Hearth
5LA1445	910±50	Beta-113775	radiocarbon	This volume	203/15, stone masonry structure
5EP2	900±50	Beta-26577	radiocarbon	McDonald 1992; Wynn et al. 1993	Level D, charcoal
5EP2200	900±60	Beta-81524	radiocarbon	Arbogast et al. 1996	Charcoal in association with large mammal bone
5BA320	900±60	Beta-14461	radiocarbon	Nowak and Jones 1986	Hearth assumed, but not directly identified in report
5LA6569	900±90	Beta-100206	radiocarbon	Schiavitti et al. 1999	unknown

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5HF289 Montez Midden	890±60	Beta-4635	radiocarbon	Chenault 1982	Feature 1, upper fill of roasting pit; dating results received after release of final report were confirmed by CDOT 10/20/98
5PE868 Ocean Vista	890±50	Beta-41180	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 1, base of juniper post, unburned architectural remnant within structure
5LA1416	890±50	Beta-113765	radiocarbon	This volume	Structure 1, 151/24-30 almost at floor, stone masonry structure
5BA346 Scomb	890±60	Beta-14462	radiocarbon	Nowak and Jones 1986	Stone enclosure
5PE904 Woodbine Shelter	880±60	Beta-40666	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 2, burned wood post within shelter, possible architectural remnant
5PE484 Cramer	880±80	Beta-21326	radiocarbon	Gunnerson 1989	Sample F96; charcoal, Room B, southwest side
5LA6294	870±60	Beta-113729	radiocarbon	Nowak and Morton 1998	Hearth materials associated with, but not located within, a rockshelter
5LA6592	870±60	Beta-100209	radiocarbon	Schiavitti et al. 1999	Unknown
5HF289 Montez Midden	870±50	Beta-4484	radiocarbon	Chenault 1982	Roasting pit
5BA27	860±90	CWRU 25	radiocarbon	Nowak and Kantner 1990	Rockshelter

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5PE8 Two Deer Shelter	860±50	Beta-48394	radiocarbon	Zier et al. 1996a; Zier 1996	Test Pit 1, Feature 1, charcoal from possibly bell-shaped pit within shelter
5LA6595	860±50	Beta-103151	radiocarbon	Schiavitti et al. 1999	Unknown
5LA5402	850±60	Beta-8009	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Rockshelter 1, Feature 4, Test Unit 3, Level 5, hearth
5LA1722	850±50	DIC 1234	radiocarbon	Kingsbury and Nowak 1980; Butler 1981	Stone enclosure, charcoal, Level 2
5LA5305	850±60	Beta-8005	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Rock shelter 2, Feature 12, Test Unit 17, Level 2, charcoal from wall structure
5EP1192 Windy Ridge	840±70	Beta-40665	radiocarbon	Kalasz et al. 1993; Zier 1996	Feature 1, hearth
5LA1416	830±50	Beta-111434	radiocarbon	This volume	Structure 3, M3 floor, adobe structure
5EP1598	830±60	Beta-88776	radiocarbon	Arbogast et al. 1996	Feature 2; hearth associated with stone circle
5PE484 Cramer	830±60	Beta-21323	radiocarbon	Gunnerson 1989	Sample 58; charcoal, Room A (hearth area)
5LA6568	820±80	Beta-100202	radiocarbon	Schiavitti et al. 1999	Unknown

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA550 Pyeatt Rock Shelter	815±125	GX 514	radiocarbon	Campbell 1969a; Butler 1981	Level 2, corncobs
5LA1416	813±13	nr[2]	archaeomagnetic[3]	Wood and Bair 1980; Mitchell 1997	Feature 31, floor
5LA22 Medina Rock Shelter	810±85	GX 515	radiocarbon	Campbell 1969a; Butler 1981	Level 1B, Harinosa de Ocho corncobs
5LA5320 Gimme Shelter	810±50	Beta-8007	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 2, Test Unit 3, Level 3, hearth
5LA5781 Upper Plum Canyon III	800±130	nr[2]	radiocarbon	Quinn 1989; Buckles 1989; Faris 1995	Hearth
5LA6568	800±60	Beta-100203	radiocarbon	Schiavitti et al. 1999	Unknown
5PE56 Avery Ranch	790±70	Beta-20656	radiocarbon	Zier et al. 1988, 1990; Zier 1996	Structure 2, Level 2, charcoal from wood pole fragment, possible architectural debris within stone enclosure
5PE824	780±60	Beta-26234	radiocarbon	Johnson 1988; Jepson 1995	Feature 1, hearth
5LA1416	780±60	Beta-95663	radiocarbon	This volume	Structure 1, A/19H/30-36, stone masonry structure
5LA768 Steamboat Island Fort	775±85	GX 719	radiocarbon	Campbell 1969a; Butler 1981	Floor, Structure B

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5HF234	770±50	DIC 1563	radiocarbon	Kihm 1983	Charcoal stain
5LA1211	763±163	nr[2]	archaeomagnetic[3]	Wood and Bair 1980; Mitchell 1997	Structure 2, Feature I-75, post
5LA5264	760±50	Beta-7312	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 1, Test Unit 2, Level 1, hearth
5LA5385	760±70	Beta-8008	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Rock shelter 2, Feature 4, Test Unit 3, Level 3, hearth
5HF1079	750±70	Beta-77620	radiocarbon	Zier et al. 1996b; Zier 1996	Structure 1, charcoal within stone enclosure, Levels 3-4
5LA5320 Gimme Shelter	750±50	Beta-8006	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Test Unit 11, Level 3, charcoal
5LA5255 Sue	750±50	Beta-7100	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 12, slab-lined hearth
5LA6230	740±50	Beta-70061	radiocarbon	Mueller et al. 1994	Feature 2, hearth, organic sediment
5PE56 Avery Ranch	740±60	Beta-20654	radiocarbon	Zier et al. 1988, 1990; Zier 1996	Structure 1, Feature 2, charcoal from stone cist adjacent to stone enclosure
5LA1416	740±70	Beta-113771	radiocarbon	This volume	Structure 1, A/19H/18-24, stone masonry structure

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA6595	730±70	Beta-103153	radiocarbon	Schiavitti et al. 1999	Unknown
5PE56 Avery Ranch	730±90	Beta-20655	radiocarbon	Zier et al. 1988, 1990; Zier 1996	Structure 1, Feature 3, possible hearth within stone enclosure
5LA5255 Sue	720±70	Beta-7101	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 9, hearth
5CF373 Water Dog Divide	720±60	Beta-24184	radiocarbon	Hutchinson 1990	Charcoal
5LA3570	714±49	DL 94-369	obsidian hydration	Charles et al. 1996	Obsidian flake recovered from subsurface and sourced to Polvadera Peak, Jemez Mtns, NM. B.P. date calculation year is 1995 (year of analysis)
5LA3570	714±49	DL 94-369	obsidian hydration	Charles et al. 1996	Obsidian flake collected from subsurface context and sourced to Polvadera Peak in the Jemez Mountains of New Mexico. B.P. date calculation year is 1995 (year of analysis)
5LA2158 Upper Plum Canyon I	710±50	Beta-9453	radiocarbon	Rhodes 1984	Rock Shelter I; Level 2, charcoal from hearth area
5LA6595	700±50	Beta-100210	radiocarbon	Schiavitti et al. 1999	unknown

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA5320 Gimme Shelter	700±160	Beta-7310	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Test Unit 9, Level 3, hearth
5LA2169	695±90	UGa 4282	radiocarbon	Nowak and Berger 1982	Stone enclosure, charcoal
5PE56 Avery Ranch	680±60	Beta-11210	radiocarbon	Zier and Kalasz 1985; Zier et al. 1988, 1990; Zier 1996	Structure 1, stone enclosure, Test Pit 3, charcoal in Level 3
5PE56 Avery Ranch	670±80	Beta-20652	radiocarbon	Zier et al. 1988, 1990; Zier 1996	Feature 1, possible hearth within stone enclosure
5PE484 Cramer	660±60	Beta-31550	radiocarbon	Gunnerson 1989	Sample F79-1, 3; bone, Room A, southeast side
5PE56 Avery Ranch	640±100	Beta-11213	radiocarbon	Zier and Kalasz 1985; Zier et al. 1988, 1990; Zier 1996	Structure 1, Test Pit 5, Level 5, charcoal within stone enclosure
5LA1725	630±50	DIC 1435	radiocarbon	Kingsbury and Nowak 1980; Butler 1981	Stone enclosure, hearth
5BA320	630±50	Beta-11018	radiocarbon	Nowak and Jones 1985	Raised mound Hearth A, Level 1

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA

Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Type of Date	Reference	Feature/Comments
5LA2255	630±80	Beta-49625	radiocarbon	Loendorf et al. 1996	Feature 4, hearth
5BA22	610±120	CWRU 24	radiocarbon	Nowak and Kantner 1990	Rockshelter
5BA29	610±120	nr[2]	radiocarbon	Nowak and Gordon 1973	Hearth
5LA1211	600±50 138±138 (modern)	nr[2]	archaeomagnetic[3]	Mitchell 1997	Feature 59
5BA24 Jess L. Perkins Cave	600±150	CWRU 23	radiocarbon	Nowak and Kantner 1990	Rockshelter
5LA1053 Carrizo Rock Shelter	600±55	DIC 324	radiocarbon	Kingsbury and Nowak 1980	Rockshelter, hearth
5LA1052	600±55	DIC 322	radiocarbon	Kingsbury and Nowak 1980	Charred bone associated with Tipi Ring 3
5LA125 Umbart Cave	590±110	GX 717	radiocarbon	Campbell 1969a; Butler 1981	Level 2, charcoal
5LA5554	570±60	Beta-7311	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 47, Test Unit 3, Level 3, hearth
5LA2158 Upper Plum Canyon I	570±50	Tx 4438	radiocarbon	Rhodes 1984	Rock Shelter I; Level 4, burned grass associated with charred basketry

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5PE649 Mary's Fort	560±70	Beta-11899	radiocarbon	Zier and Kalasz 1985; Zier 1996	Test Pit 1, Level 3, charcoal within stone enclosure
5PE484 Cramer Site	540±90	Beta-21915	radiocarbon	Gunnerson 1989	Sample F83; bone, Room B, north side
5HF1079	520±60	Beta-77618	radiocarbon	Zier et al. 1996b; Zier 1996	Structure 1, charcoal within stone enclosure, Level 4
5LA2146	520±60	Beta-28629	radiocarbon	Nowak and Kantner 1990	Rockshelter 1
5LA6204 Louden	515±65	Tx 290	radiocarbon	Greer 1966	Charcoal from midden
5LA2146	440±50	Beta-28630	radiocarbon	Nowak and Kantner 1990	Rockshelter 1
5LA5275	440±60	Beta-8003	radiocarbon	Lintz 1985; Andrefsky et al. 1990	Feature 3, Test Unit 1, Level 3, hearth
5LA3491 Forgotten	420±120	I-16, 516	radiocarbon	Loendorf et al. 1996	Feature 21, hearth remnant, possibly contaminated
5CH3 Chubbuck-Oman	420±80 400±95	GX 726	radiocarbon	Tipton 1967; Butler 1981	Human bone; two dates derived from one sample
5FN316	420±50	UGa 3521	radiocarbon	Engleman and Shea 1980	Hearth

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA5781 Upper Plum Canyon III	375±105	nr[2]	radiocarbon	Quinn 1989; Faris 1995	Rockshelter III; charcoal
5LA5255 Sue	370±60	Beta-33308	radiocarbon	Loendorf and Kuehn 1991	Charcoal
5EP2	360±60	Beta-26576	radiocarbon	McDonald 1992; Wynn et al. 1993	Levels A5-B, charcoal
5CF499	350±60	Beta-24183	radiocarbon	Hutchinson 1990	Charred wood
5LA2255	330±70	Beta-49624	radiocarbon	Loendorf et al. 1996	Feature 12, hearth
5EP1603	310±100	Beta-88777	radiocarbon	Arbogast et al. 1996	Feature 2; hearth pit structure with laid branches
5LA1085 Juan Baca	280±60	Beta-21322	radiocarbon	Gunnerson 1989	Sample No. F5-14; wood from middle of barrier wall
5HF246	260±50	Alpha 969	thermo-luminescence	Legard 1983	Hearth; dating results received after release of final report were confirmed by CDOT 10/20/98
5LA2193 Provisional	170±50	Beta-5972	radiocarbon	Indeck and Legard 1984	Feature 1, hearth
5LA145 Nightmare Mesa	170±80	GAK 783[4]	radiocarbon	Campbell 1969a; Butler 1981	Floor, Structure A, possibly contaminated

ABSOLUTE DATES FOR THE ARKANSAS RIVER CONTEXT AREA					
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Type of Date**	**Reference**	**Feature/Comments**
5LA5360	90±76	DL 94-370	obsidian hydration	Charles et al. 1996	Flake found on ground surface and sourced to Cerro del Medio, NM. B.P. date calculation year is 1995 (year of analysis)

1 A= University of Arizona Laboratory of Isotope Geochemistry, Tucson; Beta=Beta Analytic, Inc., Miami; CWRU=Case Western Reserve University, Cleveland; DIC= Dicarb Radioisotopes Company; DL=Diffusion Laboratory, Columbus, Ohio; GX=Geochron Laboratories (division of Krueger Enterprises, Inc.); I=Teledyne Isotopes, Inc.; QL= University of Washington Quaternary Isotope Laboratory, Seattle; RL=Radiocarbon Limited, Lampasas, Texas; Tx=University of Texas Radiocarbon Laboratory, Austin; UGa=University of Georgia, Athens; W=United States Geological Survey, National Center.

2 nr = not reported in the literature

3 Archaeomagnetic dates have been converted from the Christian calendar to Before Present based on the year 1950 and using the recalibrated date ranges reported by Mitchell (1997). In some cases, as a result of the plotted magnetic curve crossing over itself, more than one date is reported for a single sample. Example of mathematical conversion formula using the date range **AD 1025-1350**: 1350 - 1025 = 325 ÷ 2 = 162.5 + 1025 = AD 1187.5±162.5 - AD 1950 = **763 ± 163 B.P.**

4 GAK (Gakushuin University Radiocarbon Laboratory, Tokyo, Japan) radiocarbon dates are considered unreliable by some (Blakeslee 1994; Brad Logan, personal communication, 1998).

APPENDIX B

CATION-RATIO DATES FOR THE ARKANSAS RIVER CONTEXT AREA

Mary W. Painter

CATION-RATIO DATES FOR THE ARKANSAS RIVER CONTEXT AREA				
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Reference**	**Feature/Comments**
5LA5598	4675±200	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 246, element a
5LA5598	4425±450	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 101, element b
5LA3212	3550±200	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 4, element e
5LA5602	3350±350	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 7, element b
5LA5599	3300±250	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 2, element c
5LA2224	2975±200	SEC 1	Dorn et al. 1990; Faris 1995	Petroglyphs; abraded parallel vertical line
5LA2224	2950±225	SEC 4	Dorn et al. 1990; Faris 1995	Petroglyph; treelike symbol
5BA108	2950±225	SEC 6	Dorn et al. 1990; Faris 1995	Petroglyph; abraded parallel vertical line
5LA5598	2700±300	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 220
5LA5598	2350±200	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 172, element a
5BN10	2300±175	SEC 17	Dorn et al. 1990; Faris 1995	Petroglyph; symbol from panel 4
5LA5598	2300±200	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 174, element a
5BN65	2275±300	SEC 9	Dorn et al. 1990; Faris 1995	Petroglyph; line topped with circle in panel 3
5BA108	2225±250	SEC 5	Dorn et al. 1990; Faris 1995	Petroglyph; abraded parallel vertical line
5LA5598	2000±200	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 123, element a
5BN65	2000±175	SEC 10	Dorn et al. 1990; Faris 1995	Petroglyph; figure 8 symbol from panel 3

CATION-RATIO DATES FOR THE ARKANSAS RIVER CONTEXT AREA				
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Reference**	**Feature/Comments**
5BN10	1975±200	SEC 15	Dorn et al. 1990; Faris 1995	Petroglyph; symbol from panel 2
5BN124	1975±200	SEC 18	Dorn et al. 1990; Faris 1995	Petroglyph; symbol from Archaic panel
5BN65	1950±150	SEC 11	Dorn et al. 1990; Faris 1995	Petroglyph; vertical dumbbell symbol in panel 4
5LA5846 Carved Rock	1900±250	ASU-PC39	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 1, meandering line
5LA5602	1900±125	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 28, element I
5BN65	1850±200	SEC 14	Dorn et al. 1990; Faris 1995	Petroglyph; 21 m-long horizontal line near sun symbol in panel 6
5LA5846 Carved Rock	1750±300	ASU-PC40	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 1, meandering line
5LA5598	1500±200	nr[2]	Loendorf 1989	Boulder Panel 59, older abrasion metate
5LA5598	1450±200	nr[2]	Loendorf 1989	Bedrock metate
5BN65	1425±100	SEC 13B	Dorn et al. 1990; Faris 1995	Petroglyph; right side of a U symbol in panel 3
5LA5598	1400±150	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 143, element a
5LA5598	1350±150	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 7, element a
5BN65	1350±100	SEC 13A	Dorn et al. 1990; Faris 1995	Petroglyph; left side of a U symbol in panel 3
5LA4404	1300±200	ASU-PC35	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 13, element a
5LA5598	1300±150	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 101, element a
5LA5840	1250±200	ASU-PC37	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 6, quadruped

CATION-RATIO DATES FOR THE ARKANSAS RIVER CONTEXT AREA				
Site No./ Name	Raw Age (B.P.)	Dating Lab No.[1]	Reference	Feature/Comments
5LA5993	1200±150	ASU-PC46	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 2, element a
5LA5598	1100±100	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 58, element b
5LA5993	1000±225	ASU-PC43	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 1, element qq
5LA5993	1000±250	ASU-PC44	Loendorf and Kuehn 1991	Boulder Panel 1, element a
5LA5993	950±200	ASU-PC45	Loendorf and Kuehn 1991	Boulder Panel 1, element vvv
5LA5993	900±150	ASU-PC42	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 1, element zz
5LA5598	870±100	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 9, element a
5LA6026	850±125	ASU-PC47	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 2, element a
5LA5598	850±100	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 143
5LA330 Sorenson	825±200	PC 50	Loendorf et al. 1996	Ground stone
5LA5586	800±125	ASU-PC33	Loendorf and Kuehn 1991; Faris 1995	bison element
5LA5846 Carved Rock	800±100	ASU-PC41	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 6, anthropomorph
5LA2224	750±100	SEC 3	Dorn et al. 1990; Faris 1995	Petroglyph; large ring symbol
5LA2224	750±100	SEC 2	Dorn et al. 1990; Faris 1995	Petroglyph; abraded parallel vertical line
5LA5549	725±150	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 1, element c
5LA5549	700±100	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 9, element b
5LA5555	700±100	nr[2]	Loendorf 1989; Faris 1995	Element 44, Type K

CATION-RATIO DATES FOR THE ARKANSAS RIVER CONTEXT AREA				
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Reference**	**Feature/Comments**
5LA5598	675±100	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 220, element a
5LA330 Sorenson	650±125	PC 49	Loendorf et al. 1996	Ground stone
5LA5598	650±100	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 221, element a
5LA5598	550±100	nr[2]	Loendorf 1989	Boulder Panel 59, younger abrasion metate
5LA5840	550±125	ASU-PC36	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 2, element l
5LA5569	450±125	ASU-PC34	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 9, element a
5LA5830	450±75	ASU-PC51	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 1, element j
5LA5586	400±100	ASU-PC31	Loendorf and Kuehn 1991; Faris 1995	Deer element
no site number	400±75	ASU-PC29	Loendorf and Kuehn 1991; Faris 1995	GAN dancer figure; Boulder Panel 3, element b. Part of a group of unrecorded rock art sites located on the Hogback at Pinon Canyon.
5LA5255 Sue	375±75	ASU-PC26	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 2, element a
5LA5846 Carved Rock	375±100	ASU-PC38	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 1, cross-head man
5LA5255 Sue	350±100	ASU-PC27	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 5, element b
5LA5549	350±100	nr[2]	Loendorf 1989; Faris 1995	Boulder Panel 6
no site number	300±100	ASU-PC30	Loendorf and Kuehn 1991; Faris 1995	GAN dancer figure; Boulder Panel 4, element c. Part of a group of unrecorded rock art sites located on the Hogback at Pinon Canyon.

CATION-RATIO DATES FOR THE ARKANSAS RIVER CONTEXT AREA				
Site No./ Name	**Raw Age (B.P.)**	**Dating Lab No.[1]**	**Reference**	**Feature/Comments**
5LA5586	<300	ASU-PC32	Loendorf and Kuehn 1991; Faris 1995	Cross-head man element
5BN65	<300	SEC 12	Dorn et al. 1990; Faris 1995	Petroglyph; large abraded horse in panel 3
5BN10	<300	SEC 16	Dorn et al. 1990; Faris 1995	Petroglyph; symbol in group of plus marks on a large boulder
5BA108	<300	SEC 7	Dorn et al. 1990; Faris 1995	Petroglyph; anthropomorphic figure
5LA5255 Sue	<300	ASU-PC28	Loendorf and Kuehn 1991; Faris 1995	Boulder Panel 12, element e

1 SEC=Southeast Colorado prefix attached to control numbers for cation ratio samples reported by Dorn et al. (1990); all other prefixes could not be identified.

2 nr = not reported in the literature

APPENDIX C

CATALOG OF EXCAVATED AND TESTED SITES

Christian J. Zier and Mary W. Painter

Appendix C - Abbreviations and Explanations

How to Use Appendix C

This table is a compendium of tested and/or excavated sites in the context area that have yielded temporal information from subsurface contexts. Basic information about these sites is presented: setting (open or rockshelter); age and the manner in which it was determined; presence/absence of artifact and non-artifact classes; and presence and type of feature(s) present, if any. At least one literature citation is given for each site, with occasional exceptions. This table should not be regarded as a database to be manipulated as a means of examining temporal or other patterns. The site data are expressed at a common demoninator level, the simplicity of which is necessitated by the fact that the information available in many report and publications is limited in scope or difficult to interpret. Rather, the table should be regarded as a starting point for research that would logically lead the investigator to specific examination of original literature sources.

Abbreviations

T or E:

T = Test excavated
E = Excavated

Comment:The distinction between test excavation and full-scale excavation is not always clear. Most sites subjected to full-scale excavation have not been excavated in their entirely; however, "excavation" suggests that the investigation was more than exploratory in nature.

Open or RS

O = Site is situated in an open setting
RS = Site is situated within a rockshelter, boulder shelter, or cave.

Area Excav.:

The total surface area of excavation, in square meters.

Comment: These figures in some cases reflect conversion from English units (feet-yards). In other cases they are estimated or are unknown because of insufficient information in reports or publications.

Dating:

Age
PI = Paleoindian stage
PL = Plano period
AS = Archaic stage
EA = Early Archaic period
MA = Middle Archaic period
LA = Late Archaic period
E/MA = Early or Middle Archaic period
LA/LP = Late Archaic period or Late Prehistoric stage
LP = Late Prehistoric stage
M/LA = Middle or Late Archaic period
DE = Developmental period
DI = Diversification period
PH = Protohistoric period
D/D = Developmental or Diversification period

DI/PH = Diversification or Protohistoric period

Method

^{14}C	= Age determination based on radiocarbon assay(s)
AM	= Age determination based on archaeomagnetism
C	= Age determination based on ceramic style(s)
OH	= Age determination based on obsidian hydration
PP	= Age determination based on projectile point style(s)
TL	= Age determination based on thermoluminescence
X	= None; age is strongly suggested by condition and/or context

Comment: Age determinations are based on evidence from tested or excavated contexts; sites exhibiting only surface age indicators, for example temporally diagnostic projectile points, are excluded even if excavation was conducted. It should be noted, however, that the proveniences of artifacts (i.e., surface versus subsurface) are not given in many reports and publications.

Artifacts:	L	= Lithic debitage and/or tools
	G	= Ground stone
	C	= Ceramics
	B	= Bone tools (including adornment items such as bone beads)
	O	= Other (e.g., worked shell, culturally modified wood, cordage, basketry)
Non-Artifacts:	F	= Faunal remains
	M	= Macrobotanical remains (e.g., flotation materials from hearths, corncobs)
	P	= Pollen
	O	= Other (e.g., unmodified shell, daub)
Features:	B	= Burial
	BB	= Bone bed
	BH	= Basin house/structure or pit house
	BP	= Bell-shaped pit
	BRM	= Burned rock midden
	C	= Cairn (stone)
	CS	= Coursed sandstone structure or structural remnant
	CT	= Cist
	DL	= Stone drive line
	EM	= Earthen mound
	H	= Hearth/probable hearth (includes "roasting pits," "burned rock concentrations," and "firepits")
	H(?)	= Possible hearth
	JA	= Jacal and/or adobe structure or structural remnant
	M	= Miscellaneous stone structure
	P	= Miscellaneous pit
	PM	= Post mold/posthole and/or in situ post
	SA	= Miscellaneous stone alignment
	SC	= Stone circle
	SCN	= Stone concentration
	SE	= Stone or slab enclosure (structure)

SE(H)	= Stone enclosure/hunting blind
SM	= Miscellaneous slabs or stones suggestive of a structure
SS	= Miscellaneous stone structure
SW	= Stone wall
UP	= Upright stone pillar

Comment: The distinctions among feature types described in various reports and publications are not always clear, and in most cases feature definitions are omitted entirely. A good deal of overlap exists within certain groupings of feature types, for example hearth - miscellaneous pit - stone concentration; stone/slab enclosure - stone circle - stone wall; and cist - bell-shaped pit. It should also be noted that some architectural features are not easily assigned to single descriptive categories. For example, some Apishapa phase structures exhibit stone enclosures as well as internal basin-shaped profiles, and are therefore indicated as BH/SE.

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5BA21	E	O	59.5+	M/LA, D/D	PP, C	+	+	+	+	+	+			+	SE, SC, PM(?)	Nowak and Fedor 1992
5BA22	T	O	60+	M/LA, D/D	^{14}C, PP, C	+	+	+			+				SW	Nowak and Berger 1982; Nowak and Kantner 1991
5BA24 Jess L. Perkins Cave	T	RS	22.5	M/LA, D/D	^{14}C, PP, C	+	+	+	+	+	+			+	H, PM	Nowak and Kingsbury 1981; Nowak and Kantner 1991
5BA26 Spring Cave	T	RS	8+	D/D	^{14}C, PP	+	+				+				H	Nowak and Kantner 1991
5BA27	T	RS	6	LA, D/D	^{14}C, PP	+	+								H, PM	Nowak and Kantner 1991
5BA29	T	RS	8.75	D/D	^{14}C, PP, C	+	+	+			+					Nowak and Kantner 1991
5BA30 McEndree Ranch	T	O	?	LA	^{14}C	+			+		+		+	+	BH, H	Shields 1980
5BA86 Brushy Shelter	T	RS	13.5+	LP	PP, C	+	+	+	+	+	+			+	PM, H(?)	Kingsbury and Nowak 1980; Nowak and Kantner 1991
5BA314	T	RS, O	15	DE	^{14}C, PP	+	+				+				SW, SC	Nowak and Headington 1983; Nowak and Kantner 1991
5BA320	E	RS, O	56	LA, DI	^{14}C	+	+				+	+			H	Nowak and Jones 1985, 1986; Nowak and Berger 1982
5BA346 Scomb	T	O	24	DI	^{14}C, PP	+	+				+				SC, SE, H, SW	Nowak and Fedor 1992
5BN206	T	RS	1	LP	C	+		+			+			+	SW, H(?)	Eddy et al. 1982
5CF18	T	O	5	MA	^{14}C	+					+				H	Buckles 1975b

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5CF19	T	O	3	E/MA	PP	+					+					Buckles 1975b
5CF31	T	O	1	LA-DE	PP	+										Buckles 1975b
5CF61	T	O	1	LA	PP	+										Buckles 1975b
5CF84 Trout Creek Quarry	T	O	4	PI, EA, MA, LA, LP	^{14}C, PP	+	+	+				+			H, P	Chambellan et al. 1984
5CF358 Runberg	E	O	98.5	PL, LA, DE	^{14}C, PP	+	+				+	+	+		H	Black 1986
5CF373 Water Dog Divide	T	O	1	M/LA, D/D-PH	^{14}C, PP	+	+					+			DL, SE(H)	Hutchinson 1990
5CF390	T	O	6+	EA, LA, DE	PP	+	+									Zier and Black 1983
5CF410	T	O	?	LA, DE	PP	+										Sounart 1984
5CF499	T	O	1+	A, DE, DI, PH	^{14}C, PP	+									DL, SE(H)	Hutchinson 1990
5CF554	T	O	4	LA	^{14}C	+					+	+			H	Hand 1991
5CF555	T	O	3	LA	^{14}C							+			H, C	Hand 1991
5CF589 Ruby Mountain	T	O	1+	LA	^{14}C										H	Weimer 1991
5CH1 Olsen-Chubbuck	E	O	78	PL	^{14}C, PP	+			+		+				BB	Wheat 1972
5CR1 Draper Cave	E	RS	77	MA, LA	^{14}C, PP	+	+								H, B	Hagar 1976
5EL140 Matheson Hill	T	O	36+	D/D	PP, C	+	+	+			+				SCN	Chenault 1982

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5EP2	E	RS	13	LA, DE, DI, PH	^{14}C, PP	+	+	+			+	+	+		H	McDonald 1992
5EP45	T	RS	2	LA	^{14}C	+	+				+	+			H(?)	Zier et al. 1996a
5EP576	E	O	12	MA, LA, DE	^{14}C, PP	+	+				+		+		H	McDonald 1992
5EP750	T	O	8	DI	^{14}C	+				+					H	Gooding 1985
5EP773	T	O	?	DE	^{14}C	+									H, B	Butler et al. 1986
5EP935	E	O	13	LA, DE, DI	^{14}C, PP, C	+	+	+			+	+	+		H	McDonald 1992
5EP986 Davis Rockshelter	E	RS	27	LA, DE, DI, PH	^{14}C, PP, C	+	+	+			+				H	Dwelis et al. 1996
5EP1192 Windy Ridge	T	O	9	DE, DI	^{14}C, PP, C	+	+	+			+	+		+	H	Kalasz et al. 1993
5EP1671	T	O	1+	D/D	PP, C	+	+	+								Zier et al. 1996a
5EP1696	T	O	1	LA, DI	PP, C	+	+	+			+					Zier et al. 1996a
5EP2158	T	RS	?	LA, DE	^{14}C										H	W. R. Arbogast, pers. comm. to CAI, 1998
5EP2200 OAHP Burial 99	E	O	1+	DE, DI	^{14}C, PP	+		+	+		+			+	B	Arbogast et al. 1996
5FN12	T	O	<1	LA	^{14}C	+									H	Buckles 1974
5FN48	E	O	17	DE, DI, PH	PP	+										Colle 1978
5FN185	T	O	?	EA	PP	+										Engleman and Shea 1980
5FN316	T	O	3	DE, PH	^{14}C	+									H	Engleman and Shea 1980
5FN348	T	O	2	LA	^{14}C	+										Engleman and Shea 1980

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5FN349	T	RS	3	MA, LA	^{14}C, PP	+	+									Engleman and Shea 1980
5FN395	T	O	3	MA, LA, DE, DI	^{14}C, PP	+	+								H	Engleman and Shea 1980
5FN422	T	O	2	DI	PP	+										Engleman and Shea 1980
5FN844 Moonshine Shelter	E	RS	18.5	DE, DI	^{14}C, PP	+	+		+		+	+			H, SW	Tucker 1989, 1991
5HF234	T	O	1	DI	^{14}C	+	+								H	Kihm 1983
5HF246	T	O	6	PH	TL	+	+	+			+				H	Legard 1983
5HF289 Montez Midden	T	O	36	DI	^{14}C	+	+				+				H	Chenault 1982
5HF978	E (?)	O	?	LA	PP	+					+				BB(?)	None; site form on file, Colorado OAHP
5HF1079	E	O	9	DE, DI	^{14}C, PP	+	+	+		+	+	+		+	SE, H	Zier et al. 1996b
5HF1082	E	O	7	DE	^{14}C, PP	+	+				+				H	Zier et al. 1996b
5HF1096	E	O	1	LA, DE	^{14}C, PP	+						+			H	Zier et al. 1996b
5HF1100	E	O	5	LA, DE	^{14}C	+	+					+			H, SCN	Zier 1994
5HF1109	E	O	4	LA, DE	^{14}C, PP	+	+				+	+			H	Zier et al. 1996b
5LA22 Medina Rock Shelter	T	RS	42	LA, DE, DI	^{14}C, PP	+	+		+	+	+	+			SS, H	Campbell 1969a
5LA76 Line Junction Shelter	T	RS	4.5	D/D	PP, C	+	+	+	+		+	+		+	M	Campbell 1969a
5LA125 Umbart Cave	T	RS	7.5	LA-D/D	^{14}C, PP, C	+	+	+	+		+	+		+	SW, H	Campbell 1969a
5LA145 Nightmare Mesa	T	O	11.5	PH	^{14}C	+	+		+						SE	Campbell 1969a

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5LA171 Steamboat Island Shelter	T	RS	3.25	D/D	PP	+	+		+		+	+		+	SW	Campbell 1969a
5LA179 Fernandez Hideaway	T	RS	4.5	LA, DE	PP	+			+		+	+			SW, H	Campbell 1969a
5LA185 Grassy Canyon Enclosure	T	O	13.5	LP	PP	+	+								SE, H	Campbell 1969a
5LA186 West Torres Spring	T	RS	?	LP	+											Campbell 1969a
5LA199 Homestead Enclosure	T	O	13.5	D/D	PP, C	+	+	+	+		+				SE	Campbell 1969a
5LA211 Metate Cave	T	RS	7.5	LA, D/D	^{14}C, PP, C	+	+	+	+	+	+	+		+	SW, H	Campbell 1969a
5LA213 Staring Cow Cave	T	RS	1.5	D/D	PP, C	+	+	+	+		+	+		+		Campbell 1969a
5LA330 Sorenson	T	O	?	D/D	^{14}C, PP	+									SE, H	Loendorf et al. 1996
5LA550 Pyeatt Rock Shelter	T	RS	10	DI	^{14}C, PP	+	+		+	+	+	+		+	SW, H	Campbell 1969a
5LA761 Morts Cave	T	RS	?	D/D	C	+		+			+				SW	Campbell 1969a
5LA768 Steamboat Island Fort	T	RS	27	D/D	^{14}C, PP, C	+	+	+	+		+			+	SE	Campbell 1969a
5LA815 Tecla Mogilewicz Cave	T	RS	20+	AS, D/D	PP, C	+	+	+	+	+	+	+		+	SW, H	Campbell 1969a

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5LA901 Dry Mesa Shelter	T	RS	4	D/D	PP	+	+				+	+			SE	Campbell 1969a
5LA1051	T	O	4+	LP	C	+	+	+							SC	Nowak and Kingsbury 1979
5LA1052	T	O	?	DI	^{14}C, PP	+									SC	Nowak and Kingsbury 1979; Kingsbury and Nowak 1980; Kingsbury and Gabel 1980
5LA1053 Carrizo Rock Shelter	T	RS	21+	LA, DE, DI	^{14}C, PP, C	+	+	+	+		+	+		+	H	Kingsbury and Nowak 1980; Nowak and Kantner 1991
5LA1055	T	RS	19.5	LA, LP	^{14}C, PP	+	+				+			+	SW, H	Kingsbury and Nowak 1980; Nowak and Kantner 1991
5LA1056 Pintada Rockshelter	T	RS	22.5	M/LA, D/D	PP	+	+		+							Kingsbury and Nowak 1980; Nowak and Kantner 1991
5LA1057 Trinchera Cave	E	RS	?	AS, DE, DI	PP, C	+	+	+	+	+	+	+		+	BH, PM, H	Simpson 1976
5LA1080 Valdez Canyon	T	O	7+	DI	PP, C	+	+	+		+					P	Indeck and Legard 1984
5LA1085 Juan Baca	E	O	?	DE, DI, PH	^{14}C, PP	+			+		+				SE, SW	Gunnerson 1989
5LA1110 McKenzie Canyon Rock Shelter	T	RS	60	MA, LA, DE, DI	^{14}C, PP, C	+	+	+	+	+	+				H	Kingsbury and Nowak 1980; Nowak and Kantner 1991
5LA1211	E	O	?	DE, DI/PH	^{14}C, PP AM, C	+	+	+	+	+	+	+		+	CS, JA, PM, P, B	Wood and Bair 1980
5LA1239	E	O	?	LP	C	+		+								Baker 1965
5LA1247 Snake Blakeslee	E	O	?	DI	PP, C	+	+	+	+		+	+			SE, BH, UP	Ireland 1970; Gunnerson 1989

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5LA1310 Torres Cave	E	RS	70	DE, DI	PP, C	+	+	+	+	+	+			+		Hoyt 1979
5LA1413	E	O	?	DI	PP, C	+	+	+	+	+		+			CS	Ireland 1970
5LA1415	E	O	?	DI, PH	C			+							CS	Hand et al. 1977
5LA1416	E	O	?	DE, DI/PH	^{14}C, PP AM, C	+	+	+	+	+	+	+		+	CS, JA, PM, EM, H, P, B	Wood and Bair 1980
5LA1417	E	O	?	DI	PP, C	+	+	+	+	+	+	+			JA, PM, H	Ireland 1973b
5LA1418	E	O	?	DI	PP, C	+	+	+	+	+	+	+			CS	Ireland 1973b
5LA1419	E	O	86	DI	PP, C	+	+	+							CS	Ireland 1974a
5LA1420	E	O	?	DI	C(?)			?								Wood 1981
5LA1424 Messina Bluff	E	O	30+	DI	PP, C	+	+	+	+	+	+	+			BH, SC, H	Ireland 1974a, 1974b; Karhu 1995
5LA1425	E	O	55	DE	PP, C	+	+	+	+	+	+				CS	Ireland et al. 1974
5LA1451 Crowder Field	E	O	?	DI	PP, C	+		+		+					H	Ireland et al. 1974
5LA1480 Running Pit House	E	O	?	DE	PP	+	+		+	+	+	+			BH	Ireland 1974a
5LA1485	E	O	?	LP	C		+	+		+	+				SM, B	Baker 1965
5LA1497	E	O	?	LP	C	+	+	+		+	+				H, P	Baker 1965
5LA1503 Leone Bluff	E	O	230+	DI	PP, C	+	+	+	+	+	+				JA	Ireland 1974c
5LA1523 Leone Bluff, Area II	T	O	83	DI	PP	+	+				+			+	H	Ireland 1974b
5LA1721	T	O	?	LP	PP, C	+	+	+			+				SC, H	Nowak and Kingsbury 1979

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5LA1722	T	O	?	DE	^{14}C, PP, C	+	+	+	+	+				+	SE, H	Nowak and Kingsbury 1979
5LA1725	T	O	10	DI	^{14}C, PP	+	+				+			+	SE, H	Nowak and Kingsbury 1979
5LA2146	T	RS	23+	LA, DE, DI, PH	^{14}C, PP	+	+		+		+	+		+	SW, H	Nowak and Fiore 1987; Nowak and Kantner 1990, 1991
5LA2158 Upper Plum Canyon I	E	RS	44+	MA, LA, DE, DI	^{14}C, PP	+	+		+	+	+	+	+	+	H	Rhodes 1984
5LA2169	E	RS	53+	M/LA, DE, DI	^{14}C, PP	+	+		+		+			+	SE, SC, H	Nowak and Kingsbury 1981; Nowak and Berger 1982; Nowak and Jones 1984; Nowak and Fedor 1992
5LA2190 Veltri	E	O	32+	MA, LA	^{14}C, PP	+	+				+	+			BH, PM, H	Indeck and Legard 1984; Rood and Church 1989; Rood 1990
5LA2193 Provisional	T	O	2	PH	^{14}C	+	+								H, SA	Indeck and Legard 1984
5LA2202	T	O	<1	DE	^{14}C											Gleichman 1983
5LA2238	T	RS	11	D/D	PP	+	+		+		+				SE	Andrefsky et al. 1980
5LA2240	T	RS, O	5	DE	^{14}C	+	+					+	+		SE, H	Andrefsky et al. 1980
5LA2255	T	RS, O	4+	D/D, PH	^{14}C, PP	+	+				+				H	Loendorf et al. 1996
5LA2405	T	O	6+	LA	^{14}C	+	+					+		+	SE, H	Loendorf et al. 1996
5LA3186	T	O	2+	DE	^{14}C	+						+	+		SC, H	Loendorf et al. 1996
5LA3189	T	RS	1	D/D	^{14}C, PP, C	+	+	+			+		+		SE	Loendorf et al. 1996

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5LA3242	T	O	3+	MA, LA	^{14}C	+	+						+			Loendorf et al. 1996
5LA3406	T	O	3+	DE	^{14}C	+						+			H	Loendorf et al. 1996
5LA3491 Forgotten	E	O	59+	LA, DE, DI, PH	^{14}C, PP	+	+			+	+	+		+	SE, H	Loendorf et al. 1996
5LA3570	T	O	4+	LA	^{14}C	+	+				+		+	+	SE, SA	Charles et al. 1996
5LA4632	T	O	2+	DE	^{14}C	+	+						+			Charles et al. 1996
5LA5235 Rock Crossing	T	RS, O	4.5	LA, D/D, PH	PP	+	+				+			+		Andrefsky et al. 1990
5LA5243	T	RS	1	D/D	PP	+	+		+		+			+	SW, H	Andrefsky et al. 1990
5LA5244	T	RS	13	PH	C	+	+	+	+		+			+	SW	Andrefsky et al. 1990
5LA5249	T	O	14.3	DE	^{14}C							+	+		SC, H	Andrefsky et al. 1990
5LA5255 Sue	T	RS	4	LA, D/D, PH	^{14}C, PP	+	+		+		+	+	+	+	H	Andrefsky et al. 1990
5LA5258	T	O	7	E/MA, D/D	PP	+	+		+		+			+		Andrefsky et al. 1990
5LA5262	T	RS, O	2	DI, PH	C	+	+	+	+		+			+		Andrefsky et al. 1990
5LA5264	T	RS	4	MA, DI	^{14}C, PP, C	+		+	+		+	+		+	SW, H	Andrefsky et al. 1990
5LA5270	T	RS	6.5	LA, D/D	PP	+			+		+	+		+	H	Andrefsky et al. 1990
5LA5275	T	RS	2	PH	^{14}C						+	+	+	+	H	Andrefsky et al. 1990
5LA5305	T	RS, O	24+	LA, DE, DI	^{14}C, PP	+	+		+		+	+	+		SE, H	Andrefsky et al. 1990
5LA5320 Gimme Shelter	T	RS	16	DE, DI	^{14}C, PP, OH	+	+				+	+	+	+	H, CT	Andrefsky et al. 1990

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5LA5353	T	O	1.25	DI/PH	C			+				+			SE, SCN	Andrefsky et al. 1990
5LA5360	T	O	4	PH	OH	+	+									Charles et al. 1996
5LA5378	T	RS, O	2	DI/PH	C	+		+			+				SW, H	Andrefsky et al. 1990
5LA5383	T	RS, O	3	LA, DE, DI/PH	PP, C, OH	+	+	+	+		+	+		+	SE, H	Andrefsky et al. 1990
5LA5385	T	RS	5	M/LA, DE, DI, PH	^{14}C, PP, C	+	+	+	+	+	+		+	+	SE, H	Andrefsky et al. 1990
5LA5402	T	RS, O	7+	M/LA, DE, DI, PH	^{14}C, PP, OH	+	+		+	+	+	+	+	+	SE, SW, H	Andrefsky et al. 1990
5LA5403	T	RS	4+	MA, DE, DI/PH	^{14}C, PP, C, OH	+	+	+	+		+	+	+	+	SE, CT	Andrefsky et al. 1990
5LA5421	T	O	6	D/D	PP	+	+				+				H	Andrefsky et al. 1990
5LA5503	T	RS, O	10+	LA, DE, DI/PH	^{14}C, PP, OH	+	+		+	+	+	+	+	+	SE, H, P	Andrefsky et al. 1990
5LA5554	T	O	19+	DE, DI	^{14}C, PP, C	+	+	+			+	+	+		SE, H	Andrefsky et al. 1990
5LA5568	T	RS	3	LA, D/D	PP	+	+				+					Andrefsky et al. 1990
5LA5602	T	RS	6.5	M/LA, D/D	PP, C	+	+	+	+		+			+		Andrefsky et al. 1990
5LA5621	T	O	3	DE	^{14}C	+	+								H	Loendorf et al. 1996
5LA5781 Upper Plum Canyon III	E	RS	?	DI, LC	^{14}C											Quinn 1989

Site Number/ Name	T or E	Open or RS	Area Excav. (m^2)	Dating		Artifacts					Non-Artifacts				Features	Literature Reference
				Age	Method	L	G	C	B	O	F	M	P	O		
5LA5833 Triple J	E	O	14	DI	PP	+	+		+	+	+				SE	Baugh et al. 1986
5LA5846 Carved Rock	T	RS	1	DE	^{14}C, PP	+	+		+	+	+	+				Loendorf and Kuehn 1991
5LA5855 Snakeweb Shelter	T	RS	36	MA, LA, DE, DI	^{14}C, PP	+	+				+	+		+		Nowak and Kantner 1991; Nowak and Fedor 1992; Nowak and Morton 1998
5LA6028 Point	T	RS, O	?	DE	^{14}C						+				H	Loendorf and Kuehn 1991; Loendorf et al. 1996
5LA6197 Wolf Spider Shelter	E	RS	8	MA, LA, DE	^{14}C, PP	+	+		+	+	+	+		+	H, BP	Hand and Jepson 1996
5LA6204 Louden	E	O	32.5	DI	^{14}C	+	+							+	BRM, SC, H	Greer 1966
5LA6230	E	O	8	DI	^{14}C	+						+			H	Mueller et al. 1994
5LA6266	E	O	5	DE	^{14}C							+			H	Mueller et al. 1994
5LK5	E	O	19	LA/LP	PP	+										Buckles 1973
5LK6	E	O	45	LA, DE, DI	^{14}C, PP	+			+		+				H	Buckles 1973, 1979
5LK20	T	O	1	PI, PH	PP	+										Buckles 1975a
5LK25	T	O	1	LA	PP	+										Buckles 1975a
5LK29	T	O	7	M/LA	PP	+										Buckles 1975a, 1978
5LK138	T	O	6	DI	PP	+					+					Buckles 1978
5LK159 Dead of Winter	E	O	70.5	MA	^{14}C, PP	+	+				+				H, P	Buckles 1978
5LK199	T	O	20	M/LA, DE	PP	+	+				+				H	Buckles 1978

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				Age	Method	L	G	C	B	O	F	M	P	O		
5LK221 Campion Hotel	T	O	33	LA, LP	^{14}C, PP	+		+	+		+	+			H	Buckles 1978, 1979
5LK227	T	O	1+	LA	PP	+	+									Buckles 1978
5LK265	T	O	?	DI/PH	PP	+										Buckles 1978
5LK372	E	O	16+	PL, EA, MA, LA, DE	^{14}C, PP	+						+	+			Arthur 1981
5OT124 Ancell	E	O	1.82	DE	^{14}C	+									B	Black et al. 1991
5OT219	T	O	3+	LA	^{14}C										H	Kelly 1984
5OT430	E	O	15	LA	^{14}C	+					+	+			BRM, H	Mueller et al. 1994
5PE1	E	RS	?	LP	X	+			+						B	None; site form on file, Colorado OAHP
5PE8 Two Deer Shelter	T	RS	4	MA, LA, DE	^{14}C, PP, C	+	+	+			+	+			H, BP	Zier et al. 1996a
5PE9 Beacon Hill Burial	E	O	4	DE	PP	+				+					B	Black et al. 1991
5PE56 Avery Ranch	E	O	140+	DE, DI	^{14}C, PP, C	+	+	+	+	+	+	+		+	SE, PM, H, P, CT	Zier et al. 1988, 1990; Ireland 1968; Watts 1971, 1975
5PE62 Renaud's Shelter	T	RS	5+	LA	PP	+	+				+				H	Renaud 1931; Van Ness et al. 1990
5PE63	T	O	6	LP	PP, C	+	+	+		+	+				SE	Kalasz et al. 1993
5PE81 Pictograph	T	RS	?	D/D	C	+	+	+			+	+				Olson et al. 1968; Ireland 1968
5PE172	E	O	?	DI	PP, C	+	+	+	+		+				BH, PM	Olson et al. 1968; Ireland 1968

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				Age	Method	L	G	C	B	O	F	M	P	O		
5PE278 Belwood	E	O, RS	30+	DE	^{14}C, PP, C	+	+	+	+		+			+	BH, PM, H, BP	Hunt 1975
5PE332	T	RS	<1	D/D	C	+	+	+								Van Ness et al. 1990
5PE349 Wallace	E	O	?	DI	PP, C	+	+	+	+	+	+	+			BH/SE, PM, H, BP, P	Olson et al. 1968; Ireland 1968
5PE387 Canterbury	E	O	?	DI	PP, C	+		+						+	SE	Gunnerson 1989
5PE484 Cramer	E	O	?	DE, DI	^{14}C, PP, C	+	+	+	+	+	+		+		BH/SE, PM, H, SW	Gunnerson 1989
5PE648 Recon John Shelter	E	RS	14	MA, LA, DE	^{14}C, PP, C	+	+	+	+	+	+	+	+	+	H, SCN, PM	Zier 1989; Zier and Kalasz 1991
5PE649 Mary's Fort	T	O	2	DE, DI	^{14}C, PP, C	+	+	+			+				SE	Zier and Kalasz 1985
5PE797 Munsell	E	O	?	DI	PP, C	+		+							SE, PM	Gunnerson 1989
5PE868 Ocean Vista	T	O	10	DE, DI	^{14}C, PP, C	+	+	+	+		+	+		+	SE, PM	Kalasz et al. 1993
5PE895 Sullivan Shelter	T	RS	4	DE	^{14}C, PP	+	+				+					Kalasz et al. 1993
5PE904 Woodbine Shelter	T	RS	5	DI	^{14}C, PP, C	+	+	+		+	+	+		+	SE	Kalasz et al. 1993
5PE909	T	RS	4	DE	^{14}C, PP	+	+			+	+					Kalasz et al. 1993
5PE910 Gooseberry Shelter	T	RS	4	MA, LA, DE, DI	^{14}C, PP, C	+	+	+			+	+			H, SCN	Kalasz et al. 1993
5PE1746 Bronquist Burial	E	O	2	DE	PP	+									B	McMahon and Sullivan 1995

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				Age	Method	L	G	C	B	O	F	M	P	O		
5PE1767 Chamber Cave	E	RS	?	DI	PP	+	+	+	+	+	+	+				Nelson 1970

COLORADO COUNCIL OF
PROFESSIONAL ARCHAEOLOGISTS
PO Box 40727
Denver, CO 80204-0727

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