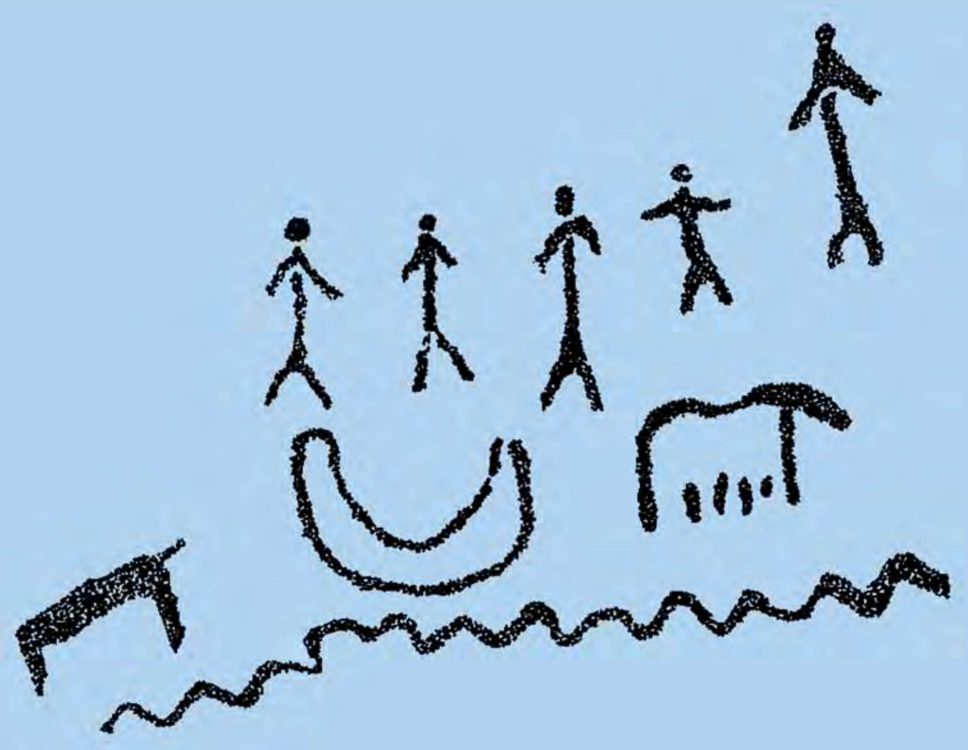
COLORADO PREHISTORY:

A CONTEXT FOR THE RIO GRANDE BASIN



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by

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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 Sanfilippo, 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

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Chapter 1
INTRODUCTION

Marilyn A. Martorano
Foothill Engineering Consultants, Inc.

The Rio Grande prehistoric context (Rio Grande context) was prepared by a team of archaeologists working under the direction of Foothill Engineering Consultants, Inc. (FEC), Golden, Colorado. Members of the team included Marilyn A. Martorano (FEC), principal investigator, and team members, Ted Hoefer III (FEC), Melissa L. Taylor (FEC), Vince Spero (Archaeologist, Rio Grande National Forest [RGNF]), Margaret (Pegi) A. Jodry (Paleoindian/Paleoecology Program, Department of Anthropology, Smithsonian Institution), and Dr. Jeffrey L. Eighmy (Chairman, Department of Anthropology, Colorado State University [CSU]). Project coordinator was Susan Chandler, Alpine Archaeological Consultants, Inc. The project was sponsored by the Colorado Council of Professional Archaeologists (CCPA) and was conducted with monies provided by the State Historical Fund, Colorado Historical Society (CHS).

The purpose of the project was to summarize the known prehistory of the Rio Grande Basin and put the information into a regional perspective for future research and management of prehistoric resources. The specific goals of the context were to update and revise the existing prehistoric contexts known as the RP-3 (Resource Protection Planning Process) documents published in 1984, and to provide professional and avocational archaeologists with a usable document containing research and management objectives and guidance for future research. The current document covers the geographical area covered previously by the Colorado Mountains prehistoric context (Guthrie et al. 1984).

The Rio Grande context is one of five regional prehistoric contexts for the state of Colorado (Figure 1-1). The other four contexts include the Platte Basin, the Arkansas Basin, the Northern Colorado Basin, and the Southern Colorado Basin. The boundaries of the five contexts are based on the four primary drainage basins in Colorado, with the Colorado Basin subdivided into two regions, the Northern and Southern Colorado Basins. Division of the context boundaries by drainage systems was conducted to divide the state of Colorado into regions for the purpose of discussion, and does not necessarily reflect cultural patterns. The use of drainage systems allows for more meaningful discussion and interpretation of ecological, hydrological, and geomorphological data for each area.

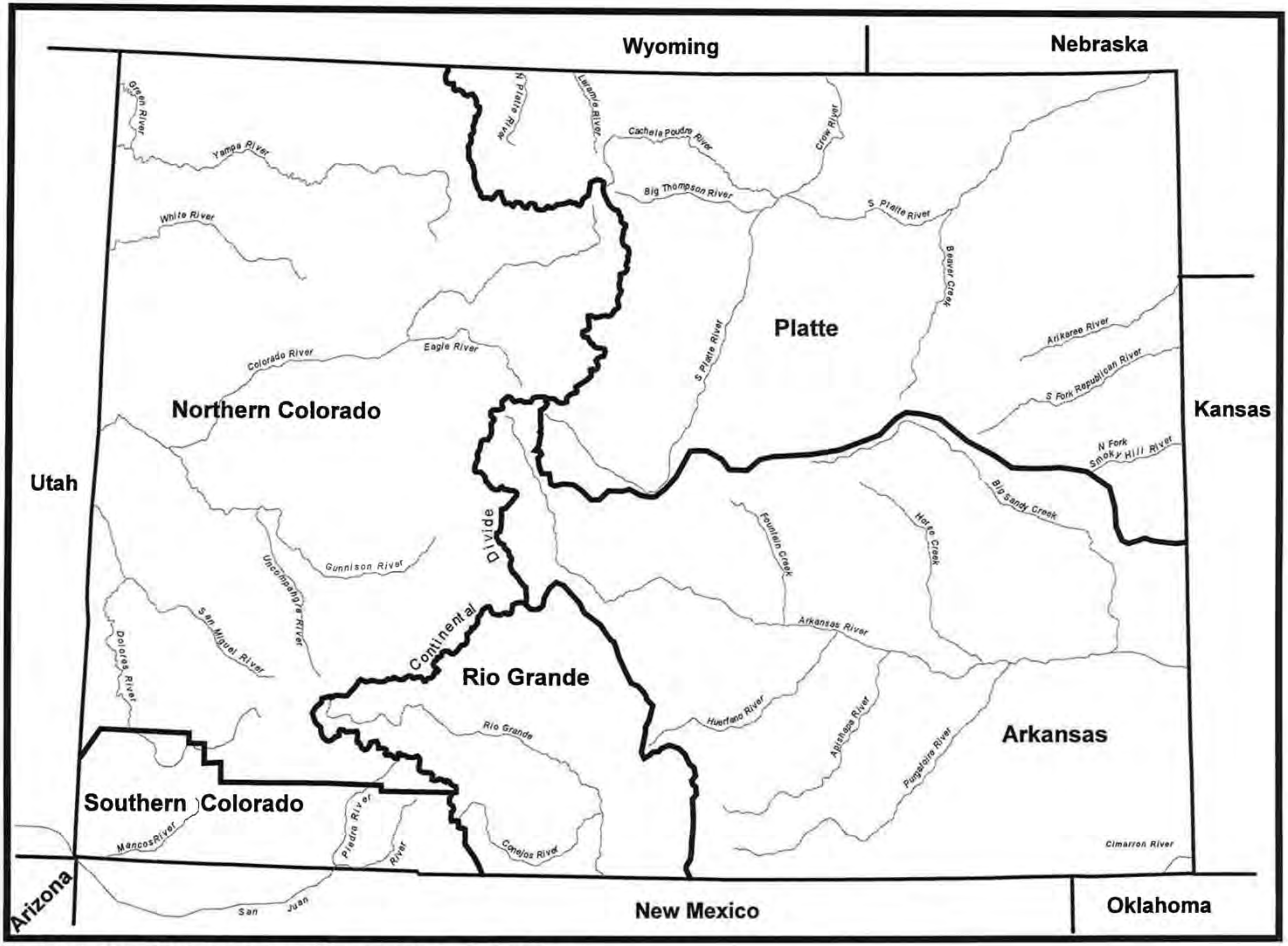


Figure 1-1. Map of Colorado showing the five prehistoric context areas.

Chapter 2
CONTEXT METHODS

Ted Hoefer III and Melissa L. Taylor
Foothill Engineering Consultants, Inc.

An immediate problem in developing this context is the quality of the data and lack of certain types of data. The lack of excavated sites and associated temporal, subsistence, and assemblage data reduces the amount of useful data to prepare this context. These types of information are only available for the Paleoindian stage and minimally for the Archaic and Protohistoric stages. A few sites representing other temporal stages have been dated, undergone test excavations or were excavated in the earlier part of this century, but in general this work has not produced data that have been subjected to modern dating and analysis techniques.

To summarize and review the data from the Rio Grande context area, it was necessary to review the site forms produced from the region. The vast majority of the data is recorded on CHS site forms. In most of the reports the information on the site forms is summarized with no further detail, and in a number of cases, no reports exist. The context authors decided to summarize the survey data in terms of temporal periods, site types, and geographic distribution. It is hoped that this summation will be useful to future research and provide a baseline upon which to build future investigations.

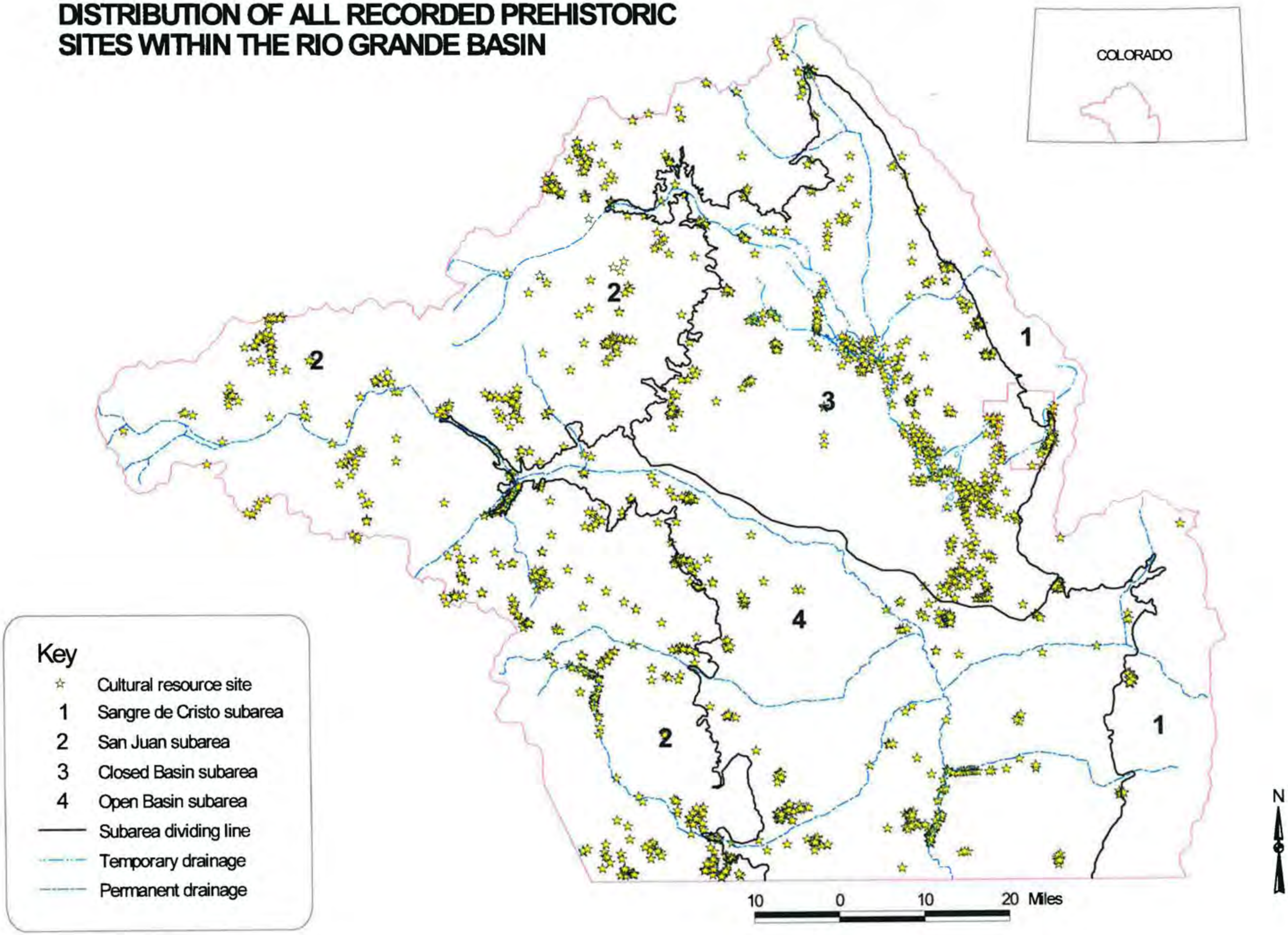
Using site forms as the data source is fraught with problems. The quality of the site forms varies greatly from adequate to useless. Variable terminology, the experience of the investigator, and the level of supporting documentation such as feature and artifact drawings/photographs and site maps all figure into the usefulness of the site form. Many early site forms are very general and provide little specific data that allow for meaningful comparisons of individual sites.

The Office of Archaeology and Historic Preservation (OAHP) database for the counties in the context region was received in both paper and electronic forms. The database was received on February 3, 1998. No subsequent information on sites recorded after this date has been considered. Information was received for Alamosa, Conejos, Costilla, Hinsdale, Mineral, Rio Grande, Saguache, and San Juan counties. The electronic form of the selected OAHP data was imported into a Microsoft Access® database for use by the context authors, which was then altered for the purpose of this project. Sites in portions of counties not in the Rio Grande watershed were removed from the Access® database. The database was queried to sort sites by cultural and temporal affiliation and site type. The site types were those used by OAHP and include open lithic scatters, open camps, open and sheltered architectural sites, sheltered camps and lithic scatters, quarries or lithic procurement areas, kill or butchering sites, rock art, burials, and culturally peeled trees, referred to as cambium trees in the OAHP database. Once the sites were sorted into categories, site lists were printed. Any site that listed temporal or cultural affiliation, open architectural features, rock art, or burials were examined at the CHS offices. Site forms that listed site types as lithic scatters and open camps were cursorily examined. Upon inspection of this sample of site forms, it was found that lithic scatters and open camps tended to be correctly classified in the opinion of the authors, but mistakes were often made on other site types.

Based on the review of the site forms, corrections were made to the Access® database used for this project. Most often these corrections involved the listed temporal or cultural affiliation. Often sites were listed as Ute, Pueblo, Woodland, etc., based on a single artifact, most often a single projectile point. Other times, no justification for the listed temporal affiliation could be found on the site form. It was decided to take a conservative approach and use a strict stage format of Paleoindian, Archaic, and Late Prehistoric to classify the sites temporally. For example, any site listed as Ute was changed to Late Prehistoric in the Access® database. In the vast majority of cases, cultural affiliation was based on a single item and did not justify the classification listed in the OAHP database. A new field was placed into the Access® database, which allows for sites that have had some information changed from the original OAHP data to be tracked. Tables that identify specifically those sites used for the purposes of this context are presented in Appendix A. The final version of the Access® database after all changes were made contains information on 1,301 sites and 828 isolated finds.

The database was also used to generate maps of site distribution by site type and temporal period. The Universal Transverse Mercator (UTM) coordinates for each site were imported into an ArcView® Geographic Information Systems (GIS) program and overlaid on maps of the context area to produce these figures. However, not all of the sites have been assigned UTM coordinates. Approximately 11 percent (n=230) of the sites and isolated finds do not have UTM coordinates and thus, these properties are not represented on the figures presented in this text. It is assumed, however, that because a majority of sites do have locational data available, the figures provide a fairly reasonable representation of total site distribution. Figure 2-1 presents the overall distribution of prehistoric sites within the Rio Grande Basin for which UTM information was available. The figures showing more specific distributions by either site type or temporal period are presented in the relevant sections of Chapters 6 and 7.

FIGURE 2-1
DISTRIBUTION OF ALL RECORDED PREHISTORIC SITES WITHIN THE RIO GRANDE BASIN



Chapter 3
ENVIRONMENT

MODERN ENVIRONMENT

Ted Hoefer III
Foothill Engineering Consultants, Inc.

Physiography

Definition of Study Area

The Rio Grande context study area is defined as the region drained by the Rio Grande in south-central Colorado (Figure 3-1). The area consists of a large intermontane basin, the San Luis Valley (also referred to as "the valley"), bordered by the San Juan Mountains on the west and the Sangre de Cristo Mountains on the east. The Continental Divide forms the northern and western borders of the study area, the Colorado-New Mexico border defines the southern limit of the study area, and the crest of the Sangre de Cristo Mountains forms the eastern border. Alamosa, Conejos, Costilla, and Rio Grande counties are wholly contained in the study area, as are portions of Hinsdale, Mineral, San Juan, and Saguache counties (Figure 3-2). Access to the valley is open from New Mexico, but is limited to a number of high mountain passes to the north, east, and west.

Definition of Subareas

The study area has been divided into four subareas (see Figure 3-1) based on hydrology and elevation. The subareas also differ in vegetative communities, but this is largely a function of elevation and precipitation differences. Subareas 1 and 2 are the Sangre de Cristo and San Juan mountains, respectively. These encompass the mountainous terrain on the east and west sides of the San Luis Valley. Subareas 3 and 4 are the northern and southern portions of the San Luis Valley. The dividing line between these subareas runs roughly from Del Norte on the west to near Fort Garland on the east. This line represents a hydrologic boundary that divides the valley into the Closed Basin and Open Basin. These subareas were chosen because each is characterized by differing terrain, vegetative communities, precipitation, climate, and hydrologic characteristics.

Landforms

The study area is dominated by three major physiographic regions: the San Luis Valley, the San Juan Mountains, and the Sangre de Cristo Mountains. The San Luis Valley is the northern portion of the Rio Grande Rift or structural depression (Upson 1971; Chronic 1980).

The valley, which formed during the Miocene period, is hinged on the west side and faulted on the east side and may contain as much as 4,500 m of interbedded alluviums, tuffs, and volcanic debris that range in age from the Miocene to the Holocene (Emery et al. 1971). Topographically the valley is a broad flat plain nearly 110 km (168 mi) in north/south extent and 80 km (122 mi) in east/west extent and covering some 8800 square kilometers. The valley ranges in elevation from 2440 m (8000 ft) near the mountain foothills to a low of 2285 m (7500 ft) in the central part of the valley near Alamosa. The valley is comprised of five physiographic subregions. These regions are the Alamosa Basin, the San Luis Hills, the Taos Plateau, the Costilla Plains, and the Culebra Re-entrant (Upson 1971).

FIGURE 3-1
RIO GRANDE BASIN PREHISTORIC CONTEXT STUDY AREA

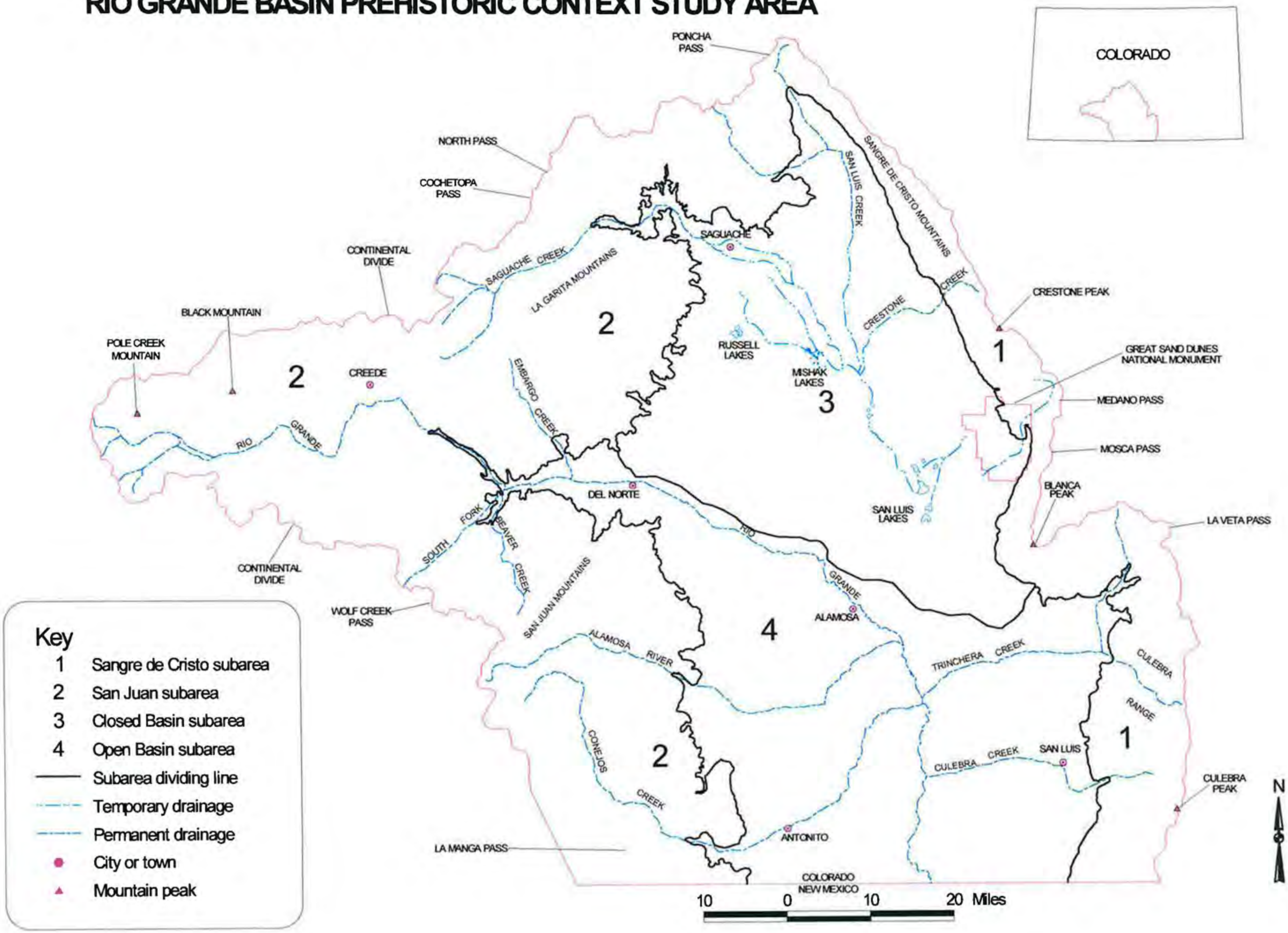
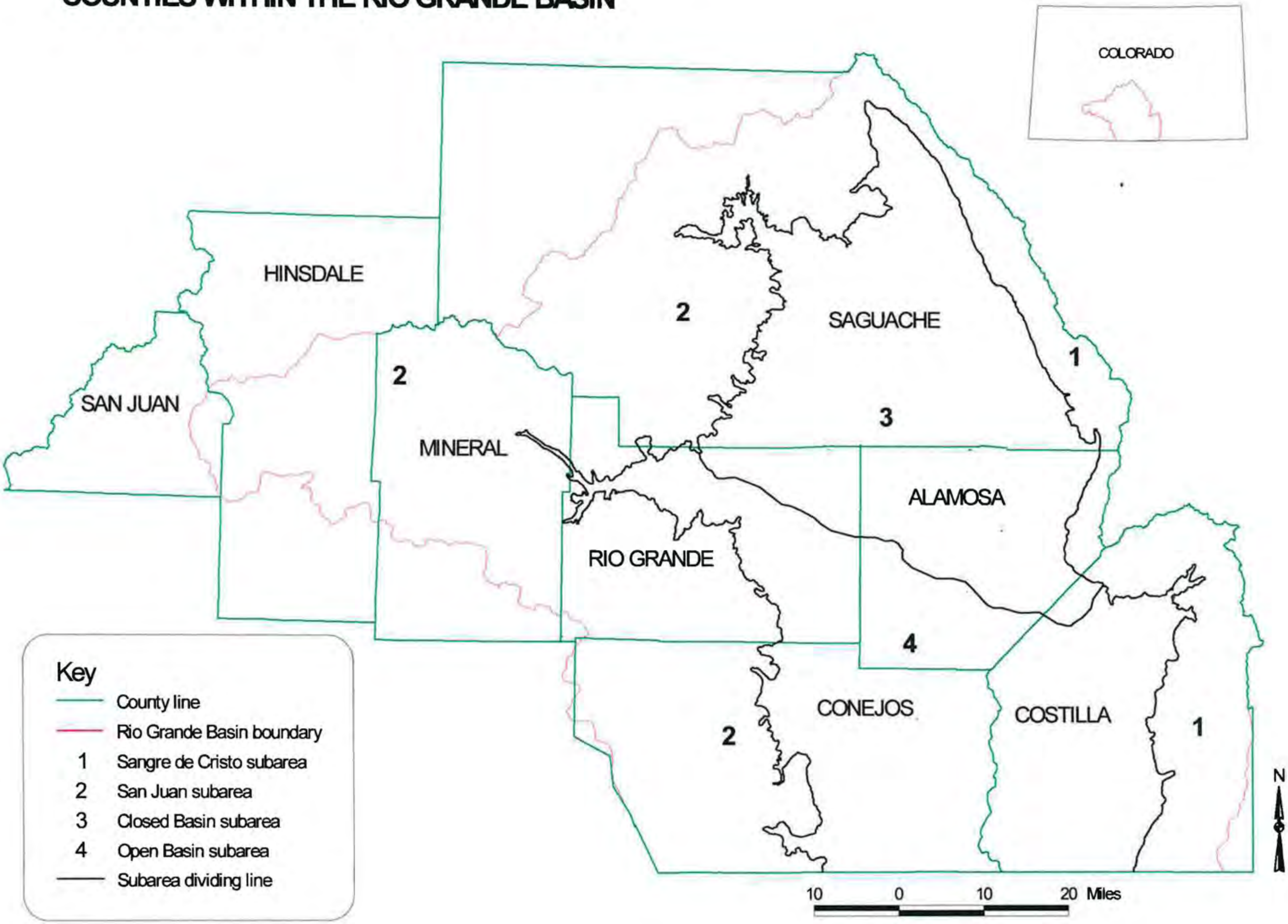


FIGURE 3-2
COUNTIES WITHIN THE RIO GRANDE BASIN



The Alamosa Basin covers portions of the northern and western areas of the valley. The Alamosa Basin is nearly flat lying except near the mountain margins where alluvial fans are present. The Rio Grande fan on the west side of the valley forms a gentle slope, while the numerous fans at the foot of the Sangre de Cristos have coalesced to form steeper-sloped bajadas. The basin floor is comprised of gravels, sands, and silts of the Alamosa Formation. These deposits have eroded from the mountains into the valley from the Pliocene into the Holocene. Numerous eolian sand deposits cover the basin, particularly on the eastern side. Prevailing southwesterly winds moving the sands eastward resulted in the formation of the Great Sand Dunes National Monument on the far east side of the basin at the foot of the Sangre de Cristos.

The San Luis Hills cover the south-central portion of the valley. These hills and mesas are 150 to 300 m higher than the otherwise flat surface of the valley. The hills are the result of mid-Tertiary volcanic events which also resulted in the formation of the San Juan Mountains. The hills are composed of andesitic lavas and breccias. The extreme southern portion of the valley in Colorado and extending into New Mexico is the Taos Plateau. This plateau has a broad, undulating surface composed of Tertiary Hinsdale basalts (Tweto 1979a).

The southeastern portion of the valley is comprised of the Costilla Plain and the Culebra Re-entrant. The Costilla Plain consists of late Pleistocene and early Holocene alluviums (Tweto 1979a). These materials are found in a north/south band from the east bank of the Rio Grande eastward to the San Luis area. The alluvium is relatively undissected and covers the Hinsdale basalt (Upson 1971). The Culebra Re-entrant is located in the vicinity of the town of San Luis in the southeastern part of the valley. It is complex geologically and consists of three parts: 1) a belt of foothills near the mountains, 2) a central graben, and 3) San Pedro Mesa. As compared to the Costilla Plain to the west, the re-entrant exhibits high amounts of erosion.

The San Juan and Sangre de Cristo mountains are part of the southern Rocky Mountain physiographic province (Hunt 1967). The San Juan Mountains on the west side of the San Luis Valley are volcanic in origin. A series of volcanic events beginning nearly 40 million years ago (mya) deposited tuff, breccias, and basalts over the region. Subsequent erosion of these deposits has formed U-shaped glacial cirques, jagged peaks and ridges, and deep, steep-sided stream valleys. The San Juans can be divided into three subareas. The Cochetopa Hills comprise the northern end of the range, the La Garita Mountains the central part of the range, and the San Juan Mountains the southern half of the range. San Luis Peak, in the La Garita Mountains, reaches a height of 4271 m (14,014 ft) and represents the highest elevation in the western part of the study area.

The Sangre de Cristo Mountains form the far eastern section of the study area. These mountains are composed of Pre-Cambrian granites and gneisses and are very steep and rugged. They were formed during the Laramide orogeny, but faulting and uplifting occurred into the Miocene and Pliocene. Recent uplift is indicated by the fault scarps on the alluvial fans at the mountain-valley juncture. The Sangre de Cristos contain a number of peaks over 4200 m; Blanca Peak is the highest at 4372 m (14,345 ft). The Sangre de Cristos are divided between the Sangre de Cristos themselves in the northern part of the range and the Culebra Range to the south.

Hydrology

All of the study area is defined by the Rio Grande watershed. The Rio Grande drains an area of roughly 7,900 square miles in Colorado. The Rio Grande begins at the Continental Divide in the San Juan Mountains. The river takes an easterly course through the San Juans. The river enters the San Luis Valley at Del Norte and continues easterly for another 30 miles before turning southward. Major tributaries of the Rio Grande include the Alamosa River and Conejos Creek on the west side of the valley and Trinchera and Culebra Creeks on the east side of the valley. The northern part of the San Luis Valley, defined as the Closed Basin, is internally drained. Saguache Creek (which drains the La Garita Mountains and Cochetopa Hills), San Luis Creek, Crestone Creek, and numerous other small creeks draining both the San Juans and Sangre de Cristos flow underground once reaching the valley floor. These waters are trapped between alternating layers of alluvial gravels and clays. It is not clear if waters flowing into the Closed Basin ever reach the Rio Grande (Emery et al. 1971). During wetter climatic episodes, these waters may reach the surface through artesian springs. Russell, Mishak, and the San Luis lakes in the northern part of the valley are recipients of water flowing to the surface. The area south of the Rio Grande is the Open Basin where water flows on the surface year-round.

Modern Climates

The climate of the context study area is dominated by two factors. One is the precipitation contrast between the mountains and valley and the other is cold temperatures. The San Luis Valley is often classified as a true desert because it receives less than 25 cm of precipitation per year. The mountains are much more moist and some areas receive over 100 cm of precipitation per year.

The contrast between valley and mountain precipitation is seen between the Alamosa, Creede, and Wolf Creek Pass weather reporting stations (Colorado Climatic Data Center 1998). Wolf Creek Pass at an elevation of 3243 m (10,640 ft) averages 108.7 cm of precipitation per year. Most of the precipitation comes between August and March in the form of snowfall. Creede, at an elevation of 2694 m (8838 ft), receives an average of 29.21 cm of moisture per year. Most of this moisture comes from July to November in the form of rainfall and snowfall. Alamosa, at an elevation of 2298 m (7541 ft), receives an average of 18.1 cm per year, the majority of which falls in the late summer in the form of rain showers. The disparity between the mountains and the valley is even greater because of the evapotranspiration rate. At elevations below 2600 m (7925 ft) in the valley, the evapotranspiration rate exceeds precipitation and aridity prevails. In the mountains, precipitation exceeds evapotranspiration, making the mountains much more moist. Although Creede receives barely 30 cm of precipitation per year, less of this moisture is lost to evaporation than in the lower valley.

Temperatures in both the mountains and the valley are cold, which effectively limits the growing season to an average of 120 days. The temperature contrast between the mountains and the valley is not that great. Generally, the valley is colder in the winter and warmer in the summer than the surrounding mountains. Cold air often becomes trapped in the valley during the winter and some areas in the mountains are actually warmer. The average low temperature for Alamosa in January, the coldest month of the year, is -2.4°F, while Creede and Wolf Creek Pass average 5.2°F and 4.0°F, respectively. Temperatures can also be bitterly cold. Temperatures exceeding -50°F have been recorded at Alamosa, -40°F at Wolf Creek Pass, and -20°F at Creede. July is the warmest month of the year. At Alamosa the average July high is 81.9°F. At Creede the July average is 77.6°F and at Wolf Creek Pass the average is 65.8°F. Additional information on current climate conditions can be found in the paleoenvironment discussion in the Paleoindian section.

Modern Flora and Fauna

The project area is characterized by four life zones (Mutel and Emerick 1984; Dixon 1971). These zones are the Upper Sonoran, Montane, Subalpine, and Alpine. The Upper Sonoran zone covers the floor of the San Luis Valley. The upper elevation of this zone is 2440 m (8000 ft). The Upper Sonoran zone in the central portion of the valley is dominated by greasewood, saltgrasses and other alkaline-tolerant shrubs, forbs, and grasses. Where the alkalinity is less severe, rabbitbrush replaces greasewood as the dominant species. Around perennial and seasonal lakes, bulrushes, sedge, and cattails can be found. Along the Rio Grande and other major streams, cottonwood trees, willows, and a variety of riparian plant species are found. Near the valley margins a grassland shrub community replaces the greasewood and rabbitbrush. This community is dominated by sagebrush, rabbitbrush, and a variety of grasses. At the upper limits of this community, sagebrush is intermixed with pinyon trees. The Montane life zone begins around 2440 m (8000 ft) in elevation at the transition between the grassland shrub and a pinyon-juniper woodland. The pinyon-juniper woodland extends upward to 2600-2750 m (8500-9000 ft) where it is replaced by a ponderosa pine forest. Oak brush is common in the montane zone in the northern part of the San Luis Valley. The Montane zone is replaced by the Sub-Alpine zone at 2900 m (9500 ft). The Sub-Alpine zone is a forest dominated by Douglas-fir, lodgepole pine, aspen, and subalpine fir. Above 3500 m (11,500 ft) is the Alpine zone. This zone is dominated by an Englemann spruce forest. As the elevation rises, the spruce forest gives way to a tundra environment.

Animals in the study area are typical of those found throughout Colorado (Mutel and Emerick 1984; Keen 1971). Ungulates such as deer, elk, bighorn sheep, and pronghorn are found in the study area, as are common furbearers such as beaver. Bison were present prehistorically. Perhaps the most interesting feature of the San Luis Valley, in terms of subsistence adaptations, is the high number of migratory game birds that populate the valley for at least part of the year. The San Luis Valley is part of the Rocky Mountain flyway which attracts numerous game birds. Today, the vast majority of these birds are found at the Alamosa and Monte Vista National Wildlife refuges. Prehistorically, particularly during wetter periods, large areas of the valley were probably suitable habitat for these birds. Currently, two species of geese and 13 species of ducks inhabit the refuges as well as a wide variety of songbirds, raptors and water/marsh-adapted species (United States Fish and Wildlife Service 1998).

PALEOINDIAN STAGE PALEOECOLOGICAL RECORDS

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Introduction

Prehistoric human adaptations developed in relation to the changing ecosystems of which they were a part. In the Closed Basin of the San Luis Valley, climatic changes impacted the distribution and abundance of wetland resources as well as the position of timberline through time. Water tables rose between ~10,900 and 10,500 before present (B.P.), creating lush grassland habitats and locally abundant playa lakes, and providing human populations with plentiful large game and ready ambush locations (Jodry and Stanford 1996). A trend toward warmer, drier conditions followed this mesic interval, punctuated by periods of increased moisture. Greater reliance on seed plants such as Indian ricegrass, marsh resources, and smaller game distinguish Holocene adaptations. By 9500 B.P., pinyon trees were established in the area and their nuts provided seasonal subsistence options. Pinyon harvesting sites dot the foothills, while the remains of fishing camps lie adjacent to former lakes and marshes on the valley floor (Jones 1977).

Sediment Cores

To investigate the interplay between Paleoindian peoples and the dynamic reorganization of climatic, hydrologic, and biotic regimes during the terminal Pleistocene/early Holocene transition, the Smithsonian Institution's Paleoindian/Paleoecology Program initiated the coring of four lakes to provide the first palynological records of postglacial vegetation and climate change for the upper Rio Grande. This research was conducted in collaboration with palynologists at the University of Arizona, Tucson and at the Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder. From west to east these lakes are 1) Black Mountain Lake in the San Juan Mountains (Reasoner and Jodry 1998a), 2) Head Lake (Shafer 1989; Jodry et al. 1989; Davis and Shafer 1991; Jodry and Stanford 1996) and San Luis Lake (De Lanois 1993) on the intervening basin floor, and 3) Como Lake in the Sangre de Cristo Mountains (Shafer 1989; Jodry et al. 1989) (Figure 3-3). These lacustrine records transect the San Luis Valley from the upper subalpine forest of the eastern San Juan Mountains to the alpine/forest ecotone of the western Sangre de Cristo Mountains. Shifts in the relative position of upper (Black Mountain/Como Lakes) and lower (Como Lake) timberline in the mountains, and changes in effective moisture and vegetation on the basin floor (Head Lake, San Luis Lake) are described. Suggestions are presented regarding possible influences of these changes on Paleoindian land-use patterns in the region.

Black Mountain Lake

Black Mountain Lake is located in Hinsdale County about 17 km (11 mi) west of the town of Creede. The lake is situated at 3413 m (11,195 ft) in elevation in the Rio Grande headwater region of the eastern San Juan Mountains and was cored in conjunction with the excavation of the Black Mountain Folsom site, 5HN55 (Jodry et al. 1996; Reasoner and Jodry 1998a). The lake's position, 9 km up-valley and 317 m upslope of this campsite, is well placed to record shifts in vegetation that might have influenced the activities of Paleoindian people in the area. In particular, its setting some 187 m below alpine timberline made it sensitive to seasonally severe temperature fluctuations, which affect the shifting position of the tundra-forest boundary through time (Fall

Figure 3-3. Physiographic map of the San Luis Valley showing the locations of (1) Black Mountain Lake, (2) Head and San Luis Lakes, and (3) Como Lake.

1997). The lake currently lies within the upper subalpine spruce-fir forest *(Picea engelmannii/ Abies lasiocarpa)*. Table 3-1 provides climatic data for the area, as recorded at Summitville in a similar subalpine setting, and at Hermit Lakes lying in a cold-air drainage in a montane valley bottom.

Table 3-1. Climatic Data for the Period 1939-47 at Summitville and for 1951-84 at Hermit Lakes, Rio Grande National Forest, Colorado.

	Summitville 3442 m	Hermit Lakes 2743 m
Average Winter Temperature	17 °F (-8 °C)	13 °F (-10.5 °C)
Average Summer Temperature	48 °F (8.9°C)	54 °F (12°C)
Average Annual Precipitation	99 cm	38 cm
Average Winter Snowfall	871 cm	198 cm

(from USDA Forest Service 1996)

Two sediment cores, 7.6 cm in diameter and a maximum of 780 cm long, were collected through winter ice with a vibracorer in January 1997 (Reasoner and Jodry 1998a). A continuous depositional record spanning the last 11,500 years (~13,400 cal B.P.) is represented by massive to faintly laminated gyttja (a sedimentary peat consisting mainly of plant and animal residues precipitated from standing water) in the upper 261 cm. The contact between the gyttja and underlying inorganic, silty-clay sediments is sharp. This distinct boundary marks a strong departure from relatively high wet bulk density, high magnetic susceptibility, low organic carbon content, and low water content in the lower core (262-740 cm), to the reverse in the upper core (0-261 cm). A fir needle *(Abies)* recovered 2 cm above this boundary provides an AMS determination of 9,930±70 B.P. (11,318-10,998 cal B.P.).

Ongoing analysis is directed at the core interval between 228 and 293 cm, which spans the period from 11,430±70 to 8,480±80 B.P. (Reasoner and Jodry 1998a). Chronological control is based on ten accelerator mass spectrometry (AMS) radiocarbon determinations. In six levels in the core between 228 and 293 cm, terrestrial macrofossils were dated. In four cases, a terrestrial macrofossil age was paired with an age determined from extracted humic acids to test the reliability of humic ages for the entire record. The close correspondences between the two sets of data are seen on the right side of Figure 3-4. Table 3-2 lists the calibrated (Stuiver and Reimer 1993; CALIB 3.0) and uncalibrated radiocarbon ages, and dated materials, for Black Mountain Lake core BML 97-2.

Table 3-2. Radiocarbon Dates from Black Mountain Lake Core BML 97-2.

Lab Number	Core Depth	^{14}C Age (B.P.)	Dated Material	Calibrated Age (cal B.P.)	1 sigma range
CAMS-38698	160 cm	4,980± 70	Picea needle	5,721	5,856-5,645
CAMS-38697	160 cm	5,140±50	Humic acids	5,911	5,931-5,772
CAMS-38706	228 cm	8,480±80	Picea needle	9,450	9,495-9,391
CAMS-38700	238 cm	8,890±70	Picea needle	9,906	9,974-9,860
CAMS-38699	238 cm	8,920±50	Humic acids	9,917	9,972-9,884
CAMS-38705	253 cm	9,370±110	Picea needle	10,483	10,737-10,338
CAMS-38702	259 cm	9,930±70	Abies needle	11,231	11,258-11,211
CAMS-38701	259 cm	9,910±60	Humic acids	11,204	11,334-11,214
CAMS-38704	293 cm	11,430±70	Conifer twig	13,311	13,450-13,247
CAMS-38703	293 cm	11,670±50	Humic acids	13,517	13,562-13,497

(from Reasoner and Jodry 1999: Table 1)

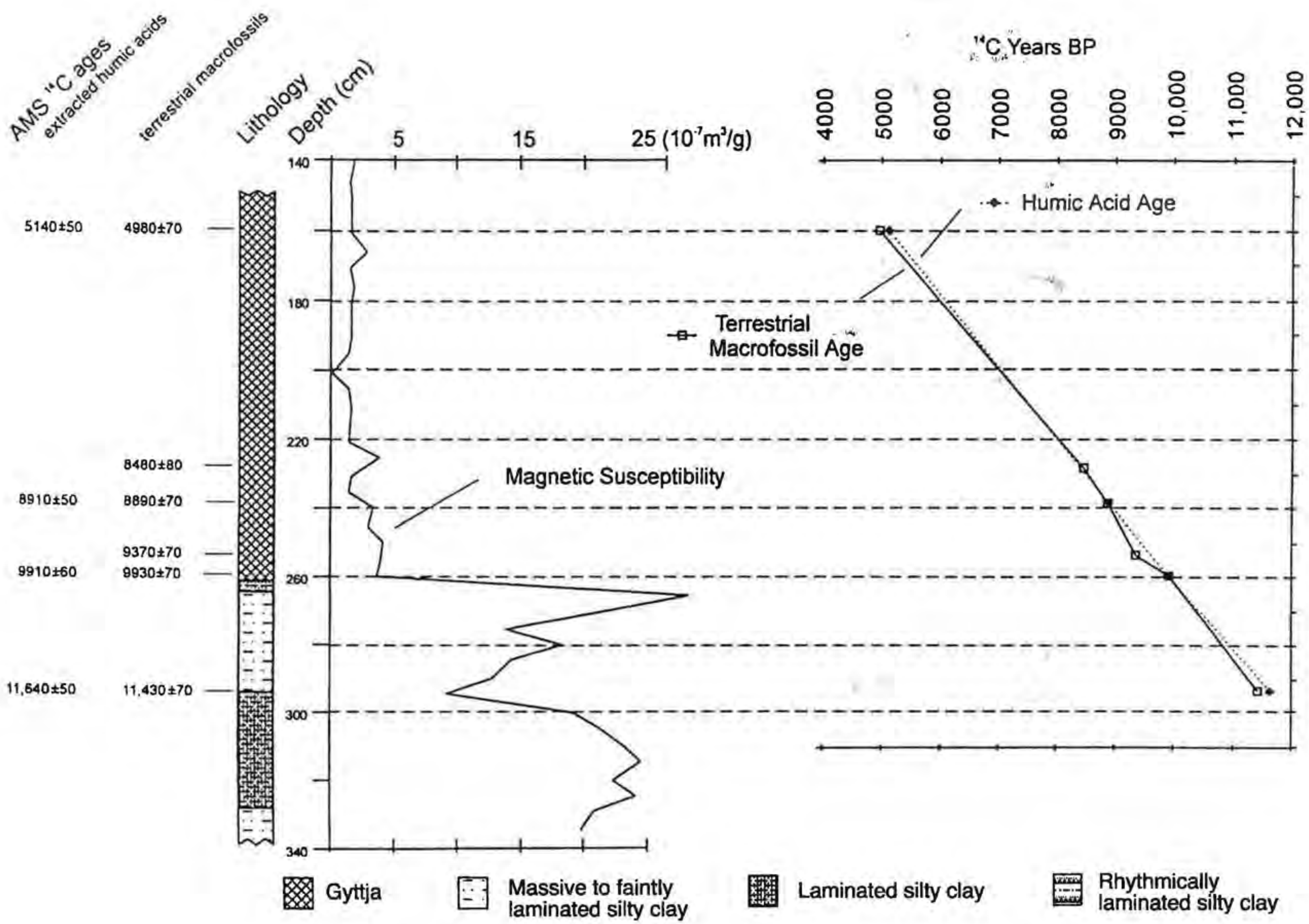

Figure 3-4. Geochronology and magnetic susceptibility for a portion of Black Mountain Lake core 97-2.

Thirty-six pollen samples, collected at intervals of 2.5 cm and less, have been analyzed thus far for the late-glacial portion of the core (Reasoner and Jodry 1998a). The mean grain count is 664 (range: 488-949). Pollen percentage data are used to reconstruct the late Pleistocene to early Holocene vegetation history. The down-core variations in the major taxa are shown in Figure 3-5. Reasoner subdivided the pollen record into four zones on the basis of a stratigraphically constrained cluster analysis (Grimm 1988; CONISS). The cluster analysis draws major dissimilarity partitions at approximately 10,085 B.P., 11,130 B.P., and 11,620 B.P. The dates of 10,085 and 11,130 B.P. are very close to the termination and initiation, respectively, of the Younger Dryas climatic oscillation (Alley et al. 1993; Edwards et al. 1993; Mayle et al. 1993; Taylor et al. 1993). High-elevation arboreal taxa decline during the Younger Dryas and increase again about 10,100 B.P. Herbaceous taxa show the opposite trend. As the site is located in high mountainous terrain these pollen changes likely represent fluctuations in the elevation of alpine timberline (Reasoner and Jodry 1998a). Inferences of vegetation history are currently based on relative pollen percentages, to be supplemented by pollen accumulation rate, diatom (unicellular aquatic plant which often fossilize well in both lake and marine systems due to their siliceous cell walls), and macroscopic charcoal information as analysis proceeds.

Zone 1, 315-296.5 cm, Sagebrush-Pine-Grasses Assemblage

The top of this zone dates ~11,570 B.P. and the base is undated. Total arboreal taxa increased over Zone 1 from 22 percent to 32 percent of the total pollen in the zone. *Artemesia,* (sagebrush, 34-44 percent) and *Pinus* (pine, 18-26 percent) pollen dominate, with *Poaceae* (grasses), and *Picea tubuliflorae* (high spine) represented at percentages from 5 to 10 percent. Pollen from nonarboreal taxa such as *Chenopodiaceae/Amaranthaceae* (goosefoot/amaranth), *Rosaceae* (rose family), *Ambrosia* (ragweed), *Caryophyllaceae, Cupressaceae, Cyperaceae* (sedge) and *Salix* (willow) occur in percentages from 1 to 5 percent. *Thalictrum (meadow rue)* increases over Zone 1 from trace amounts to 3 percent. Also present in trace amounts throughout Zone 1 are *Alnus* (alder), *Polygonaceae, Umbelliferae* (parsley family), *Botrychium, Dryopteris*-type, *Pteridium* (ferns), and spores of *Selaginella densa* (rock *selaginella*) (Reasoner and Jodry 1998a).

Zone 2, 296.5-285.5 cm, Pine-Sagebrush-Spruce Assemblage

Zone 2 dates from ~11,570 to ~11,130 B.P. The significant feature of Zone 2 is the increase of total arboreal taxa from 32 percent to 45 percent of the pollen sum. Increases in pollen percentages of *Picea, Pinus, Thalictrum,* and *Pteridium,* and declines in *Artemisia, Rosaceae,* and *Tubuliforae* high-spine occur at or near the base of this zone. *Abies* (fir), *Quercus* (oak), *Cupressaceae, Salix, Chenopodiaceae/ Amaranthaceae,* and *Ambrosia* pollen, as well as spores of *Selaginella densa* occur consistently throughout the zone at 2-5 percent. *Alnus, Caryothyilaceae, Potentilla* (Cinquefoil), *Polygonaceae* (i.e. bistort), *Umbelliferae, Botrychium,* and *Dryopteris*-type palymorphs are present in trace amounts (Reasoner and Jodry 1998a).

Zone 3, 285.5-262.5 cm, Sagebrush-Pine-Grasses Assemblage

Zone 3 dates from ~11,130 to 10,140 B.P. Total arboreal pollen percentages decline sharply from 45 percent to remain between 28 and 32 percent for most of the zone. This change largely reflects decreases in pine, spruce, and fir pollen percentages and increases in sagebrush pollen percentages. Throughout the zone, pine and spruce pollen are present in consistent percentages of nearly 25 percent and 8 percent, respectively. Oak and fir pollen occur in steady, but low (<2 percent) percentages. Sagebrush pollen increases to about 40 percent near the base of Zone 3 and gradually declines upwards toward the top of the zone. Percentages of *Poaceae, Tubliflorae* (high spine),

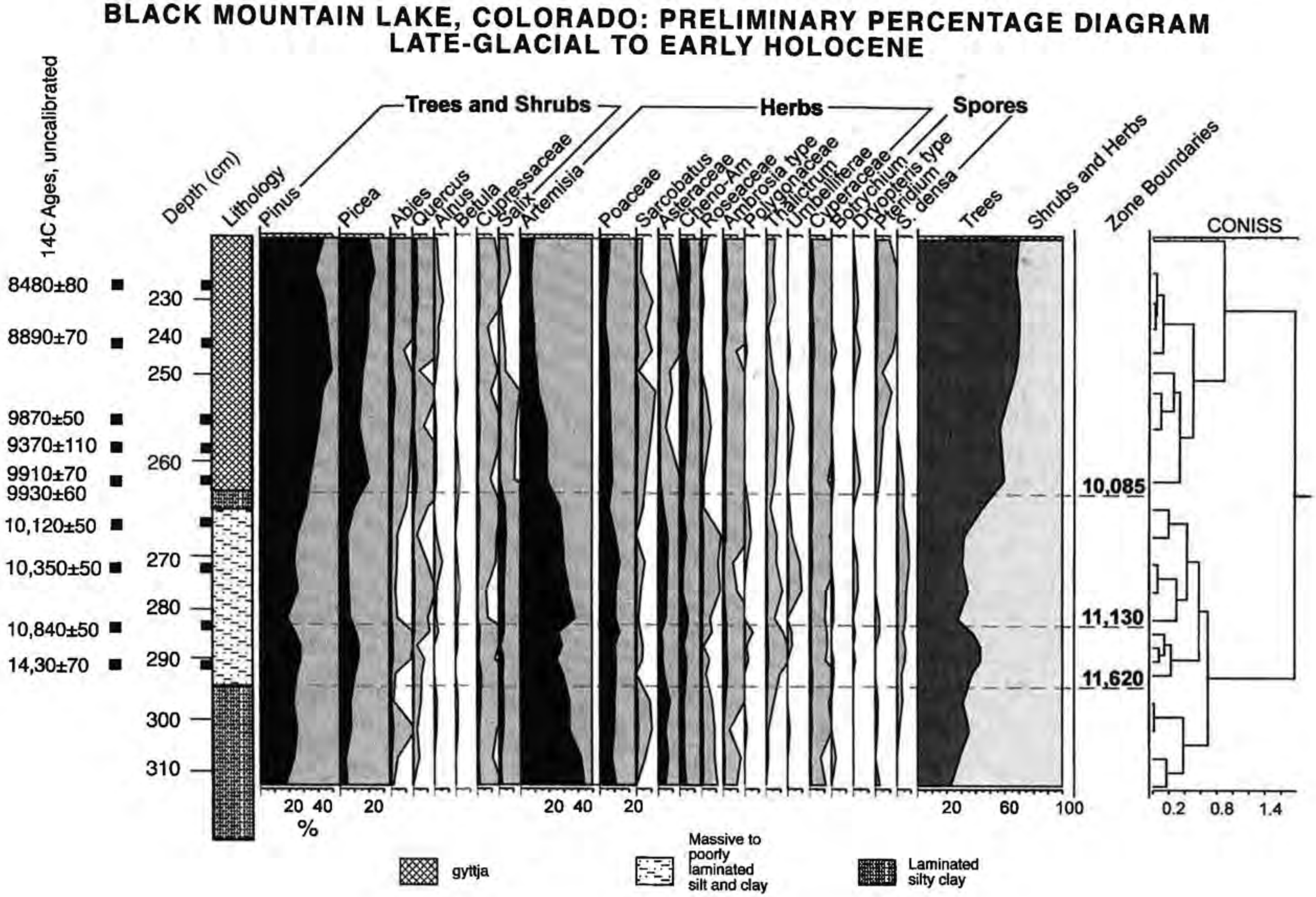

Figure 3-5. Preliminary pollen percentage diagram of Black Mountain Lake, Colorado (from Reasoner and Jodry 1998a).

Rosaceae, Salix, and *Selaginella densa* rise slightly from the previous zone, whereas *Cupressaceae, Ambrosia, Thalictrum,* and *Chenopodiaceae/Amaranthaceae* decline a bit. *Alnus* (alder), *Caryophyilaceae, Potentilla,* and *Umbelliferae* pollen are present in low percentages. Spores of *Botrychium, Dryopteris*-type, and *Pteridium* are present in trace amounts (Reasoner and Jodry 1998a).

Zone 4, 262.5-220 cm, Sagebrush-Pine- Assemblage

Zone 4 dates from approximately 10,140 B.P. to approximately 8000 B.P. The base of Zone 4 is a first-order CONISS dissimilarity partition, coincident with the termination of the Younger Dryas climatic oscillation. The most conspicuous feature of the zone is a sharp increase in total arboreal taxa from about 32 percent to over 60 percent of the pollen sum across the lower boundary of the zone. Declines in *Artemisia, Salix, Alnus, Caryophyilaceae, Potentilla, Tubuliflorae* (high spine), *Rosaceae, Umbelliferae,* and *Selaginella densa* percentages are accompanied by increases in *Pinus, Picea, Abies, Quercus,* and *Pteridium* percentages at or near this level. *Alnus* pollen and *Botrychium* and *Dryopteris*-type spores are represented in trace amounts (Reasoner and Jodry 1998a).

Summary

Black Mountain Lake sediments register a significant vegetation response to the abrupt climate changes during the Younger Dryas oscillation. Preceding the Younger Dryas (between ~11,600 and 11,100 B.P.), there is a substantial increase in arboreal pollen taxa from 32 to 45 percent of the total pollen spectra. During the Younger Dryas, the total arboreal pollen percentages decline sharply from 45 percent to around 30 percent. This change primarily reflects declines in pine, spruce, and fir, and increases in percentages of sagebrush. Following the Younger Dryas, arboreal pollen increases sharply from 32 percent to more than 60 percent. These data strongly suggest that the temperature-controlled alpine timberline moved downward in response to cooler conditions, placing the Folsom inhabitants of the Black Mountain Folsom site within the upper timberline ecotone (Reasoner and Jodry 1998b).

The pollen record from Black Mountain is very similar to that recovered from Sky Pond (Reasoner and Jodry 1998b), an alpine lake (3320 m [10,890 ft]) located ~100 m downvalley from a moraine in Rocky Mountain National Park. In the Sky Pond record, a depression in upper timberline is associated with a small advance of cirque glaciers in the Colorado Front Range (Menounos and Reasoner 1997). An AMS date of 12,040± 60 B.P. was obtained directly above basal diamicton (the lower extent of an unsorted and unstratified mixture of glacially-deposited sediments) and provides a minimum age for cirque deglaciation in the area. An interval of clastic sediments within the gyttja of the lower core represents a period of glacial advance that is AMS dated between 11,070 ± 50 and 9970 ± 80B.P. (Menounos and Reasoner 1997). This is in agreement with the Santanta Peak glacial advance reported by Benedict (1973, 1981, 1985a). The predominance of xerophytic taxa in the early portion of the Black Mountain Lake pollen record suggests that cooler temperatures rather than increases in precipitation may have primarily influenced the glacial advance (Reasoner and Jodry 1998a, 1998b).

Around 10,100 B.P., alpine timberline migrated above the elevation of Black Mountain Lake as the climate warmed substantially, reaching warmer than modern conditions prior to about 9000 B.P. Arboreal pollen percentages in the early Holocene portion of the record are consistent with those determined from modern samples collected from subalpine forests in Colorado and Wyoming (Fall 1992, 1997). The completion of the Black Mountain Lake pollen and diatom record is still in progress, and will extend to include the period from ~12,500 B.P. to the present.

Head Lake and San Luis Lakes

Head (2310 m [7577 ft]) and San Luis lakes (2300 m [7544 ft]) are located near one another on the floor of the San Luis Valley just west of the Great Sand Dunes. Current vegetation around the lakes is dominated by greasewood *(Sarcobatus vermiculatus)*, shadscale *(Atriplex* sp.*)*, and rabbitbrush *(Chrysothamnus sp.)*. Prior to about seventy years ago, grasses and sagebrush *(Artemisia tridentata)* were far more common (Rogers et al. 1985).

Head Lake

A 260 cm composite sediment core was obtained through winter ice with a vibracorer (Shafer 1989; Jodry et al. 1989), in conjunction with Smithsonian excavations at Stewart's Cattle Guard Folsom site (5AL101) located 6 km (3.7 mi) to the southeast (Jodry 1987; Jodry and Stanford 1992). Lake sediments consist of clayey or silty sand that fine upward from 260 to 47 cm, peat from 47-43 cm, and alternating calcareous clayey sand or sandy clay from 43-28 cm. Pollen concentrations are low overall, but increase substantially above 130 cm. Below 130 cm, pollen influx was very low. Palymorph counts for the lower core were only prepared at the 160, 200, and 240 cm levels (Shafer 1989). The interval from 130 to 190 cm appears to represent a period of greater eolian sand deposition (and/or low pollen production). Limnologic preservation was poor (Owen Davis, personal communication 1998). Conventional radiocarbon dates from bulk sediment samples provide chronologic estimates (Shafer 1989; Davis and Shafer 1991) (Table 3-3).

Table 3-3. Radiocarbon Dates from Head Lake.

Lab Number	Core Depth	^{14}C Age (B.P.)	Dated Material
Beta-30226	10-15	1740±150	Bulk sediment
A-05142	20-30	5230±190	Bulk sediment
Beta-30562	35-40	10,490±290	Bulk sediment
A-05143	45-55	11,060±160	Bulk sediment
A-05144	100-120	9440±340	Bulk sediment
A-05145	190-210	10,080±650	Bulk sediment

(from Shafer 1989)

The record of aquatic plants at Head Lake suggests that water levels were high during the terminal Pleistocene (Shafer 1989). At 60 cm, peak pollen percentages of rooted aquatic plants such as sedges *(Cyperaceae)*, cattail *(Typha)*, and pondweed *(Potamogeton)* suggest that water levels were rising. Peak percentages of algae *(Pediastrum)* at 50 cm suggest that water levels and surface water area were at a maximum from approximately 11,000 to 10,900 B.P. (Figure 3-6). At high water levels, emergent aquatic plants were less abundant, perhaps constrained by closely bordering sand dunes. Dunes of this kind exist at the lake margins today and preclude development of a shallow water littoral zone at higher lake levels, where emergent plants such as sedges *(Carex)* are inundated. Lake levels apparently dropped dramatically sometime after ~9500 B.P., as evidenced by the disappearance of algae *(Pediastrum)*, coupled with maximum percentages of greasewood *(Sarcobatus)* pollen. The latter was probably expanding onto the saline margins of the receding lake. "Because only 25 cm of sediment separates levels dated at ca. 9500 and 3700 B.P., sedimentation rates were apparently very low after lake levels fell" (Shafer 1989:124). Alternately, the lake dried out in response to warmer/drier climatic conditions between ~6500 and 3500 B.P. (as seen in the Como Lake core) and an unconformity is present in the Head Lake sediment profile during this interval.

Relative percentages of the dung fungus spore, *Sporomiella*, in both the Head and Como Lake cores, may suggest a greater herbivore biomass near the lakes in the San Luis Valley during

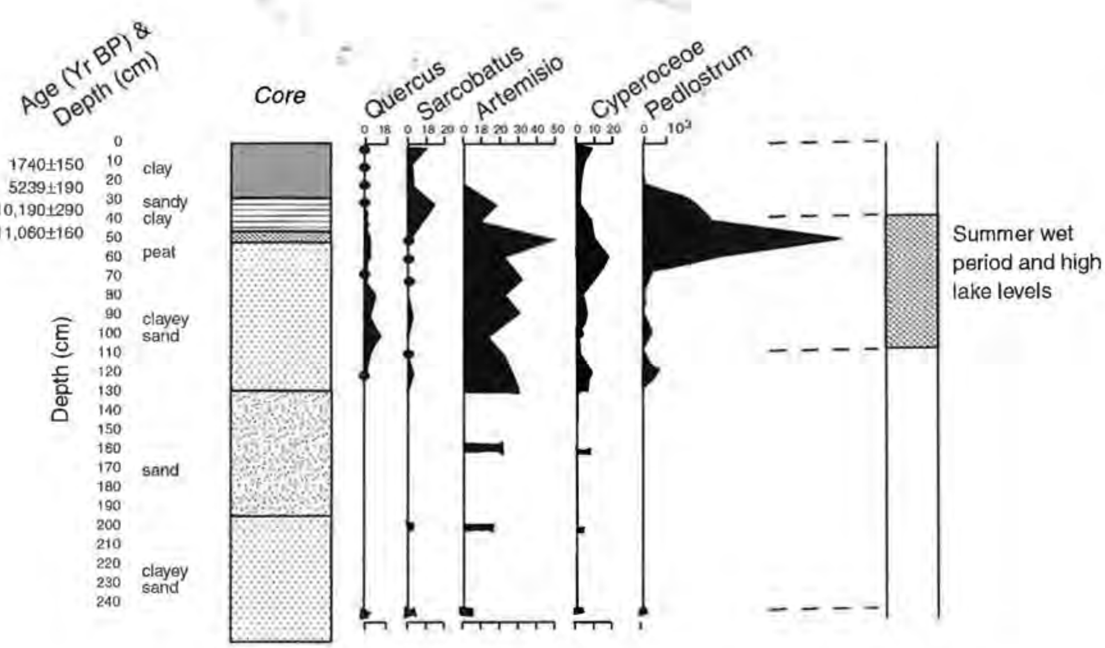

Figure 3-6. Palynomorph percentage diagram of Head Lake, Colorado (adapted from Shafer 1989: Figure 28; Jodry et al. 1989: Figure 7).

the late Pleistocene (Davis and Shafer 1991; Jodry and Stanford 1996). Davis (1987) proposed that increases in the abundance of *Sporomiella* are good proxy indicators of enlarged herbivore biomass. *Sporomiella* is common on the dung of domestic herbivores, of living megaherbivores, of some smaller herbivores, and is documented in the late Pleistocene mammoth dung from Bechan Cave in southeast Utah (Davis et al. 1984). Davis identified peak percentages in these spores during historic times in western North American lakes associated with heavily stocked rangeland. The highest percentages are in samples from ponds where animals are corralled or otherwise concentrated (Davis 1987). In southeastern Washington, significant increases followed the introduction of domestic grazing animals. Average values in lacustrine sediments of greater than 3 percent are associated with maximum grazing intensity (Davis 1987).

Prior to the historic period, few Holocene samples contain *Sporomiella*, and then at average percentages of 1 percent or less. In contrast, *Sporomiella* equals historic percentages in some late Pleistocene deposits (Davis 1987). The Head Lake record produced some of the highest percentages of *Sporomiella* yet recorded by Davis for late Pleistocene lacustrine sediments (Davis and Shafer 1991). "*Sporomiella* ranges from 0.7 percent - 2 percent in the historic period, is less than 0.3 percent in the Holocene, and is up to 4.8 percent in sediment between 10,920±200 and 11,060±160 B.P." in Head Lake (Davis and Shafer 1991).

By ~5200 B.P., lake levels had dropped precipitously; algae disappeared and greasewood pollen reached maximum percentages, probably reflecting the expansion of this halophyte onto the saline margins of the receding lake (Jodry et al. 1989). Beginning about 3700 B.P., increases in juniper and pine percentages suggest increasing moisture.

Lake levels on the San Luis Valley floor are today largely controlled by recharge to a shallow, unconfined aquifer from direct surface infiltration, and to a lesser extent from mountain runoff (Emery et al. 1971). If this was true in the past, it suggests that higher water levels in Head Lake during the terminal Pleistocene/Holocene transition were a result of greater precipitation (Jodry et al. 1989). The expansion of Gambel's oak and pinyon pine during this time suggests that southwest monsoon precipitation may have been the source, as predicted by general atmospheric circulation models (Kutzbach 1987; Kutzbach et al. 1993).

The *Sporomiella* evidence suggests that large herbivores were intensively grazing in the vicinity of Head Lake at the onset of the Younger Dryas. The abundant distribution of Folsom sites near former playas in the Closed Basin clearly indicates their use as ambush locations during bison hunting. The scarcity of Clovis and late Paleoindian artifacts at known Folsom-age playas in the area suggests that these hydrologic features were not present, and implies less effective moisture immediately pre- and post-Folsom (see Haynes 1991a, 1993). The frequency of Folsom hunting sites suggests that the carrying capacity for large herbivores was high, and that the San Luis Valley may have been particularly attractive to Paleoindian hunting groups at this time (Jodry and Stanford 1996).

Sporomiella percentages at Head Lake decline subsequent to ~11,060 ± 160 B.P., and in Como Lake (discussed below) after ~10,800 B.P. (Davis and Shafer 1991). "At both sites, the *Sporomiella* decline is immediately followed by a major climatic oscillation from cold-wet (10,500 B.P. at Como; 10,750 B.P. at Head) to hot/dry (10,190 B.P. at Como; 10,490 B.P. at Head)" (Davis and Shafer 1991:6). The decrease in *Sporomiella* may also indicate the effect of changing hydrology on the grazing patterns of large mammals (Jodry 1998a). Perennial lakes such as Head and San Luis still hold water today despite arid climatic conditions. In contrast, smaller playas are currently dry. If this relationship held true during Clovis times (11,200-10,900 B.P.), then Pleistocene grazing animals may have concentrated around permanent lakes and springs. In contrast, greater availability of surface water during the mesic Folsom interval (~10,900 to 10,500 B.P.) may have favored a more dispersed herbivore grazing pattern, resulting in a decline from the highest concentrations of *Sporomiella* between 11,000-10,900 B.P. in the large perennial lakes. Increased temporal resolution is needed to further assess how the rates and parameters of paleoecological change affected late Paleoindian populations in the northern San Luis Valley (Bartlein et al. 1995).

San Luis Lake

De Lanois (1993) analyzed the San Luis Lake sediments for a Master's thesis in the Department of Geosciences at the University of Arizona, Tucson. This 154-cm-long core, consisting of coarse to silty sand, records climate change for the interval from ~1200 B.P. (A.D. 750) to the present (De Lanois 1993). Four bulk sediment dates provide chronologic control for the upper 90 cm (Table 3-4).

Table 3-4. Radiocarbon Dates from San Luis Lake.

Lab Number	Pollen Zone ~Core depth	^{14}C Age (B.P.)	Tree-Ring Calibrations (Stuiver and Becker 1986)	Dated Material
A-5604	D ~15 cm	17±56	A.D. 1936-1806 or 1739-1681	Bulk sediment
A-5605	C ~46 cm	57±60	A.D. 1285-1432	Bulk sediment
AA-7769	B ~70 cm	928±45		Bulk sediment
A-5607	B ~90 cm	920± 0	A.D. 1006-1233	Bulk sediment

(from De Lanois 1993)

Zone A The deepest level producing pollen is tree-ring calibrated between 1014 and 1230 B.P. (Stuiver and Becker 1986). Increases in pine and greasewood at the expense of sagebrush indicate that temperatures were warmer than present. Nonarboreal pollen dominates and algae percentages are low. The warmest/driest interval represented in the core occurs at approximately A.D. 1090. This is temporally consistent with a regional climatic warming event, the Medieval Warm period, dated A.D. 1149 (De Lanois 1993).

Zone B Dated from ~520 to 988 cal B.P., Zone B indicates a cool, wet interval characterized by abundant nonarboreal pollen and peaks in charcoal and algae *(Pediastrum* and *Botryococcus)*. *Botryococcus* reaches maximum percentages for the core at a depth of 63 cm, indicating a high lake level. This is followed by somewhat warmer and drier conditions.

Zone C Dated from ~174 to 520 cal B.P., Zone C suggests climatic conditions that were cooler and wetter than present. Arboreal pollen dominated, including pine, subalpine fir, spruce, juniper, and oak) and low percentages of algae were present. De Lanois (1993) correlates these data with the Little Ice Age climatic event dated elsewhere between A.D. 1500 and 1800.

Zone D Dated between 100 cal B.P. and the present. Zone D records the appearance of Russian thistle *(Salsola,* 1 percent) and increases in dung fungus *(Sporomiella,* 6 percent) associated with the introduction of cattle and sheep in the historic period. High percentages of nonarboreal pollen (i.e., *Chenopodiaceae-Amaranthus* and *Sarcobatus)* and algae suggest warmer and drier conditions, with a cooling trend toward the present (De Lanois 1993).

Como Lake

Como Lake is located on the east side of the San Luis Valley, south of Great Sand Dunes National Monument. At 3669 m (12,053 ft) elevation, it is the lowest in a series of lakes occupying a glacial basin in the Holbrook Creek drainage on Blanca Peak, the highest point (4373 m) in the Sangre de Cristo Mountains (Shafer 1989). The lake is currently surrounded by a discontinuous forest dominated by Engelmann spruce *(Picea engelmannii)*, subalpine fir *(Abies lasiocarpa)*, and bristlecone pine *(Pinus aristata)*. Upper treeline is presently situated ~110 m above the lake. Changes in its postglacial position are reflected in the lake's record of pollen and plant macrofossils. Signatures of valley-floor vegetation are also represented due to upslope eolian transport of pollen. Como and Head Lakes were analyzed by Shafer (1989) for his dissertation research, Department of Geosciences, University of Arizona, Tucson.

A 300 cm composite core consists of basal deposits of glacial rock flour, overlain by gyttja. Two bulk sediment dates and three radiocarbon determinations from spruce macrofossils provide chronologic control for the upper 285 cm (Table 3-5).

Table 3-5. Radiocarbon Dates from Como Lake.

Lab Number	Core Depth	^{14}C Age (B.P.)	Dated Material
A-05088	55-65	4,390±80	Bulk sediment
A-05086	145-155	7720±100	Picea wood
A-04894	200-210		Picea macro
A-04895	240-250	10,260±230	Picea macro
A-05087	275-285	11,730±290	Bulk sediment

(from Shafer 1989)

Postglacial fluctuations in upper treeline are inferred from conifer macrofossils and pollen percentages (Figure 3-7). By ~10,500 B.P., Engelmann spruce and bristlecone pine macrofossils are present, suggesting that upper treeline had reached the lake following full-glacial lowering (Shafer 1989). Bristlecone pine pollen reached 30 percent of the upland pollen total prior to 10,000 B.P. and remained at values greater than 10 percent until about 7500 B.P. From approximately 9900 to 9600 B.P., peaks in pine, spruce, and fir macrofossils suggest a maximum upslope advance of at least 175 to 203 m (575-666 ft) higher than present (Shafer 1989). This overlaps with the interval of maximum July insolation values during the late Quaternary (~9600 to 9000 B.P.) predicted by the atmospheric general circulation models (Kutzbach 1987). Pinyon pine *(Pinus edulis)* is first identified in sediments at ~9500 B.P. Its appearance at that time may indicate expansion in response to greater summer precipitation and warmer annual temperatures. Pinyon pine pollen is most abundant during the interval between ~7000 and 3500 B.P. Continuous forest cover around the lake may have persisted until approximately 5500 B.P., when subalpine fir and bristlecone pine macrofossils last occur (Shafer 1989). Reduced charcoal in the deposits after about 4000 B.P. suggests a lowering of timberline below Como. Just prior to ~2000 B.P., Engelmann spruce macrofossils reappear, indicating that timberline likely reached the elevation of the lake once again (Shafer 1989, as summarized in Jodry and Stanford 1996).

Signatures of valley floor pollen and lower ecotone migration in the Como Lake record suggest the following trends (Shafer 1989). Sagebrush *(Artemisia tridentata)* and grasses (Gramineae) were widespread during the terminal Pleistocene, but declined markedly after ~10,000 B.P. After ~9500 B.P. greasewood *(Sarcobatus vermiculatus)* pollen percentages steadily rose as soil alkalinity gradually increased through the Holocene; peak percentages occurred ~6500 to 3500 B.P. Higher percentages of Douglas-fir *(Pseudotsuga)* and pinyon pine *(Pinus edulis)* pollen seem to indicate that lower ecotones migrated upward in response to drought stress from ~7000 to 5500 B.P. The period of least effective moisture inferred from Como Lake sediments is approximately 6500 B.P. "*Sporomiella* percentages range from 0.2 – 0.7 percent in the historic period, from 0.2 to 1 percent from 4390 ± 80 to 7720 ± 100, and from 2 to 4 percent in sediments from 10,260 ± 330 and 11,730 ± 290 B.P." These Pleistocene

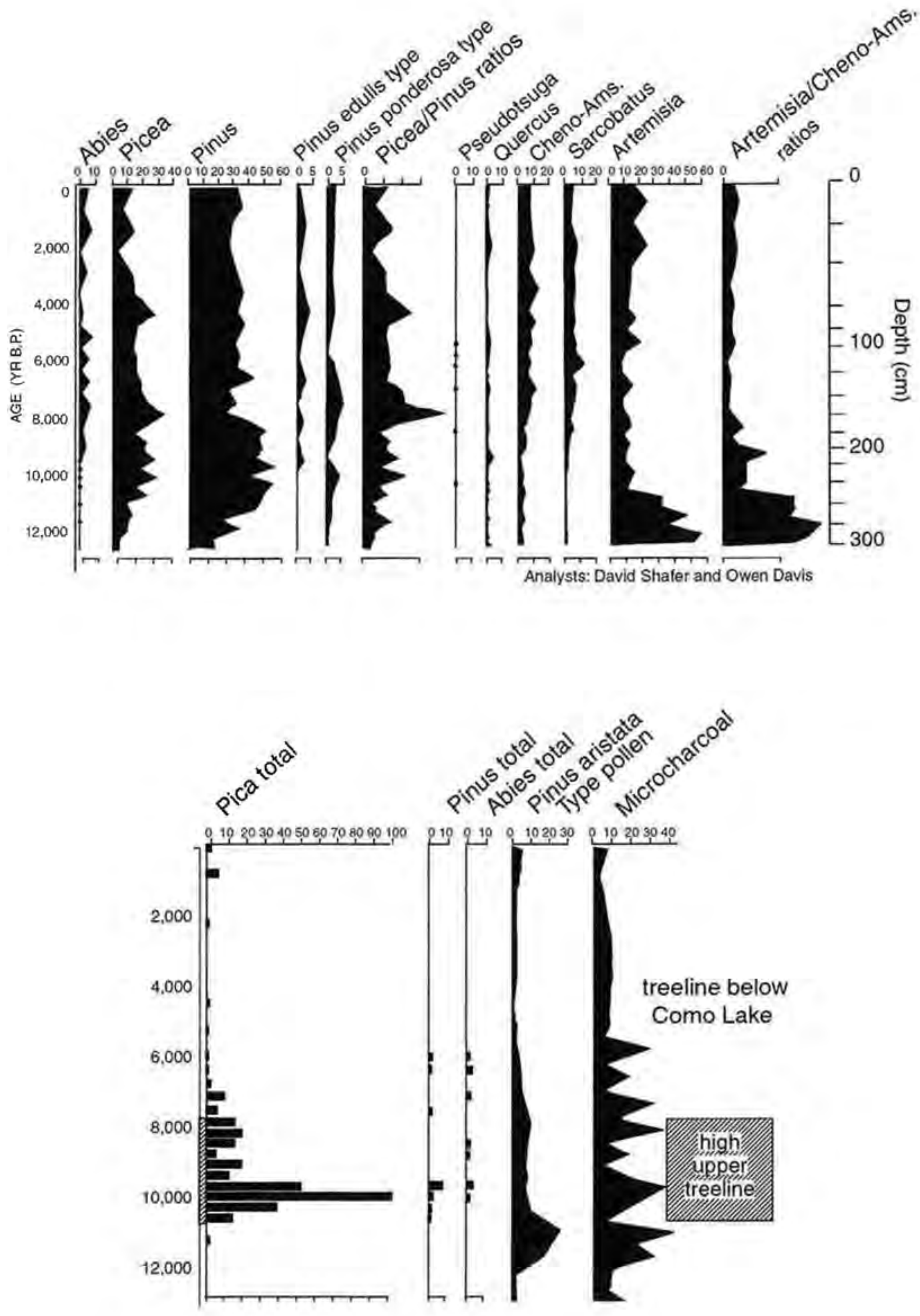

Figure 3-7. Palynomorph percentage diagram and upper treeline record of Como Lake, Colorado. (from Jodry et al. 1989: Figures 5 and 6).

percentages are "among the highest recorded for sediments of this age, and the transition to lower Holocene values is abrupt" (Davis and Shafer 1991:5).

Shafer (1989) infers the probability of enhanced monsoonal circulation beginning approximately 11,000 to 10,000 B.P. in the Rio Grande Rift that resulted in higher temperatures and a shift to greater summer precipitation. At Como Lake, these shifts seem to have resulted in a maximum upslope advance of upper treeline between ~9900 and 9600 B.P., the first appearance of pinyon pine about 9500 B.P., and greater numbers of such summer precipitation-dependent trees as ponderosa pine from ~10,500 to 7000 B.P. Meanwhile, on the valley floor a late-glacial pollen assemblage dominated by sagebrush and grasses declined sharply after ~10,000 B.P. and plants such as greasewood began to expand after ~9500 B.P. Precipitation on the valley floor appears to have been greater prior to about 9500 B.P. (Shafer 1989). The Como Lake record is in general agreement with other paleoecologic studies from the Southern Rockies. Isotopic analysis of wood samples from the San Juan Mountains suggested to Friedman et al. (1988) that monsoonal circulation was more intense during the early Holocene, and monsoonal precipitation decreased along with reduction in summer solar radiation from approximately 9000 B.P. to the present. Insect data summarized by Elias (1988, 1996:1) corroborates "warmer-than-modern" mean summer and winter temperatures by 10,000 B.P., followed by a decline by 9000 B.P. from an early Holocene peak.

Fall's (1988, 1997) investigation of elevation shifts in upper and lower timberline since the latest Pleistocene in central Colorado suggests that prior to 11,000 B.P., a subalpine forest dominated by pine and spruce grew 300-700 m below modern limits. The inferred climate was 2-5°C cooler and had 7-16 cm greater precipitation than today. At the beginning of the Younger Dryas, around 11,000 B.P., fir *(Abies)* increased as a component of the subalpine forest in probable response to "cooler conditions with increased winter snow" (Fall 1997:1). By 10,000 B.P., the spruce-fir forest was well established over its modern range. It reached maximum extent by about 9,000 B.P., when the subalpine forest grew between 2920 m (9578 ft) and 3670 m (12,038 ft). At that time, upper timberline was some 270 m above modern limits, "suggesting that mean annual and mean July temperatures were 1-2°C warmer than present. Intensification of the summer monsoon, coupled with increased summer radiation between 9000 and 6000 B.P. raised mean annual precipitation by 8-11 cm and allowed the lower limit of the subalpine and montane forests to descend to lower elevations" (Fall 1997:1).

Discussion

During the Younger Dryas interval concurrent with Clovis, Goshen, and Folsom, paleoenvironmental records suggest that climatic conditions in mountainous regions of Colorado were probably cooler and wetter than during the preceding 500-800 years, and during the succeeding early Holocene (Reasoner and Jodry 1998a). From ~11,000 to 10,000 B.P., alpine glaciers advanced up to 3 km from cirque headwalls (Menounos and Reasoner 1997; see also Benedict 1992b:345) in the Front Range and alpine timberline declined in elevation. The closely spaced pollen sampling and AMS dating of plant macrofossils and humic acids in the Black Mountain Lake and Sky Pond records increase temporal resolution of vegetative response to this short-lived climatic event (Reasoner and Jodry 1998b). Similar vegetation changes register in the Head and Como Lake cores, but the timing of events is less clear. Beginning in the early Holocene between 10,000 and 9000 B.P., pollen and plant macrofossil data from a number of locations demonstrate that alpine timberline advanced above modern limits, and was significantly higher than during the preceding interval (11,000 to 10,000 B.P.). The lower timberline ecotone, between the montane forest and steppe, also shifted at this time. Fall (1997) suggests that a maximally expanded forest grew between 2920 m and 3670 m elevation in central Colorado about 9000 B.P. The combined effects of warmer temperatures, greater summer precipitation, decreased winter snow, and altered composition and distribution of high-altitude habitats after 10,000 B.P., are coincident with the appearance of Foothill-Mountain archaeological remains at higher elevations in the Rocky Mountains and the first solid evidence for late Paleoindian campsites near present-day alpine timberline (Jodry 1998a).

Once the rocky, denuded cirques and extensive areas of late-lying snow were transformed to regions of vegetated soil supporting a mix of tundra and trees, both animal and human populations were induced to forage at higher altitudes. Climatic amelioration apparently favored the expansion of large herbivore grazing areas and alpine game drive systems appear to be in use by 7650±190 B.P. in the Front Range (Benedict 1992a:7, 1996). The development of suitable campsites near present-day timberline is suggested by their increasing numbers after ~9000 B.P. The logistics of regional travel appears to have drawn the makers of Clovis, Folsom, Agate Basin and Hell Gap artifacts, collectively dated between ~11,200 and 9600 B.P. (Frison 1991; Haynes 1993; Pearson and Blackmar 1997), to the Continental Divide trails and passes where they are found (Husted 1965; Benedict 1992b). However, high-altitude campsites attributed to these peoples (which might indicate longer stays) are rare (Benedict 1992a). Cody complex artifacts ^{14}C dated between ~9000 and 8000 B.P. (Frison 1991) and Foothill-Mountain lanceolate projectile points ^{14}C dated between ~8700 and 7500 B.P. (Frison 1991) appear to be the best represented Paleoindian artifacts at present-day upper timberline.

By 9000 B.P. in central Colorado, the subalpine forest occupied an elevation range 300 m larger than today, with expansions of both upper and lower timberline. Summer and winter temperatures warmer than today by 10,000 B.P. (Elias 1996) to ~9000 B.P. (Fall 1997) probably enabled late Paleoindian peoples to enter the highest elevations sooner in the summer, and to stay longer in the fall, than was possible for early Paleoindian people (Jodry 1998a). The effects of greater warmth, precipitation, and forest cover on the seasonal distributions of large prey animals needs further study. The expansion of pinyon pine forests around 9500 B.P. in the San Luis Valley significantly increased this food resource and probably encouraged greater use of the lower timberline ecotone by animals and humans alike (Jodry 1998a). A similar expansion of pinyon pine on the Colorado Plateau is documented between 10,000 and 7000 B.P. (Betancourt and Van Devender 1984).

Frison (1992) points out that much of the available data on high altitude Paleoindian sites, notably the Foothill-Mountain materials, comes from caves and rockshelters in Wyoming and Montana. Although some of these shelters contain geologic deposits of the proper age, they have yet to produce Clovis or Folsom artifacts. This in spite of the fact that "many of the stone flaking material sources and mountain meadows that have produced fluted-point evidence are in close proximity to caves and rockshelters" (Frison 1992:331). Perhaps the cooler temperatures, possibly coupled with greater winter precipitation and more late-lying snow, rendered some of these places excessively damp and unattractive during the Younger Dryas interval (Jodry 1998a). Inherently dry locations such as Mummy Cave may have experienced other negative effects such as heightened cold-air drainage along the North Fork of the Shoshone River in front of the cave entrance. While the makers of fluted points may have preferred open-air sites to caves/rockshelters due to belief systems, it is suspected that climatic variables in the Rocky Mountains contributed to these choices (Jodry 1998a). Investigating the effects of changing climate on the accessibility of suitable campsites at higher elevations may hold some promise for exploring the differential distribution of early versus late, high-altitude Paleoindian sites in the upper Rio Grande.

POST-PALEOINDIAN PALEOENVIRONMENTAL STUDIES

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Introduction

Post-Paleoindian paleoenvironmental research in the Rio Grande drainage consists of work conducted in association with the Smithsonian Institution's Paleoindian/Paleoecology Program, tree-ring research conducted in the vicinity of the Great Sand Dunes National Monument, and work conducted in the Blanca Wildlife Refuge area of the Closed Basin. A basic summary of all of these investigations is included below as a starting point for future research into post-Paleoindian paleoenvironmental reconstruction and analysis of climatic change on prehistoric populations in the Rio Grande Basin.

Lake Core Data

Analysis of pollen and plant macrofossils from Como, Head, and San Luis Lakes has provided the first records of vegetation and climatic history of the San Luis Valley applicable to the post-Paleoindian temporal periods. The climatic and vegetative inferences included below are summarized from Jodry and Stanford (1996). These data have not yet been analyzed as to their relationship to cultural change/adaptation for the post-Paleoindian temporal periods within the Rio Grande Basin as Jodry has done for the Paleoindian stage (this volume), but many research questions are applicable. For example, were there demographic changes related to climatic variability, especially the periods of increased moisture and greater availability of lacustrine resources, during the Late Archaic and Late Prehistoric?

Como Lake Core

Mountain Pollen and Macrofossils

- 10,500 B.P., upper treeline reaches Como Lake following full glacial lowering
- 9900-9600 B.P., maximum upslope advance of upper treeline 175 to 203 m higher than present
- 9500 B.P., appearance of pinyon pine pollen at Como Lake may indicate expansion of its range
- 7000-5500 B.P., higher conifer pollen may indicate upward movement of lower ecotones due to drought stress
- 5500 B.P., last occurrence of bristlecone pine and subalpine fir macrofossils at Como Lake
- 4000 B.P., lowering of treeline below Como Lake
- 2000 B.P., treeline again reaches Como Lake

Valley-Floor Pollen

- 10,500 B.P., sagebrush and grasses
- 10,000 B.P., sagebrush and grasses decline markedly

- 9500 B.P., greasewood pollens steadily rise, indicating warmer and drier conditions and increased soil alkalinity
- 7000-5500 B.P., higher percentages of conifer pollen suggest that lower ecotones migrated upward in response to drought stress
- 6500 B.P., period of least effective moisture
- 6500-3500 B.P., maximum greasewood

Head Lake Core

- pre-11,000 B.P., oak pollen most abundant, sagebrush relatively abundant, greasewood low
- 11,000-10,700 B.P., percentage of algae signifies that water level and surface area were at maximum
- 5200 B.P., lake levels drop significantly, algae disappear, and greasewood pollen reaches maximum percentages, indicating expansion onto the saline margins of the lake

San Luis Lake Core

- 1230-1014 B.P., increase in pine and greasewood suggests temperatures warmer than present
- 988 to 520 B.P., cool/wet period with abundant nonarboreal pollen with peaks in charcoal and algae. The warmest/driest interval represented in the core is 900 B.P.
- 520-174 B.P., cooler and wetter than present with arboreal dominance (*Pinus, Abies, Picea, Juniperus, Quercus*)
- 100 B.P., to present, appearance of Russian thistle and increases in dung fungus associated with introduction of cattle and sheep historically. High percentages of nonarboreal pollen and algae suggest a return to warmer and drier conditions with a cooling trend in recent years

Tree-Ring Data

Paleoenvironmental data, in the form of tree-ring analysis, are available for the Late Prehistoric and Protohistoric periods based on work at the Great Sand Dunes National Monument by Mangimelli (1990:21-26) and Grissino-Mayer et al. (1998:1-37).

Certain species of western conifers, such as the pinyon pine *(Pinus edulis)*, Douglas-fir *(Pseudotsuga menziesii)*, limber pine *(Pinus flexilis)*, and ponderosa pine *(Pinus ponderosa)*, have proven to be very sensitive to changes in precipitation and, to a lesser degree, temperature. Tree-ring chronologies developed from such species as pinyon and ponderosa have been used to reconstruct these climatic variables over the lifetime of the tree.

According to standard dendrochronological techniques, Mangimelli (1990) analyzed 2 cores from each of 12 pinyon trees averaging 391 years of age. The results indicated that periods characterized by cool and moist conditions resulted in growth of the tree above the mean, and below-average growth occurred during warm, dry episodes. Ponderosa pine trees were also studied in the same manner with similar results.

Based on the results of this analysis, Mangimelli (1990:23-25) was able to reconstruct climatic variables for the Great Sand Dunes vicinity for the past 300 years. He determined that significant intervals of abnormally cool-moist conditions occurred in this area during the following periods: 1690-1702, 1715-1725, 1825-1835, 1885-1898, 1901-1924, 1935-1940, and 1970-1975. Significant intervals of abnormally warm-dry conditions occurred during the following periods: 1730-1750, 1775-1785, 1815-1822, 1850-1855, and 1950-1965. Although this study was limited geographically, it suggested that the climate of the San Luis Valley has not been static, even in recent times.

Grissino-Mayer et al. (1998) utilized tree-ring data from ponderosa pine, limber pine, Douglas-fir, Rocky Mountain juniper, and pinyon pine. The study utilized data from 90 living as well as dead specimens. The majority of the samples were increment cores, although some cross-sectional samples were also taken. The samples were collected at four locations including Morris Gulch, Great Sand Dunes area near Sawmill Canyon, Medano Creek Trail, and Mosca Pass. The cores and cross sections were cross-dated and each ring was assigned with the exact calendar year in which it was formed.

Samples of limber pine from the Morris Gulch area had tree-ring records dating back as far as A.D. 1278 (Grissino-Mayer et al. 1998:10-11). An additional living limber pine tree, with an inside ring date of A.D. 1265, was located in the Mosca Pass area. The oldest live tree dated within the Great Sand Dunes National Monument is a Douglas-fir along Little Medano Trail. The inside date for this tree is A.D. 1260. In general, the ponderosa pine tree samples have inner ring dates between A.D. 1600 and 1800. The oldest tree-ring date obtained from dead logs yielded an inner ring date of A.D. 1035.

One of the trees that was dated during this study is tree 5SH1261.44, the culturally peeled ponderosa pine tree that is now located at the visitor center at the Great Sand Dunes National Monument. The peeling event on this tree was confidently dated to the period between October 1799 and April 1800 (Grissino-Mayer et al. 1998:10). The tree was peeled during the dormant period after the growing season of 1799, perhaps during the spring when ponderosa pine trees were often traditionally peeled to obtain the inner bark (Martorano 1981).

The tree-ring samples collected during this investigation yielded two tree-ring chronologies, one at lower elevations within the monument, and another at high elevations in the Sangre de Cristo mountains to the east. The data from all of the samples were combined into one master tree-ring chronology dating from A.D. 1035 to 1996 (Grissino-Mayer et al. 1998:15). Based on this chronology, the longest and most intense drought occurred between A.D. 1570 and 1600, a dry period that has also been reconstructed for northwestern New Mexico (Grissino-Mayer et al. 1998:21). The "Great Drought" of the Colorado Plateau and south-central New Mexico, which occurred between A.D. 1273 and 1299, appears not to have been a period of major drought in the Great Sand Dunes area (Grissino-Mayer et al. 1998:21). Grissino-Mayer et al. (1998:21) believe that this finding places an eastern limit on the probable extent of the "Great Drought" in the American Southwest.

The climatic reconstruction also indicates that prior to A.D. 1400, the decadal variability was high, indicating rapid fluctuations between decadal periods of above and below average rainfall. About A.D. 1400, it appears that there was a major change in decadal precipitation variability. The period from A.D. 1400 to 1570 was one of fairly stable precipitation, with few extreme fluctuations from the mean. The single exception was a very wet year in 1521 and a dry year in 1522. This period of relative stability in rainfall terminated with the major drought between A.D. 1570 and 1600 (Grissino-Mayer et al. 1998:21). Another major change in precipitation variability occurred beginning with major drought in the late 1500s. Decadal-length precipitation patterns also became more oscillatory.

One feature of the precipitation reconstruction is the overall declining range of variability over the past 1000 years. This decreasing variance suggests that the overall precipitation patterns have become more stable from year to year and from decade to decade since A.D. 1035, with a declining number of extreme fluctuations as observed in the early part of the record. The lowest amount of variability occurred in the late 1800s, similar to findings from previous studies, and suggesting that the year-to-year rainfall during this period was very stable. The period of low variability abruptly terminated when a very wet period signaled a return to wide decadal fluctuations at the beginning of the twentieth century (Grissino-Mayer et al. 1998:22-23).

Due to the very recent reporting of the data from Grissino-Mayer et al. (1998), the cultural implications have not yet been analyzed; however, there are several significant research topics related to this work including:

- One topic relates specifically to the fact that there does not appear to have been the major period of drought in the Great Sand Dunes area that occurred in much of the Southwest during the late 1200s, related to the abandonment of many areas of the Southwest. Did the lack of a drought in portions of the Rio Grande Basin result in increased population or influence from the Southwest at the beginning of the fourteenth century?
- A second research theme relates to how the other identified major periods of drought or increased moisture affected cultural use of the Rio Grande Basin in general. For example, how would faunal and floral resource availability have changed during times of significant reduction or increase in precipitation? If major changes did occur, can the effects be identified in the archaeological record?
- A third major research topic associated with climatic reconstruction during the Protohistoric stage within the Rio Grande Basin relates to culturally peeled trees. For example, were the majority of the peeling events and/or larger-sized scars contemporaneous with identified drought episodes? If so, use of the inner bark as an emergency or supplemental source of food would be suggested. Identifying the seasonality of the peeling event (such as tree 5SH1261.44) would also help to answer questions related to probable uses of the inner bark of these trees.

Additional discussions of culturally peeled tree research questions are included in Chapter 7, Special Topics.

Other Data

Other specific paleoenvironmental data for the Archaic and the Late Prehistoric stages are minimal at this time primarily due to the paucity of climatic information resulting from excavation data and the lack of specific paleoenvironmental research into these time periods. However, some suggestions for climatic change regarding wetland adaptation in the Blanca Wildlife Refuge area of the Closed Basin during the Late Archaic have been offered by Jones (1977). Based on buffalofish remains recovered at site 5AL80, Jones reconstructed wetland water levels necessary for survival of this fish species, and compared those to documented archaeological site locations. His data suggest increased moisture around ca. 1670 B.P. that created a lacustrine environment in that area. The temporal and geographical extent and cultural effects of this climatic phenomenon require further research.

Chapter 4
HISTORY OF ARCHAEOLOGICAL INVESTIGATIONS

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SUMMARY OF INVESTIGATIONS

The study of the prehistory of the Rio Grande drainage basin in Colorado begins with early observations of explorers and scientific mapping expeditions. Later investigations have been undertaken under the auspices of academic research, local amateur research, cultural resource management (CRM), and investigations by federal land-managing agencies. Additional discussions of the history of Paleoindian investigations are included in the Paleoindian stage section of Chapter 6.

The earliest mention of aboriginal cultures in the San Luis Valley and surrounding mountains was made during expeditions through the San Luis Valley by Don Diego de Vargas in 1694 (Carson 1994; Colville 1995), and later by Juan Bautista de Anza in 1779 (Kessler 1994). The expeditions chronicled the presence of Ute, Apache, and Comanche groups in the valley. During the exploration of Colorado by Zebulon Pike in 1807, Indian remains were noted around Mosca Pass and the Great Sand Dunes (Carter 1978). The Wheeler-Hayden Expedition in 1874 described a possible aboriginal structure on top of Blanca Peak (Rhoda 1874; Bueler 1974).

Archaeological investigations have taken place since the 1930s. A. L. Pearsall was a local amateur who explored along the Rio Grande to the New Mexico border. He reported on the presence of Pueblo artifacts in the San Luis Valley including Bandelier Black-on-gray pottery (Pearsall 1939). Local amateurs also reported on the structures and game traps in the Saguache area (Boyd 1940).

The first wide-ranging investigations were instituted by Etienne Bernardeau Renaud. Renaud directed the University of Denver's Archaeological Survey of the High Plains from 1930 to 1947. Included were surveys of the San Luis Valley along the Rio Grande, the Saguache area, and in the Closed Basin near the Great Sand Dunes (Renaud 1942a, 1942b, 1943, 1946). This work, along with surveys in northern New Mexico, was used as a basis for defining the "Upper Rio Grande Culture" (Renaud 1944). The Upper Rio Grande culture was described as a flaked stone tool culture that relied heavily on black tool stone materials such as basalt.

C. T. Hurst of the Western State College Museum in Gunnison was active in field research in the late 1930s and the early 1940s. He conducted archaeological fieldwork in the Saguache area and recorded and excavated site 5SH1458. This site contains Ute and Pueblo artifacts, turquoise, and corn (Hurst 1939). Hurst (1941, 1943) also excavated Folsom sites in the San Luis Valley, including the Linger site, and reported on finds of Mammoth remains. Also active in the Saguache area were Harold and Elizabeth Huscher, who reported on stone structures near the town of Saguache and other areas of the San Luis Valley including Wagon Wheel Gap (Huscher and Huscher 1943).

Little work was done in the area between World War II and the early 1970s. H. C. Meyers (1950) produced a Master's thesis on the Archaeology of the San Luis Valley, and Frank Swancara (1955) conducted an inventory at the Great Sand Dunes National Monument. Joe Ben Wheat of the University of Colorado Museum also conducted fieldwork in the northern San Luis Valley in the 1950s. Nelson and Breternitz (1970) reported on Paleoindian points found in the San Luis Valley, as well as throughout Colorado, by private collectors. A relatively large number of projectile points from Alamosa County were reported, indicating that the valley was probably extensively used by Paleoindians.

The pace of investigations increased in the 1970s. The investigations were of two general types: research of Paleoindian sites by the Smithsonian Institution and CRM surveys conducted by colleges and universities. CRM surveys came about as the result of passage of National Historic Preservation Act of 1966. Later in the 1970s private contractors began performing CRM projects and federal agencies such as the Forest Service and Bureau of Land Management (BLM) established CRM programs for lands under their jurisdictions.

The Smithsonian investigations in the San Luis Valley began at the Linger Folsom site in 1974 (Dawson and Stanford 1975). Subsequent investigations were carried out in 1977 and 1979. Excavations at the Linger site led Dennis Stanford and Pegi Jodry of the Smithsonian to an ongoing research project on the Paleoindian cultures of the area (Stanford 1990a). Investigations have taken place at the Linger, Zapata (Wormington 1957), Reddin (Stanford 1990b), and Stewart's Cattle Guard (Emery and Stanford 1982; Jodry 1987, 1992; Jodry and Stanford 1992; Jodry et al. 1989; Davis and Shafer 1991) Folsom sites and at a suspected Clovis location (Cassells 1997). The Steward's Cattle Guard site is a Folsom bison kill and associated campsite. Extensive research that has been carried out at this site has revealed a wealth of information concerning adaptations at the terminal Pleistocene. The Smithsonian is currently conducting research at the Black Mountain Folsom site in a cooperative effort by the San Juan National forest (SJNF) and the Rio Grande National Forest (RGNF), Earthwatch, and Passport in Time volunteers. This site was excavated in 1993 and 1997 and is located at an elevation of 3097 m (10,160 ft) in the San Juan Mountains (Jodry 1993, 1997; Jodry et al. 1996). Goals of the project are to define prehistoric work areas, determine the function of the site, and help determine regional relationships with other Folsom groups by comparing the type of raw material used for making artifacts at Black Mountain with those from other sites. In conjunction with the Paleoindian studies, the Smithsonian has been conducting research into paleoclimates (Davis and Shafer 1991; Jodry et al. 1989; Jodry and Stanford 1996).

CRM investigations did not begin in the San Luis Valley until 1975. Adams State College (ASC) conducted an archaeological survey at the Blanca Wildlife Refuge for the U.S. Fish and Wildlife Service (Dick 1975). The survey resulted in the recording of 137 prehistoric sites. This project led to excavations by the Laboratory of Public Archaeology (LOPA) of CSU and the University of Northern Colorado (UNC). The LOPA excavation at 5AL80/81 focused on the relationship of the sites found on the ASC survey to the wetland environments and fish resources in the area (Jones 1977).

The RGNF cultural resource program began in 1975 with the seasonal (summer) hiring of two seasonal archaeological technicians to inventory proposed natural resource project areas, mostly timber sales. In 1986, the cultural resource program established the permanent position of forest archaeologist to oversee the program. In 1995, the RGNF and the SJNF administratively combined and the cultural resource program assumed a team concept. As of October 1998, approximately 150,000 acres (0.08 percent) of the 1,850,000-acre RGNF have been inventoried for cultural resources, with more than 500 prehistoric sites formally recorded.

In 1986, the RGNF Cultural Resource Inventory Research Design for Cultural Resource Inventories and Test Excavations, which used the concepts contained in the *Colorado Mountains*

Prehistoric Context (Guthrie et al. 1984), was formulated and put into effect to guide cultural resource efforts. The general research orientation is geared toward determining the type, nature, and distribution of the prehistoric cultural resources on the RGNF. Specific research objectives include establishment of a local chronology based on absolute dating methods, testing of the RGNF cultural resource predictive model, providing input into the annual projectile point typology project, identification of functional site types, and determination of the influence of the Rio Grande on external relations and movements of culture groups. The RGNF research design identifies further research needs relative to settlement patterns, subsistence, foreign relations, and social organization for each type of site found. Statements are also given pertaining to the significance of each site type found on the RGNF.

Cultural resource overviews were prepared under contract as a part of the RGNF cultural resource program. Overview development began in 1979 when Paul R. Nickens and Alan D. Reed (Nickens 1979) evaluated 133 previously recorded archaeological sites found during cultural resource inventories from 1975 to 1977. Eight of the sites were shovel-tested, resulting in one instance of finding subsurface cultural material. A limited obsidian hydration analysis was conducted on 10 flakes of obsidian and a typological analysis of 46 projectile points was done. The study indicates utilization of the RGNF from about 10,900 B.P. to 150 B.P., with most attributed to the Archaic tradition similar to those identified in New Mexico as the Picosa, or the Elementary Southwestern culture (5,000 B.P. to 2,000 B.P.) as defined by Irwin-Williams (1967).

In 1982, Laurie Webster produced an in-depth evaluation of four prehistoric sites as an addition to the RGNF prehistoric overview. The study was done to describe site function, available resources, site locational factors, tool function, raw material sources, chronological and cultural affiliation, and possible external relations of the sites which were chosen as types that are representative of the RGNF. Several sites were analyzed in this portion of the contracted overview, including 5CN94, a multiple activity, short-term campsite; 5CN158, a special activity chipping and game processing site; 5SH264, a short-term campsite with a large number of flakes and a high tool diversity with an emphasis on game processing; and 5HN55, a high-altitude Folsom locale. As a part of the same overview Klesert (1982a), using attributes from 220 recorded sites on the RGNF, formulated a univariate site predictive model. This study determined that a low degree of slope, vertical proximity to a permanent water source, and the local presence of clearings are the most diagnostic variables for prehistoric sites on the RGNF. In another portion of this overview Rohn (1982) analyzed ceramic samples collected from four sites on the RGNF; Taos Micaceous, Pueblo (similar to McElmo/Mesa Verde Black-on-white), and Ute types were identified.

Because site avoidance followed by monitoring has been the method used to protect significant cultural resources, subsurface testing has not been a focus. Testing and excavation have occurred in several instances, including the testing of site 5SH903 located in the Cochetopa Hills; 5RN330, the Dog Mountain petroglyphs and rockshelter; and 5ML45 and 5ML46. All of these sites contain significant cultural deposits that could contribute valuable information to the archaeological record.

The only excavations in the high San Juan Mountains, other than those at Black Mountain, were conducted at sites 5ML45 and 5ML46 in 1981 (Reed 1981a, 1981b, 1984). These sites are located on Piedra Pass, in the San Juan Mountains, at an elevation of about 3475 m (11,400 ft). Utilization during the Archaic stage is indicated by radiocarbon dates and projectile point types. A pollen and macrofossil analysis was conducted at site 5ML45 (Scott and Seward 1981).

Other CRM surveys in the RGNF include an archaeological survey of U.S. 160 on the east side of Wolf Creek Pass by Judy Ann Shafer (1978). This project identified sites along approximately 16 miles of the highway expansion corridor, in the drainage of the South Fork of the Rio Grande. Inventory resulted in the recording of 24 prehistoric sites and 27 isolated finds. The Colorado Department of Transportation (CDOT), then the Colorado Department of Highways, conducted an archaeological survey of Forest Highway 7 (S.H. 149), west of Creede (Gooding and Kreuser 1980). Recorded sites suggest utilization from Paleoindian through Archaic times. Archaic lithic materials, including rhyolite and obsidian, were identified as being related to the Oshara tradition. Alpine Archaeological Consultants, Inc. conducted a 400-foot-wide cultural resource inventory along seven miles of land located adjacent to the upper portion of the Conejos River on the RGNF (Horn 1990). Five prehistoric sites were recorded. In addition to these surveys, a number of small CRM compliance surveys have been conducted in the RGNF.

Kathy Mauz (1993) conducted a research-oriented inventory on Snow Mesa, west of the town of Creede, that pertained to trace element analysis and the sourcing of siliceous artifacts. Trace element analysis of chert, quartzite, and obsidian led to lithic procurement strategy assumptions including the use of native and foreign chert sources, the use of at least three quartzite sources, and the use of obsidian from at least four different areas, including one in the Jemez Mountains of New Mexico.

Since the late 1970s, a number of surveys have been conducted in the Open and Closed Basins. The largest of the surveys were the Closed Basin Project by the Bureau of Reclamation (Button 1980, 1981, 1982a, 1982b, 1982c, 1982d, 1982e, 1984, 1985a, 1985b, 1987), the San Luis Valley Archaeological Project (SLAP) by the University of Denver (DU) (Haas 1981, 1982; Gadd 1985), and the Poncha-San Luis Valley 230-kV transmission line (Conner et al. 1980).

The Closed Basin Project was a large, multiyear endeavor that resulted in the recording of nearly 350 sites in a survey area of approximately 20,000 acres. The project was conducted between Alamosa and the Great Sand Dunes National Monument. A number of sites were test excavated and numerous backhoe trenches were dug. The subsurface testing was largely negative. The final report concludes that there is a low probability for buried cultural deposits in the eolian sands of the Closed Basin (Button 1987).

The SLAP was a project conducted using students in field schools from DU (Haas 1981, 1982; Gadd 1985). A number of parcels covering most of the valley and surrounding foothills were surveyed and numerous sites were recorded, including some previously visited by Renaud. No publicly available report was ever completed on the project. Manuscripts are available at DU (Haas 1981, 1982).

Conner et al. (1980) conducted an archaeological investigation of the Poncha-San Luis Valley 230-kV transmission line in 1979. The survey consisted of a 62-mile-long and 200-foot-wide transect from about eight miles northwest of Alamosa northward to a location one-half mile west of Poncha Pass. The inventory resulted in the recording of four lithic sites in the Closed Basin associated with playa lakes. Early, Middle, and Late Archaic cultural materials were recorded.

In the last 10 to 20 years, numerous small compliance surveys have been conducted in the San Luis Valley. Most of the surveys have been conducted by the BLM, CDOT, the National Park Service (NPS) at Great Sand Dunes National Monument, and on Colorado Division of Wildlife lands. One of the more interesting surveys was conducted by the BLM in 1987, which attempted to relocate and rerecord some of the sites located by Renaud (Weimer 1989b). The survey was partially successful and some of the sites were relocated. Unfortunately, many sites could not be found or the cultural materials did not match earlier descriptions.

A number of Master's theses have been written on the archaeology of the context area. Meyers (1950) wrote the first overview of San Luis Valley archaeology. Two theses were completed by CSU anthropology students in 1981. Marilyn Armagast Martorano (1981) researched peeled ponderosa pine trees at the Great Sand Dunes National Monument. It is believed that the Ute and other groups used the inner bark for subsistence. George Burns (1981) conducted trace element and obsidian hydration analyses on artifacts from the RGNF. Trace element and obsidian hydration analyses of 122 obsidian surface artifacts from the RGNF were conducted to help establish a chronology for the area. In addition, 10 samples of raw material obsidian from known regional obsidian sources, mostly in New Mexico, were subjected to trace element analysis. Subsequent cluster analysis indicated that there was some use of obsidian from the Jemez Mountains in New Mexico.

The SLAP project provided data for two theses from DU students. Billman (1983) wrote about the Archaic stage in the San Luis Valley. Gadd (1985) attempted to synthesize all of the archaeological site data that had been gathered to date in the San Luis Valley.

The remaining theses are by Downing (1981), Barnes (1982), and Jodry (1987). Barbara Downing reexamined a portion of the Renaud site collections housed at DU. She examined only a portion of the collection and discussed only a few San Luis Valley sites. Susan Barnes (1982) wrote a thesis for the Department of History at ASC on the rock art of the San Luis Valley. Finally, Margaret Jodry (1987) used data from the Stewart's Cattle Guard site for her thesis at the University of Texas, Austin. Jodry is currently using data from Paleoindian sites in the area for her doctoral dissertation at the American University.

ANALYSIS OF PREVIOUS INVESTIGATIONS

The previous investigations conducted in the Rio Grande context area vary in methodology, quality of field recording, research intent, and report quality. The earlier projects by Renaud and Hurst recorded some of the prominent archaeological sites in the area. Renaud covered many areas of the valley and recorded a great many sites. However, it is difficult to work with the Renaud data. Renaud recorded the sites on cards and described very little, but he did collect artifacts from the sites. The Renaud materials are housed at DU. Part of his collection has been reanalyzed by Downing (1981), but many sites need reexamination. Downing (1981:9) notes that many of the projectile points collected by Renaud are missing from the collections. Renaud's reports are also difficult to use. His research focus was different from that of today and he did not have the use of modern dating techniques. His reports do little more than describe the range of sites in the San Luis Valley. The importance of Renaud's work is that it established that the San Luis Valley and the surrounding mountains contained a variety of archaeological sites.

The work of C. T. Hurst is important for establishing the antiquity of sites in the San Luis Valley through his work at the Linger Folsom site (Hurst 1941). Hurst (1939) also investigated 5SH1458, which he describes as a Ute shelter near Saguache. Mark Stiger of Western State College (WSC) recently revisited the site and updated the site form. It appears that this site still contains significant archaeological deposits. As a founder of the Colorado Archaeological Society (CAS) and the journal *Southwestern Lore*, Hurst established the practice of publishing results of investigations.

The Smithsonian investigations at Linger, Cattle Guard, Black Mountain, and other sites have provided not only a wealth of information regarding early occupation of the San Luis Valley, but also information on Folsom settlement and subsistence in regional and national contexts. These investigations are multidisciplinary and have employed modern research methods. The studies are also firmly grounded in anthropological theory. The associated paleoclimatic research will provide valuable information for future researchers.

The excavations at Piedra Pass (Reed 1981a, 1981b, 1984) and at the Blanca Wildlife Refuge (Jones 1977) have provided important information on the prehistory of the area. Although both were performed as part of CRM compliance work, both were quality investigations that have provided valuable information.

Unfortunately, the majority of the work in the context area has been surveys that have not increased knowledge of the archaeological cultures in any substantial way. The number of recorded sites has increased, but little more is known now than that learned from the work of Renaud and Hurst. With few exceptions, the archaeological inventories that have been conducted have been for compliance purposes and lack any type of research focus. The RGNF conducts inventories under a research design formulated in 1986. The Closed Basin survey research design was predicated on how the survey was conducted (Button 1982c, 1987), rather than by asking questions and designing a methodology to answer the questions. This survey provides a great deal of information on site location variables, but little else. The Closed Basin testing program was ad hoc and seemed to be a procedure to prove Button's suspicion that buried archaeological deposits were rare in the Closed Basin.

Geographic Coverage

The Closed Basin, particularly the eastern portion near the Great Sand Dunes, the corridor along the Rio Grande in Conejos and Costilla counties, and many locations in the San Juan Mountains have been subject to archaeological inventory. Almost no work has been done in the Sangre de Cristo Mountains and the Culebra Range. The agricultural areas around Alamosa and Monte Vista and southward toward the San Luis Hills have been minimally investigated. The western portion of the Closed Basin between Alamosa and Saguache, which is mostly agricultural land, remains uninventoried. Areas within the basin that have not been explored are mainly private land or extremely steep and rugged portions of the Sangre de Cristo Mountains.

Location of Existing Collections

Collections of material from the context area are stored at a number of locations. The Renaud and SLAP collections are at DU. Artifacts from the RGNF are stored at the Forest Service offices in Monte Vista. The Rio Grande County Museum in Del Norte has some materials collected privately and has copies of the materials from the Rio Grande rock art project (Frye 1995a). Material from the Blanca Wildlife Refuge survey are at the Adams State College Museum in Alamosa (Dick 1975), and the materials collected from excavations on the refuge are at CSU in Fort Collins or the UNC in Greeley. The Smithsonian Institution in Washington, D.C. houses materials collected from the Paleoindian research project. The Closed Basin project materials are curated at the University of Colorado (CU) Museum in Boulder and at the Smithsonian Institution. Collections made on various projects by Joe Ben Wheat and the CU Museum and many of the small compliance projects are curated at the CU Museum. Human skeletal remains were housed at Colorado College, but these have probably been re-interred under mandate of the Native American Graves Protection and Repatriation Act (NAGPRA). Cultural materials from the Great Sand Dunes National Monument are housed at the museum facility at the park. The Hurst collections are located at the C. T. Hurst Museum on the campus of WSC in Gunnison.

Chapter 5
THEORETICAL AND METHODOLOGICAL CONSIDERATIONS

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ARCHAEOLOGICAL CONCEPTS AND METHODOLOGICAL TRAPS

As suggested in Chapter 4, despite the growing numbers of recorded sites in the Rio Grande Basin, little more is known now of post-Paleoindian archaeology than is available in the works of Renaud and Hurst. The reasons for the lack in advancing knowledge is partially because excavations are rare and little substantive analysis has been conducted on surface remains. However, the intellectual basis of archaeological research in the area has also held back our understanding of Rio Grande Basin prehistory. If a review of site forms and associated reports are any guide, the following concepts define the vast majority of archaeological research in the area:

- The culture area concept is still used as a major organizing principle.
- Cultural-historical analysis has been elevated over other forms of analysis.
- Definitions of hunter-gatherers and horticulturists are limited and simplistic.
- Data analysis at the site recording level tends to be overly reductionist, possibly obscuring relevant and important variation in artifacts, features, and assemblages.
- Sites that are bigger and/or older are revered, to the detriment of other sites.

The culture area concept is usually, if not always, used to describe archaeological assemblages (Mason 1894; Wissler 1926). According to Wissler, the culture area concept explained the connection between culture and environment as being mediated by a subsistence technology that was linked to particular food sources (e.g., Plains bison hunters). The center of the culture area was where a culture became best adjusted to a particular subsistence economy. From this center, cultural traits spread until the geographic limit of the primary food source was reached. Reports are replete with references to the Plains or Southwest culture areas. There is nothing inherently wrong about using the term culture areas, as long as they are used as descriptive terms and not explanatory frameworks. Overuse of the culture area concept causes several problems. The first is denial of indigenous cultural development. Using the Southwest as a referent means that southwestern traits diffused or otherwise were transported into an area from the core of the culture area. This stance denies any independent development of cultural traits and links cultural change to changes occurring in the cultural core. The culture area concept is also limited geographically. The three culture areas proximate to the Rio Grande Basin are the Plains, Southwest, and Great Basin. This leaves all of the southern Rocky Mountains as a frontier between these areas. Use of culture areas implies that the mountainous environment exerts little influence on cultural adaptation and change. The Mountain tradition (Black 1991) partially remedies this situation by defining a model of subsistence and settlement within a mountain context. Unfortunately, a number of recent reports are using this model in the same way culture areas are used. If a site has a trait(s) listed for the Mountain tradition, the site becomes a component of the Mountain tradition. Although Black's work is a cultural-historical model, its tone suggests that the Mountain tradition was not intended to be used in the same way as the culture area concept.

The main form of analysis in nearly all of the archaeological investigations in the context area is the construction of cultural histories or use of cultural histories from other geographic regions to place artifacts and features in a temporal context. Culture histories are temporal sequences usually expressed, for example, as stages, periods, phases, or traditions. As with using culture areas, nothing is necessarily wrong with building culture histories. In fact, placing archaeological assemblages in some sort of temporal order is often necessary before proceeding to other analyses. There are problems with using culture histories, however. The first is that they are not really culture histories; they are artifact histories (Jones 1994). Archaeological assemblages are extremely difficult to link to cultural or ethnic groups. This is exemplified locally by the difficulty of assigning artifact traits to Numic groups (Reed 1994; Larson and Kornfeld 1994). Changes in artifact technology are often linked to changes in the culture. This is usually shown by drawing a line on a chronological chart and creating another period, phase, or focus, which tells one very little about the "culture" that produced the artifact. Another problem with cultural histories is anomalous artifacts or assemblages. Anomalies are explained away as a rare intrusion from another culture area or are ignored. Finally, culture histories are built on shifting attributes, which tend to blur the definition of a stage, period, or phase. For example, the Archaic stage is usually defined by the technology (large side- and corner-notched dart points, increased use of ground stone) and subsistence adaptations (broad-spectrum hunting and gathering) (Guthrie et al. 1984). However, the Late Prehistoric stage is defined only by technological changes, as in the use of smaller projectile points and sometimes the use of ceramics. There are no apparent subsistence economy differences between the stages. This causes difficulty in describing differences between the two stages and results in references back to the Archaic as in the label "Post Formative Archaic" (Guthrie et al. 1984:45). Likewise, ceramics is a Formative Stage trait, but ceramics are also part of non-Formative Late Prehistoric assemblages. Another classification problem is the Middle Archaic. Mulloy (1958) used the term Middle Prehistoric to describe assemblages on the northwestern Plains. The term was modified by Frison (1978, 1991) to Middle Archaic. On the northwestern Plains, this term has some meaning. When the term is applied in areas distant from the northwestern Plains, its meaning becomes vague and terms such as Early-Middle Archaic or Middle-Late Archaic crop up in reports. When this happens, it is an unstated admission that the classification scheme is flawed. For a classification to be of maximal use, the attributes of the classification should be mutually exclusive. If this exclusivity cannot be achieved and the definitions of chronological stages and periods are obscure, then those definitions should not be used. If a cultural history must be built, the classification must be internally consistent and have some interpretive value. Finally, culture histories have been used, for management purposes, as tools to evaluate sites. Sites from certain stages or periods are thought of as less significant than sites from other periods or stages. The sites are evaluated for their position in an artificially created taxa, rather than for any research potential.

Simplistic views of hunter-gatherers and horticulturists tend to obscure important variations in each group and make it difficult to study interactions between groups. Hunter-gatherers are typically viewed as mobile hunters with low population densities, lack of territoriality, minimum of food storage, and simple band social structures (Lee and DeVore 1968; Sahlins 1972). Horticulturists are viewed as living in settled villages, growing most of their food, and as having more complex social structures. Kelly (1995) has demonstrated that hunter-gatherers display wide variations in mobility, territoriality, food storage, sharing, social structure, and subsistence economies. Hunting is an important economic pursuit for some groups that also practice horticulture. Settled village life does not necessarily require a horticultural economic base as demonstrated by some Northwest coast groups and in some Fremont sites. The definitions of subsistence economies do not have room for mixed economies such as hunter-gatherers living adjacent to horticulturists or hunter-gatherers practicing limited amounts of horticulture. How different groups interact and how this interaction affects each others' subsistence economies is important and should have a recognizable archaeological expression. However, one tends to think in static or ideal definitions of hunter-gatherers and horticulturists and fails to recognize important variations.

The culture area concept, cultural-historical reconstructions, and use of simplistic definitions of subsistence economies all point to one tendency among archaeologists to be reductionist in the data and to pay less attention to the range of variation in the data. It is easier to place artifacts and assemblages into existing categories than to try to describe and explain the range of variation displayed in the data. In reality most archaeological data exist along a continuum, but archaeologists persist in dividing the continuum into categories. There is a tendency to ignore the range of variation and favor the placement of boxes around artifacts, cultures and temporal periods. Over time, archaeological assemblages are described in terms of those boxes, rather in terms of the artifacts and assemblages themselves. As the reader will discern, this has been a detriment for the archaeology of the Rio Grande Basin.

The final theoretical issue relates to the management of archaeological resources, but in some ways also relates to research goals and the sociology of archaeology as a profession. *Bigger is better and older is better.* The statement guides many archaeologists in determining which sites are significant, and conversely, which sites are not significant. Sites that are large, have many artifacts, are stratified, and/or are older are rated higher on the significance scale. Smaller sites, lithic scatters with fewer artifacts, single-component sites, and/or younger sites are often rated much lower in significance. Along this line of thinking, older sites are generally much rarer and should be significant; however, many younger sites contain valuable information on any number of subjects. The "bigger is better and older is better" criteria for judging a site's worth also becomes institutionalized in a number of ways. Funding is easier to justify for older sites or complex stratified sites. Acceptance of research findings in journals also seems to be easier for older or complex sites. This issue becomes magnified when archaeologists from one region of the country emigrate to another region. For example, southwestern archaeologists tend to pay less attention to lithic scatters or small sites with "crud ware" pottery in the mountains because they place more emphasis on large, complex sites. In some ways the use of the term "isolated find" serves the same purpose in Colorado. The resource is evaluated on its size, not by its potential to contribute to archaeological knowledge.

The sad part of using the "bigger and older criteria" is that our methodological and interpretive tools are ill-equipped to deal with many of the sites rated as highly significant. Stratified sites, particularly those of hunter-gatherers in the intermountain west, consist of multiple, overlapping occupations. Sorting out the components, much less activity sets within the components, can be an extremely difficult task that is often not accomplished to the degree necessary to make the site information useful. The anthropology of hunter-gatherers suggests that many activities take place in the context of a small family group or task group working around a hearth (Kelly 1995). Ethnographic evidence also suggests that the activities around the hearth are structured and that this structure is archaeologically discernible (Binford 1978, 1983). How can one possibly begin to understand large, stratified sites with overlapping occupations, when the archaeology of a simple activity set is yet to be understood? If one keeps adhering to the "bigger and older" concept, the answer to these questions may never be known.

SUGGESTIONS FOR METHODOLOGICAL IMPROVEMENTS

How are the above problems solved? No simple answer exists because these problems are embedded in the methods and theories. A better question is, what does the researcher want to know from the archaeological record? If one continues to construct artifact taxonomies based on references to culture areas, no changes are necessary. If, however, one wants to learn how prehistoric cultures lived, adapted to their environment, and changed in response to changing conditions, then some changes are needed. In the foreseeable future, because most of the work in the Rio Grande Basin will consist of surface inventories, changes in site recording methods are necessary. Possible solutions include practicing semantic discipline, emphasizing variation instead of overly reductionist classifications, placing a greater emphasis on site integrity, identifying the research potential of each site, better use of modern technology, and obtaining datable materials from suitable contexts.

Semantic Discipline

The terms used to describe the contents of sites and the context of sites should be clear and unambiguous. Use of descriptors such as Woodland, Oshara, and other cultural-historical terms should be avoided as descriptors for artifacts and assemblages. Use of these terms in a general sense is fine, but not as substitutes for data descriptions. The existing database contains hundreds of references to projectile points by using cultural-historical categories rather than clear morphological descriptions. After morphological descriptions are made, interpretations and impressions can be noted. Photographs and drawings should complement the written descriptions..

Describe Variation

Too often descriptions of artifacts and assemblages are lumped into convenient categories. At an early stage of investigation such as site recording, more information is better than less information. If one persists in using the interpretive/impressionistic classifications now commonly used to describe sites, rarely, if ever, will important variations be detected. Classification is a powerful tool that can be employed in later stages of analysis. Describing variation is not an easy task. Determining the appropriate variations is important and developing classifications are dependent on the theoretical orientation of the researcher. However, at the site recording level where description of artifacts and assemblages is important, research strategies can be developed that can be understood by one's colleagues. Common morphological terms have been developed for most tool and feature assemblages. Use of these descriptive terms is better than using impressionistic terms that are essentially incomparable and difficult to understand.

Emphasize Aspects of Site Integrity

What is the geomorphological setting of the site? Has the site been disturbed or vandalized? These are very important questions when addressing research potential. These aspects of site recording are underemphasized and usually discussed briefly, if at all. Determining the level of site integrity is a first step in determining research potential. No site is 100 percent intact because of the effects of cultural and natural formation processes, but the degree and type of disturbance at a particular site are likely to structure the types of analysis and research that can be conducted.

Site Research Potential

Every prehistoric site contains some information. Instead of deciding significance on the "bigger and older" criteria, the research potential of each site should be considered. Since very little is known of the archaeological record in the Rio Grande Basin, it makes no sense to place emphasis on large complex sites when smaller, less complex sites could potentially be used for the same research purposes.

Better Use of Modern Technology

A great deal of information is present in surface assemblages. Sites, and the artifacts and features within them, can be correlated to many environmental variables. However, for the correlations to be truly useful, the site locations must be correct. Global Positioning System (GPS) technology is now widely available and ensures the correct determination of site locations. GPS systems should become a regular tool of the archaeologist. GPS data can be directly imported into Geographic Information Systems (GIS). GIS can be used to analyze site and environmental variables quickly and reliably. GIS can also be a powerful management tool.

Obtain Datable Materials from Suitable Contexts

Culture histories in the Rio Grande Basin are unreliable because sites and artifacts are related to temporal sequences that may or may not have local applicability. As will be discussed below, ^{14}C ages from Paleoindian sites have begun to place some temporal ordering on the earliest archaeological remains, particularly Folsom occupations. This has made it possible to make valuable and insightful comparisons with Folsom sites in other regions. Temporal ordering of sites and artifacts, based on ^{14}C, dendrochronological archaeomagnetic, or other absolute methods is needed to develop locally derived temporal sequences from post-Paleoindian occupations. If a local temporal sequence(s) can be constructed, comparisons with Southwestern, Plains, and Mountain sequences will be more productive and may allow useful discussions about the origins, dispersal, interaction, and demise of archaeological assemblages in the Rio Grande Basin.

Chapter 6
REVIEW OF THE ARCHAEOLOGY OF THE RIO GRANDE BASIN

INTRODUCTION

The archaeology of the Rio Grande Basin is reviewed below by cultural stage. This section is designed to provide information on the sites that have been temporally classified, either by relative or absolute methods. The discussion is divided into four parts based on the following cultural stages: Paleoindian, Archaic, Late Prehistoric/Ceramic, and Protohistoric. Table 6-1 illustrates the chronology used for this report and other commonly used chronologies from adjacent areas. The Archaic and Late Prehistoric stages have not been divided into phases or other taxonomic units, because too little information is available.

Each of the stages is discussed differently. These differences are partially due to different authors. However, the amount and quality of the work and the quality of the databases varies widely, with the highest quality and most focused research occurring in the Paleoindian stage.

On the general site distribution maps, Smithsonian site numbers are not included due to space limitations. Figure 6-1 includes the general locations and site numbers of the prominent sites discussed in the text, such as Black Mountain and Linger sites.

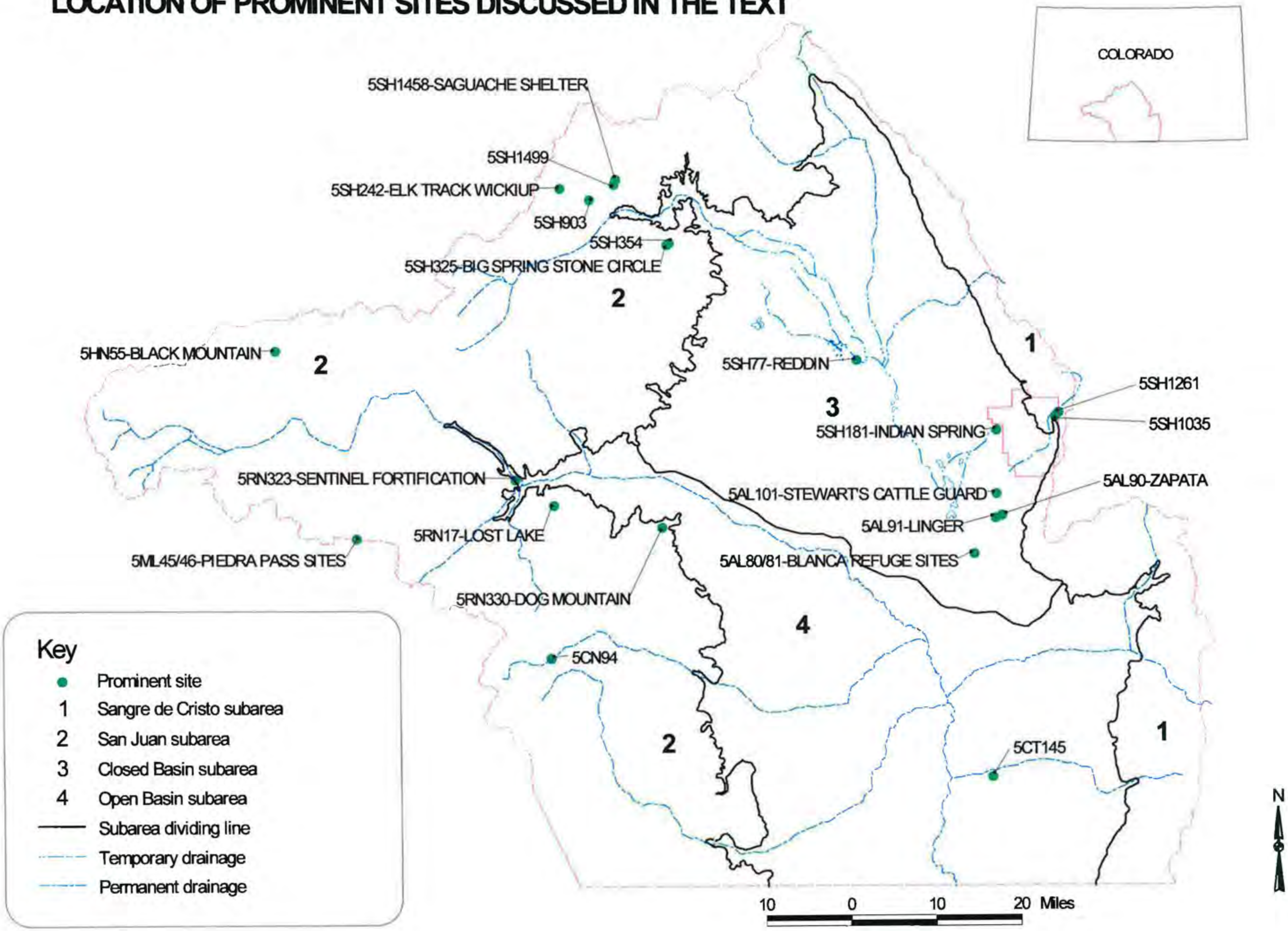
Guthrie et al. (1984) briefly mention the locations and types of prehistoric sites found in the Rio Grande Basin. No discussions of prehistoric lifeways, cultural processes, etc. specific to the Rio Grande Basin are included in that document. Only the general research domains identified by Guthrie et al. for the entire mountain study area are applicable to the Rio Grande Basin; therefore, the information presented in the following sections is a major step forward to understanding the prehistory of the area.

Table 6-1. Regional Chronology.

Age Years AD/BC	Rio Grande Basin[1]	Mountain Tradition[2]	Mountain Context[3]	San Juan NF[4]	Oshara Tradition[5]
	Protohistoric	Numic	Protohistoric	Ute	BM III to Pueblo III
	Late Prehistoric	Mountain Archaic	Late Prehistoric-Formative	PI-III	
AD 1000				BM III	
				BM II	
0 AD/BC	Archaic		Late Archaic	Archaic	En Medio
1000 BC			Middle Archaic		Armijo
2000					San Jose
3000			Early Archaic		Bajada
4000					
5000					Jay
6000	Late Paleoindian Co-Traditions		Paleoindian	Paleoindian	Cody Complexes
7000		Paleoindian			Paleoindian
8000					
9000					
10,000	Folsom Goshen? Clovis				
11,000					
12,000	Pre-Clovis?				

[1]This report; [2]Black 1991; [3]Guthrie et al. 1984; [4]Duke 1997; [5]Irwin-Williams 1973. Dashed lines indicate unknown dates for transitions between stages.

FIGURE 6-1
LOCATION OF PROMINENT SITES DISCUSSED IN THE TEXT



PALEOINDIAN STAGE

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Introduction

This contribution to the archaeology of the Rio Grande Basin has four goals: 1) to provide a brief introduction to key issues in New World Paleoindian studies as a context within which regional investigations might contribute, 2) to summarize the area's Paleoindian record including the archaeological database and a history of Paleoindian investigations, 3) to propose a model of Folsom land use, and 4) to offer testable hypotheses regarding the relative visibility and distribution of early versus late high-altitude Paleoindian campsites. Suggestions regarding directions for ongoing and future research are embedded in these discussions.

New World Paleoindian Studies

Peopling of the Americas

Issues of national and international significance regarding the initial peopling of the Americas include how early peoples were related culturally and biologically, where their homelands were located, when they arrived in the New World, by what routes and means they traveled, and what social, technological, and subsistence practices enabled them to adapt to varied and dynamic ecological circumstances. These topics are being addressed through studies of Paleoindian archaeology (Dillehay et al. 1992; Hoeffecker et al. 1993; Kelly and Todd 1988; Stanford 1991), biological anthropology (Mosch and Watson 1997; Steele and Powell 1992, 1993; Turner 1992), Native American origin stories (Watkins 1998; Echo-Hawk 1994), genetics (Forster et al. 1996; Stone and Stoneking 1996; Szathmary 1994), historical linguistics (Greenburg et al. 1986; Nichols 1990, 1992, 1998; Rogers et al. 1992), and paleoenvironments (Wright 1991; Wright et al. 1993; Elias 1996; Fall 1997). Several broad syntheses of these topics are available (Bonnichsen and Steele 1994; Dillehay and Meltzer 1991; Hofman 1996; Meltzer 1993; Stanford 1999).

The length of human inhabitancy in the Americas is a subject for which there is great interest but little consensus within or among scientific, Native American, Christian, and other communities. The archaeological record indicates that early hunter-gatherers were living at the site of Monte Verde, an open-air settlement in the cool temperate forests of southern Chile, by at least 12,500 B.P. (Dillehay 1997). Here a human footprint in the muddy sand and masticated quids of medicinal plants provide personal glimpses into the remarkable story preserved by a layer of peat at this late Pleistocene site. Evidence for even earlier occupations at Meadowcroft Rockshelter in Pennsylvania (Adovasio 1993) and Pendejo Cave in the Tularosa Basin of New Mexico (Chrisman et al. 1996) lacks the substantial cultural associations documented at Monte Verde. Their acceptance by many researchers awaits consideration of the final published reports. Currently, no prehistoric sites in Colorado have unequivocal evidence for a human presence older than about 11,200 B.P.

Human skeletal remains of Paleoindian age (~11,200 to 8500 B.P.) are rare in North America and their study by physical anthropologists has received both cooperation (Hourglass

Cave, Colorado, consultation with the Ute Tribe) and opposition (Kennewick, Washington, consultation with the Umatilla Tribe) among Native American groups (see Preston 1997). The overall shape of the head and mandible of some early individuals from sites including Kennewick (~8,410 B.P.) in Washington, and Spirit Cave (~9,040 B.P.) and Wizard Beach (~9,250 B.P.) in Nevada, differs from both later prehistoric and modern Native Americans populations (Jantz and Owsley 1997; Steele and Powell 1992, 1993). It has been suggested that some early Paleoindians more closely resemble Ainu, the native peoples of the northern Japanese island of Hokkaido (Jantz and Owsley 1997), pointing toward progenitors among early east Asian hunter-gatherer groups occupying the Pacific Rim (D. Owsley, physical anthropologist, National Museum of Natural History, personal communication 1999). How these observations are to be interpreted in terms of cultural relationships, patterns of migration, and rates of biological change is uncertain and awaits further study. The discoveries of a Paleoindian man (41-45 years old) in Hourglass Cave at 3200 m (10,500 ft) in elevation in the mountains of northern Colorado (Mosch and Watson 1997; Stone and Stoneking 1996) and a Paleoindian woman eroding from an arroyo on the northern Colorado Piedmont (Breternitz et al. 1971) indicate the possibility of future encounters elsewhere in the state. Recent study of a Paleoindian woman 17 to 21 years old from the Buhl site in southern Idaho (dated 10,657±95 B.P.) suggested periods of dietary stress during her childhood and an overall diet dominated by meat and fish (Green et al. 1998). Studies such as these provide rare opportunities to learn about the relative health and diets of Paleoindians.

The direction(s) from which Colorado was first peopled is unknown. Earlier suggestions that Paleoindians moved south through the Canadian Rockies via an ice-free corridor between the Laurentide and Cordilleran ice sheets are being called into question on the basis that this newly deglaciated corridor was not conducive to supporting human populations (S. Elias, personal communication 1997). Multidisciplinary researchers studying the terminal Pleistocene landscape that connected Siberia with Alaska (and ultimately Canada and the U.S.), who attended a Beringian conference in Florissant, Colorado in 1997, favored an alternate scenario of New World entry along the Pacific coast (Fladmark 1979, 1986). Additional AMS radiocarbon dating for Clovis-age (and earlier) sites in Colorado would address the issue of early population movements by contributing to models of time-transgressive geographic patterning for early settlement.

Regardless of when or how they arrived, early inhabitants of North America experienced abrupt climatic changes during the Younger Dryas cool episode dated between 11,000 and 10,000 B.P. Documenting the distribution and scale of ecological changes during this millennium has been a major focus of Quaternary research in recent years (Peteet 1995). The Black Mountain Lake sediment core from the upper Rio Grande (Reasoner and Jodry 1998a, 1998b) provides one of the most accurately dated, high-resolution, terrestrial records of the Younger Dryas currently available from the western United States.

Paleoindian Cultural Succession and Cotraditions

The sites of Blackwater Draw in New Mexico and Hell Gap in Wyoming established Paleoindian cultural succession for the Great Plains. For several decades a unilinear progression of projectile point forms from Clovis to Folsom/Midland, followed by Agate Basin, Hell Gap, Alberta, Cody, and Frederick/Jimmy Allen provided the established guideline for Paleoindian chronology. As the database grew, it became clear that this linear model was unrealistically simplistic. While Paleoindian geochronology remains incompletely understood, it is now evident that several different hunter-gatherer groups were sharing the landscape during terminal Pleistocene and early Holocene times in the Great Plains and Rockies.

Recognition of late Paleoindian cotraditions in the Rocky Mountains arose from investigations of stratified cave deposits in the Bighorn Canyon along the Wyoming-Montana border (Husted 1969). Differences in projectile point styles and prey animals distinguished sites in the foothills and mountains from those on the open Plains (Frison 1988, 1991, 1992). Between about 8,000 and 10,000 years ago, people occupying rockshelters and open-air sites in foothill and mountain meadow settings were making a variety of lanceolate, stemmed, and fishtail bifaces known collectively as Foothill-Mountain. These parallel diagonally flaked projectile points/knives were typically made of local raw materials and were associated with large quantities of mountain sheep and lesser numbers of mule deer and smaller animals. In contrast, contemporaneous sites on the Plains more often reflected communal bison hunting activities by makers of classic Paleoindian point styles (i.e., Agate Basin, Hell Gap, Cody, and Jimmy Allen). Frison (1992:338) proposed that dichotomous cultural patterns arose in these contiguous Mountain and Plains ecosystems because "it was not possible for a group to monitor and exploit both areas" simultaneously. Foothill-Mountain peoples may have been the more culturally isolated of the two, as suggested by greater variation of their projectile point forms across shorter distances as compared with the Plains (Frison 1992:338).

The Rio Grande Basin has great potential for further investigating this model. Rockshelters along the eastern slope of the San Juan Mountains have received only cursory test excavations (i.e., Dog Mountain Shelter [Spero 1987d]), but are known to contain prehistoric artifacts in stratified deposits, in addition to rock art. Thus far, the rock art has commanded more professional attention than the buried deposits. Foothill settings on the Valley's west side are near springs and wetlands, as well as prime mountain sheep and bison terrain. Rockshelters here would have been highly attractive. Both Foothill-Mountain and Plains Paleoindian projectile points are represented in local collections. Stratified rockshelters are also present among the volcanic hills east of the Rio Grande in the southern San Luis Valley.

Another example of possible cotraditions and/or concurrent use of multiple Paleoindian point styles includes Goshen-Plainview-Folsom-Midland. Irwin (1967) first identified Goshen points at Hell Gap in the 1960s. Excavation of a large, unmixed Goshen component at the Mill Iron site in southeast Montana (Frison 1996) and the recent reinvestigation of Hell Gap renewed interest in this unfluted, parallel pressure-flaked point style. Goshen points are morphologically and technologically nearly identical to Plainview points and may represent northern and southern variants, respectively. Goshen appears to be earlier in the north; Plainview seems to continue later in the south (Hofman 1996). Goshen points also have technological affinities with unfluted Folsom points (i.e., Midland). Stratigraphic relationships at Hell Gap, and at Carter/Kerr - McGee in eastern Wyoming, support Goshen predating Folsom on the northern Plains. However, the averaged means of two clusters of radiocarbon dates from Mill Iron (11,360 ± 70 and 10,840 ± 60 B.P. [Haynes et al. 1992]) leaves open the possibility of some contemporaneity between the two. Thus, it appears that around 10,900 B.P. makers of fluted Clovis points, unfluted Goshen points, and fluted and unfluted Folsom points may have overlapped. Likewise, recent recalibrations of radiocarbon dates for Agate Basin and Cody complex projectile points suggests some chronological overlap in their use as well (Eighmy and LaBelle 1996; Pearson and Blackmar 1997).

Sorting out technological traditions that appear to give rise to one another (such as Agate Basin to Hell Gap, Alberta to Scottsbluff, and perhaps Goshen to Folsom) and may represent peoples who held distinct cultural traditions (perhaps Folsom and Agate Basin, and possibly Pryor Stemmed and Jimmy Allen) is an ongoing concern of Paleoindian research. Because the definition of cultural chronology is the foundation upon which other questions depend, the refinement of Paleoindian geochronology is a research priority. Stratified Paleoindian sites and accurately dated single-component localities are needed to refine Paleoindian cultural history for the upper Rio Grande. Stratified sites are particularly important because "the overlap of standard deviations indicates that probably the only foreseeable way we will be able to determine the relative age of the diversity of Paleoindian complexes appearing in the few centuries following Clovis will be through stratigraphic succession at multicomponent sites" (Haynes et al. 1992:364).

Paleoindian Stage Research Questions

Beyond sorting out basic typological and chronological issues, other concerns in Paleoindian research include unraveling the following:

- the effects of climatic change on early adaptive patterns and cultural development
- the role of geomorphological processes in the differential preservation and visibility of archaeological sties
- the range and variability of assemblages within campsites and across landscapes and the implications these hold for understanding the social and technological organization of activities
- the relationships between resource procurement, ritual practices, and patterns of group dispersal and aggregation
- the archaeological signatures of human aggregation and the exchange/sharing of information, resources, and people within and between groups
- the relationship between the representation of tool stone across the landscape (and among different tool categories) and the mobility patterns of different members of a society
- the nature of gender roles and the archaeological signatures of women and children
- the nature of high altitude Paleoindian adaptations
- the origins, development, and relationships among ground stone, heated rock, and food preparation and storage technologies
- the archaeological correlates and effects of population increase
- the variability in, and determinants of, late Pleistocene diet breadth
- the range of variability represented by Paleoindian and Archaic strategies of resource procurement, mobility, and social interaction

The earliest discoveries of spectacular projectile points amidst the bones of giant, extinct animals at the Folsom and Clovis type sites initiated a fascination with Paleoindian points and Pleistocene megafauna that continues to this day. Consequently, an overemphasis on the big game hunting component of some Paleoindian economies obscures the diversity in foraging strategies adopted by different groups during the period from 11,000 to 8,000 B.P. Understanding how particular decisions regarding subsistence and social organization relate to the varied conditions of resource fluctuation, intergroup interaction, and technological change underlies current investigations of early peoples (Kelly 1995).

Paleoindian Sites by Subarea

Paleoindian Sites in the San Juan Subarea

The sample of Paleoindian sites from the high country above 3048 m (10,000 ft) near the Rio Grande headwaters is small but is expanding as a result of recent cooperative research on the Black Mountain Archaeological Project by the Smithsonian Institution, RGNF, and San Luis Valley Archaeological Network (Jodry 1998a). Three Folsom, two Cody Complex sites, and a late Paleoindian site are known, and additional late Paleoindian and fluted materials are reported from the area by collectors. The uppermost Rio Grande currently receives some of the deepest snow in Colorado and pedestrian access to the high country is generally restricted to June through mid October. Small hunter-gatherer groups apparently followed game to summer grazing areas in mountain meadows, returning with them to lower elevations in the fall. Additionally, the high country offered unique vistas, tool stone sources, medicinal plants, and travel routes between river basins.

The first excavation of Paleoindian material in the area, at the Black Mountain site (5HN55), confirmed the seasonal use of high-altitude campsites by Folsom people (Jodry et al. 1996). This locality, related lithic sources, and nearby Paleoindian surface finds (above 3048 m/10,000 ft) are described below. Observations regarding regional travel and the possible use of high-altitude resources are discussed.

Black Mountain Folsom Site (5HN55)

Black Mountain is a stratified, multiple-component campsite at 3097 m (10,160 ft) in Hinsdale County. The site is at the base of a bedrock knoll on a level terrace elevated ~11 m above North Clear Creek (Figure 6-2). It lies within a topographically protected bowl bordered from northwest to southeast by a high Pleistocene outwash terrace of Bull Lake (or earlier) age and is sheltered to the southwest by Black Mountain (3614 m [11,854ft]). The camp is protected from prevailing winds and cold air drainage by the knoll. Further, it benefits from an unshaded setting warmed by early morning and afternoon sunlight, and allows easy access to water and fuel. The knoll provides an excellent overlook. From its vantage some 20 m above the camp, one can observe movement both up and downstream along the creek and watch animals grazing in the broad expanse of North Clear Creek Park. Elk and other large four-footers seasonally migrate to and from nearby alpine meadows along the high terrace above the site. This corridor follows a divide between North Clear Creek, and Rito Hondo and Spring creeks. The site is strategically located at a protected bend along North Clear Creek and is close to travel routes north over the Continental Divide to the Gunnison River basin. Likewise, travel upstream leads to low passes that head southwest to the San Juan Basin. Moving downstream, one follows the creek to its confluence with the Rio Grande, 14 km (8.7 mi) to the southeast. The Black Mountain site is an exceptionally good camp location with regard to protection from the elements, proximity to a wide variety of resources, and convenient placement at an intersection of travel routes. The beautiful scenery adds greatly to the enjoyment of being at this particular spot.

Testing was undertaken by the Smithsonian Institution and the RGNF in 1991 (4 m^2; Jodry 1993), followed by excavation in 1993 (32 m^2; Jodry et al. 1996) and 1997 (39 m^2; Jodry 1998a). Overlooking the creek, on the downstream end of the knoll, are the remains of a post-1910 sheepherder camp, and a light scatter of nondiagnostic flakes of obsidian and local cherts. These cultural components lie primarily on the surface, and to a lesser degree are shallowly buried in the topsoil. The overwhelming majority of the cultural material at the site, however, derives from the remains

Figure 6-2. View south to Black Mountain Folsom site, 5HN55.

of a buried Folsom campsite. The Folsom component is associated with the lower portion of a 10-12 cm thick paleosol, the top of which is encountered approximately 25 cm below present ground surface (bpgs). Earthworms and voles vertically disperse artifacts today, and did so prehistorically. Excavation indicates that the buried Folsom material is distributed for at least 120 m along the base of the knoll, in a swath at least 18 m wide. Varying densities of flaking debris across this 2,160 m^2 area suggest that the cultural material is intermittently, rather than continuously, distributed. Excavation focused on two lithic concentrations separated by nearly 70 m.

Lithic Concentration I. The first concentration is found at the base of the knoll, on the northwest end of the site. Here, the knoll lies between the camp and the creek. An area of approximately 44 m^2 yielded portions of three preforms, nine channel flakes, two gravers, an early stage biface fragment, four end scrapers, two Folsom point tips, several utilized flakes, a possible hammerstone, and more than 1,500 flakes from biface production and unifacial tool resharpening. Of these, a fluted preform base, a point tip, an end scraper, a utilized flake, and 18 reduction flakes were recovered on the surface in 1977; another point tip was surface collected in 1997. The remaining artifacts are from buried contexts. Thus far, bone cracking equipment used in marrow recovery is absent from the assemblage.

Concentration I was uncovered south and east of a heavily disturbed feature that was an irregularly shaped, shallow depression containing charcoal flecks, charcoal-stained sediment, and some flakes. Although it may once have been a Folsom hearth, subsequent bioturbation by voles makes this uncertain. It may represent a natural depression, which filled with Folsom campsite debris around the time of the occupation. The presence of burned flakes suggests that a campfire might once have been in the area. Immediately south of this feature, Folsom knappers were thinning, shaping, and fluting preforms. The predominant raw materials were high-quality, multicolored chert and chalcedony from the Lower Mississippian Leadville Limestone Formation. This material is referred to as Mosca, after a source area of the same name (5HN392) recorded on the San Juan National Forest (Charles 1995, discussed below). Also present among the biface reduction debris were locally available yellow, brown, and burgundy jaspers of medium quality. Veins of highly desiccated but otherwise macroscopically similar yellow jasper outcrop on the creekside face of the knoll. It appears that this lithic material formed during contact metamorphism along a volcanic dike (L. Langford and B. Patten, flint knappers and consultants on lithic sources, personal communication 1997). Also present in smaller amounts were Morrison quartzite, and an unknown, very high quality, banded chert represented by a channel flake and other preform finishing flakes. Use/resharpening flakes from unifacial tools were present.

Approximately 11 m from the peak density of flintknapping debris, a small cluster of tools was recovered in an area of ~16 m^2. Here were found a preform tip, biface fragment, two gravers, a possible hammerstone, five channel flakes, and an end scraper. A use/resharpening flake, refitted to the end scraper, was separated from it by 3.5 m horizontally, and 30 cm vertically. The remains of a domestic activity area appear to be represented. As yet, it is only partially excavated. More than 300 flecks of scattered charcoal (3-11 mm in length) were piece plotted in Concentration I in 1993. Table 6-2 lists the AMS radiocarbon and dated materials, for 10 of these samples. Note that AA-14461 and UCR-3416 are dates from a single, split sample. Calibrated ages for eight of the radiocarbon determinations are based on the Pretoria Calibration Procedure, as reported by Beta Analytic Inc.

Table 6-2. Radiocarbon Dates from Buried Soil at Lithic Concentration I.

Lab Number	^{14}C Age (B.P.)	Dated Material	Intercepts of radiocarbon age with calibration curve	Calibrated Age, 1 sigma (cal B.C.)
AA-14462	10,631±84	Pinus		
AA-14461	7888±72	Pinus		
UCR-3416/ TAMS-24193	8110±70	Pinus		
Beta-97616	7940±60	Pinus	6735 B.C.	6995 - 6640 B.C.
Beta-97617	7980±60	Pinus	985 B.C., 6825 B.C., 6795 B.C.	7015 - 6705 B.C.
Beta-97618	7060±60	Pinus	5940 B.C.	5965 - 5835 B.C.
Beta-97619	7090±50	Pinus	5955 B.C.	5975 - 5870 B.C.
Beta-97620	9950±60	Juniperus	9100 B.C.	9165 - 9070 B.C.
Beta-97621	7220±60	Pinus	6015 B.C.	6115 - 5980 B.C.
Beta-97622	7130±60	Pinus	5970 B.C.	5995 - 5945 B.C.
Beta-97623	7120±50	Pinus	5965 B.C.	5895 - 5945 B.C.

(from Jodry 1998a)

A single age of 10,631±84 B.P. derived from the lower portion of a buried A horizon associated with the Folsom material. A large fragment of an early-stage biface (recycled into a scraping tool) was found in an undisturbed context at the same level. The paleosol developed in slope wash deposits derived from the bedrock knoll, and intermixed with eolian material. This slope wash, carrying large cobbles and small boulders of ignimbrite, was deposited on a late Pinedale terrace consisting of glaciofluvial outwash deposits (Richard Madole, USGS emeritus geomorphologist, personal communication 1997). The Folsom people camped on the vegetated surface of this terrace. Subsequent to the Folsom occupation, soil development apparently kept pace with deposition until ~7000-8000 B.P., when the ground surface stabilized for a time. The upper ~23 cm of the stratigraphic profile is an A horizon that postdates about 7000 B.P. This zone represents continued deposition of slope wash from the knoll, but the large cobbles characteristic of late Pleistocene-early Holocene deposition are no longer present. The single occurrence of juniper charcoal yielded an age of 9950±60 B.P., when insect and pollen records from the Southern Rockies indicate warmer-than-modern climatic conditions.

<u>Lithic Concentration II</u>. Lithic Concentration II is situated near the downstream end of the knoll, where the creek is visible (left of dot, Figure 6-2). A small flintknapping area is associated with a basin-shaped hearth that measured 40 cm in diameter and 7 cm deep, and contained charcoal-stained and -flecked sediment. Samples of this charcoal were submitted for AMS ^{14}C dating. Two preforms, a unifacial flake tool, a broken end scraper, and 427 flakes were recovered in a 7 m^2 area excavated near this feature. Also found was a distinctive flake that may indicate the manufacture of a Folsom ultrathin biface (P. Geib and S. Ahler, experienced flint knappers who excavated in and near the hearth feature, personal communication 1997). Several natural boulders in the vicinity of the hearth were apparently used as benches by knappers flaking near the fire. The majority of the flaking debris and both preform fragments are made of locally available, medium-quality volcanic cherts. Early-stage reduction flakes from at least two cores are present, as well as flakes from later-stage Folsom point production and tool resharpening. Additional excavation around this hearth is planned. The limited occurrence of Mosca chert in Lithic Concentration II, and its separation by about 70 m from Concentration I, suggests that these two areas represent temporally distinct Folsom occupations of the site. No late Paleoindian material has yet been recovered.

In addition to the two lithic concentrations, 13 scattered 1 x 1 m test units were excavated. From one of these units, a Folsom preform base of Mosca chalcedony and an impact-damaged quartzite Folsom point were recovered. These two artifacts were found shallowly buried alongside a tobacco can (dated post1910). It may be that a sheepherder collected these artifacts from the surface of the site while camping there, and left them with the tobacco can. Support for this idea comes from a preform tip that refits the preform base found near the can. The tip was excavated from the Folsom level, 32 cm below ground surface, in a test unit 20 m distant.

Table 6-3 shows the representation of Black Mountain tools by raw material type. Cortical remnants are present on early-stage reduction flakes of the volcanic cherts and Morrison quartzite, suggesting relatively nearby sources. In contrast, cortex was absent from the later-stage biface reduction debris of Mosca cherts and chalcedonies, suggesting a more distant source. Procurement of tool stone appears to be one facet of high-altitude resource use in the San Juan Mountains. Some of these materials would only be available during the snow-free months in summer and fall.

Table 6-3. Black Mountain Tools by Raw Material Type.

Tool Type	Local Mosca Chert	Local Volcanic Cherts	Local Morrison Quartzite	Unknown Chert	Total
Folsom point	2		2		4
Preform	2	2	1	1	6
Graver	1	1			2
End scraper	4	1		1	6
Unifacial tool			1		1
Early-stage biface	2			1	3
Core fragment	1				1
Total	12	4	4	3	23

(from Jodry 1998a)

The tool assemblage provides clues to some site activities. Small fragments from the tips of two Folsom points may represent animals killed at the site, or alternately, meat carried in to the camp (Concentration 1). Either way, it appears likely that some form of meat procurement took place. Preforms of at least five tool stone varieties were fluted at Black Mountain, suggesting that people were gearing up for hunting, presumably for large game. No faunal material is preserved, and there is no direct evidence to indicate which prey animals were the objects of Folsom point production. Among large herbivores, bison, elk, mountain sheep, mule deer, and bear are all good candidates, as may be fur-bearing animals such as wolf and bobcat. There is a tendency to regard animal procurement as primarily a meat-oriented endeavor. However, mountain sheep hides, in particular, were highly prized for clothing. Many of the earliest garments in ethnographic collections from the Plains and Plateau (~A.D. 1850), including those at the Smithsonian Institution, are made from mountain sheep (David Christensen, personal communication 1997). Christensen (personal communication 1997) suggests reasons for this. The size of an adult Rocky Mountain bighorn sheep *(Ovis canadensis)* hide more closely approximates the size of the human body than does buffalo or deer, and perhaps more importantly, mountain sheep leather is much stronger for its weight than either antelope or deer. By comparison, bison leather is hot and heavy, particularly in women's dresses.

Mountain sheep could have been a seasonal resource sought by Folsom people (Jodry 1998a). A Late Prehistoric period individual from the site of Mummy Cave was wearing a mountain sheep garment, with the hair on the inside next to the skin (McCracken et al. 1978:13). Comparable parkas were likely worn in Paleoindian times as well. Resilient and warm parkas would be essential gear for early people trekking over the colder, windswept Continental Divide of early Paleoindian times. A mountain sheep skull was associated with Folsom material at the Hanson site (Frison 1978:144). A net thought to have been used to trap mountain sheep in the Absaroka Mountains of Wyoming was radiocarbon dated to 8860 ±170 B.P. (Frison et al. 1986). Frison et al. (1990:238) judge that "September and most of October would have been the optimum trapping time during most years."

The lush meadows along North Clear Creek are open, gently rolling, and well watered. They provide excellent grazing for cattle today and quite likely for bison, elk, and mule deer in the past. From the Black Mountain site, Folsom hunters would also have had easy access to the alpine meadows favored by elk in summer, and good mountain sheep country only a short distance away. Although smaller animals were likely acquired as well, it is doubtful that Folsom points were needed in their procurement. One suspects that Folsom people may have used deadfalls or snares, but there is no direct evidence for this. The bedrock knoll at the site currently provides a protected habitat for yellow-bellied marmots. This large-bodied animal puts on a layer of fat in the fall that sustains it during hibernation (Whitaker 1996). Burned marmot bones were recovered in a Folsom midden at the site of Indian Creek, Montana along with hare, black-tailed prairie dog, vole, and bison (Davis 1993). With the exception of prairie dogs, the other species were probably present near Black Mountain as well.

Evidence for the working of hard materials (such as wood, bone, and antler) at the Black Mountain site is inferred from use-wear studies of end scrapers from Concentration I (Ahler 1997; Ahler and Jodry 1997). The five tools examined were characteristically reduced in length through repeated resharpening. They are all missing their platforms and have been modified around most of the perimeters by use and rejuvenation. As a group, they seem to have been more exhaustively used and/or more heavily recycled than is typical of Folsom end scrapers from Cattle Guard, a bison kill and processing campsite in the San Luis Valley (Jodry 1987, 1992). Hunters were possibly fashioning or rejuvenating the wooden or bone components of their gear, perhaps foreshafts. Higher altitude woods, such as spruce and bristlecone pine, might represent mountain resources procured during the summer.

Two other resources may leave no record at archaeological sites but may represent powerful incentives for travel in the mountains. The first is medicinal plants; the second is mushrooms (Jodry 1998a). A number of important medicinal plants grow at high altitudes. One such, oshá *(Ligusticum porteri)*, currently grows above 3048 m elevation. Oshá is widely used by indigenous peoples around the world and is actively sought in the northern Rio Grande today. Its medicinal uses are "legion" (Moore 1979:121), and it is one of the best treatments for viral and upper respiratory infections. The roots are gathered and dried in the sun for a few days, after which they can be stored for years. Another medicinal plant is bistort *(Polygonum bistortoides)*. While bistort roots are well known as food sources (Harrington 1967; Grinnell 1923), when ground they make an excellent first aid dressing or antiseptic for cuts (Moore 1979). Whole roots, collected in high alpine meadows (above 3048 m), are dried and ground for future use. Gentians *(Gentiana* spp.*)* are "the best stomach tonics in the plant kingdom, and certainly the most specific in the West" (Moore 1979:79). Their bright flowers identify gentians in mid to late summer in wet meadows and bogs. They currently reach their maximum densities from 2900 m (9500 ft) to 3200 m (10,500 ft) in elevation. Again, their roots are dried for future use. Each of these medicinal plants, when dry, would be easily transported, and of great value. A final observation regarding plants is that edible mushrooms were prolific in 1997, at and above the Black Mountain site, due to an exceptionally cool, wet summer (perhaps analogous to Folsom summers). In the Southern Colorado Rockies, the best months to collect fungi and mushrooms are July and August (Lincoff 1981), the time when Folsom people were most likely in the mountains. As with medicinal plants, dried mushrooms are light and relatively easy to transport.

Summary. Black Mountain is the highest-altitude Folsom campsite yet excavated in North America and firmly establishes the seasonal use of high mountain environs as a component of Folsom settlement in the Southern Rockies (Jodry et al. 1996). The site provides an alternative to suggestions that early Paleoindian projectile points found at higher elevations made their way to the mountains in the belongings of later peoples (Benedict 1992b). Palynological data suggest that the site was situated near the forest-tundra border during the Folsom occupation (Reasoner and Jodry 1998b). Islands of dwarfed conifers and dense thickets of shrubby willows and grasses, which form mosaics with herbaceous tundra species, characterize this ecotone. The greatest number and diversity of species today are found in the low alpine tundra immediately adjacent to timberline. This is generally the most productive area within the tundra and most grazing takes place here (Bliss 1975).

In the upper Rio Grande today, the alpine tundra is summer range for mountain sheep and large elk herds (4,000-5,700 in 1992-1995). One particular elk herd summers at the headwaters of the Rio Grande and moves in a southerly direction over the Continental Divide in the fall to winter near Durango (Colorado Division of Wildlife 1996). The presence of Mosca chert at the Black Mountain site suggests that some Folsom groups did likewise.

Mosca Creek Quarry (5HN392)

The Mosca Creek Quarry consists of an extensive exposure of good quality cherts and chalcedonies originating in the Lower Mississippian Leadville Limestone Formation. This source area lies within the subalpine forest on a south-facing slope (3057-3246 m [10,025-10,650 ft]), about 25 km (15.5 mi) northwest of Pagosa Springs along headwater tributaries of the Piedra River. Multicolored chert outcrops in a northeast/southwest-trending bed along the banks of Mosca and Sand creeks, and occurs as buried nodules in the sediment of the adjoining mountain slopes (Charles 1995).

Isolated tools and discrete reduction localities recorded thus far are typologically dated from Archaic to Protohistoric times (Charles 1995). No Paleoindian projectile points or reduction materials have been identified. It is uncertain whether the Mosca chert at Black Mountain derives from this particular source area, from another unidentified outcrop of the same formation, or from residual stream gravels. However, the wide range of variable colors and patterns represented at Black Mountain are duplicated at 5HN392. Like Black Mountain, the Mosca Creek Quarry was situated in the alpine tundra ecotone during Folsom times, and lithic procurement was seasonally limited by snow. The site and the quarry are separated by 52 km (32 mi) by air, and major trails connect the two places (Figure 6-3). Folsom groups wintering at lower elevations in the San Juan Basin would be able to gather this tool stone along the upper tributaries of the Piedra River on their way to and from the mountains.

Mountain Travel: Implications for the San Juan Subarea

The geographic position of the Rio Grande headwaters, nestled in a great southwestward arc of the Continental Divide, places a great deal of physiographic diversity within striking distance of highly mobile nomadic peoples. More than a dozen named trails currently connect the San Juan Basin with the upper Rio Grande via the tributaries of the Animas, Los Pinos and Piedra rivers (Warren 1992; Jacobs 1992). Likewise the area is linked to the north via tributaries of the Gunnison River. The major trails traversed today were traveled historically, and their prehistoric use is nearly assured as they follow topographically constrained, natural travel corridors along streams leading to low passes over the Continental Divide. Many probably started as seasonal migration routes used by animals. Note the following account reported by Fremont (1988:284-285 [1845]) while exploring unfamiliar territory in the Colorado mountains:

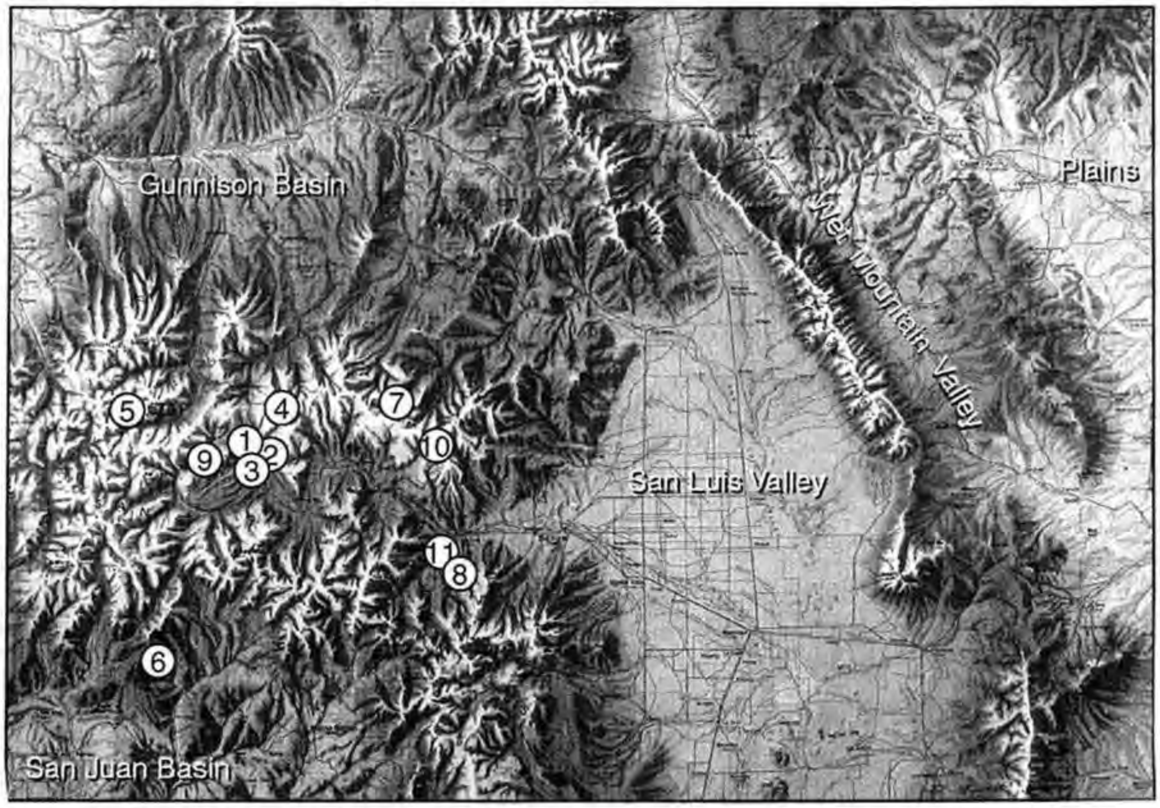

Figure 6-3. Physiographic map showing locations of (1) Black Mountain site, (2) Ayearses, (3) fluted point, (4) Snow Mesa, (5) 5HN510, (6) Mosca Creek Quarry, (7) reworked Clovis Point, (8) 5RN306, (9) Black Mountain Lake, (10) Cody Knife, (11) 5RN119.

> In the afternoon the river forked into three apparently equal streams; broad buffalo trails leading up the left hand, and the middle branch indicating good passes over the mountains; but up the right-hand branch, (which, in the object of descending from the mountain by the main head of the Arkansas, I was most desirous to follow) there was no sign of buffalo trace. Apprehending from this reason, and the character of the mountains, which are known to be extremely rugged, that the right-hand branch led to no pass, I proceeded up the middle branch, which followed a flat valley bottom between timbered ridges on the left and snowy mountains on the right…

In addition to trails along streams, other routes follow the broad, flattened crests which, in many places, give the eastern San Juan Mountains a "unique alpine mesa appearance" (Jacobs 1992:222). The Continental Divide is a major thoroughfare that effectively links the area's drainages, making it possible to move out of one basin and follow the crest to enter the next.

The prehistoric use of high country trails in the Front Range has been documented in contemporary accounts. Husted (1974:865) states that "the relatively greater number of finds of early points on Trail Ridge strongly suggests that this high east/west trending ridge was a desirable route between the Plains and the parks to the west." Benedict (1985a:107) asserts that "an old trail thought to be prehistoric because it connects a number of ancient campsites and is overgrown with tundra vegetation, can be traced to the site [Caribou Lake] from the base of Arapaho Pass." Benedict (1992a:8) also points out that "campsites are most numerous in valleys that lead to major passes across the Continental Divide and are strategically situated with respect to game-drive systems."

North Clear Creek appears to have been a well-traveled corridor between the headwater trails along the Continental Divide and the main channel of the Rio Grande, 18 km (11mi) downstream (Jodry 1998a). In addition to the fluted points found at the Black Mountain site, two other fluted points were reported nearby. About 5 km (3 mi) downstream from Black Mountain, a Folsom preform base, broken during removal of the second flute, was found on a gently sloping hillside (3110 m [10,200 ft]). This site, reported by the Ayearses family and named in their honor, lies on the northeast side of North Clear Creek, a short distance above North Clear Creek Falls (see Figure 6-3). The preform is made of a translucent yellow-brown chalcedony from an unknown source that is not represented in the Black Mountain assemblage. Another fluted point (Clovis or Folsom?) reportedly came from the opposite side of North Clear Creek between Ayearses and Black Mountain (see Figure 6-3). This location overlooks a small tributary just above its confluence with North Clear Creek.

A waterfall, a large natural lake, a warm spring, and a towering bedrock prominence (Bristol Head) occur between the Black Mountain site and the confluence of North Clear Creek and the Rio Grande. From the top of Bristol Head (3873 m [12,703 ft]) one can see the tallest peak in the Sangre de Cristo Mountains (Mount Blanca), nearly 85 km (53 mi) to the east. Herds of bighorn sheep and elk regularly graze on Bristol Head and the outstanding vistas from this beautiful landmark suggest a likely role in the sacred geography of the region (see Benedict 1985b; Snow 1977).

To the west of Bristol Head is a high table mountain known as Snow Mesa. A late Paleoindian projectile point base was recorded there (see Figure 6-3) (Mauz 1993).

Snow Mesa Site

Snow Mesa (3700-3780 m [12,136-12,398 ft]) is a broad, rolling alpine upland encompassing almost 13 km^2 (5.2 m^2) abutting the Continental Divide east of Spring Creek Pass (Jacobs 1992). As viewed from the Black Mountain campsite 5 km (3 mi) away, Snow Mesa is a distinct landmark on the northeastern skyline. Its tundra meadows provide grazing for large elk herds, and marshy areas support waterfowl (Mauz 1993). Toward the mesa edge, springs issue from the base of eroding tiers of bedrock and cobble-sized blocks of volcanic chert are found embedded in the sediment. On the mesa top, Mauz (1993) systematically mapped the distribution of both naturally occurring chert, and archaeological material, within a 9,300 m^2 (2.3 acre) area. More than 2,200 flakes and 30 tools were documented as isolated finds, and as part of a large lithic scatter thought to be the remains of a multiple component campsite situated beside the mesa's solitary lake. Of relevance to this discussion was the recovery of a Late Paleoindian ground stemmed, basally thinned, projectile point base of obsidian. Mauz (1993) tentatively identified this base as Jimmy Allen; however, its stemmed morphology argues against this. Regardless, its assignment to Late Paleoindian times seems appropriate.

Mauz (1993, 1995) conducted trace element analyses of artifacts and naturally occurring cherts from the mesa. Her results indicate that the obsidian artifacts derive from four nonlocal deposits. One of these is clearly the Jemez Mountains of northern New Mexico. The other obsidian artifacts likely derive from the Jemez Mountains as well, but this is less conclusive. Most of the volcanic chert artifacts were made of material from the mesa itself. Mauz concluded that prehistoric peoples intermittently occupied summer camps beside the lake between ~7900 and 2000 B.P. She notes that timberline was at its highest ~8000 B.P. when treeline advanced some 80 m above its present elevation (3535 and 3660 m) as follows:

> A situation such as this would certainly have favored occupation of Snow Mesa, or other high areas where open tundra now exists, as it would have meant a nearer and more substantial supply of wood necessary for heat and cooking even during the warmest months of the year. Under present conditions, it would be impractical to manually transport any quantity of wood the one to two kilometers from the surrounding valleys and up the steep edge of the Mesa to the site of the survey and postulated campsite [Mauz 1993:6].

Snow Mesa lies at the head of Miner's Creek, a "gentle, broad, and grassy valley" (Mauz 1993:96) which leads to the eastern edge of the mesa from its confluence with the Rio Grande, about 18 km (11mi) downstream near Creede. Perhaps people carrying tools of Jemez obsidian followed this route up from the southeast. The site is also accessible from the Gunnison River Basin to the north via low passes such as Spring Creek (3323 m/10,901 ft). The Colorado Trail winds along the Mesa today, and the La Garita stock driveway follows the Divide, immediately to the north.

The apparent absence of fluted point material from Snow Mesa may be related to its elevation ~650 m (2,132 ft) above that of the Black Mountain site. The scarcity of fuel and lack of protection from the wind during early Paleoindian times may have made it unsuitable for habitation. Likewise, the apparent absence of late Paleoindian materials from what appears to be an exceptionally good campsite at Black Mountain may also reflect shifting timberline. If the Black Mountain site were covered in forest vegetation some 8000 years B.P., rather than the parkland which exists today, then the positive camp features of the overlook, a sunny location, and close proximity to the tundra edge would all be negated. North Clear Creek notwithstanding, the location might appear as another ridge within the forest, a long hike from timberline.

Two Cody complex artifacts (~8800 B.P.) are reported from higher elevations in the region. A Cody knife (in private hands) was found above timberline (~3657 m [11,995 ft]) from the headwaters of Saguache Creek, 23 km (14 mi) to the east and on the opposite side of the Continental Divide (see Figure 6-3). The base of an Eden point was recovered at 5RN119 during an inventory survey on the east side of Wolf Creek Pass (see Figure 6-3) (Shafer 1978). Testing here revealed shallow deposits and no further materials of definite Plano affiliation.

5HN510

Site 5HN510 is a possible Jimmy Allen locality in Hinsdale County that appears to fit a pattern of Paleoindian campsites located in valleys leading to passes (see Figure 6-3). The site is situated on a bench overlooking the confluence of Henson's Creek and the North Fork of Henson's Creek, headwater streams of the Lake Fork of the Gunnison River. At an elevation of 2999 m (9839 ft), the site lies below modern treeline a short distance from Engineer Pass, a major route connecting the Animas River with the Gunnison River (Julie Coleman-Fike, personal communication 1998). By air, 5HN510 is roughly 26 km (16 mi) northwest of the Black Mountain site, on the opposite side of the Continental Divide.

A broken and discarded, burned Paleoindian projectile point was found in association with two thermally fractured, angular fragments of the same material (Rich Fike, personal communication 1998). The point base was made of distinctive, nonlocal, mottled red-and-white chert with black dendritic veining. This artifact, which is well-made and basally thinned, could possibly be Clovis. However, direct comparison with Jimmy Allen type specimens suggests a close match. Unfortunately, the point is too overprinted by heat spalls to classify typologically with more confidence.

The site consists of a prehistoric lithic scatter of quartzite and cherts, a historic trash dump, and recent campfires that may account for the burning on the Paleoindian artifacts. The presence of a discarded base, rather than a complete point or a projectile point tip, along with additional pieces of the same exotic material, suggested to Fike (personal communication 1998) that a campsite may be represented. A long-time collector in this region reported that a number of other Clovis and Folsom points came from the Lake City area nearby (Rich Fike, personal communication 1998). Although 5HN510 lies outside of the upper Rio Grande basin, its proximity and setting holds significance for the upper Rio Grande.

5RN306

This multicomponent, prehistoric lithic scatter consists of 13 tools and 60 flakes located on an east-facing forested ridge above a large grassy park containing a small pond. The site occupies the divide (3365 m [11,040 ft]) between two headwater tributaries of the South Fork of the Rio Grande (see Figure 6-3). The ridge is contained in a mountain basin surrounded by peaks up to 3887 m (12,750 ft) high (Spero 1982m). To one side of the scatter, a basalt scraper and two basalt flakes of probable Archaic origin were found with a Folsom projectile point midsection of light gray quartzite (V. Spero, personal communication 1997).

Confirmation of a buried Folsom site at this location awaits future testing. The locality was found during a survey for the Crystal Lakes Timber Sale on the RGNF.

Timberline Shifts and Paleoindian Campsite Locations

Northern and Central Colorado's eastern mountain ranges have benefited from intensive archaeological surveys at higher elevations (Rocky Mountain National Park: Ives 1942; Husted 1965, 1974; Benedict 1981, 1992a, 1992b, 1993, 1996; Indian Peaks Wilderness Area: Benedict 1981, 1985a, 1990; Benedict and Olson 1978; Medicine Bow Mountains: Morris et al. in preparation). A sample of 15 high-altitude late Paleoindian sites from the headwaters of the North and South Platte and Colorado rivers, for which information is available regarding site setting, elevation, and site function, provide a comparative database for Paleoindian sites in the uppermost Rio Grande. Fourteen of the sites are in the Medicine Bow Mountains (Morris et al. in preparation) and one, Caribou Lake, is in the Indian Peaks area (Benedict 1985a). The average elevation of these 15 sites is 3295 m (10,810 ft); the range is 2935 to 3440 m (9,685 to 11,220 ft). Nine are thought to be campsites (as opposed to kills, undifferentiated lithic scatters, or isolated finds) based on the quantity and diversity of artifacts, and the relative habitability of the setting (Morris et al. in preparation). These nine campsites have an average elevation of 3316 m (10,879 ft), and a range of 2935 to 3400 m (9,540 to 11,155 ft). Previous research suggests that prehistoric peoples temporarily lodging at higher elevations in the Front Range tended to favor settings in the tundra-forest ecotone where scattered trees were present, but they were no longer within the closed forest.

> The camps are typically located on more nearly level ground near the lakes and streams. The kill sites tend to be on steep slopes and high passes.... Particularly numerous are those 'border' sites at or near the upper level of timberline, where access to the more easily traveled tundra pastures and the shelter and wood resources of the forests were both available [Morris et al. in preparation].

> Like many high-altitude campsites in the Front Range (Benedict 1975), the Caribou Lake site is in the timberline ecotone. The ecotone was a preferred environment for camping because it was more sheltered than the open tundra and provided fuel for fires; visibility was better than in the subalpine forest, and insects were fewer. The ecotone provided easy access to both forest and alpine-tundra resources [Benedict 1992a:8].

As noted earlier, paleoecological studies indicate that this ecotone shifted in relative position through time (Markgraf and Scott 1981; Carrara et al. 1984; Shafer 1989; Thompson et al. 1993; Elias 1996; Fall 1988, 1992; Reasoner and Jodry 1998a, 1998b) primarily in response to changes in temperature (Fall 1997). Jodry (1998a, 1999) proposed that the downslope movement of upper timberline between ~11,400 and 10,500 B.P. partially accounts for an apparent underrepresentation of Clovis and Folsom campsites relative to late Paleoindian campsites near present-day alpine-timberline. Speaking in relative terms, this area is simply too high. Late Paleoindian campsites such as Caribou Lake (3400 m [11,155 ft]) were open, rocky, cold, glaciated places during the terminal Pleistocene. The preferred timberline "camping zone" was probably situated at least 200-300 m downslope at this time, in what is now subalpine forest and parkland. Although early Paleoindians did travel over high passes, their campsites seem to have been farther downslope. This may help explain why fluted points are so poorly represented in Benedict's (1992a) alpine surveys of the Indian Peaks Wilderness Area, and why when isolated Clovis artifacts have been reported in association with Continental Divide trails and passes (Husted 1965), campsites have not been forthcoming (Jodry 1998a, 1999).

The relative elevations of late Paleoindian material at Snow Mesa (3750 m [12,303 ft]) and early Paleoindian material at Black Mountain (3097 m[10,160 ft]) may reflect the influence of shifting timberlines through time. The apparent absence of fluted point material at Snow Mesa may be due to the fact that during the terminal Pleistocene, this tundra-covered upland provided little in the way of fuel or protection from wind and rain, making it a less suitable campsite location for Clovis and Folsom peoples. It may even have been snow covered at that time. In contrast, warmer climatic conditions and the probable expansion of trees onto the Mesa after 9000 B.P. would have increased its suitability for habitation by later Paleoindian groups. In similar fashion, the lowering of timberline concurrent with Folsom times enhanced the Black Mountain site location by placing it in the alpine-forest ecotone.

Archaeological Visibility and High-Altitude Paleoindian Site Locations

Differences in site formation processes between alpine and subalpine environments may have contributed to differences in the archaeological visibility of Paleoindian sites in the forest and tundra zones (Jodry 1998a). Benedict (1992a) suggested that since modern timberline became established in early Holocene times, the position of the alpine-forest ecotone has remained relatively stable (Benedict 1992a:3). Thus, particularly good campsites in this ecotone tended to be reoccupied intermittently for at least 8000 years. An example of this is seen at the Caribou Lake site near Arapaho Pass in the Front Range, where cultural components extending from late Paleoindian to late Prehistoric times are present (Benedict 1992a). In contrast, the alpine-timberline of terminal Pleistocene times was apparently in place for something less than a thousand years. Thus, early Paleoindian campsites may not have been subject to the same extent of prehistoric reoccupation. If so, high-altitude Clovis and Folsom sites may contain fewer artifacts and thus would appear more ephemeral on the surface than might be true of later Paleoindian sites, since reoccupation leads to greater debris, and greater debris increases archaeological visibility. At Black Mountain, post-Folsom prehistoric campsites are concentrated on a lower terrace beside North Clear Creek, on the upstream end of the knoll, and in a saddle on the knoll itself. Only the modern sheepherder camp appears to spatially overlap the Folsom campsite.

Another consideration is the relative effect of cold climate processes such as frost-heave between the two zones. Cryoturbation is more extensive near timberline where artifacts are displaced upward. Likewise, soil development at higher altitudes is slower, and tundra vegetation may be less obscuring. The combined result may be a greater visibility of cultural material at the surface. Conversely, subalpine ground cover, especially pine needles and downed trees can be very concealing (Kevin Black, personal communication 1998). Many areas of the subalpine zone are subject to greater deposition and soil development, such as at Black Mountain where Folsom material is buried some 25 cm below surface within a paleosol. Although voles and earthworms bring artifacts to the subalpine surface, there is less contribution by cryoturbation. In concert, increased ground cover and deposition rates may limit the archaeological visibility of early Paleoindian sites within the subalpine zone, relative to late Paleoindian sites near present-day upper timberline. If so, the number of early versus late sites in the mountains may reflect natural processes of site formation and exposure rather than Paleoindian land-use patterns.

When one considers that population size likely increased 11,000 to 8000 years ago, and that the colder climate concurrent with Folsom occupations may have curtailed the high country summer season, then early Paleoindian sites would be less frequent on the basis of demographics and relative duration of summer use alone. It may be premature to assume that early Paleoindian use of high-altitude environments was categorically different, or less extensive, than late Paleoindian use on the basis of the better representation of the latter sites in the current database (Jodry 1998a). Jodry proposed that high-altitude summer campsites (above 3050 m [10,000 ft]) might cluster in different elevational ranges for early and late Paleoindian groups due to climatically induced shifts in timberline and snowpacks after Folsom times. Elevations between approximately 3050 and 3400 m (~10,000 and 11,155 ft), depending on aspect and cold air drainage, need to be more closely surveyed for early Paleoindian campsites, as this appears to approximate the terminal Pleistocene timberline ecotone in this portion of the Southern Rockies. This is not to suggest that hunting losses or offerings will not occur in a wider elevational range, but rather that campsite assemblages might be expected in greater frequencies in the timberline ecotone.

Paleoindian Sites in the Open and Closed Basin and Sange de Cristo Subareas

Introduction

Across a distance of about 140 km (87 mi), the Rio Grande passes from cool, moist alpine tundra, through the diverse habitats of the subalpine, montane and pinyon-juniper forests, to reach the desert scrub-covered basin, dramatically interspersed with wetlands. A drop in elevation of some 1850 m (6,070 ft) occurs en route. With regard to changes in climate and the progression of vegetation zones, this is analogous in some respects to a transect from the edge of the Arctic Ocean in northern Canada to southern Colorado. Yet the higher elevations restricted to alpine tundra in the mountains of British Colombia and Alberta sustain montane, subalpine, and alpine communities in southern Colorado. The more southerly latitude and higher base elevation of the San Juan Mountains act to vertically compress life zones, creating a greater diversity of habitats across a comparable vertical range.

This discussion of Paleoindian archaeology in the San Luis Valley reviews the history of investigations in the region, presents some basic information about key sites, and summarizes the frequency and distribution of reported finds on the valley floor and in the surrounding foothills. A climatic model of changing resource structure from Folsom to late Paleoindian times is suggested as a partial explanation for differences in the representation and distribution of Paleoindian cultural complexes through time in the area (Jodry 1999). This summary includes previously unpublished information recorded in Stanford's and Jodry's files in the Paleoindian/Paleoecology Program, Smithsonian Institution. It also reports information from state site forms, contract reports of limited distribution, and discussions with John Cotter, Betty Huscher Bachman, Jerry Dawson, Dennis Stanford, Vince Spero, Kenny Frye, Marvin Goad, Ron Kessler, and other members of the San Luis Valley Archaeological Network.

Paleoindian Investigations in the San Luis Valley

The startling discovery that prehistoric peoples overlapped in time with Ice Age animals, and in fact hunted them successfully, came in 1926 with the excavation of the Folsom type site in New Mexico. This research, directed by J. D. Figgins of the Colorado Museum of Natural History in Denver, was reported nationally (Figgins 1927). The resulting publicity introduced the temporal depth and general characteristics of fluted Paleoindian projectile points to a wide audience and people began searching for them (Wormington 1949). Artifact collectors soon brought other important Paleoindian sites to the attention of academic researchers (J. Cotter, personal communication 1998; Roberts 1935). In this way, the Dent site was excavated in 1932-33 (Figgins 1933), the Lindenmeier site from 1934 to 1940 (Roberts 1935, 1936), the Clovis type site at Blackwater Draw in 1936 to 1937 (Cotter 1937, 1938), and the Linger site in 1941 (Hurst 1941, 1943).

During the dust bowl days of the 1930s deflation uncovered hundreds of Paleoindian sites across the Plains and in the eolian sand sea of the San Luis Valley. Prompted by the great numbers of artifacts coming to light, E. B. Renaud, professor of anthropology at DU, conducted summer reconnaissances in the western Plains from 1930 to 1947. He contacted local arrowhead collectors, visited their sites, and searched for new localities. Typological studies of the newly emerging Paleoindian materials were undertaken by Renaud (1931) and by DU students Jack Cotter (1935), Marie Wormington, and Betty Holmes (later Huscher) (Wormington and Holmes 1937).

In 1932, as an undergraduate and graduate student, Cotter documented Paleoindian points reported to the DU and the Colorado Museum of Natural History. An analysis of 1,263 points was the subject of Cotter's (1935) thesis and formed the basis of Renaud's 1934 report, *The First Thousand Yuma-Folsom Artifacts*. Following graduation, Cotter directed excavations at the Lindenmeier site near Fort Collins for the Colorado Museum of Natural History in 1935 and worked there for Frank H. H. Roberts on the Smithsonian crew in 1936. As a doctoral student at the University of Pennsylvania, Cotter (1937, 1938) served as chief-of-party for E. B. Howard at Blackwater Draw in 1936-1937. The Clovis projectile point type was named for specimens recovered there in 1937 (Wormington 1957). Years later, Clovis and Folsom artifacts would be discovered in relative stratigraphic position at Blackwater Draw, demonstrating for the first time the greater antiquity of Clovis.

Meanwhile at the Colorado Museum of Natural History, Figgins started an archaeology department and hired former student volunteers Marie Wormington and Betty Holmes to be in charge of this endeavor. One of their first projects was to visit amateurs and study 500 unfluted lanceolate Paleoindian points (Betty Huscher Bachman, personal communication 1998). These points were collectively called Yuma after the county in northeastern Colorado where so many were discovered by Perry and Harold Anderson (Wormington 1949). Wormington and Holmes proposed descriptive classifications for this material based on flaking patterns, and Wormington presented this information at the International Symposium on Early Man in Philadelphia in 1937 (Wormington and Holmes 1937). The following year, Holmes represented the United States at the International Congress on Early Man in Denmark (Cassells 1997). Wormington subsequently authored four editions of a highly influential synthesis of New World Paleoindian archaeology, *Ancient Man in North America* (Wormington 1957). This volume was a key guide to sites and typology for generations of Paleoindian researchers.

Colorado researchers and institutions played a leading role in the development of Paleoindian studies. Figgins demonstrated human presence in the New World at the end of the Ice Age. Renaud, Cotter, Wormington, and Holmes conducted some of the earliest typological studies and syntheses of Paleoindian projectile points. Smithsonian excavations at Lindenmeier provided the first detailed look at a Paleoindian campsite and enabled Roberts (1935) to define the first Paleoindian cultural complex for Folsom. Years later, Joe Ben Wheat (1972) of the University of Colorado Museum conducted the first anthropological analysis of a Paleoindian bison bone bed in his seminal study of the Olsen-Chubbuck site. This work forever changed the direction of Paleoindian faunal studies. All of these endeavors owe their beginnings to interested and responsible citizens who brought important paleontological and archaeological materials to the attention of museum and university personnel. Cooperative research between professionals and amateurs is the cornerstone of Paleoindian studies (Stanford 1990b).

A significant influence on early San Luis Valley archaeology was the presence of Clarence T. Hurst, professor of anthropology at WSC in Gunnison from 1928 to 1949. As a founding member of the Southwestern Colorado Archaeological Society (forerunner of the CAS) Hurst promoted strong relationships between amateurs and professional archaeologists. He also created an outlet for the dissemination of archaeological information in the journal *Southwestern Lore*. Hurst brought national attention to the presence of Folsom material in the San Luis Valley by publishing the results of his test excavations at the Linger site in *American Antiquity* (Hurst 1943) and *Southwestern Lore* (Hurst 1941).

Among the many active and knowledgeable artifact collectors from the San Luis Valley in the 1930s were Gene Sutherland, Al Pearsall, and Jack Nelson from Monte Vista and Henrietta Boyd of

Saguache, principal members of the Rio Grande Chapter of the Southwestern Colorado Archaeological Society. Cotter (1935) noted 10 Yuma points and five Folsom points from the San Luis Valley and thanked Gene Sutherland in the acknowledgments. Pearsall was known locally for scattering rubber "Pearsall points" made from red inner tubes as calling cards on the sites he hunted. A few years after the discovery of the Folsom site in New Mexico, Sutherland found the Linger and Zapata Folsom sites near Great Sand Dunes National Monument. He urged Renaud and Hurst to come and see the association of bison bones and Folsom points.

Renaud (1933, 1935, 1942b, 1943, 1946) visited the San Luis Valley briefly during the summers of 1932 and 1933 and again in 1942, 1944, and 1945. In 1932 he observed "bleaching and crumbling pieces of large bones of extinct animals" in the region south and west of the Great Sand Dunes near San Luis and Dry lakes and picked up two small fragments of Folsom points (Renaud 1943:51). Thunderstorms that year, and sandstorms the next, prevented further work. Returning 10 years later, he "found the country so swampy and partly flooded that it was materially impossible to come close to the old sites which promised valuable finds" (Renaud 1943:51). He reported viewing large fragments of bison and proboscidian bone in Nelson's collection in 1943, as well as Folsom points collected by Nelson, Sutherland and Pearsall (Renaud 1943). Much of the Folsom material was being collected at the Linger site

Beginning in the 1940s, five Paleoindian localities have been tested or excavated in the San Luis Valley including Linger, Zapata, Reddin, Stewart's Cattle Guard, and the Zapata Mammoth. As well, two paleontological sites were excavated: the Medano mammoth locality and Magna. These investigations are described below.

Linger Folsom Site (5AL91)

Hurst 1940-1941. On the east side of the San Luis Valley, between the Sangre de Cristo foot slopes and a former marsh system now known as Dry Lakes, there existed at various times in the past a strip of formerly lush wet meadows fed by mountain streams and springs. This stretch of land was particularly favored for human occupation during Paleoindian and later times. During cool/wet intervals such as the terminal Pleistocene (10,900-10,200 B.P.), wooded streams meandered through the meadows and small interdunal ponds were present. Favorable drainage continues to support wet meadows in low lying areas at the base of Blanca Peak today. However, the gently undulating, partially stabilized dunes that border the meadows on the west are especially susceptible to wind erosion. It is here that Sutherland discovered the Linger and Zapata Folsom sites during a period of accelerated deflation in the early 1930s. The property at that time was part of the Linger brother's Zapata Ranch, situated southwest of the Great Sand Dunes in Alamosa County.

By 1941, Sutherland's collection included nine Folsom artifacts from Linger. Nelson had an additional point base. Two unifacial tools were recovered in a test pit dug in 1940, and in 1941 Hurst, Sutherland, and Pearsall spent a day excavating the site. Five clusters of bison bone, thought to represent five individual animals (Hurst 1943), were visible on the surface. The uppermost bone was badly disintegrated, but an intact right metacarpal and several teeth were recovered subsurface. These were sent to the American Museum of Natural History for identification, where the Linger metacarpal was found to be larger than one excavated at the Folsom type site (Hurst 1943; composite bull skeleton AMNH 33801). The artifacts recovered on the surface and in "immediate association" with the bison bone (Hurst 1943:252) are listed in Table 6-4. Both camp and kill site assemblages appear to be represented.

Table 6-4. Artifacts Reported from the Linger Site by Hurst (1941).

Artifact	Test Pit 1940	Hurst Test Excavation 1941	Sutherland Collection	Nelson Collection	Total
Folsom point		1	3		4
Folsom base		3	3	1	7
Folsom midsection/fragment		2			2
Folsom tip		1	2		3
Channel flake		1			1
Untyped Paleo point			1		1
Large unifacial tool	1	1			2
Small scraper	1	1	1		3
Total	2	10	10	1	23

Hurst (1943:253) intended to continue excavations at Linger after World War II when "tires are once more available, as the trip is through trackless sand country and thorny vegetation and tires are severely punished." This did not transpire. Artifacts excavated in 1941 remained in the hands of the amateurs (Dawson and Stanford 1975).

Publicity about the Linger excavations in the *Denver Post, Rocky Mountain News, Colorado Magazine* and *Southwestern Lore* aroused the interest of arrowhead hunters throughout the state in the sand dunes of the San Luis Valley. Recreational arrowhead hunting has been enthusiastically pursued near the Great Sand Dunes ever since. Many private collections contain artifacts from Linger.

Dawson 1968. Sutherland introduced a boy from Monte Vista, Jerry Dawson, to arrowhead hunting on a trip to Linger in 1937. Dawson went on to study anthropology at the University of New Mexico, where he excavated the Rio Rancho Folsom site west of Albuquerque (Dawson and Judge 1969; Judge and Dawson 1972). The two remained friends and in 1967 Sutherland urged Dawson to revisit Linger and check its prospects for further work. Encouraged by what he saw, Dawson spent four weeks the following summer in test excavations at Linger and in reconnaissance of nearby Folsom sites (including Zapata). His stated objectives were to determine 1) the extent of the site still intact, 2) the methods of excavation required in loose sand, 3) the nature of the Folsom deposits, and 4) the comparative setting of Linger relative to other Folsom kill and camp sites in the area (Dawson n.d.).

The blowout in 1968 was almost devoid of vegetation and measured approximately 150 m north/south by 100 m east/west. The central portion of the site looked the same as seen in Hurst's (1941) photographs and the bison deposits were still visible. In a letter to Herb Dick, Dawson (1968) summarized his observations.

> Over one third of the site area, which includes a number of bison skeletons, is still unexposed and intact. Because of the loose sand, controlled excavation will be a bitch but possible. The lack of readily-identifiable strata will somewhat complicate geological studies. But the bones in situ, although cracked, are still together and are definitely capable of identification and restoration; generally, they are in better shape than those from the original bison quarry at Folsom. Even the preservation of small bones is excellent: several heavily cut and carved pieces of bone were obtained from but shallow excavation.

In a letter to Dennis Stanford, Dawson (n.d.) continues,

> Three distinct kinds of areas are apparent at both the Linger and Zapata sites: 1) Carcass, dense deposits of bone where the animal dropped, was probably skinned, and partially dismembered, 2) Stripping, areas adjoining the Carcass where dismantled portions of the animal were apparently stripped of their usable portions and discarded, and 3) Butchering Camps or Stations, probably temporary occupations maintained during the butchering process. Portions of all three kinds of areas were excavated last summer.
>
> Throughout all three of these areas are fragments of skinning tools, sharpening flakes, and discarded, lost tools. Whole and shattered points occur in the first two areas; point bases, channel flakes, blank ends, and points broken during the fluting process were found in the camp area. In the carcass and stripping areas, several small, heavily-cut pieces of bone were found, either sharpening blocks for butchering skinning tools or early stages of handle, foreshaft, or bone point manufacture. The camp areas lack the isolated bone members characteristic of the stripping areas but do contain burnt bone fragments, oxidized rocks, a moderate amount of chipping, and discarded tools apparently occurring in clusters.

Dawson's plans for further work were curtailed when the landowner refused permission to excavate the following year. Color slides taken of the site in 1968 are on file at the Paleoindian/ Paleoecology Program, Smithsonian Institution.

Smithsonian Institution, Stanford 1977-1979. At Dawson's request, Stanford returned to Linger in 1977-79 in order to salvage eroding bone beds. CAS volunteers assisted with the excavations in 1979. Figure 6-4 shows the Smithsonian excavation units in relation to site topography. Three areas of intact cultural material were found, including a bison processing area at the north end of the site, a bison kill area at the southwest end, and a second bone area on the southeast edge of the blowout. The remains of five bison were represented in both the processing/camp area and in the kill area, but their contemporaneity is uncertain and not assumed. The remains of a former playa were indicated by a distinctive reddish brown, limonite-enriched sand deposit in the southern portion of the site.

Approximately 150 disarticulated bison bones were recovered in the processing area (Figure 6-5). More than 30 exhibited green bone breaks and several had impact scars. Bone cracking tools, consisting of tabular pieces of cemented sandstone from the Sangre de Cristo Mountains to the east were associated with the bones. One of these had linear striations, possibly indicative of its further use as an edge abrader during biface manufacture, or alternately as an anvil upon which to cut (Figure 6-6). The greatest diversity of tool types was found here, including sandstone abraders, red pigment, a preform, several flake tools, and four hammerstones/anvils (Figure 6-7). A few bones of antelope and a canid were recovered.

The kill area yielded over 250 bison bones representing at least five animals. Here the remains of several skulls were recovered, as well as an articulated front quarter and ribs (Figure 6-8). A Folsom point tip apparently contacted bone at it entered this animal. Its two refitted pieces were recovered just above and below one of the ribs (Figure 6-9f). A nearly complete Folsom point, two tips, a butchering tool, a graver, and a point base were found (see Figure 6-9). It is unfortunate that before the excavations were completed here, vandals looted the kill area and

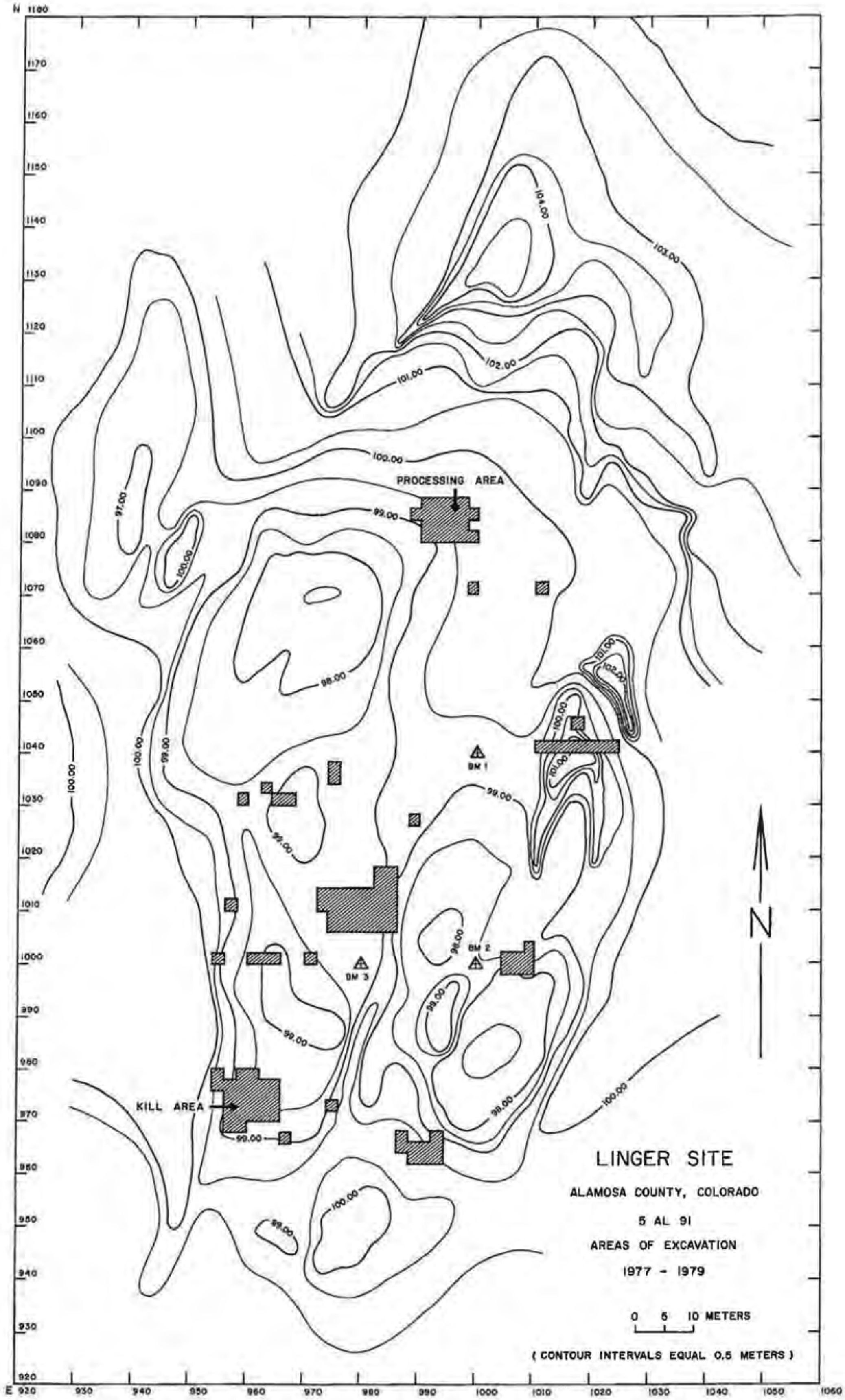

Figure 6-4. Topographic map of the Linger site showing the 1977-1979 Smithsonian excavation units.

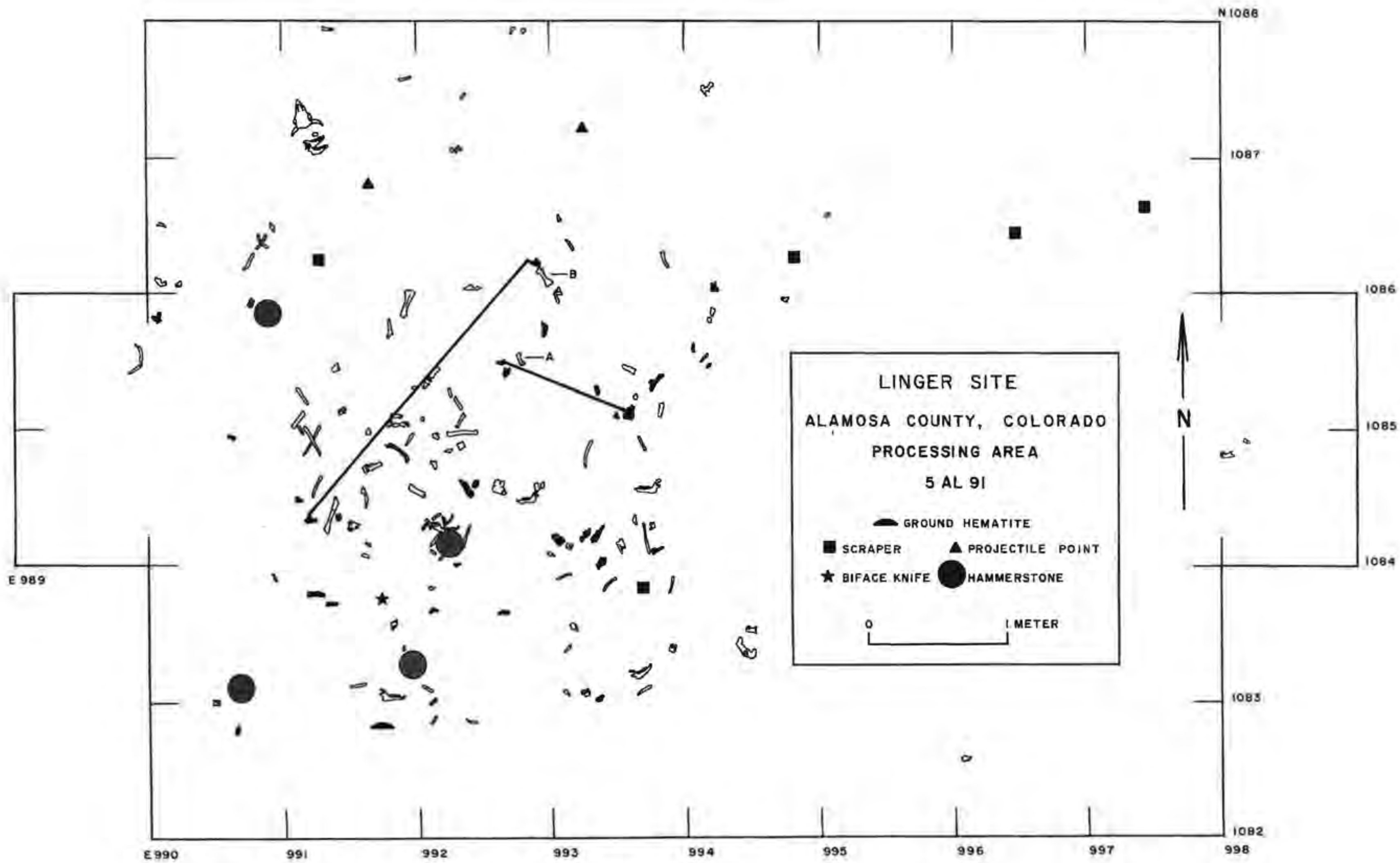

Figure 6-5. Distribution of bison bone and artifacts in Linger processing area. Lines connect conjoined marrow cracked bones (from Jodry 1999).

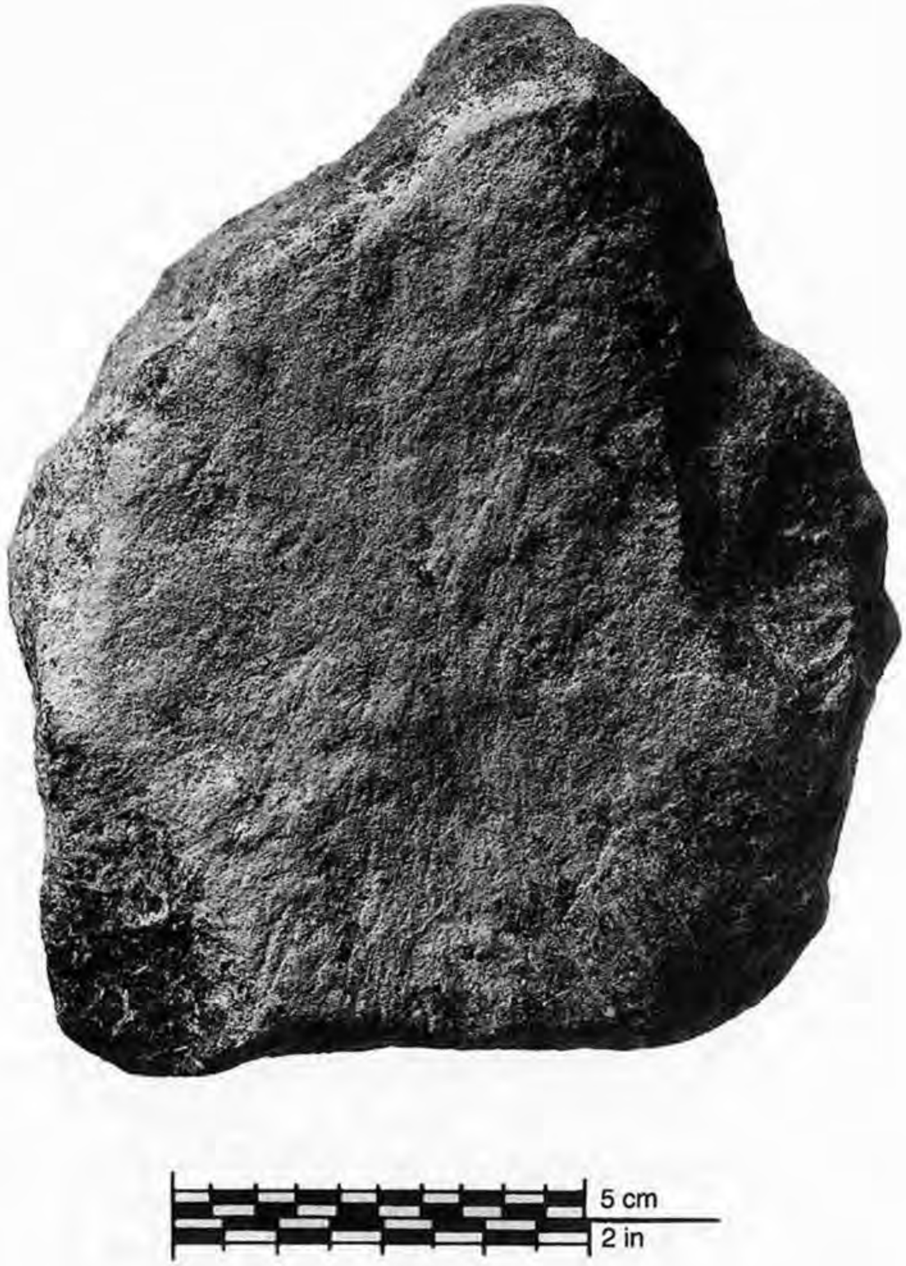

Figure 6-6. Tool from the Linger processing area possibly used to crack marrow bones. Note striations from additional use as an anvil cutting surface or abrader (from Jodry 1999).

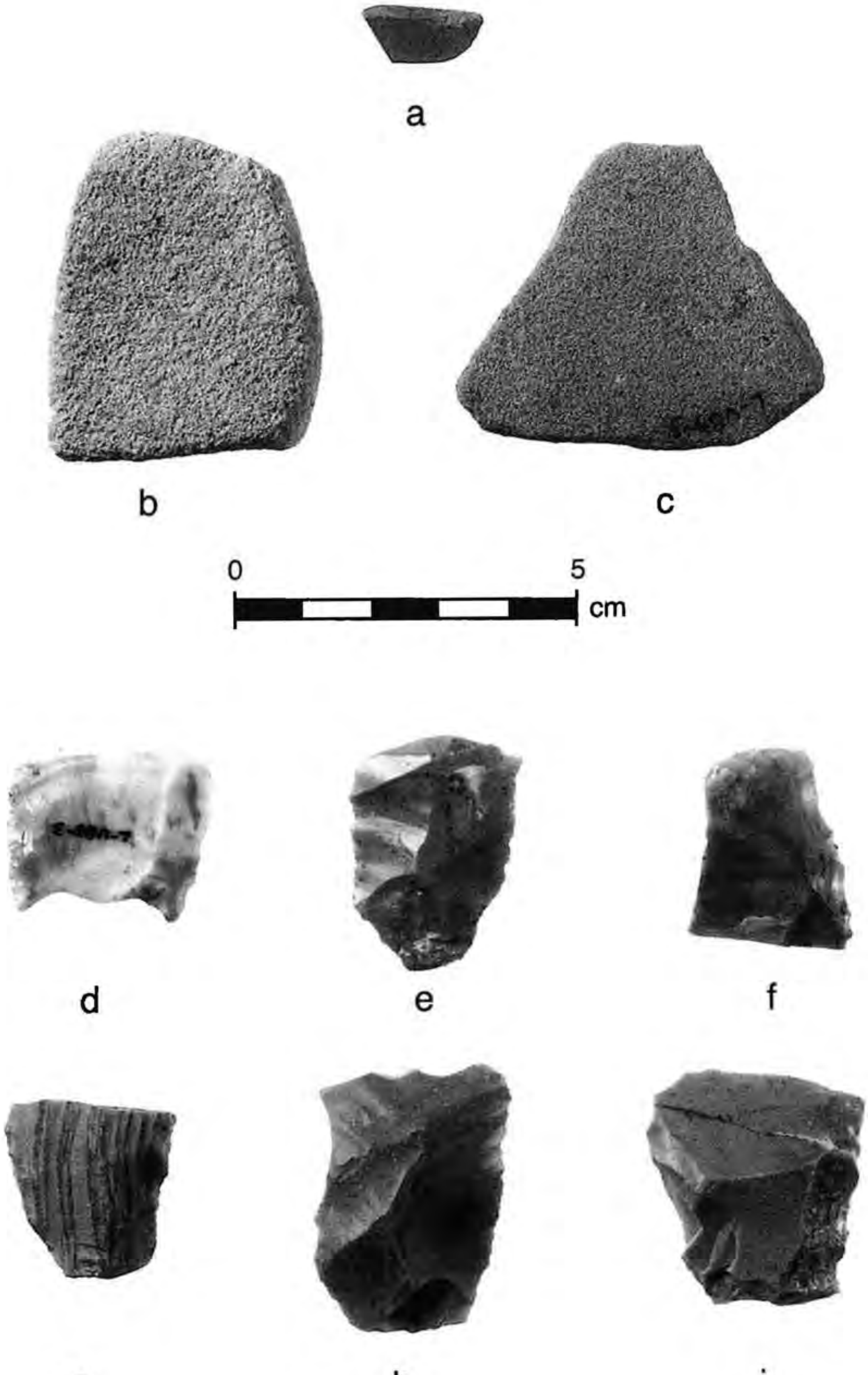

Figure 6-7. Artifacts from the Linger processing area: (a) abraded red pigment; (b-c) sandstone abraders; (d) Alibates preform; (e-i) flake tools (from Jodry 1999).

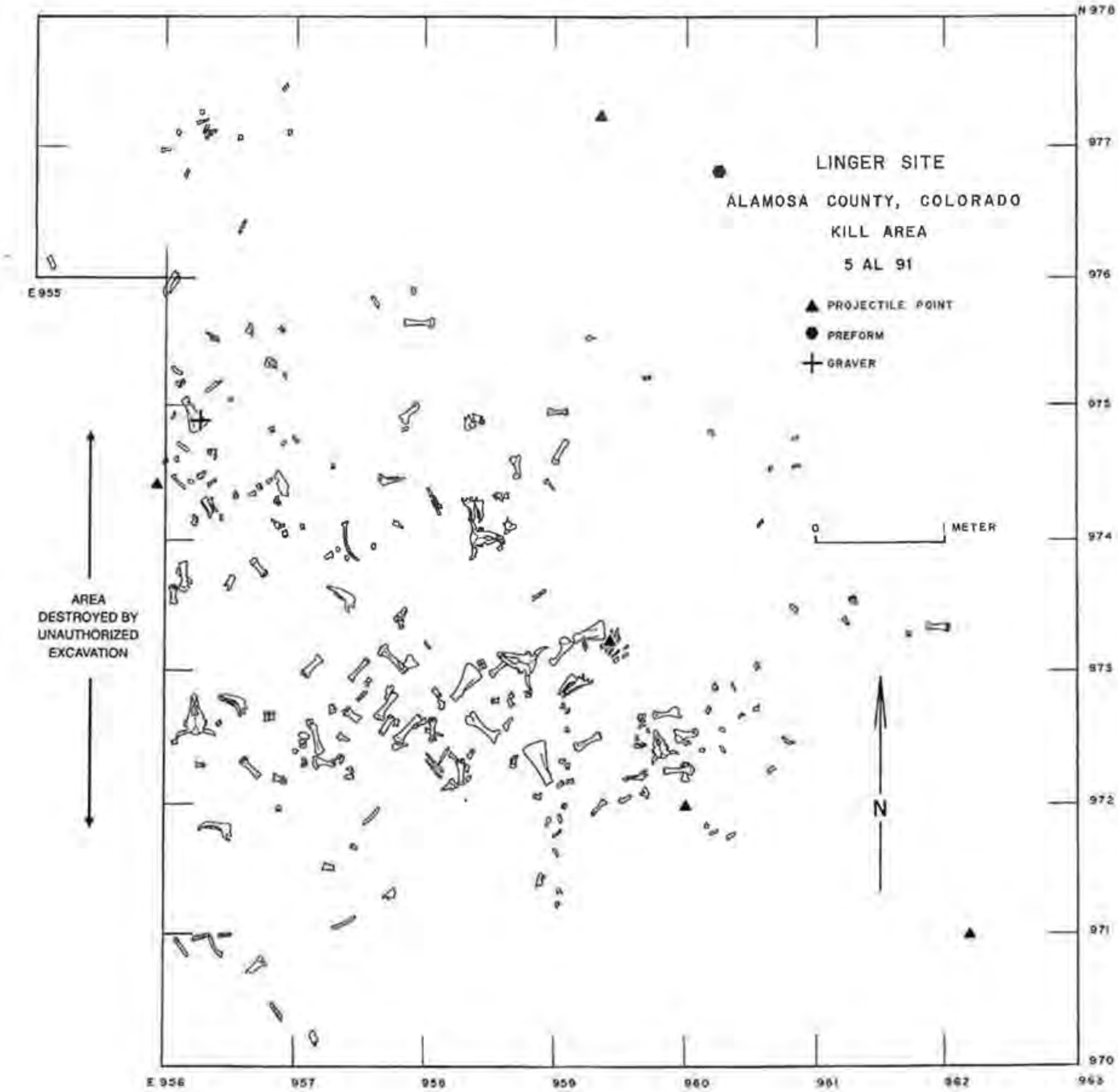

Figure 6-8. Distribution of bison bone and artifacts in Linger kill area (from Jodry 1999).

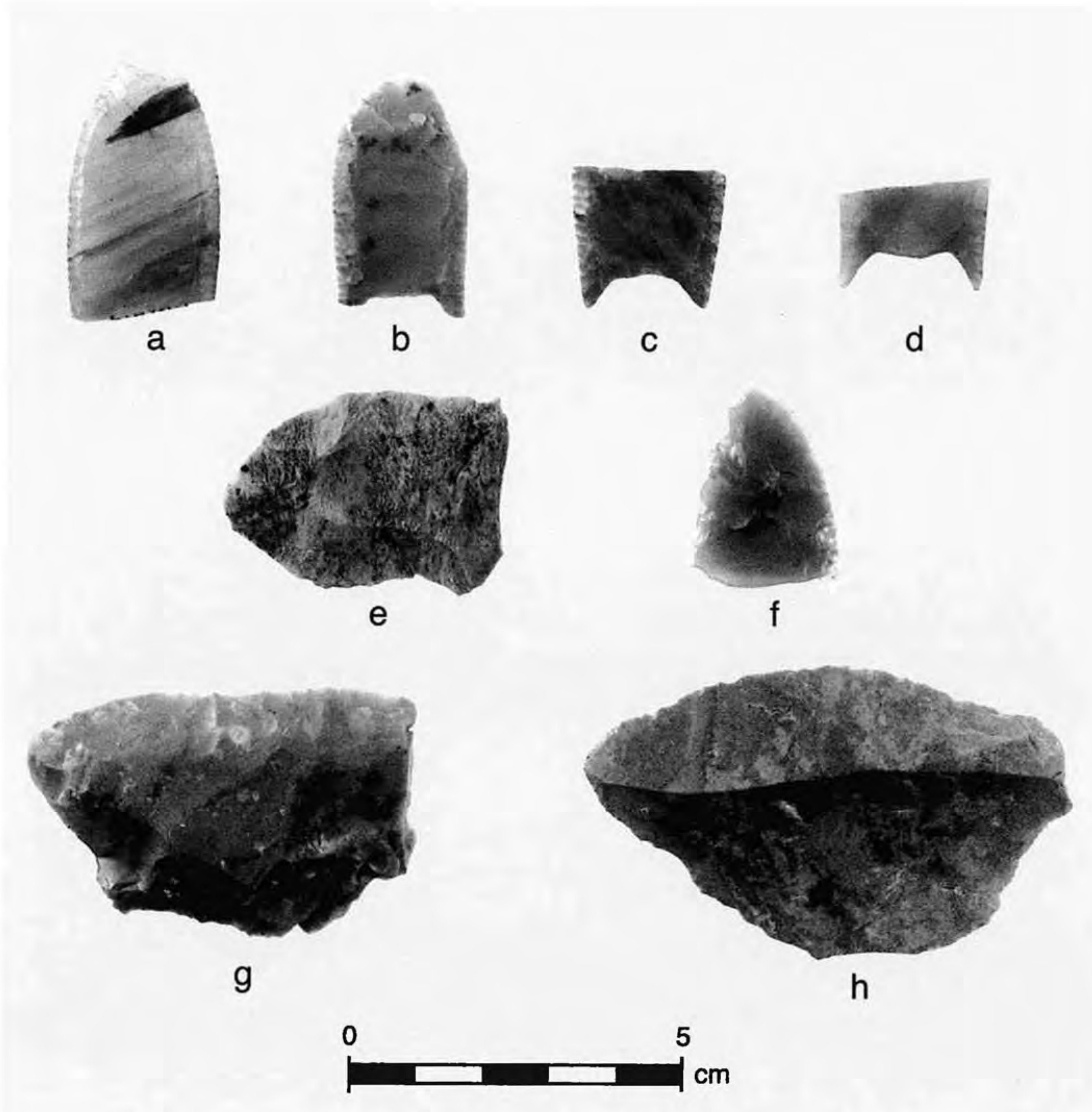

Figure 6-9. Artifacts from the Linger kill area: (a-d) Folsom points; (3) graver on flake tool; (f) refitted Chuska Folsom point tip; (g-h) butchering tools (from Jodry 1999).

destroyed most of the remaining bone bed while the crew was in town buying supplies (Stanford 1990a).

Twenty meters east of the kill area, a third concentration contained 53 bison bones along with a small Folsom point fragment. Additional testing between the kill area and the processing/camp area in 1978 and 1979 produced mostly deflated, near-surface materials. Small groups of bison were apparently ambushed while watering at an interdunal pond (Stanford 1990a). Some of the bison bones, stripped of meat, were apparently discarded where the animals fell. Others, along with meat and hide, were carried to camp where further processing took place and where new weapon tips were manufactured. A preform of Alibates dolomite from the Texas panhandle near Amarillo was broken during fluting. Cobbles, gathered from the base of nearby Blanca Peak, were brought to the camp and used as anvils, upon which the bison leg bones were broken to obtain the marrow. It appears likely that more than one episode of Folsom occupation may be represented. Table 6-5 lists the cultural material recovered in the Smithsonian excavations.

Table 6-5. Artifacts and Bison Bone from Smithsonian Excavations at the Linger Site (5AL91).

Material Recovered	Kill Area	Bone Area 2	Processing/ Camp Area	Total
Folsom point	1			1
Folsom tip	2			2
Folsom base	2			2
Folsom fragment		1	1	2
Preform base			1	1
Channel flake			1	1
Biface fragment	1		1	2
Unifacial tool	2		1	3
Hammerstone/anvil/abrader			4	4
Sandstone abrader			2	2
Scraper			4	4
Graver	1			1
Red pigment			2	2
Subtotal of artifacts	9	1	17	27
Bison bone	253	53	156	462
Total (artifacts and bison bone)	262	54	173	489

The bone surfaces at Linger are fairly well preserved and suggest rapid burial by wind-blown sand. Radiocarbon analysis of the bone produced age estimates that are considered too young (8480 ± 85 B.P., SI-3540; 9885 ± 140 B.P., SI-3537). Like many of the Paleoindian sites in the San Luis Valley, the Linger site is multicomponent. Dawson (personal communication 1994) observed that the Archaic material at Linger was associated with a thin, dark soil horizon that was separated from the underlying Folsom deposits by at least 30 cm of eolian sand in 1968. The blowout is aggrading currently and vegetation is expanding across the site.

Zapata Folsom Site (5AL90)

The Zapata site is exposed in two adjoining blowouts northeast of Linger. Discovered by Sutherland in the 1930s, Zapata was dug in the 1950s by F.V. Worman, professor at ASC in Alamosa. Worman excavated in a low area bridging the two basins and recovered one complete and one broken Folsom points, a channel flake, a preform, a graver, and two scrapers in association with bison bone (Wormington 1957). These artifacts suggest that a temporary campsite may have been represented, possibly associated with a bison kill. This work is unpublished, and the portion of the excavated

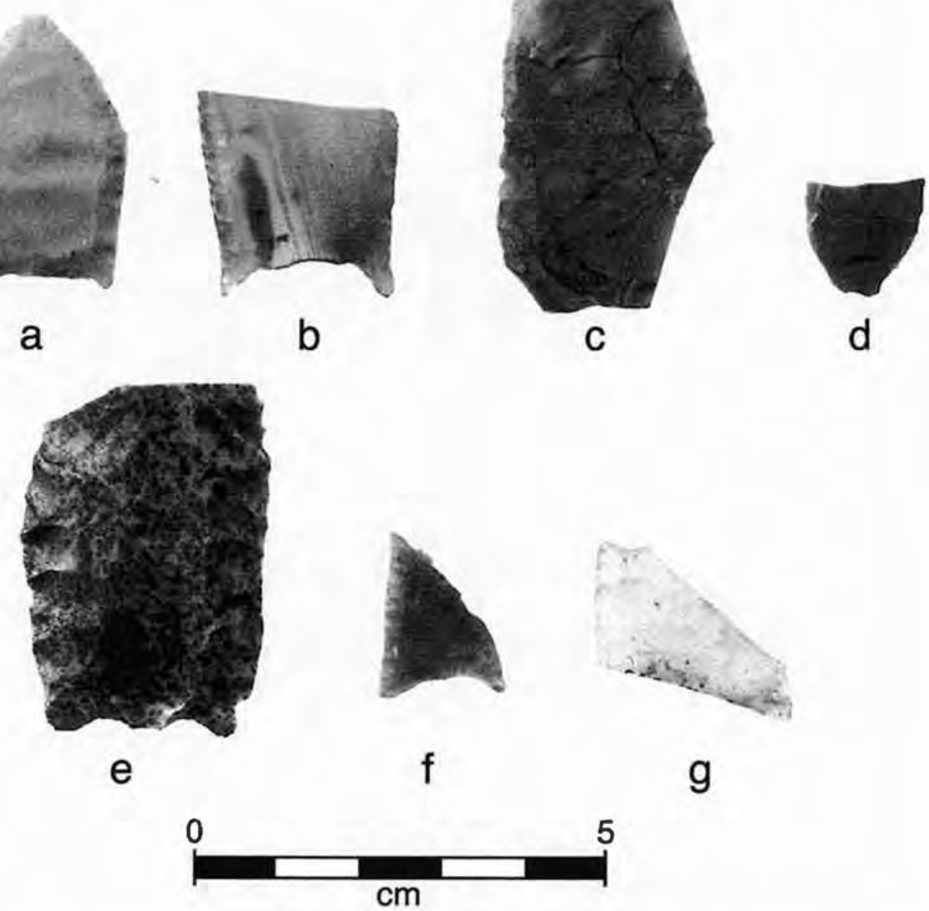

Figure 6-10. Artifacts from the Zapata site: (a-b) Folsom points; (c) preform; (d) channel flake; (e) preform; (f-g) Folsom point fragments.

assemblage residing at ASC in the 1980s was sent to the Smithsonian Institution (Figure 6-10 a-d, f).

In 1978, Stanford revisited Zapata with geologist John Albanese and determined that Folsom material was contained within two sediments: the unconsolidated brown eolian sand seen at Linger and Cattle Guard, and an organically enriched, consolidated gray sand. The genesis of the gray sand awaits further study but seems to represent wet meadow or lacustrine deposits discontinuously exposed in portions of both blowouts. The small party of CAS (Lyons 1978) and Smithsonian volunteers excavated several test units along a dune ridge between the blowouts. Worman's excavation area was found "but wind deflation had destroyed the bone bed during the interim" (Stanford 1990b:36). Two test units on the eastern margin of the site produced well-preserved, butchered bison bone along with Folsom artifacts (including a preform). Judging from surface exposures of artifacts and bone, intact deposits may be preserved in a number of locations at the site (Dennis Stanford, personal communication 1998). The evidence suggests hunting and rearmament activities near a wetland grazing/watering area. Table 6-6 lists Zapata artifacts in the Smithsonian collections. Zapata is notable for the high incidence of Edwards Plateau chert from Central Texas, greater than that documented from the Linger and Cattle Guard sites. Morrison quartzite and local jaspers are also present.

Table 6-6. Zapata Site (5AL90) Artifacts in Smithsonian Collection.

Material Recovered	Worman 1950s	Smithsonian 1970s	Private Collection donated to Smithsonian	Total
Folsom point	1		1	2
Folsom tip		1		1
Folsom base/fragments	2	5	1	8
Folsom fragment		1		1
Preform	1	1		2
Preform base				0
Channel flake	1	6	6	13
Biface fragment		1		1
Utilized flake			1	1
Total	5	15	9	29

Gene Sutherland collected a human cranial fragment in the northeastern portion of the site, reportedly from an area where the gray sand is visible today (Dawson n.d.). He gave this bone to Dawson, who in turn brought it to George Agogino at Eastern New Mexico University for study. A tentative identification of a female less than 22 years of age is reported by Patterson and Agogino (1976). The cultural affiliation of this person is unknown but may well represent one of the many post-Folsom age individuals buried in the sand sea adjacent to Dry Lakes. This find was incorrectly attributed to the Linger site (Patterson and Agogino 1976).

Informal surveys conducted over the years in the area around Linger and Zapata by Lyons (1950s), Dawson (1960s-1970s), and Stanford (1970s-1980s) identified several additional Paleoindian lithic scatters (5AL94, -97, -99, -101, -102, -113, and -123). In 1979, Stanford requested that CAS volunteers, who were assisting his investigations over Labor Day weekend, record these sites for the state files. Ray Lyons supervised that effort. The Linger, Zapata, Reddin, and Stewart's Cattle Guard sites were recorded in this way.

Reddin Folsom Site (5SH77)

Gordon Reddin, former postmaster of Hooper, discovered a Folsom point base south of La Garita Creek in 1978. He reported the find to Stanford who was then excavating the Zapata site. Further examination by Stanford and Reddin confirmed the presence of an extensive, multicomponent lithic scatter on a deflated hardpan. Stanford, Reddin, and two local volunteers conducted a controlled surface collection in 1979. Stanford superimposed a grid at 30 m spacing over 6,450 m^2 to provide horizontal control for a 100 percent surface collection of flaking debris and piece-plotted tools (Stanford 1990a). Figure 6-11 depicts the density distribution of flakes and tools from this 1979 collection. There are at least three major Folsom artifact concentrations. The largest occupies a low rise adjacent to La Garita Creek and overlaps an Archaic artifact concentration. The distribution of Folsom material at Reddin, north of playas and south of a stream, is similar to that reported for Folsom campsites along the middle Rio Grande west of Albuquerque (Judge and Dawson 1972; Dawson and Judge 1969).

In 1983, Dennis Stanford, Pegi Jodry, Marcel Kornfeld, and Jerry Dawson returned to Reddin for a six-week field season in response to plans by the Bureau of Reclamation to build a water recovery well and pipeline (80-foot right-of-way) at the site. The grid was reestablished and expanded to cover 9,480 m^2 for a second 100 percent surface collection of flakes and piece-plotted tools. To provide a more tightly controlled sample of flakes distributions, every flake and tool within a 150 m^2 area were piece plotted. Additionally, 26 test units each measuring 5 x 5 m were excavated (skim shoveled and ¼ inch screened) along the pipeline route, and four 5 x 5 m test units were dug within the densest Folsom concentration. Artifacts were contained within a reworked sand/gravel layer (1-20 cm thick) which discontinuously covered the compacted Hooper soil (hardpan). Some artifacts apparently were displaced into the uppermost Hooper soil (Stanford 1983).

The Bureau of Reclamation agreed to shift its pipeline 150 meters to the west to avoid the area of greatest cultural concentration that it would otherwise impact. A backhoe trench 5 m long and 1 m deep was dug near the site of the recovery well and two backhoe trenches were dug in the playas to examine lake bed stratigraphy. Based on trench stratigraphy and the distribution of surface and excavated artifacts, Stanford (1983) concluded that the Hooper soil hardpan formed prior to the Folsom occupation and the cultural material at the site represents a composite of multiple occupations deposited on a slowly aggrading to nonaggrading surface.

Folsom artifacts include more than 483 points, preforms, and channel flakes in addition to Paleo-like scrapers, gravers, and flakes with carefully prepared, ground platforms (Stanford and McClelland 1993). Table 6-7 lists Folsom raw materials represented at the site. Dendritic jasper dominated the assemblage in keeping with the site's relative proximity to the San Juan Mountains to the west and the Trout Creek jasper source to the northeast. The only non-Folsom Paleoindian projectile point identified was a basalt small basal fragment probably of Agate Basin or Hell Gap affiliation. The paucity of non-Folsom Paleoindian points suggests that the playas held water during the Younger Dryas cool period but not before or after. During this mesic interval, Folsom people left an archaeological record indicating a greater intensity of hunting activities at this location. With increased drying after 10,000 B.P., changes in forage and the availability of surface water likely altered the grazing patterns of large animals in the site vicinity. The Archaic and younger occupations appear to be oriented toward La Garita Creek and a more intensive utilization of plant and small animal resources (Button 1987).

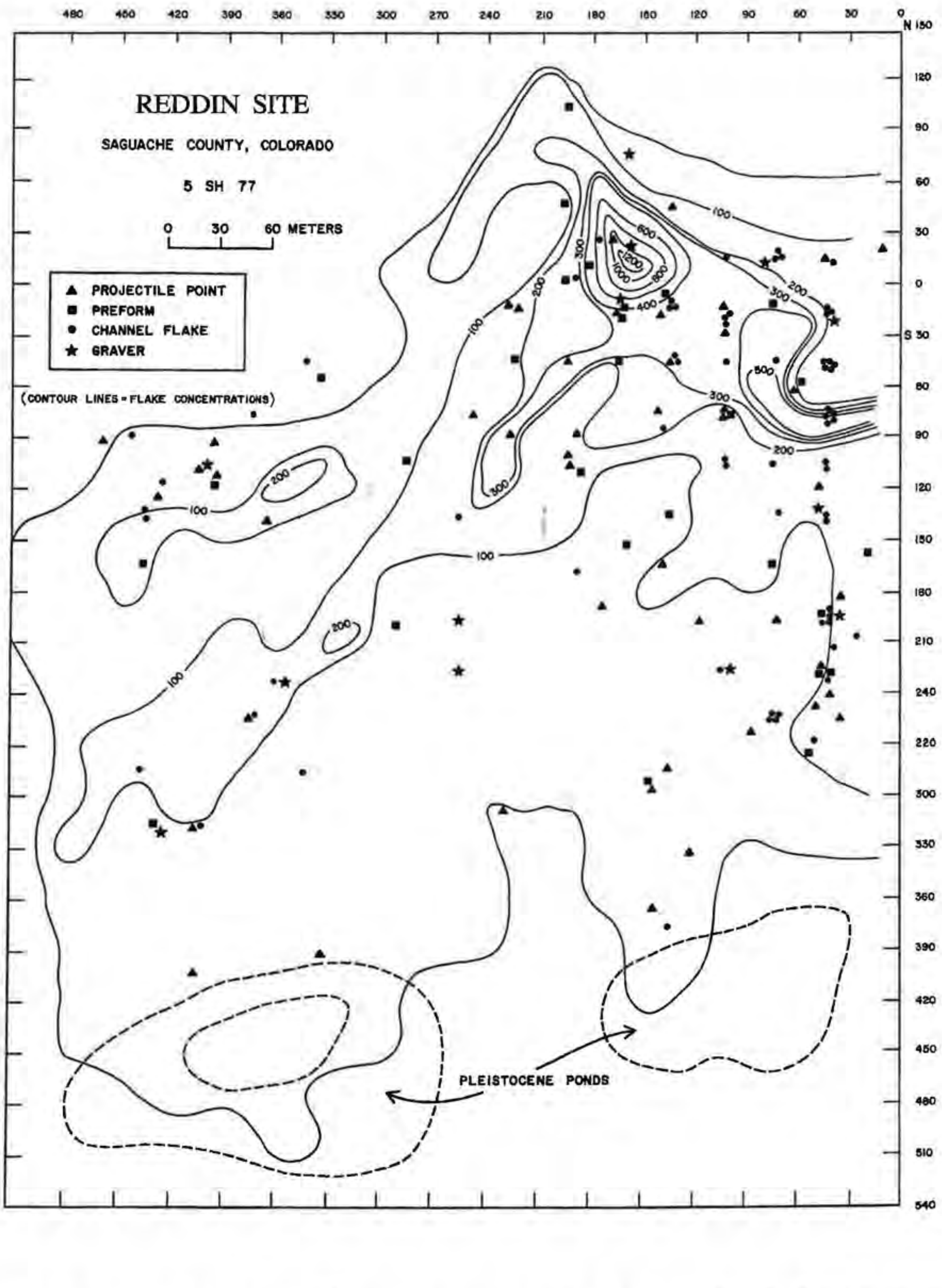

Figure 6-11. Density distribution of flakes and piece-plotted tools recovered at the Reddin site in 1979.

Table 6-7. Folsom Raw Materials at the Reddin Site (5SH77).

Material	Folsom Points	Preforms	Channel Flakes	Total
Dendritic jasper	99	40	178	317
Black Forest wood	16	13	5	34
Edwards chert	9	2	15	26
Morrison quartzite	16	7	1	24
Cumbres chert	6	2	5	13
Obsidian	11	1	1	13
Chuska chert	1	0	5	6
San Antonio basalt	1	0	0	1
Alibates dolomite	0	0	0	0
Other	26	11	12	49
Total	185	76	222	483

(from Stanford and McClelland 1993)

The majority of the Folsom artifacts at Reddin are small fragments. Notably underrepresented are complete points and larger fragments of points and preforms such as those found at Linger, Zapata, and Cattle Guard. Unlike the latter sites, which were rapidly buried by eolian sand deposits, the Reddin artifacts probably remained exposed for longer periods on a slowly aggrading, and periodically degrading, surface. If so, the Folsom tools discarded at Reddin may have provided a source of quality raw materials for later prehistoric peoples. Ethnohistoric accounts note that the Ute sometimes reused stone tools from prehistoric campsites.

The post-Paleoindian assemblage included 144 projectile points analyzed by Billman (1985). He classified 54 specimens including 40 Late Prehistoric, three Late Archaic, 11 Middle Archaic, and no Early Archaic diagnostics. The Smithsonian sample from Reddin nearly doubled the total number of projectile points (n=146) recovered during the Bureau of Reclamation's five-year survey of nearly 20,000 acres in the Closed Basin (Billman 1985; Button 1987).

Stewart's Cattle Guard Site (5AL101)

Stewart's Cattle Guard site is the focus of a long-term study by the Smithsonian Institution (Jodry 1999). Over 1,400 m^2 were carefully excavated and documented between 1981 and 1996 at this Folsom bison kill and processing camp located west of Great Sand Dunes (Figure 6-12) (Jodry 1987, 1992, 1996, 1998b; Jodry and Stanford 1992). (Cattle Guard was chosen for extensive excavation as per the conclusions of ethnoarchaeological studies that excavations of hunter-gatherer sites need to be horizontally extensive for researchers to interpret the patterning of camp activities [Gamble and Boismier 1991; O'Connell 1987; O'Connell et al. 1992; Yellen 1977]). The site retains an unusual degree of spatial integrity, which permits fruitful analysis of internal camp layout and the social and technological organization of activities. The relatively short-term Folsom occupation minimized the amount of background noise introduced by overlapping activities in long-term and/or reoccupied camps. The accessibility of the site, due to a minimum of overburden, makes intensive excavation financially feasible. Unfortunately, the lack of overburden also increases the site's susceptibility to wind erosion and surface collecting.

Accelerated deflation in the 1970s led to the site's discovery by artifact collectors. By 1981, the wind had removed much of the overlying sediments without compromising the majority of the buried deposits. Continued erosion since then, however, has heightened the urgency to salvage threatened areas before data becomes irretrievably lost. Cattle Guard provides a unique opportunity to investigate the organization of activities surrounding the hunting and use of bison by

a

b

Figure 6-12. Views east toward the Sangre de Cristo Mountains: (a) Stewart's Cattle Guard site; (b) grazing corridor between the mountains and the marshes (from Jodry 1987).

Folsom people. Excavation on a similar scale of the deeply buried Folsom deposits at Lindenmeier and the Folsom type site is cost prohibitive unless the overburden (containing younger cultural deposits) is mechanically removed. A crucial window of opportunity is available at Cattle Guard to conduct the very kind of excavations that are required to reconstruct Folsom activities as they played out in a particular circumstance. An understanding of the variability of settlement patterns on a regional scale depends on an understanding of landscape and site use in particular cases.

Cattle Guard came to professional attention through the assistance of the Zapata Ranch foreman, Tad Carpenter. He introduced Stanford to local artifact collectors, one of whom had a Folsom point from the blowout. Testing in 1981 by a Smithsonian crew, assisted by CAS volunteers, revealed an intact buried deposit of bison bones associated with Folsom artifacts (Emery and Stanford 1982). Full-scale excavations began in 1983 under the direction of Jodry (1987, 1999).

At least 49 bison were killed in the late summer/early fall, in what appears to be a single event. Three functionally distinct, yet complementary, activity areas have been identified. These include a bison kill, a residential camp, and a separate work area. Distinctive, and complementary, bison bone and tool assemblages were recovered from each (Jodry 1987, 1992, 1999; Jodry and Stanford 1992). The camp area contained the remains of domestic activities thought to have taken place near hearths. Figure 6-13 shows the stone tools associated with one of the hearth-centered, probably household, clusters. Although no charcoal was recovered, the former presence of hearths was inferred from concentrations of burned bone and tools. The remains of weaponry manufacture (Figure 6-14), and the maintenance and use of a wide variety of tools, was associated with each activity cluster. From four to six preforms were completed in each of five domestic areas, perhaps indicating the number of weapon tips a hunter kept at-the-ready. Broken Folsom points were discarded in the same area where the newly manufactured points were made, and presumably hafted (Figure 6-15). Faunal remains from the preparation and discard of meals, and the processing of bones for marrow, were also found. Numerous broken and refitted tool fragments interconnect activity areas within the camp.

A kill area, immediately southeast of the camp, contained bones discarded during initial butchery, small flakes dislodged from tool edges, 10 projectile points and fragments, and a utilized flake. After the animals were killed, they were apparently butchered where they lay. Several articulated leg and vertebral units were recovered, in contrast to the almost total disarticulation of bones in the camp. Quarter units and rib slabs were among the bones transported to the camp for further processing. The poorly preserved bones were not suitable for metric studies, but general observations of size suggested that cows and calves were represented. Broken Folsom point fragments from the kill area refitted pieces found in the camp, suggesting their contemporaneity.

A work area adjoined the camp on the southwest. This locality was distinguished by the presence of many discarded end scrapers and hundreds of flakes resulting from their use and rejuvenation (several of which are refitted). Hide working use-wear patterns were identified on several tools (Ahler and Jodry 1997; Kay n.d.). Thin bifacial knives (Jodry 1998b) and woodworking implements were also recovered. This area contrasted sharply with the camp in the underrepresentation of projectile point manufacturing debris so characteristic of the latter.

Stewart's Cattle Guard is providing one of the most complete pictures of the processing activities that took place in fall bison hunting camps that is currently available for Folsom. The site name honors Malcolm and Rose Marie Stewart, former owners of the Zapata Ranch who were especially helpful to Smithsonian investigations in the San Luis Valley.

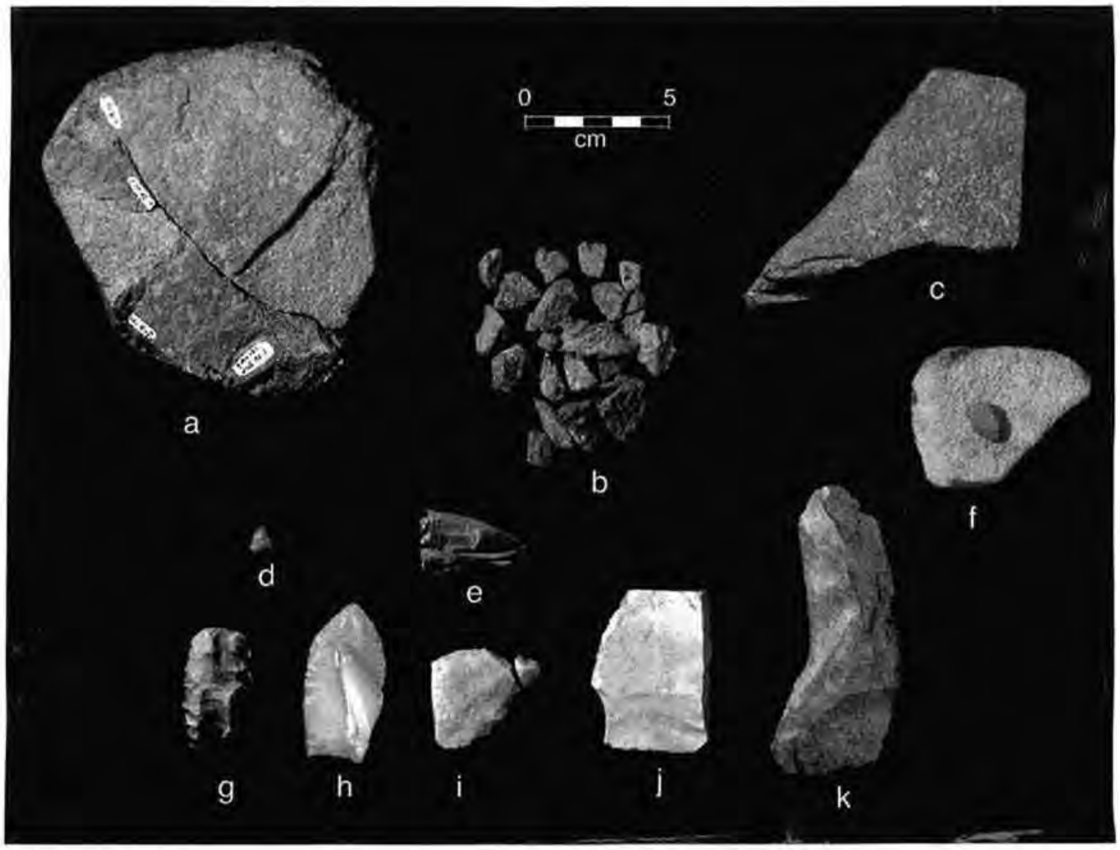

Figure 6-13. Artifacts from a hearth-centered activity area at the Cattle Guard site: (a-c) bone cracking equipment and fragments dislodged during use; (d) Folsom point fragment; (e, g-h) preforms; (f) red pigment and sandstone abrader; (i) end scraper with refitted fragment; (j) multipurpose flake tool; (k) flake knife (from Jodry 1999).

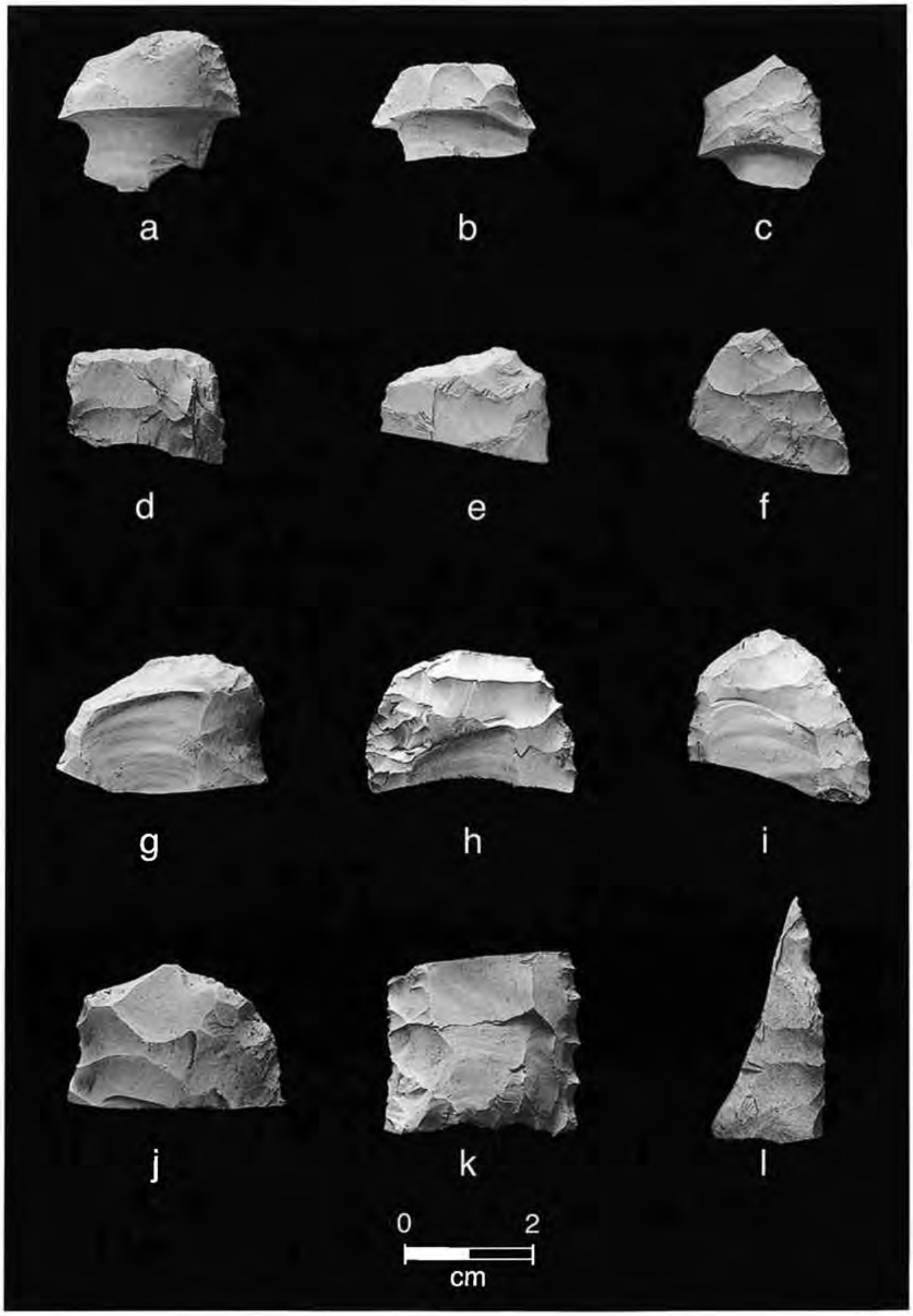

Figure 6-14. Folsom preforms from the Cattle Guard site.

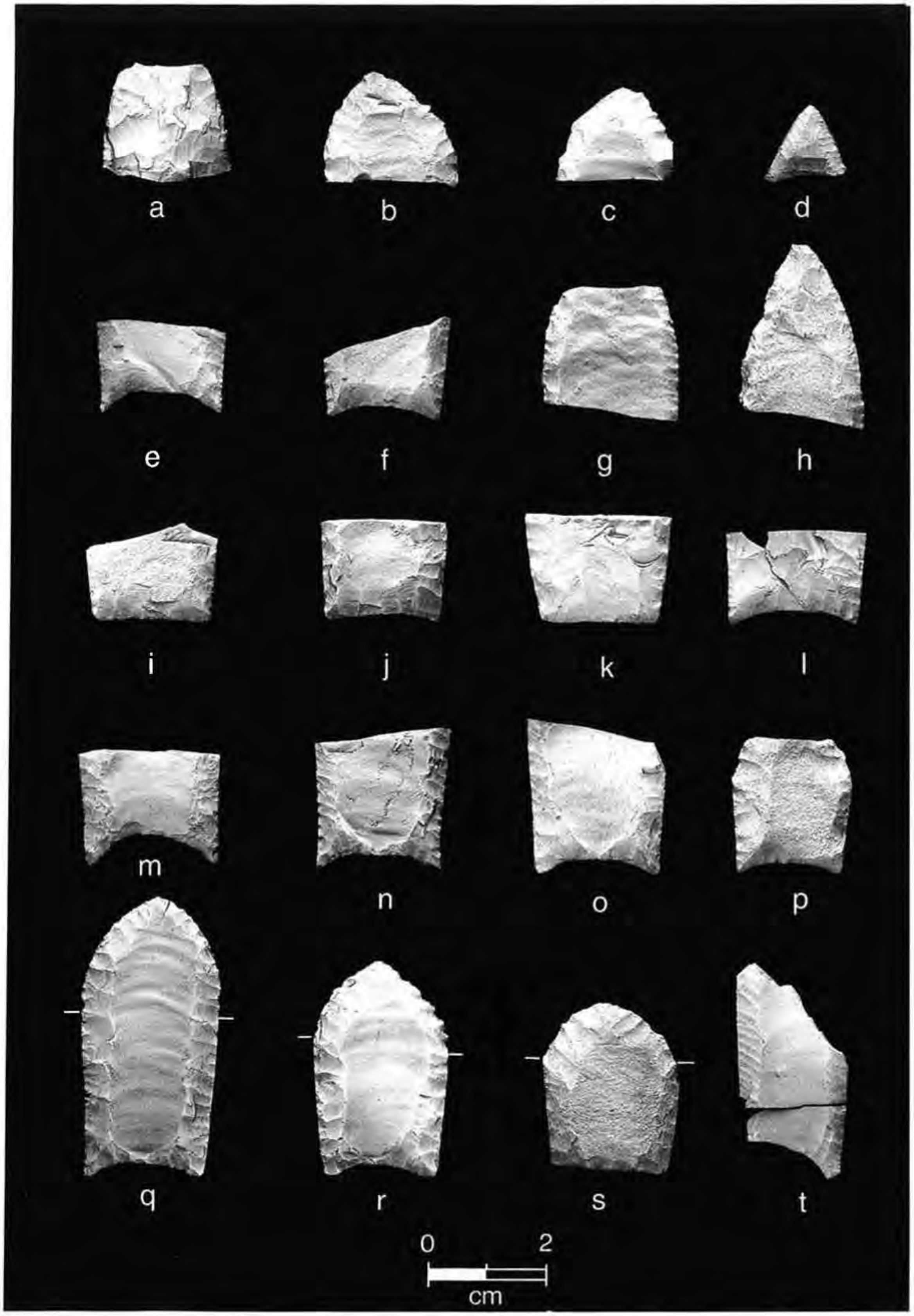

Figure 6-15. Folsom points from the Cattle Guard site.

Zapata Mammoth Site

Hurst (1943) reported the presence of nine mammoths in the San Luis Valley, but did not give specific locations. Three such occurrences have been studied to date. Joe Ben Wheat excavated mammoth remains at the Magna site (discussed below) and Dennis Stanford tested two additional mammoth localities.

The first was named the Zapata Mammoth for the ranch on which it was located. This site consisted of a scatter of highly fragmented and mineralized pieces of mammoth bone situated on the edge of a pond or cienega, west of the Great Sand Dunes. The bone was too deteriorated for further analysis.

Stanford tested the site briefly in September 1978 with a small group of CAS and Smithsonian volunteers (Lyons 1978). He concluded that the deposit had eroded and been reburied prior to his excavation. This suspicion was confirmed when a local collector visited the excavation and reported that the site blew out in the 1950s and two Clovis points were collected from the bone pile. This account was further substantiated by Stanford's recovery of two Paleoindian artifacts among the bones: a brown jasper end scraper made on a flake with a ground platform, and a very Clovis-like biface thinning flake with a broad, ground, striking platform (Stanford 1990a). The Zapata Mammoth site is interpreted as a Clovis locality where mammoth were either killed or scavenged.

Medano Mammoth Site, also referred to as Indian Spring (5SH181)

The second mammoth locality was named Medano, after the ranch where it was discovered. The eroded remains of Pleistocene animals were recorded west of the Great Sand Dunes by BLM archaeologists (John Beardsley and Martin Weimer) conducting a reconnaissance survey in 1988. At their request, the eight-person Smithsonian crew digging at Cattle Guard volunteered to help test this eroded deposit in 1988.

A concentration of badly deteriorated animal bone and tooth fragments measuring approximately 5 x 8 m was exposed in a blowout. Pockets of iron oxide-cemented sand suggested the former presence of a higher water table, and perhaps seeps, in the immediate vicinity. Controlled excavation showed that deflated Archaic artifacts (flakes and a point base) were intermingled with the animal remains. One fairly complete but poorly preserved mammoth tooth was collected. In addition, a cervical vertebra, scapula, and calcaneum of a possible camel, a probable bison humerus, and a mammoth tibia were tentatively identified in the field. Avian, rodent, and amphibian bones were recovered during 1/8-inch screening. No evidence of Paleoindian human association was observed. The faunal specimens and notes are housed at the Smithsonian Institution.

Magna Site (5SH8)

In 1951 a rancher found very large animal bones while he was clearing a boggy area adjacent to a former stream in the northern San Luis Valley, east of Saguache. Joe Ben Wheat of the CU Museum visited the site the following year, then returned in 1972 to investigate further (Ellwood 1981). More than 30 teeth were recovered from backfill, as well as pieces of ivory that appeared to have cut marks. No Paleoindian artifacts were directly associated with the faunal material, but some 30 meters away, Wheat collected two bifaces from an old erosional surface. He thought that one heavily patinated biface resembled a Sandia point. The other artifact was a thick biface made on a side-struck flake (Cassells 1997). Although these finds are intriguing, the cultural associations remain uncertain.

The Magna site confirms the presence of mammoth in streamside settings in the San Luis Valley. A surface reconnaissance of the surrounding area conducted in association with Wheat's excavation yielded 112 items including projectile points and chipped and ground stone (Van Elsacker 1972).

Summary

Professional Paleoindian investigations on the floor of the San Luis Valley have focused primarily on Folsom material. Controlled surface collection, testing, and/or excavation at four bison hunting sites (Linger, Zapata, Reddin, and Stewart's Cattle Guard) were undertaken by WSC (1940s), ASC (1950s), and the Smithsonian Institution (1977-present). Three mammoth localities have been tested, one of which was probably a Clovis kill site. No systematic study of late Paleoindian materials has been conducted. These sites are discussed further below within the context of the overall distribution of 98 Paleoindian localities.

Reported Paleoindian Sites and their Distributions

Introduction

The current sample of 117 components at 98 Paleoindian localities from the upper Rio Grande includes 50 sites and isolates on file as of 1998 at the OAHP, (CHS) and at the RGNF (Table 6-8), and 48 sites and isolates reported to Jodry and Stanford by private individuals (Table 6-9). Sites are best known from the Closed Basin and the eastern foothills of the San Juan Mountains where most professional work has been undertaken and where artifact collectors from Alamosa, Monte Vista, and Del Norte have been particularly active. Paleoindian sites along the western slope of the Sangre de Cristo Mountains and the tributaries of the Rio Grande in the southern end of the valley are represented in private collections that are currently undocumented.

Table 6-8. Paleoindian Components Reported in OAHP and RGNF Files.

County	Clovis	Folsom	Plano/Late Paleoindian	Paleoindian, unspecified	Total No. Components	Total No. Sites
Alamosa	3	12	3	3	21	18
Conejos	-	-	2	2	4	4
Costilla	-	-	-	-	-	-
Hinsdale	-	1	-	-	1	1
Mineral	-	-	-	-	-	-
Rio Grande	-	2	1	-	3	3
Saguache	-	4	14	6	24	24
Total	3	19	20	11	53	50

Table 6-9. Paleoindian Components from Private Collections Reported in Smithsonian Files.

County	Clovis	Crescent	Goshen/ Plainview	Folsom	Plano/Late Paleoindian	Paleoindian, unspecified	Total No. Components	Total No. Sites
Alamosa	3	1	1	8	17	-	30	18
Conejos	1	-	-	2	-	-	3	3
Costilla	-	-	-	-	-	-	-	-
Hinsdale	-	-	-	1	-	-	1	1
Mineral	-	-	-	-	1	-	1	1
Rio Grande	1	-	-	3	1	-	5	4
Saguache	4	-	1	7	3	-	15	15
Unspecified	2	-	-	3	4	-	9	6
Total	11	1	2	24	26	-	64	48

Table 6-10 summarizes these samples by cultural affiliation and county. Folsom (n=43) is by far the best represented period of the Paleoindian stage, followed by Clovis (n=14) and Cody (n=17). While more meaningful interpretations await further work, it appears that the San Luis Valley was a distinctive landmark on the physical and social landscapes of many Paleoindian groups. Its geographic position at the juncture of the Plains, Rockies, Southwest, and Plateau may have led to its inclusion in the home ranges of groups with ties in each of these directions. Recent detailed syntheses of the major Paleoindian complexes are available (Frison 1991, 1996; Hofman 1996; Stanford 1999) and only brief summaries are given here to highlight aspects of each temporal period that appears to have particular relevance to the San Luis Valley.

Table 6-10. Total Paleoindian Components by Artifact Type and County (OAHP Files and Private Collections).

	Total	AL	CN	CS	HN	MN	RN	SH
Clovis	12	6	1				1	4
Crescent	1	1						
Goshen/Plainview	2	1						1
Folsom	40	20	2		2		5	11
Agate Basin	2	1						1
Hell Gap	2	2						
Cody	16	9					2	5
Dalton	2	1						1
Foothill-Mountain	4	2						2
Concave Base Lanceolate	2	2						
Concave Base Stemmed	2	1				1		
Unspecified Plano	10	2	2					6
Unspecified Paleoindian	11	3	2					6
Total	106	51	7	0	2	1	8	37

Clovis, Crescent, and a Possible Haskett

Clovis is the earliest cultural complex yet demonstrated in North America. Whether they represent the first people to have entered the San Luis Valley remains to be seen. Clovis sites are dated between approximately 11,500 and 10,900 B.P. and overlapped the extinction of late Pleistocene species such as the mammoth, mastodon, and ground sloth in North America (Taylor et al. 1996). In the Rocky Mountains, Plains, and Southwest, Clovis points were used to hunt and butcher mammoth and bison near springs, ponds, and streams (Haynes 1987). Turtles were especially common in Clovis diets as well. Haynes (1991a, 1993) summarized the stratigraphic evidence for regionally lowered water tables during Clovis times when people and/or mammoths dug to obtain water at sites in southern Arizona, eastern New Mexico, and north-central Texas. Clovis technology apparently was replaced during the period of abrupt climatic change at the onset of the Younger Dryas ~11,000 years ago.

Fourteen Clovis points are reported from the study area. The distributions of 11 are shown in Figure 6-16. To date, Jodry has seen twelve Clovis points from eleven locations. The remaining data are gathered from site forms (5AL94, 5AL123) and Zapata Mammoth reports. Nine of the points were found in low-lying areas near lakes, ponds, marshes, and streams on the east side of the Closed Basin. These include two Clovis points found at the Zapata Mammoth site, a nearly complete Clovis point discovered on the Closed Basin survey (Figure 6-17, i), and two Clovis bases recovered in backdirt from a trench dug by workers at the Blanca Wildlife Refuge. One of these was reworked into a drill. Two Clovis points were found near the Great Sand Dunes. One of these has a robust cross section (Figure 6-18a). Figure 6-17h illustrates a second Clovis midsection with a similarly thick (8.47 mm) cross section.

A large, complete Clovis point was reportedly found near the center of the valley. This artifact is striking in its technological resemblance to Clovis points from the Drake Cache (Stanford and Jodry 1988). A complete point and a base were collected from the foothills of the San Juan Mountains, and a Clovis base, reworked into a scraper, was discovered near a high mountain stream 3322 m (10,900 ft) on the RGNF near the Continental Divide. Tool stone selection favored high-quality materials including Edwards Plateau chert and Trout Creek jasper. Two points were made of a fine-grained, reddish brown Morrison quartzite (see Figure 6-17i), another of white quartzite, a fourth of tan quartzite. With the exception of the Edwards chert, use of raw materials available from Rocky Mountain sources within about 100 km (62 mi) seems indicated. Of the 12 points available for examination, five are complete, three are complete bases, two are bases recycled into a drill and a scraper, and two are midsections.

Mrs. Gene Sutherland reportedly collected a crescent of fine-grained dark red chert near the Great Sand Dunes. It was made available for study by her grandson. This Paleoindian tool type is better known from intermontane environments in the Great Basin and strongly suggests western contact. A crescent was part of the Fenn Clovis Cache reported from the area where Wyoming, Idaho, and Utah meet (Frison 1991: Figure 2.13a). Western connections may be further indicated by a possible Haskett point/knife, made of local basalt and found along the eastern flanks of the San Juan Mountains. Haskett-like materials excavated at the Lookingbill Site, Wyoming are dated to 10,400 B.P. (M. Larson, personal communication 1998).

Goshen/Plainview

Technological and typological comparisons indicate that Goshen and Plainview projectile points are "basically identical in form and manufacture" (Bradley and Frison 1996:66; Haynes 1991b). Goshen in the northern Plains may date at least 11,000 B.P. at the Mill Iron site in Montana and the Jim Pitts site in South Dakota. It is stratigraphically below the Folsom occupation at the sites of Hell Gap and/Carter Kerr-McGee (Bradley and Frison 1996). These data suggest that Goshen is a likely precursor of Folsom or perhaps an early Folsom variant, or both, on the northern

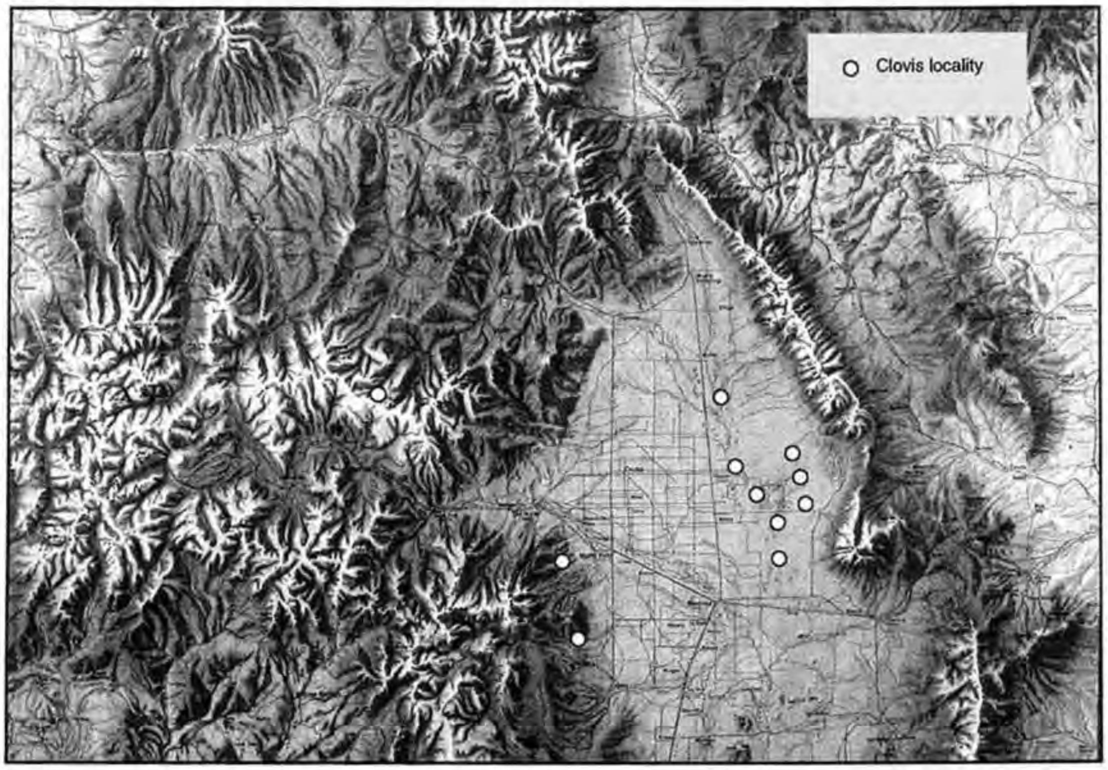

Figure 6-16. Distribution of Clovis artifacts in the Rio Grande Basin.

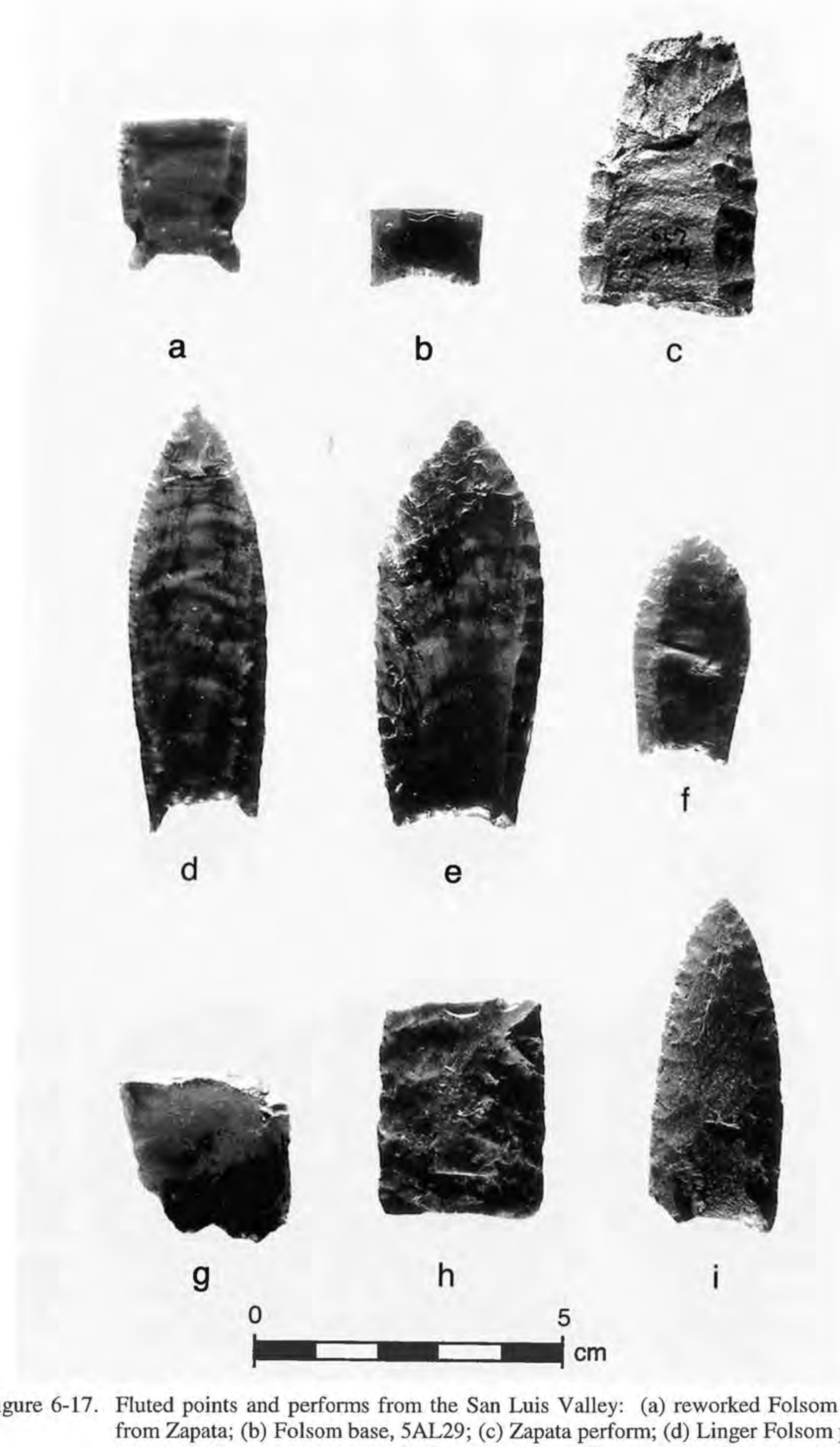

Figure 6-17. Fluted points and performs from the San Luis Valley: (a) reworked Folsom point from Zapata; (b) Folsom base, 5AL29; (c) Zapata perform; (d) Linger Folsom point; (e) CattleGuard perform; (f) isolated find from Hermosa locality; (g) Ayearses perform; (h) Clovis midsection from private collection; (I) Clovis point from 5AL162.

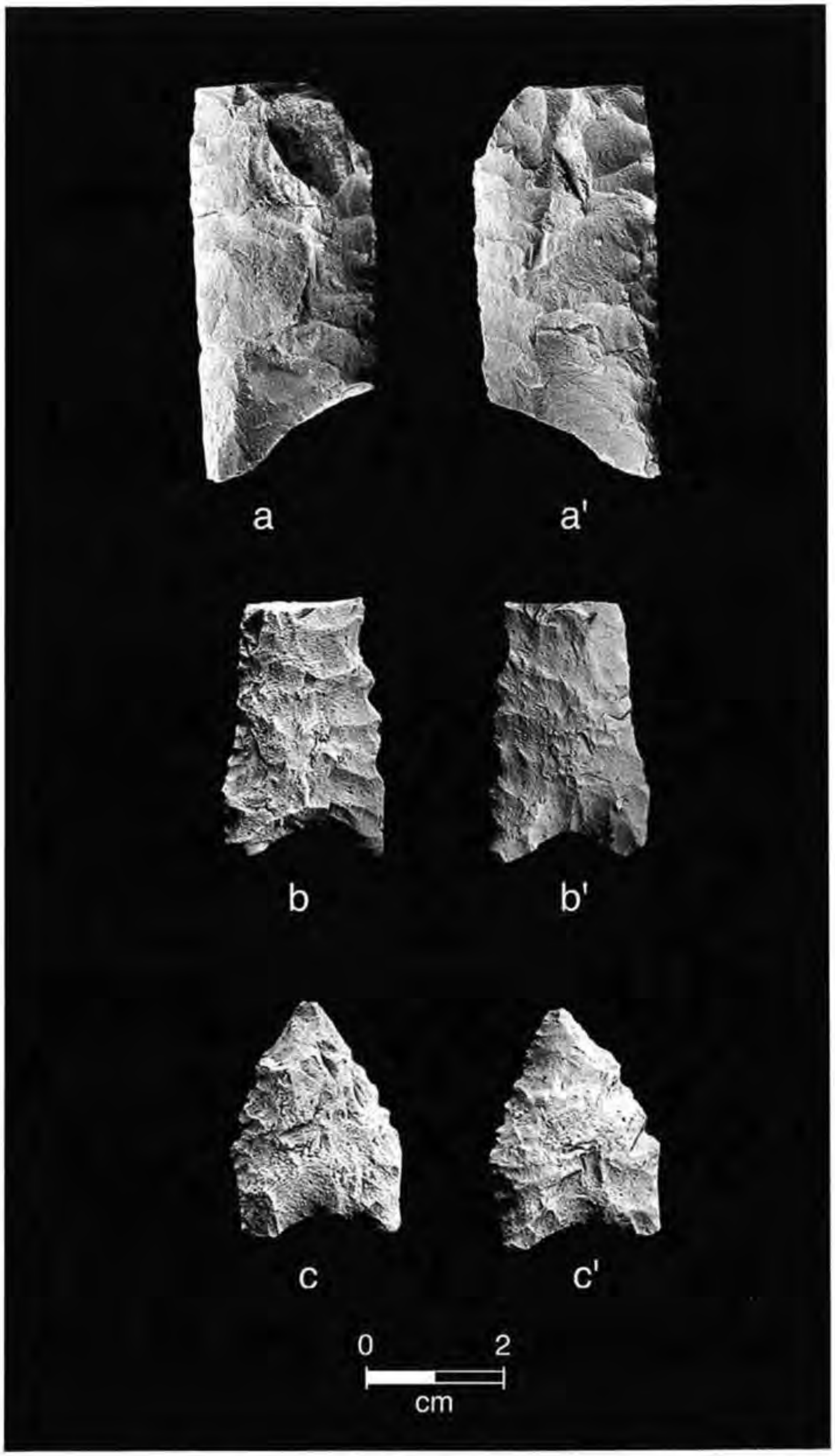

Figure 6-18. Paleoindian points from the San Luis Valley: (a) Clovis point from private collection; (b-c) Dalton-like points from the San Juan foothills.

Plains (Frison 1993). Meanwhile, Plainview on the southern Plains appears to date about 10,000 B.P. at the Plainview and Lubbock Lake sites (Bradley and Frison 1996). The presence of other Goshen-like (well-made, thin, nonfluted but basally thinned, precisely parallel flaked, concave base) projectile points have been called Belen in the central Rio Grande valley near Albuquerque (Judge 1973).

Thus far, Goshen/Plainview groups are best known from bison kill locations. The Upper Twin Mountain bison kill in Middle Park near Kremmling is the only excavated site of this cultural complex in Colorado (Kornfeld and Frison n.d.; Kornfeld 1998). Both Goshen and Folsom components are common in this area (M. Kornfeld, personal communication 1998; Naze 1986, 1994), where abundant lithic sources and excellent ungulate forage were available near the headwaters of the Colorado River.

The distribution of Goshen/Plainview and other untyped/unfluted concave base projectile points in the San Luis Valley is seen in Figure 6-19. Three Goshen/Plainview points from two localities near the Great Sand Dunes and four bases from a site east of Alamosa (Figure 6-20a, c, d, e) are reported from private collections. The four point bases are too small to classify with confidence. They are thin and well-made of fine-grained chert and San Antonio basalt (Bryan and Butler 1940).

Folsom

Folsom dates between 10,900 and 10,200 B.P. (Hofman 1995; Taylor et al. 1996) and is the best-represented and -studied Paleoindian complex in the upper Rio Grande. Forty-three localities are reported; four sites have been tested (Linger: Hurst 1941, 1943; Dawson and Stanford 1975; Cattle Guard: Emery and Stanford 1982; Zapata: Stanford 1990a; and Black Mountain: Jodry 1993; Jodry et al. 1996), and one extensively excavated (Cattle Guard: Jodry 1987, 1992, 1999; Jodry and Stanford 1992). The distribution of 39 sites and isolates is shown in Figure 6-21. Folsom people appear to have traveled and hunted adjacent to wetlands in the Closed Basin, as well as along streams and springs of the foothills and higher elevations of the San Juan Mountains.

A single Folsom base from the southern end of the valley and a recently discovered Alibates dolomite channel flake from just across the border in New Mexico document a Folsom presence in this little-studied portion of the Rio Grande valley. The paucity of sites along the flanks of the Sangre de Cristo Mountains reflects the need to talk to collectors in communities from San Luis to Villa Grove. Years ago Dawson (personal communication 1983) reported a Folsom point from Poncha Pass leading to South Park. Trout Creek jasper from the Arkansas drainage is common to Folsom assemblages in the valley. Sites distributed between this South Park source and the San Luis Valley are to be expected. Folsom artifacts are common in private collections from the Wet Mountain Valley to the east (John Beardsley, personal communication 1987). Therefore, it is likely that additional localities are situated along trails crossing the Sangre de Cristo Mountains. A historic trail that connected the Plains (via the Huerfano and Arkansas drainages) with the San Luis Valley diverged at Bandito (see journals in Kessler 1998). One branch traveled along Muddy Creek and crossed the Sangre de Cristo Mountains over Mosca Pass near the Great Sand Dunes. The other branch followed South Oak Creek to North La Veta Pass and ran along Sangre de Cristo Creek to enter the eastern side of the valley near the present route of U.S. Highway 160. Here it connected with the east fork of the North Branch of the Old Spanish Trail (Kessler 1998). Travel corridors such as these likely have great antiquity. The Smithsonian Institution's Paleoindian/Paleoecology Program is currently engaged in a joint effort with the Stennis Research Center at the National Aeronautics and Space Administration (NASA) to map trails and fossil wetlands using remote sensing technology.

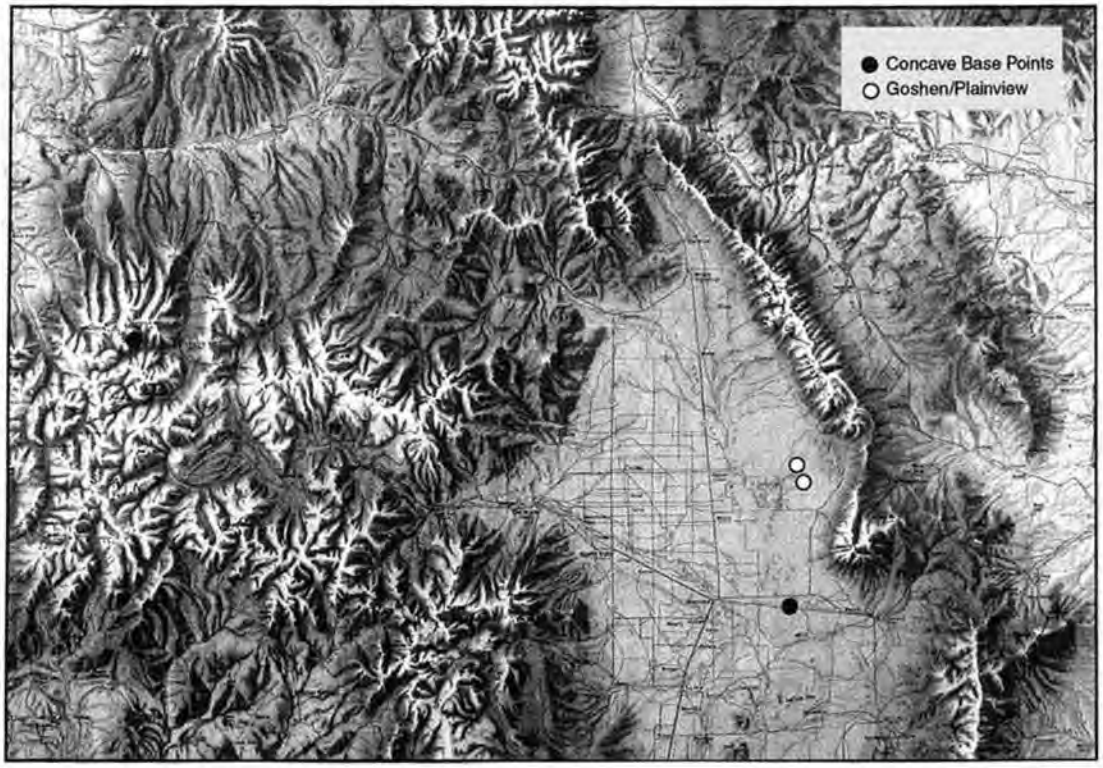

Figure 6-19. Distribution of Goshen/Plainview and untyped concave base points in the Rio Grande Basin.

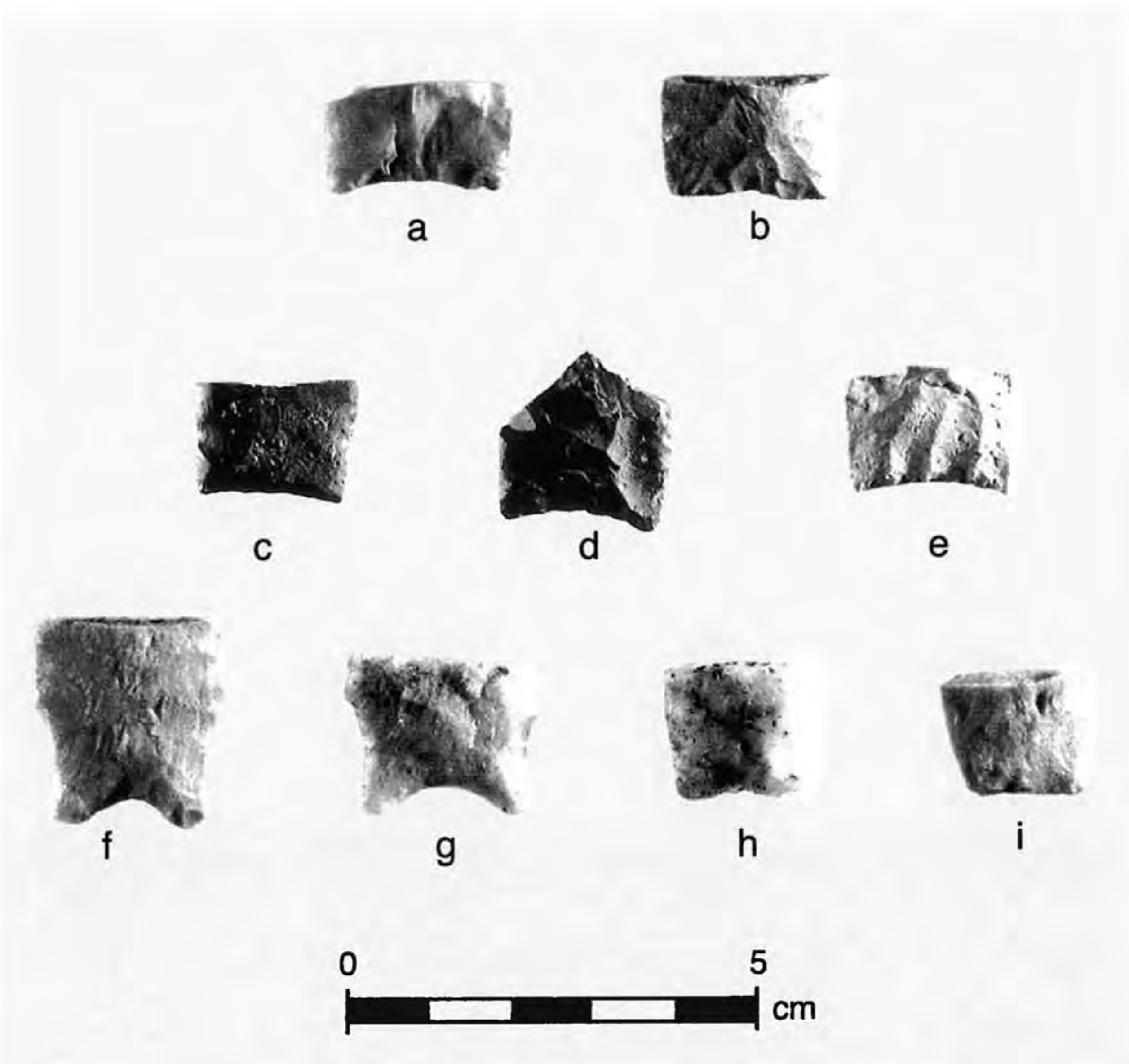

Figure 6-20. Untyped Paleoindian projectile points from the San Luis Valley: (a, c-e) Jimmie Myers site; (b) private collection; (f) private collection, (g) 5AL101; (h-i) 5SH973.

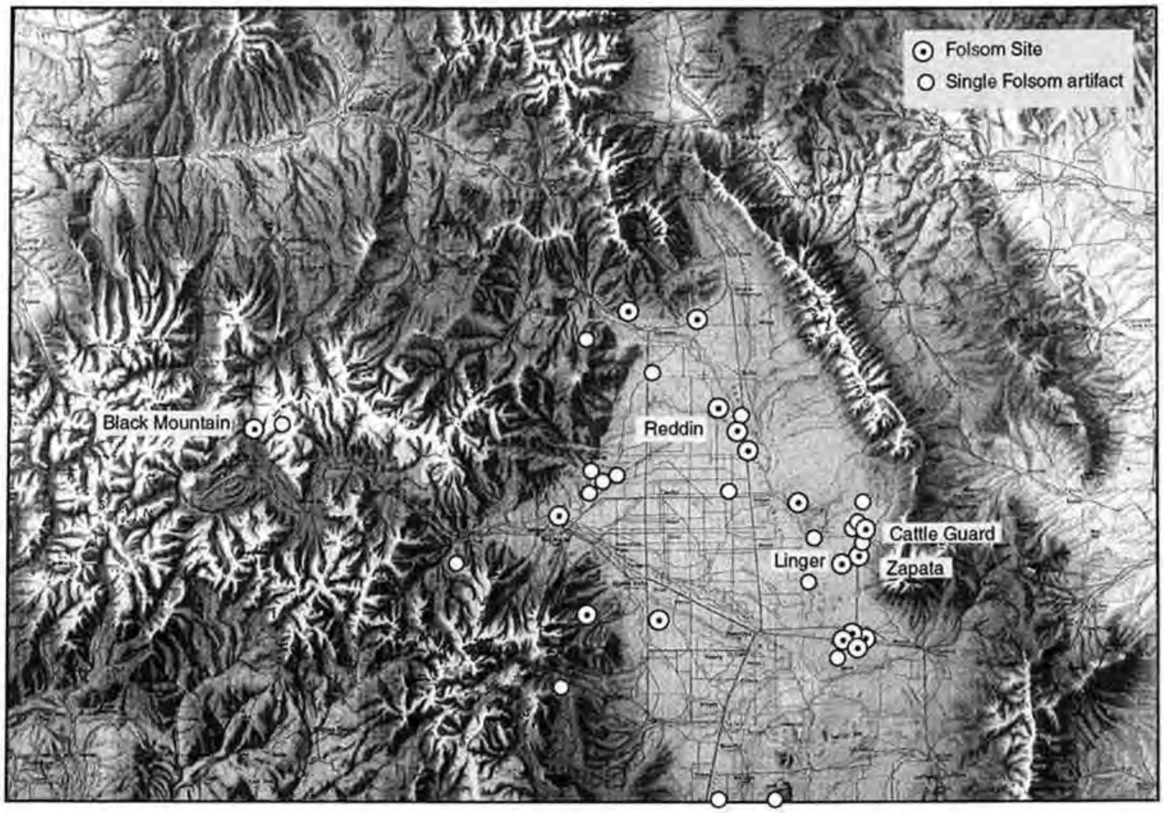

Figure 6-21. Distribution of Folsom artifacts in the Rio Grande Basin.

The distribution of tool stone used in the manufacture of Folsom weaponry provides some clues to the regional movements of people (Jodry 1999). Table 6-11 gives the proportional representation of raw materials for more than one thousand Folsom points, preforms, and channel flakes from the Linger, Zapata, Reddin, Cattle Guard, and Black Mountain sites. Dendritic jasper and silicified woods that closely resemble sources from South Park and along the Front Range account for more than half the sample. This strongly suggests that Folsom groups traveling in South Park and along the Arkansas River entered the valley over passes such as Poncha. Dendritic jasper dominates (65.6 percent) the Reddin assemblage, perhaps reflecting its relative proximity to Trout Creek sources.

Table 6-11. Raw Materials Represented by Points, Preforms, and Channel Flakes at Five Folsom Sites.

Material	Black Mountain (# and % of 10)*	Reddin (# and % of 483)	Zapata (# and % of 28)	Linger (# and % of 18)	Cattle Guard (# and % of 537)	Number and percentage of 1075 total artifacts
Dendritic jasper	-	n=317 65.6%	n=6 21.4%	n=5 27.8%	n=65 12.1%	n=393 36.5%
Black Forest silicified wood	-	n=34 7.0%	n=3 10.7%	n=1 5.6%	n=199 37.1%	n=237 22.0%
Cumbres chert	-	n=13 2.7%	-	-	n=72 13.4%	n=85 7.9%
Morrison quartzite	n=3 30%	n=24 5.0%	n=2 7.1%	-	n=47 8.8%	n=76 7.1%
Edwards chert	-	n=26 5.4%	n=13 46.4%	n=3 16.7%	n=16 3.0%	n=58 5.4%
Chuska chert	-	n=6 1.2%	-	n=1 5.6%	n=33 6.1%	n=40 3.7%
Other fossilized wood	-	-	n=1 3.6%	n=1 5.6%	n=22 4.1%	n=24 2.2%
Obsidian	-	n=13 2.7%	-	-	-	n=13 1.2%
Alibates dolomite	-	-	-	n=4 22.2%	n=10 1.9%	n=14 1.3%
Mosca chert	n=4 40%	-	-	-	-	n=4 0.4%
Hornfels	-	-	-	-	n=2 0.4%	n=2 0.2%
Volcanic chert	n=2 20%	-	-	-	-	n=2 0.2%
San Antonio basalt	-	n=1 0.2%	-	-	-	n=1 0.1%
Other	n=1 10%	n=46 9.52%	n=3 10.7%	n=3 16.7%	n=70 13.1%	n=126 11.7%

(* = includes Folsom points and preforms only)

Cumbres silicified tuff and Morrison quartzite, available in the San Juan Mountains, contribute approximately 7.9 percent and 7.1 percent to the sample, respectively. Surprisingly, Edwards chert is present in only slightly lower percentages (5.4 percent), although it is found more than 740 km (236 miles) distant. A Folsom preference for Edwards over Alibates was noted for central and southern New Mexico (Amick 1994a, 1994b) and for the southern Plains (Hofman 1991). That Edwards should be nearly as well represented as materials from the adjacent San Juan Mountains may hint that Folsom land-use patterns in the region have a stronger north/south versus east/west component. The evidence at Black Mountain is consistent with this idea. Locally available

San Juan Mountains materials were used including Mosca chert, jasper, and Morrison quartzite. Likewise, the Folsom midsection from 5RN306 is made of local gray quartzite. Although the Mosca quarry is extensive and its tool stone is of excellent quality, this chert has not yet been recognized in large quantities on the valley floor.

An unusually high percentage of Edwards chert (46 percent) is found at Zapata, and lesser amounts at Linger (16 percent), Reddin (5 percent), and Cattle Guard (3 percent). Alibates dolomite contributes nearly 17 percent of the weaponry component at Linger. The small samples from Linger and Zapata may be inflating these proportions. Nonetheless, these data strongly indicate that people in the San Luis Valley had ties to the southern Plains and these connections may be stronger on the valley's eastern side. Similarly, the distinctive pinkish orange chalcedony originating in the Chuska Mountains of northwest New Mexico is five times more common on the eastern valley sites (5-6 percent) than on the west (1 percent). Edwards (0.6 percent) and Chuska (13 percent) cherts are documented for Folsom weaponry assemblages from the central Rio Grande about 120 km (75 mi) to the south (Amick 1994b). Some Folsom groups, carrying tools of Edwards, Alibates and Chuska materials, may have worked their way northward along the Rio Grande corridor and entered the San Luis Valley from the south. Chuska decreases southward along the Rio Grande from a peak of 13 percent in the Albuquerque Basin to 6 percent in the Jornada del Muerto and 1 percent in the Tularosa Basin (Amick 1994b:19). Chuska frequencies drop to between 1 and 6 percent in the northern Rio Grande as well (Jodry 1999). A preference for nonbrittle, fine-grained siliceous stone that facilitated fluting seems to account for the trace representation of materials such as obsidian (1.2 percent), hornfels (0.2 percent), and San Antonio basalt (0.1 percent).

Dalton

Two Dalton-like projectile points, made of local San Antonio basalt from the Colorado-New Mexico border, just west of the Rio Grande, may suggest cultural connections with the eastern Plains (see Figure 6-18b, and c). They are heavily resharpened and serrated, with almost identical basal dimensions. Both were found in the foothills of the San Juan Mountains, one in the vicinity of a well-used trail over the Continental Divide. A third specimen was reportedly collected west of the Great Sand Dunes. Hofman (1996) noted a Dalton point from the Laird site in western Kansas that apparently was made of the same Black Forest silicified wood from the Front Range that dominates the Cattle Guard Folsom assemblage. Dalton points are known from Middle Park as well (M. Kornfeld, personal communication cited in Hofman 1996).

Agate Basin and Hell Gap

The Agate Basin type site in eastern Wyoming provides the most complete data available for this cultural complex (Frison and Stanford 1982). Stanford (1999) states the following regarding its beginnings:

> The origin of Agate Basin technology is unknown, but it is likely to have derived from Northern Great Basin/Plateau lanceolate forms which may predate the occurrence of Agate Basin by nearly a millennium (Bryan 1988), and moved eastward around 10,500 years ago. This writer's opinion is that the technology involved in producing Agate Basin points is considerably different from that used in the manufacture of fluted points and may indicate that a different human population utilized Plains bison during the waning years of the Folsom Period.

Radiocarbon ages for Agate Basin cluster between 10,500 and 10,250 B.P. (Pitblado 1998; Stanford 1999:Table 5). At Blackwater Draw Locality No. 1, these artifacts are found in the top of sediments that were deposited during a period of higher lake levels. Folsom artifacts are situated lower down in association with the beginning of diatomite deposition. Agate Basin components also occur directly above Folsom at the Agate Basin and Hell Gap sites in Wyoming. It is possible that Agate Basin people may prove to be contemporaneous with Goshen and Folsom groups (Hofman 1996; Stanford 1999). Agate Basin material is represented in Colorado at the Frazier bison butchery site on the South Platte drainage near Kersey where Wormington (1988) directed excavations in 1965 and 1967.

Agate Basin points are carefully manufactured, unstemmed lanceolate forms with ground, tapering lateral edges and convex to straight bases. Stanford (1999) further described them as "relatively narrow, with pressure-finishing flakes and tiny edge retouching." Their less frequent occurrence in surface collections in the central Plains and the southern Rockies (this volume; Hofman 1996; Pitblado 1994, 1998), compared with Folsom artifacts, suggests a smaller population and/or perhaps a shorter time interval for Agate Basin in this area.

Stemmed Hell Gap points with rounded shoulders and broad blades are thought to have evolved from Agate Basin projectile points (Frison 1991; Stanford 1999). The two types are difficult to differentiate on the basis of point bases broken below the shoulder portion. Hell Gap points typically had straight bases but rejuvenation frequently introduced convex or concave variations. As noted by Stanford (1999), "rejuvenated Hell Gap points that have their blade width narrowed (thereby removing the shoulders), are indistinguishable from Agate Basin points if they are not found in excavated context."

Bison hunting by Hell Gap people was a communal undertaking at the Jones-Miller site near the Arikaree River in eastern Colorado. Here a corral apparently was constructed and two kill events over the course of a winter and spring yielded meat and hides from nearly 300 animals (Stanford 1978). A late fall kill of 100 bison in a parabolic sand dune trap is documented at the Casper site in Wyoming (Frison 1974). Agogino and Galloway (1965) reported the remains of elk, deer, rabbit, and porcupine from the Hell Gap campsite of Sister's Hill in northern Wyoming.

Two Agate Basin and two Hell Gap projectile points were reported from private collections. One of each was found by Tad Carpenter while working on the Zapata Ranch, including a Hell Gap base made of a fine-grained, mottled brown chert that resembles material from South Park (Figure 6-22f, and g). A second Hell Gap point was collected near the wetlands west of the Great Sand Dunes. A final Agate Basin point was reportedly associated with a peat bog near the flanks of the San Juan Mountains south of Saguache. Hunting in wet meadows on the edges of wetlands may well account for their spatial distributions (Figure 6-23).

Cody Complex

A variety of square base projectile point types with slight to strong shoulders, and a distinctive knife with a transverse blade comprise the Cody complex dated between approximately 10,000 and 8,800 B.P. (Frison 1991; Frison and Todd 1987; Hofman 1996; Wormington 1957; Pearson and Blackmar 1997). Figure 6-22a-e, h, illustrates several from the upper Rio Grande. Stanford (1999) suggested that the large number of sites and extensive geographic distribution of Cody artifacts indicate both a lengthy duration of this technological tradition and greater population levels than in preceding Hell Gap and Agate Basin periods. Cody faunal assemblages are diverse. In addition to large game such as bison, antelope, deer, elk, and moose, smaller species such as rabbits and grouse, occur as well as wetland resources including turtle, mallard, teal, gadwall, pintail, and fish.

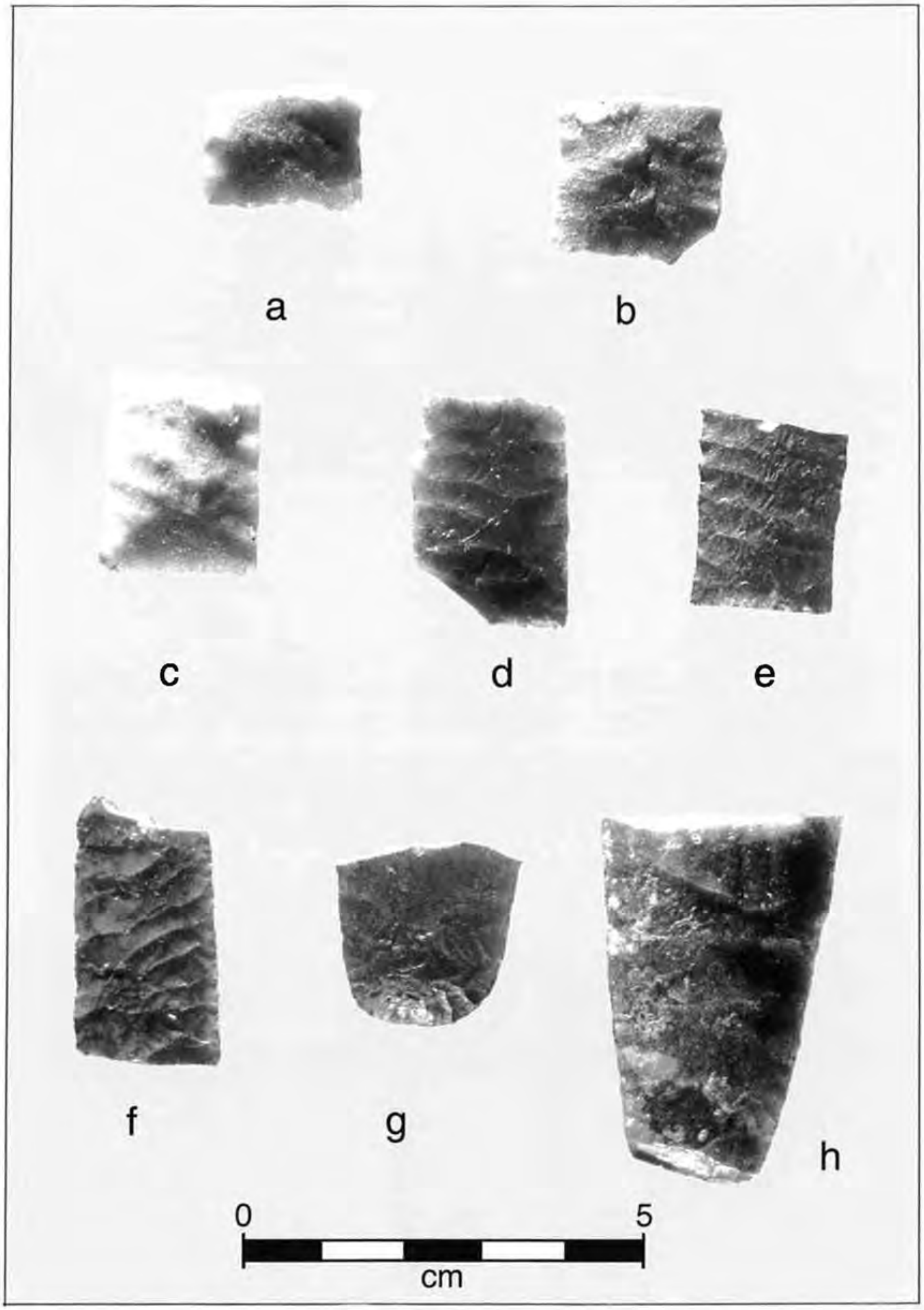

Figure 6-22. Agate Basin, Hell Gap and Cody points from the Rio Grande Basin: (a) 5SH947; (b) 5SH521; (c) private collection (d) 5AL172; (e-h) Zapata Ranch, private collection donated to Smithsonian Institution.

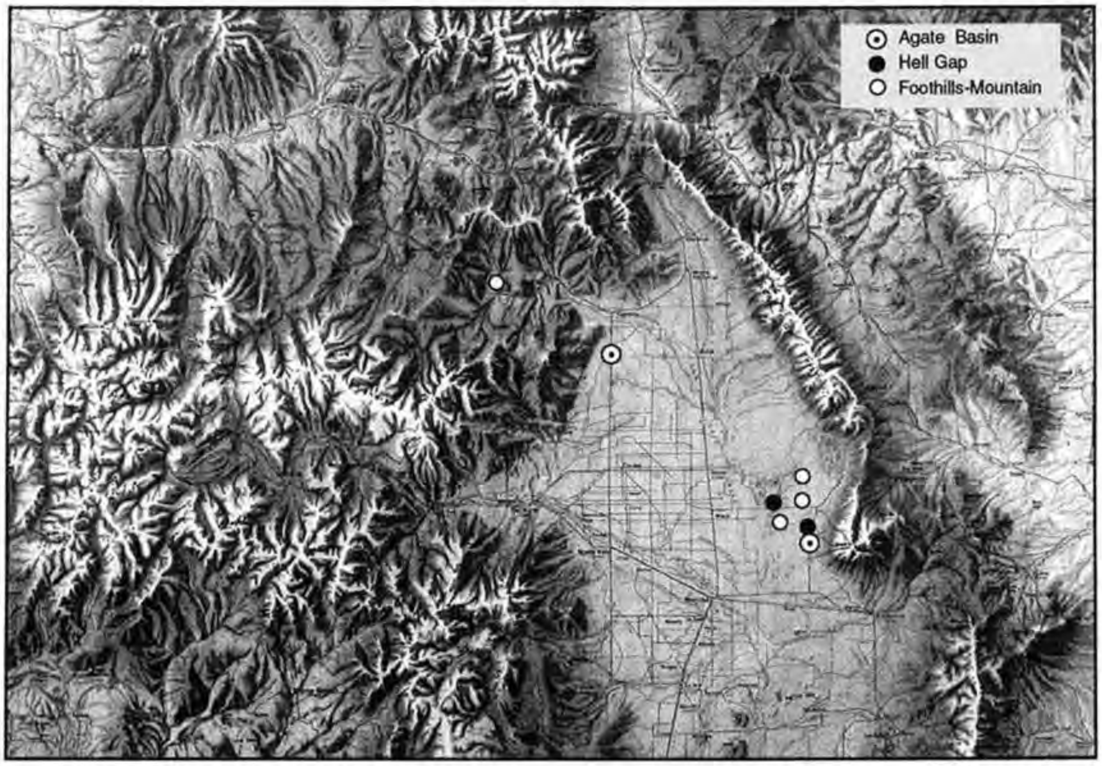

Figure 6-23. Distribution of Agate Basin, Hell Gap, and Foothill-Mountain points in the Rio Grande Basin.

Use of wetland plants by Cody people is reported at a bison kill/butchery site (FA6-3) situated along the edge of a marsh at Lubbock Lake. Twenty-one tools with traces of use wear appear to have been used to cut plants such as tule *(Scirpus acutus)* (Bamforth 1985:248). The activity area where these tools were recovered was radiocarbon dated between 8600 and 8300 B.P.

The present sample includes 14 Cody localities; the distribution of 11 is shown in Figure 6-24. In the Closed Basin, Cody sites were found near perennial streams, lakes, and springs, implying the importance of more permanent water sources to settlement patterns in the region. Cody projectiles were infrequent near the playas hunted by Folsom people, suggesting that these water sources dried up after Folsom times. Playas were de-emphasized during Cody times in favor of streams in the central Rio Grande valley as well (Judge and Dawson 1972). A probable Cody kill site associated with bison bone was found adjacent to a perennial lake at the southern end of the Closed Basin and another is reported from an arroyo on the lower slopes of Blanca Peak. Use of the Sangre de Cristo and San Juan foothills is documented, as well as occupation of the higher elevations of the La Garita Mountains near the Continental Divide.

The radiation of pinyon pine in a maximally expanded forest around 9600 B.P. likely redefined the significance of the foothill zone for humans and other animals alike. The first appearance of pinyon pine pollen at approximately ~9500 B.P. (Shafer 1989) may indicate expansion of the species in response to greater summer precipitation and warmer annual temperatures. Whether Cody people harvested these nutritious nuts is uncertain. Nonetheless, it is perhaps significant that they were among the first Paleoindian groups for whom this was an option in the upper Rio Grande (Jodry 1998a). Wheat (1979) recovered two in situ grinding slabs in a short-term camp (Area 2) at the Jurgens site in northeast Colorado, possibly indicating intensification of plant use and processing by Cody people. Beveled triangular and quadrilateral bifaces that appear to be adzes (similar to Dalton adzes) were recovered at the R-6 site in northeast New Mexico (Stanford 1999).

The total elevational range of Cody is 291 m (955 ft) greater than Folsom, and 413 m (1,355 ft) larger than Clovis in the upper Rio Grande. The present sample indicates that Paleoindian groups camped at ever-higher altitudes in the Rockies through time, with peak elevations for Clovis at 3243 m (10,640 ft), for Folsom at 3365 m (11,040 ft), and for Cody at 3658 m (12,000 ft) (Table 6-12). By way of comparison, the mean elevation of Cody occurrences in New Mexico is 200 m (656 ft) higher than Folsom (Amick 1994a:281; see also Wessel et al. 1997).

Table 6-12. Elevational Distribution of Clovis, Folsom, and Cody complexes in the San Luis Valley.

Complex	No.	Mean	Highest	Lowest	Range
Clovis	9	2497	3243	2294	949
Folsom	36	2470	3365	2294	1071
Cody	11	2529	3658	2296	1362
Total	56				

That the appearance of Cody campsites along important travel routes at higher elevations in the Rocky Mountains, such as Caribou Lake at 3400 m (11,155 ft), appears correlated with the upward movement of alpine timberline at this time, has already been discussed (Benedict 1974, 1985a). A Cody knife (private collection) is currently the highest altitude (3658 m) Paleoindian find in the upper Rio Grande. It was found along the La Garita Stock Driveway, a travel route of considerable antiquity that follows the mesa-like tundra country along and near the Continental Divide. Similarly, an Eden

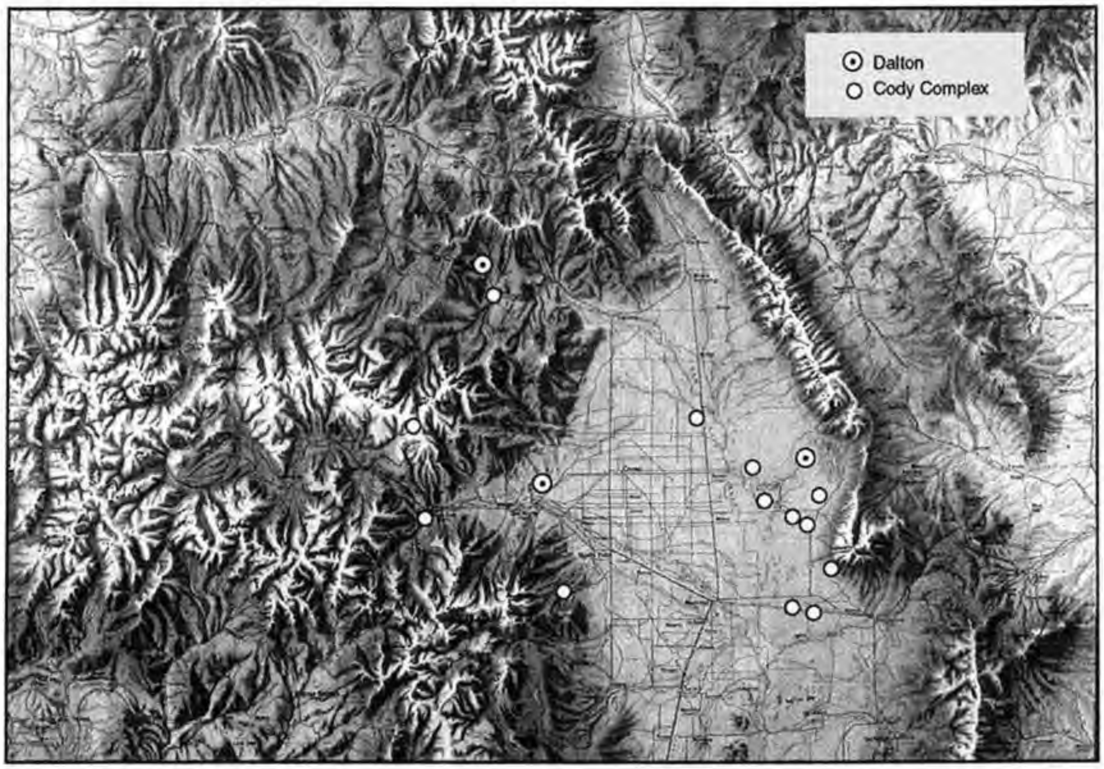

Figure 6-24. Distribution of Cody Complex and Dalton points in the Rio Grande Basin.

point was recorded along the Rio Grande on the east side of Wolf Creek Pass at site 5RN119 (2560 m) (Shafer 1978).

Foothill-Mountain

The Foothill-Mountain complex (FMC) was discussed briefly above in relation to Paleoindian cultural succession and cotraditions. Husted (1969) and Frison (1987, 1988, 1992) identified the remains of groups living at higher elevations in the Rocky Mountains of Wyoming and Montana that were separate from Plains groups living at the same time. Beginning around 10,000 B.P., the Foothill-Mountain people made greater use of rockshelters and hunted mountain sheep to a considerable degree. Pitblado (1994) extended the distribution of the FMC to the Colorado Rockies when she documented the fact that FMC points were the most prevalent Paleoindian artifacts in southwest Colorado. Parallel-oblique flaking, variable workmanship, a slightly concave, ground base, and an apparent preference for quartzite tool stone characterize them. FMC projectile points recognized in the northern Rockies include Pryor Stemmed (Frison and Grey 1980), Lovell Constricted (Husted 1969), Haskett (Frison 1991), and Ruby Valley of the Alder complex (Davis 1993; Davis et al. 1988, 1989). Roasting pits and earth ovens dated to ~9,400 B.P. at the Barton Gulch site in Montana (Eighmy and Davis 1997; Davis 1993) were associated with carbonized seeds and pollen indicative of numerous edible plant species. Faunal remains dominated by deer, rabbit, and hare suggested individual and/or small group hunting (Davis 1993). At other localities in Wyoming and Montana, mountain sheep dominated (Frison 1991).

FMC projectiles are associated with two dated sites in the Gunnison area adjacent to and west of the San Luis Valley. These sites, 5GN205 and 5GN191, yielded ages of 10,094 ± 830 B.P. (Tx-3154) and 8,807 ± 100 B.P. (Tx-3149), respectively (Mueller and Stiger 1983). Site 5GN191 is thought to represent a processing component of an intercept hunting system on a bison migration route (Mark Stiger, personal communication 1999). It is situated in the open near an animal trail connecting the Gunnison River with an upstream spring (Mueller and Stiger 1983:77). Site 5GN205 occupied a ridge top overlooking the Gunnison Valley. By 8800 B.P., a "settlement preference for the contemporaneous occupation of northside ridge top and southside lowland locations" was established (Mueller and Stiger 1983:89). Habitation shelters and camps were found in the ridge top settings and flintknapping areas comprised the lowland locations.

Similar sites may be situated in the Saguache Creek corridor leading to the Gunnison Valley via Cochetopa and North passes. Site 5SH1461, located in the foothills west of Saguache on a tributary of Saguache Creek, yielded a lanceolate concave base projectile point of local quartzite (Figure 6-25a) that resembles a specimen illustrated from Rocky Mountain National Park (Benedict 1996:Figure 45b). Benedict (1981, 1996) proposed that these FMC points continued to be used until at least 6000 B.P. above timberline in the Front Range. A projectile point tip of the same material (see Figure 6-25b), with the same lenticular cross section, and a remarkably similar flaking pattern was collected from 5AL28 from the Closed Basin south of San Luis Lake (Button 1987). Two other projectile points appear to fall within the variation described for the FMC. These slightly constricting, straight to concave base point fragments were collected from a lithic scatter at 5SH973 near La Garita Creek. One is made of gray Morrison quartzite, the other is made of white, speckled chert (see Figure 6-20h, i).

On the eastern flanks of the San Juan foothills, rockshelters developed in the Tertiary volcanic deposits. Such shelters, however, are not characteristic of the Precambrian bedrock of the Sangre de Cristo Mountains. The San Juan FMC components postdating 10,000 B.P. will be

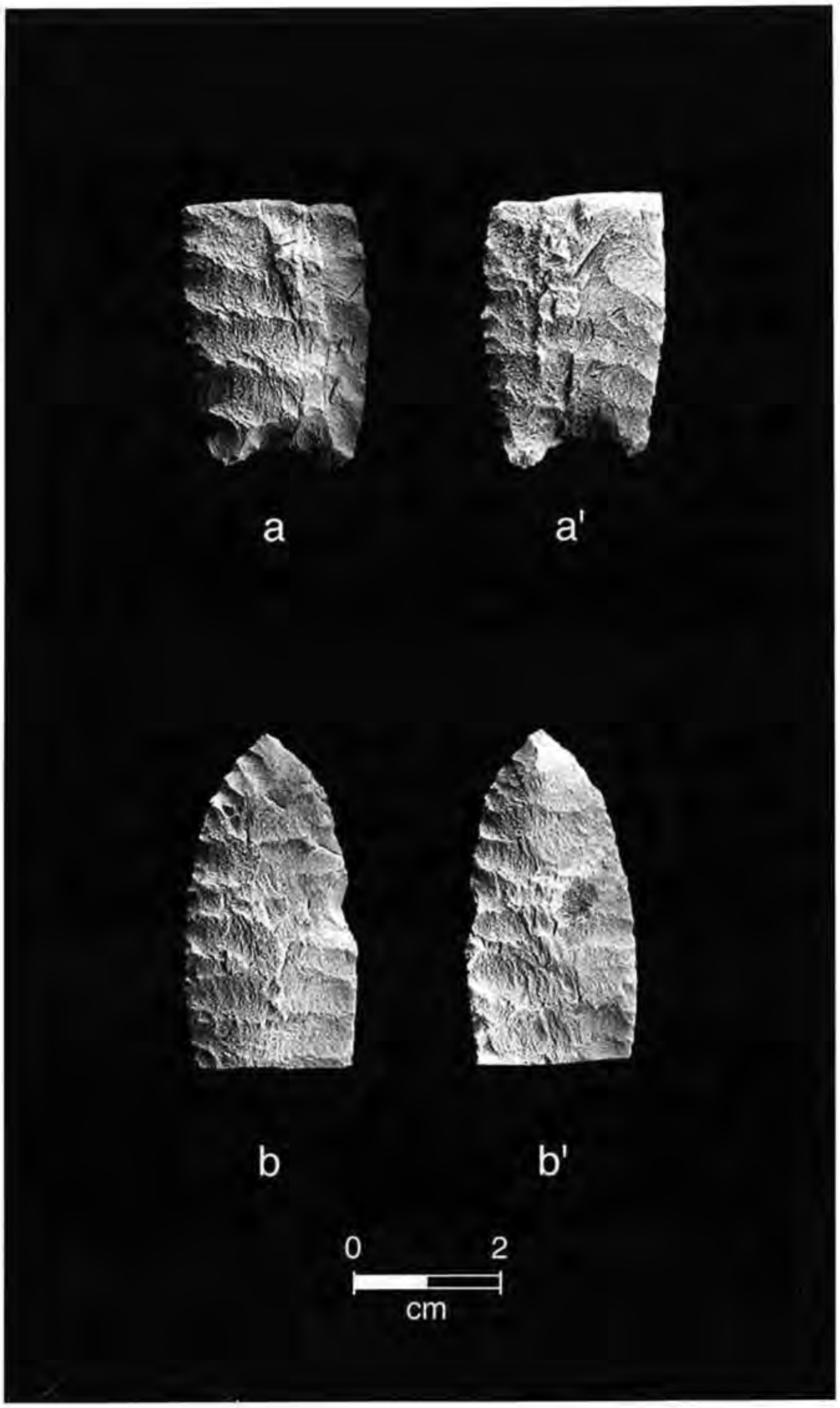

Figure 6-25. Foothill-Mountain points from the San Luis Valley: (a) 5SH1461; (b) 5AL28.

identified in these shelters. Prime mountain sheep habitats are located in proximity, as are elk wintering ranges. It seems equally probable that adaptations to marsh resources, so well established by Archaic times, saw their beginnings in the intensive utilization and processing of wetland plants and small game in late Paleoindian times. Foothill-Mountain groups in the San Luis Valley might have capitalized on the juxtaposition of rich biotic resources in the foothills/mountain environs and the valley floor wetland habitats. This is a hypothesis in need of testing. A final observation is that communal game drive hunting began in the Front Range by approximately 7650 B.P. (Benedict 1992a) by people using lanceolate projectile points with parallel-oblique flaking similar to those found in the San Luis Valley. It is possible that evidence for game drive systems, and/or sheep traps, may one day be identified in areas such as the La Garita Mountains.

Unspecified Plano and Untyped Stemmed

Twenty-two localities are represented by untyped lanceolate projectile points including 19 recorded in OAHP records, an isolated find reported by a private individual (see Figure 6-20b), an isolated point base donated by Tad Carpenter, and a collection of four bases from the Jimmie Myers site (see Figure 6-20a, c-e), also donated to the Smithsonian Institution. The distribution of this material is shown in Figure 6-26. Settings near streams in the Closed Basin predominate, reflecting the bias in sampling. Also included are two localities from the San Luis Hills in the southern end of the valley. One of these is the tip of a basalt projectile point with refined transverse parallel flaking. It was recorded as an isolated find on a BLM survey near the mesa top head of a small drainage at an elevation of 2761 m (9058 ft) at site 5CH663. The other is an isolated Plano projectile point (5CN272) recorded near the base of an isolated upland during DU's San Luis Valley Project.

Cultural and historical relationships among a variety of unfluted concave base lanceolate projectile points remain poorly defined. The period coincident with and following the Cody complex is key to understanding cultural-ecological adaptations to essentially modern environments. A distinctive technological feature on some very late Paleoindian projectile point forms is parallel-oblique flaking. This has been identified on both FMC points as well as projectile points thought to represent Plains-adapted groups such as Jimmy Allen, Frederick, and Lusk (Frison 1991). Both parallel-transverse and parallel-oblique flaking is present on concave base lanceolate projectiles from the upper Rio Grande. There appears to be a tendency for those that are parallel-obliquely flaked to be made of Trickle Mountain quartzite, although several of the parallel-transversely flaked concave base points available to this author for study are made of fine-grained cherts, jaspers, and Morrison quartzite (see Figure 6-20, a-e). Little else can be said until more systematic study is undertaken. The presence of four bases at the Jimmie Myers site suggests a possible camp situated near the north end of a large perennial lake. Further investigations at this locality are planned.

Of uncertain cultural affiliation are two particularly well-made, stemmed, concave base, untyped points. One, from a private collection, is made of gray Trickle Mountain quartzite (see Figure 6-20f). It is heavily ground on the lateral and basal margins of the stem and has been thinned on one face by the removal of basal thinning flakes. The other base appears to be made of Morrison quartzite. It is very thin, and beautifully flaked in a parallel-oblique pattern (see Figure 6-20g). Were it not for the indented stem, it would possibly be classified as Jimmy Allen; perhaps it is Plains rather than Foothill-Mountain related. The point was recorded on the surface at the Cattle Guard site, on the far eastern end of the blowout separated from the Folsom occupation.

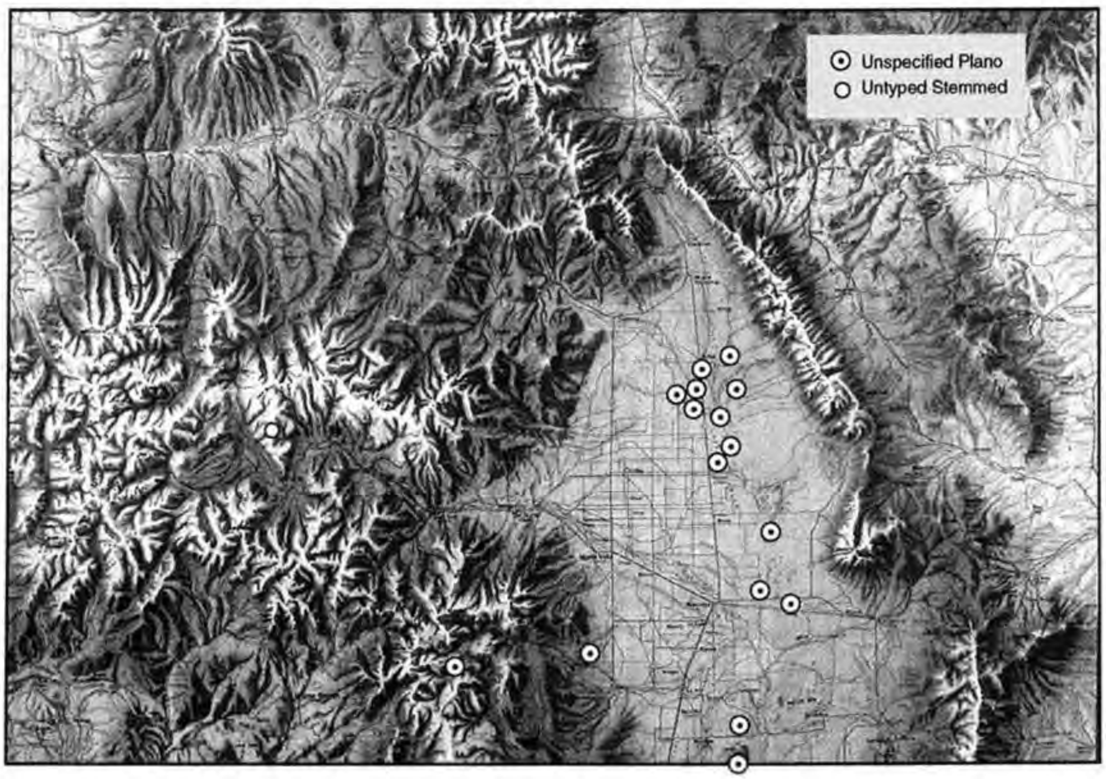

Figure 6-26. Distribution of unspecified Plano and untyped stemmed points in the Rio Grande Basin.

A third occurrence of an untyped point is a basally thinned, ground stemmed concave base point from the Snow Mesa site. This specimen is made of obsidian that appears to be from the Jemez Mountains of northern New Mexico.

Discussion

Effective Moisture, Temperature, and Forage Production

Variations in the availability of water and solar energy are prime determinants in the overall carrying capacity, are the specific composition and distribution of plants and animals on a landscape. The distribution of water, in particular, affects the density of game animals in an area and their patterns of movement. This in turn constrains the options of human populations who choose subsistence strategies that are closely tied to these animals. In summarizing Paleoindian settlement patterns for the central Rio Grande, Judge and Dawson (1972:1215-1216) note the following:

> site locations were selected which would take fullest advantage of the megafaunal dependence on water. As the character of these water sources changed during the postglacial period, Paleoindian site situations were altered to adapt to these changing circumstances.... It is suggested that this gradual change toward increasing dryness may explain much of the intercultural variation in Paleoindian settlement technology within the survey area.

The availability of nitrogen as a nutrient, the productivity of grasslands and marshes, the grazing and watering patterns of large herbivores, and the hunting strategies of Paleoindians were all significantly tied to climatically induced changes in hydrologic regimes. Several Plains archaeologists have examined the ecological relationships between moisture, grassland productivity, bison population densities and mobility patterns, and variation in human social organization (Reher 1978; Reher and Frison 1980; Fawcett 1987; Bamforth 1988). Reher (1978:30) infers that significant increases in effective moisture led to enhanced shortgrass productivity and increased buffalo carrying capacity on the northern Plains during the Little Ice Age (ca. A.D. 1500-1800). He proposes that these ecological conditions would accelerate the rate of cultural change in proportion to the duration of the period of increased forage and bison biomass. Reher (1978:30) further suggests that,

> ...local buffalo population "highs" should define an increase from family-level local groups to temporary aggregations, larger group size during the [bison] jumping season, and perhaps longer duration of the semisedentary behavior associated with the kills.
>
> With a decrease in carrying capacity, we would expect a concomitant decrease in dependence on buffalo, less frequent integrative periods, and increasing dependence on buffering strategies. This undoubtedly happened time and time again over the last 10,000 years....

Essentially, Reher and Frison reason that the amount of available moisture is a major determinant of the size of bison populations, because grassland productivity and biomass are positively correlated with precipitation. Conversely, drier conditions, which negatively affect the quality and distribution of forage, increase the rates of bison tooth wear which shortens life expectancy. It also contributes to decreasing levels of fertility among cows experiencing nutritional stress.

Variation in the level of soil moisture is tied to the amount of critical nutrients available to plants, particularly nitrogen, which is the single most important nutrient determining grassland productivity (Bamforth 1988). Nitrogen is absorbed in solution by plant roots, and its absorption tends to increase with greater soil moisture and with the availability of greater amounts of nitrogen. Generally speaking, the higher the organic content of soils, the higher the levels of nutrients present (Bamforth 1988). Water stress affects grassland productivity both by altering the nutritional quality of the grass itself and by changing its forage yield or quantity. Grasslands respond to lowered effective moisture by reducing their metabolic rates and producing fewer carbohydrates and lower percentages of protein and nutrients in their above-ground structures. Greater effective moisture leads to increased concentrations of plant nutrients that are important to grazing animals (Coe et al. 1976). Temperature also influences the quality of Plains grasses. As temperatures increase, plants mature more quickly, resulting in a greater ratio of indigestible to digestible fiber in their edible parts. Plants grown at lower temperatures have a longer period of higher nutritional yield (Bamforth 1988:36).

Greater effective moisture and cooler temperatures coincident with the appearance and duration of Folsom technology is well documented for the Rocky Mountains, Plains, and Southwest as evidenced by stratigraphic, palynologic, isotopic, and microfaunal data (Friedman et al. 1988; Frison and Stanford 1982; Graham 1987; Haynes 1993; Shafer 1989; Thompson et al. 1993; Walker 1982). Extraordinarily high percentages of the herbivore dung fungus *Sporomiella* in late Pleistocene lake sediments from the upper Rio Grande strongly indicate a big population of large ungulates (Davis and Shafer 1991). Higher water levels of lakes in the San Luis Valley at this time are documented in the pollen records of aquatic plants. The presence of Folsom sites around playas that have yielded only rare occurrences of either Clovis or later Paleoindian occupations suggests that these ephemeral lakes were not available to pre- and post-Folsom groups. This confirms the greater availability of surface water during Folsom times (Jodry et al. 1989; Jodry and Stanford 1996).

Nutrient cycling during Folsom times appears to have been distinct from that characterizing the later Paleoindian stage (Jodry 1999). Recent study of nitrogen and carbon soil dynamics in response to climate change in the Front Range indicates that as snow depth and duration expands in alpine areas, it generally increases the carbon and nitrogen mineralization rates in high-elevation soils (Williams et al. 1998). This accelerates decomposition rates and leads to increases in net nitrification. The greater nitrogen availability in alpine soils appears to result in greater nitrogen export to streams causing a greater chance for nitrogen saturation to occur in the drainage catchment (Williams et al. 1998:29). The presence of earlier and longer-lasting snow in the mountains during Folsom times is evidenced by the expansion of Santanta Peak glaciers between 11,070 ± 50 and 9970±80 B.P. (Menounos and Reasoner 1997; Benedict 1973, 1981, 1985a). These snowpack conditions likely resulted in enriched nitrogen levels reaching the Closed Basin aquifers in snowmelt runoff, and net greater nitrogen enrichment enhancing plant growth and animal nutrition during the Folsom period (Jodry 1999).

Similarly important are the implications of the significant role of large grazers in nutrient cycling and ecosystem change. Zimov et al. (1995) propose that changes in animal abundance strongly influence the structure and species composition of vegetation. Zimov et al, (1995:128) summarize available evidence from high latitudes in the following passage:

> In fertile grass-dominated meadows, a set of feedbacks promotes productivity and grazing (Chapin 1991, Figure 1a). Growth of grasses in the current tundra environment is stimulated by nutrient inputs from fertilizers (McKendrick et al. 1978; Shaver and Chapin 1986), animal carcasses, and feces (Batzli et al. 1980; McKendrick et al. 1980), or

intensive disturbance by humans (Chapin and Shaver 1981; Zimov 1990) or animals (Batzli and Sobaski 1980). Mowing stimulates the aboveground production of steppe grasslands five fold (Kucheruk 1985) and aboveground production of sedge tundra three-fold (Peshkova and Andreiashchkina 1983) indicating that grazing stimulates aboveground production in these ecosystems. This grass-dominated vegetation has higher tissue nutrient concentrations than mosses or dwarf shrubs, is more digestible, and attracts grazers (White and Trudell 1980).

Large grazers in the Arctic contribute to high litter quality, and the rapid turnover of nutrients by stimulating decomposition and mineralization and by increasing plant evapotranspiration rates, which dry overly wet soils. Thus, grazing by Pleistocene megaherbivores was essential to the maintenance of a productive grass-steppe vegetation (Zimov et al. 1995). Solid evidence demonstrates that a high density of grazers is necessary to maintain the productivity of Africa grasslands as well (McNaughton 1976, 1979a, 1979b, 1984). It is expected that primary consumers like bison had a controlling affect on ecosystem productivity and the heterogeneity of grasslands and sedge meadows in intermontane basins of the Rocky Mountains during Paleoindian times.

Bison Populations and Paleoindian Subsistence and Mobility

The significant relationship between effective moisture and the carrying capacity for grazing animals (Coe et al. 1976) largely explains the abundant bison populations in the San Luis Valley during the Folsom occupation. Not only were these bison more abundant, but also they were larger animals than those hunted by Agate Basin, Hell Gap, Cody, or later peoples (Frison 1978:283, Tables 7.1 and 7.3; McDonald 1981). Guthrie (1980, 1984, 1990) proposed that late Pleistocene bison, and the forage on which they depended, had an extended growing season due to differences in nutrient cycling and seasonality. The study by Williams et al. (1998) further suggests that the quality of forage may have been higher due to nitrogen enhancement during the Younger Dryas period.

With the onset of drier conditions, bison decreased in size (Reher 1974; Todd 1987; Wilson 1978; Hill 1996). The greatest reduction (based on measurements of limb elements and cortical bone thickness) occurred between 10,000 and 6500 B.P. (Fawcett 1987:139). Nutritional stress in late Paleoindian bison populations is indicated by higher incidences of enamel hypoplasia and greater rates of tooth wear. Both are particularly evident in the bison population at the Casper Hell Gap site, radiocarbon dated to approximately 9900 B.P. (Frison 1974). In sum, data support the view that overall nutritional levels of bison decreased during the Paleoindian period in response to climatically induced changes in grazing conditions and relative levels of effective moisture. The San Luis Valley palynological records show that forage communities altered dramatically after ~10,000-9500 B.P. Sagebrush *(Artemisia tridentata)* and grasses (Gramineae*)*, once widespread during the late Pleistocene, declined markedly after ~10,000 B.P., and after 9500 B.P., greasewood *(Sarcobatus vermiculatus)* expanded.

Changes in the distribution and density of game animals likely necessitated accommodations in the size, composition, and procurement strategies of hunting parties. Several researchers have investigated the relationships between bison population density and distribution and Paleoindian population dynamics and land-use patterns (Amick 1994b; Bamforth 1985, 1988; Fawcett 1987; Frison 1978, 1991; Irwin-Williams and Haynes 1970; Reher 1978). Jochim (1976:53) proposes that "the greater the security of a resource, the greater its 'pull' on settlement." Higher bison population densities, possibly coupled with lowered herd mobility, made bison a particularly reliable and predictable resource during Folsom times (Bamforth 1988). Afterward, increasingly smaller bison apparently became more mobile, and began to aggregate into larger herds for the rut in the summer.

Bamforth's (1988:176) study of Paleoindian settlement on the southern Plains indicates that Folsom sites containing larger and more diverse assemblages (termed multiple-activity sites) tended to be closely associated with permanent water sources. Conversely, Folsom sites with limited assemblages were found more often near intermittent water sources. Bamforth surmise that aggregated Folsom groups preferentially camped near permanent water sources. Alternately, Folsom people may have reoccupied camps near permanent water more frequently than locations near playas. In Bamforth's sample, multiple-activity sites were less common during the late Paleoindian period. He accounts for this difference as follows:

> The increased mobility and less predictable migration patterns of bison in the Late Paleoindian Period would have forced hunters more and more to take herds where they could find them, and the absence of an association between multiple and limited activity sites and different types of water sources in Late Paleoindian times may reflect the more flexible settlement pattern expected in such conditions.... it may represent an increase in the overall degree of population dispersion in the region [Bamforth 1988:178].

Comparative analysis of Plains ethnographic data shows that "complex aboriginal societies" (defined as those with greater numbers of bands and other intertribal associations) were found in portions of the Plains where climatic conditions selected for larger and less mobile bison herds (Bamforth 1998:186). This is consistent with the theoretical expectation that a close relationship exists between human organizational variability and environmental variability. Jochim (1976:73-74) predicts that human aggregations should be larger when they are supported by resources that are presented in large units, satisfy needs in addition to that for food, occur in large aggregations, are abundant in the environment, and are not very mobile. The importance of resource abundance and reliability in facilitating social differentiation among hunter-gatherers by enabling individuals to strive for prestige has been suggested (Hayden 1990; Mithen 1990). Ecological conditions during the Folsom period appear to have been sufficiently favorable to promote social aggradation and permit social differentiation.

Comprehensive study of the empirical and theoretical foundations of Folsom patterns of social interaction is needed (see Hayden 1982; Hofman 1994; MacDonald 1998; and Wilmsen 1973 for good starts in this direction). Hayden (1982:113) suggests that, in general, more frequent and longer lasting interaction between communities would result in stronger patterns in material culture. The widespread distribution of Folsom projectile points (from Indiana to Utah, Canada to Mexico), their strong stylistic adherence to a shared template of form, and their long-lasting occurrence (approximately 500-700 years) argue for frequent and sustained face-to-face communication within and between Folsom groups. By way of contrast, the proliferation of projectile point styles during the late Paleoindian period (after 10,200 B.P.) and the increasing use of local tool stone strongly suggest that very different parameters of regional and local social interaction developed in response to changing environmental conditions.

Evolutionary ecological approaches (including optimal foraging and diet-breadth models) may help clarify the poorly understood relationships between resource structure and the settlement and subsistence organization patterns along the upper Rio Grande (Amick 1994a; Binford 1990; Kelly 1995; Mithen 1990). Great Basin archaeology has demonstrated the utility of this theoretical perspective and methods of analysis (Kelly 1995, 1997 and references therein), strongly indicating that they might be fruitfully applied in the San Luis Valley.

Historic documents that chronicle former land-use patterns in the region are additional sources of key information. Of particular significance here are the records of preferred travel routes and their relationship to valley topography and hydrology.

Historic Travel Routes, Wetlands, and Paleoindian Site Locations

Historically documented travel routes through the valley date back to Don Diego de Vargas in 1694 (Colville 1995; Kessler 1995). The North Branch of the Old Spanish Trail passed along the foothill margins on both sides of the valley, where travel was easier, springs were numerous, and overlooks of the valley were excellent. As people headed up the Rio Grande from the south, they had to choose either an eastern or a western route to avoid the impassable gorge of the Rio Grande in northern New Mexico (Kessler 1995). The first major ford across the river was encountered in the San Luis Valley, just a few kilometers upstream from the northern terminus of the gorge. In addition to the gorge, the valley's marshes presented significant challenges to east/west travel.

Extensive wetlands (marshes, lakes, and streams) stretch in a nearly continuous southeast northwest-trending arc from east of Alamosa to Cochetopa Pass in the northwest corner of the valley, near Saguache. These rich habitats were clearly important places to Paleoindians, as evidenced by the abundance of sites and isolated finds associated with them. Wet meadows, which occupy shallow lake basins and the land between shallow marshes and the uplands, may have been especially attractive to bison (Jodry 1999). With sufficient moisture, sedges, grasses, rushes, and wetland wildflowers predominate in these locations (Niering 1997). A study of the Slave River Lowland Bison herd indicates that they prefer sedges to grass in a modern northern climate, which may provide a good analog for the cool and wet Folsom environment of the San Luis Valley (Reynolds et al. 1978).

On the valley's east side, a corridor more than 8 km wide lay between the flanks of the Sangre de Cristo mountains and the marshes to the west (Figure 6-27). This corridor likely supported wet meadow vegetation during Folsom and Cody times. The Linger, Zapata, and Cattle Guard sites, three other Folsom sites, four Cody localities, and the Zapata Clovis Mammoth kill are all found in this area near the base of Blanca Peak. Historically, an important trail (the east fork of the North Branch of the Spanish Trail) skirted the marshes by passing along the foothills where travel was easier and wooded campsites were found near streams and springs. North from the New Mexico border, the trail followed along the Sangre de Cristo Mountains to Rito Alto Creek several kilometers north of the Great Sand Dunes. Side trails in the vicinity of Great Sand Dunes headed east over the mountains. From Rito Alto Creek, the trail headed west to merge with the west fork of the Spanish Trail where Saguache creek exits the foothills (Kessler 1995). By traveling to Rito Alto Creek before proceeding west, it was possible to avoid the marshy terrain associated with San Luis, Saguache, and La Garita creeks and their tributaries. Beckwith, a lieutenant with Gunnison's survey expedition in 1853, described the area near present-day Crestone as follows:

> marsh grass grew luxuriantly for a few hundred yards on either side of two small creeks which we crossed, one of which...was so miry that it turned us a mile directly towards the mountains before we could affect a crossing. To our left we could see fine prairie-grass fields, directly in the course of Cochetopa Pass, for which we were traveling around the valley; but the guide warned us of marshes, and the attempt was not made to cross them. Thirteen miles from camp we reached a fine meadow of bottom-grass a mile in width, extending from the base of the mountains far out into the plain, through the center of which winds a fine stream of mountain water, named, after our guide, Leroux [Rito Alto] Creek [Beckwith 1854, cited in Kessler 1995:213].

Figure 6-27. Satellite photograph of the San Luis Valley (from Jodry 1987).

The trail was used extensively by Indians (Ute and others), by Spanish military (Anza in 1779), by Taos trappers (Fowler in 1822), by American government surveyors in the mid to late 1800s (Fremont and Gunnison in 1853, Wheeler in 1873), and later by Spanish and other settlers (Kessler 1995). It is quite likely that this route had its origins in the movement of animals, including mammoth and bison. Large animals grazing northward on the east side of the Rio Grande, or moving southward from Poncha Pass, would naturally funnel into this corridor, creating favorable hunting grounds.

Studies of the eruption and wear patterns of bison teeth from the Linger and Cattle Guard sites suggest that Folsom people hunted the valley's east side in very late summer or early fall, probably just after the bison rut (Jodry 1999). This is the same season represented by three Folsom bison kills at the Cooper site in Oklahoma and for Folsom bison kills at the Lipscomb and Lake Theo sites in Texas. Use-wear, refit, and spatial analyses of activity areas at Cattle Guard suggest that quantities of hides, bone marrow, and probably dried meat were processed there, perhaps in preparation for the coming winter. From the density of Folsom sites and the unusually high percentages of *Sporomiella* dung spores, it can be reasoned that bison were a dependable fall resource in the San Luis Valley. In fact, this basin may have represented a veritable meat larder during Folsom times. It is suggested here that the San Luis Valley was a recurrent stop in the migratory travels of multiple Folsom groups who headed there in the fall, confident in their ability to harvest bison. Sufficient bounty was evidently available to support seasonal aggregations of bands, and the valley is especially pleasant at this time of year. The insect population dies off with the first freezes in early September, and the days are sunny and beautiful.

Climatic changes in post-Folsom times may have decreased the size and predictability of bison populations and led to a greater emphasis on small group encounter hunting augmented by greater reliance on other game species. The large, late Paleoindian bison kills documented on the Plains have not been reported, as yet, for the upper Rio Grande. That late Paleoindian people were drawn to the Closed Basin wetlands is strongly indicated by the distribution of surface artifacts. However, the degree to which they were hunting large game there remains to be demonstrated. Increasing use of marsh plants, small animals, fish, and birds after 10,000 B.P. might be expected in response to changing environmental conditions. The seasonal harvesting of such nonfood items as basketry-making supplies and bird feathers may have provided additionally important motivations for visiting the wetlands. The growing incidence of ground stone from Cody times on may mark the developing importance of seed and nut crops in prehistoric diets. These speculations need to be tested through the excavation and analysis of late Paleoindian and Archaic sites.

Paleoindian settlement patterns included some transhumance between the basins and plains and the mountains. High-altitude sites are documented for Folsom (Black Mountain) and Cody (Caribou Lake) components and are suggested by surface artifacts for Clovis and later Paleoindian periods. By midsummer, an ascent to the mountains allows people to augment their stores of tool stone, to harvest the vertical succession of ripening plants, and to follow large game animals on their return to alpine meadows. In the fall, just as the weather encourages large game and Paleoindians to descend from the high country, the San Luis Valley offers a viable seasonal option. More research is needed, with careful attention to tool stone sourcing, to give directional orientation to these seasonal movements (see Benedict 1992a, 1992b). At present it appears that the Folsom people camping at Cattle Guard entered the San Luis Valley from the north or northeast, perhaps from a summer season in South Park and the surrounding mountains. Little can be said of other Paleoindian groups until further studies are conducted.

This discussion focused on the representation and distribution of Paleoindian cultural complexes in the Rio Grande Basin of Colorado, reconstruction of changing biota, and the implications of this information for variable strategies of land use during the terminal Pleistocene and earliest Holocene. Diet breadth during most time periods, including Paleoindian, probably includes some use of plants, small game, birds, eggs, fish, and insects. It is assumed that large, lanceolate Paleoindian projectile points were primarily tools used to procure and process large game. Paleoindian points, in and of themselves, speak most directly to activities related to ungulate hunting and are not particularly informative tool classes for investigating other food acquisition strategies. The available data from the San Luis Valley are restricted to projectile points for most Paleoindian complexes except Folsom. Therefore, considerations of variability in climate and vegetation, predator-prey relations, and hunter mobility patterns formed the basis of this preliminary review of Paleoindian land use. This approach was not meant to reinforce stereotypes of Paleoindians as exclusively big game hunters, nor to privilege the economic pursuits of hunters over other members of their society. It was simply an attempt to learn something of the past by relating the distribution of prehistoric weaponry to a body of paleoenvironmental data, to historical records regarding travel routes, and to patterns of hunter-gatherer land use.

Evaluation of the Database

During Smithsonian investigations at Reddin and Cattle Guard, Dennis Stanford and Jerry Dawson trained Bureau of Reclamation archaeologists Van Button and Brian Billman to recognize attributes of Paleoindian lithic technology (i.e. platform preparation, flake morphology, raw material selection) that might be recognized on survey in the absence of (or in advance of discovering) diagnostic projectile points. Coincident with this training, the recognition of Paleoindian materials within Stages 4 and 5 of the Closed Basin survey along La Garita, Saguache, and San Luis creeks markedly improved. Sites 5SH933 (Folsom basal fragment), 5SH934 (Folsom base, graver), 5SH935 (Cody base), 5SH947 (Late Paleoindian base), 5SH949 and 5SH964 (Folsom lateral edge), 5SH973 (two Foothill-Mountain bases), and 5AL29 (Folsom base) were recorded. The expectation that Paleoindian material would occur in this area, coupled with the increased effort to search for diagnostics when more subtle indicators suggested the possible presence of Paleoindian material, resulted in greater success in the identifying of early sites. Recognition of Paleoindian traits in the absence of diagnostics is an important tool that aids in chronological placement of sites. Repeated visits to likely site locations are also an important strategy.

Collectors significantly limit the number of Paleoindian diagnostics that a once-over-lightly survey is likely to encounter. On the other hand, their knowledge, when responsibly documented and shared, adds a scope and depth to the Paleoindian record that would not be available otherwise. The information shared by collectors with Jodry and Stanford doubled the sample of sites discussed here. Significantly more data from private collections await study. Recording information of this kind requires a serious commitment in time and cooperation on the part of many people. Keen interest and talent on the part of avocationalists and historians exist in the San Luis Valley. People with long-standing ties to this landscape are dedicated to preserving its cultural heritage. The Smithsonian Institution's Paleoindian/Paleoecology Program shares these sentiments and works to produce empirically based studies of prehistoric land use, subsistence, and technology. Thus far, field studies have focused on the multidisciplinary excavation of key Folsom sites and the recovery of lake sediment cores to enable the reconstruction of local vegetation. Reconnaissance surveys are planned that will sample, compare, and synthesize the distribution and composition of sites from one ecological zone to the next. However, continuing to work in partnership with interested local residents to record private collections and site locations is the current priority.

The Rio Grande Basin is sorely in need of a temporal framework that is based on stratigraphic and radiocarbon studies in the valley itself, rather than a framework borrowed from the chronologies established for surrounding regions. The rockshelters on the valley's west side are prime candidates for testing. The traditional emphasis on obtaining surface data from pedestrian surveys has been too heavily relied on in this region. Very few sites were tested during five years of work on the Closed Basin project; this constituted a major lost opportunity to learn about key wetland habitats that supported human and game populations for all of prehistory. Wetland habitats are endangered today. Major land modifications at San Luis Lake and in the Dry Lakes area have no doubt impacted many archaeological sites with very little return in data from cursory surveys in these locations. The construction of a golf course in some of the most luxurious meadows on the valley's east side, the setting of major encampments for the last 11,000 years, is another case in point. Development of the San Luis Valley is accelerating but archaeological investigations are not keeping pace with this development.

During the few times that excavations have been undertaken (such as at 5AL80 at Dry Lakes*:* Jones 1977; Cattle Guard*;* Emery and Stanford 1983; Jodry 1987, 1992, 1998a, 1999; Jodry and Stanford 1992; Linger: Hurst 1941, 1943; Dawson and Stanford 1975; Black Mountain*:* Jodry 1993; Jodry et al. 1996; and the Dog Mountain Shelter*:* Spero 1987d), a quantum leap of information was forthcoming. With due respect for the site preservation stance that characterizes the current times, the archaeology of the San Luis Valley will be clouded in ignorance unless key locations are carefully selected to investigate through interdisciplinary excavation. One need but glance at the rich archaeological and ethnographic literature regarding wetland adaptations in the Great Basin (i.e., Callaway et al. 1986; Kelly 1997 and references therein) to appreciate the intricate and interesting human stories that are waiting to be told in the San Luis Valley.

A unique opportunity is at hand to conduct thorough studies on large blocks of land newly acquired by the Nature Conservancy. Scientific, educational, and community participation can be incorporated into prehistoric research programs. The timing appears to be right and the resources are in place for an archaeological renaissance in the San Luis Valley. The careful excavation of endangered Paleoindian sites (such as in the area of peat mining east of Alamosa), the recording of private collections, and additional survey are all viewed by this author as priorities.

Data Needs for the Paleoindian Stage

- Recognition and documentation of Paleoindian traits on sites in the Rio Grande Basin that lack diagnostics.
- Continued data sharing and partnerships with local collectors and archaeological groups to identify, record, and protect Paleoindian resources.
- Development of a temporal framework based on stratigraphic and radiocarbon studies rather than borrowed chronologies.
- Site testing and excavation of Paleoindian sites to obtain the data needed to develop a local temporal data base.
- Expanded research into pre- and post-Folsom occupation including the Paleoindian/Archaic stage transition.
- Continued research into Paleoindian stage exchange systems, technology, resource utilization and seasonality, and social organization.
- Continued paleoenvironmental reconstruction and research into the cultural implications of the paleoenvironmental data.

ARCHAIC STAGE

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Definition of Archaic Stage

The Archaic stage was formally proposed as a historical-developmental stage by Willey and Phillips (1958:104-143) following its initial use by Ritchie (1932) to describe archaeological materials in New York state. The stage represents a technological shift from the use of lanceolate projectile points to stemmed and notched forms, an increase in the use of ground stone implements, and a shift in subsistence from reliance on large game animals to a broad-based pattern utilizing many species of plants and animals. Settlement patterns are generally recognized as variations of mobile collector-foragers (Binford 1980) who move across the landscape targeting subsistence resources. For the purpose of this context the Archaic stage is defined as the period from 5500 B.C. to A.D. 500 (7450-1450 B.P.).

The temporal frames chosen for the Archaic stage are somewhat arbitrary. The beginning date of 500 B.P. is generally cited as the beginning of the stage (Guthrie et al. 1984; Irwin-Williams 1973; Duke 1997; Lintz and Anderson 1989; Frison 1991), although some evidence exists for pushing this date back in time to around 7850 B.P. (Reed 1981a, 1981b, 1984; Wiens 1994). The beginning of the stage is generally associated with the onset of a drier and warmer climatic period (Antevs 1955; Benedict 1979) and the disappearance of Paleoindian tool kits.

The end of the Archaic stage is problematical. In areas where horticulture replaced hunting and gathering as the primary subsistence economy, the Archaic stage was replaced by the Formative Stage. On the Plains, the Archaic was replaced by the Formative Plains Woodland period sometime after A.D. 200 (1750 B.P.) (Eighmy 1984; Lintz and Anderson 1989). In the Southwest, Formative Ancestral Puebloans represented by the Basketmaker II replaced Archaic populations around A.D. 1 (Cordell 1984; Duke 1997). The traits used in the past to distinguish Formative cultures from Archaic cultures are the addition of ceramic artifacts, the shift from the use of the atlatl to the bow and arrow and a corresponding reduction in projectile point size, the use of more complex forms of architecture than simple house pits, and horticulture. Implied by these developments is a reduction in residential mobility and the formation of small villages. This distinction is now breaking down. Corn at Cottonwood Cave on the Uncompahgre Plateau has been dated as early as 2220 B.P. (Stiger and Larson 1992), suggesting that horticultural practices may extend well back into the Archaic stage. Architectural remains, some of which are complex, and storage features are now commonly found in Archaic components throughout the intermountain west (Metcalf and Black 1991; Stiger 1981, 1986; Euler and Stiger 1981; Hoefer 1987; Harrell et al. 1997). These features imply at least seasonal sedentism and a greater reliance on food storage than has been previously assumed for Archaic populations. Finally, ceramic artifacts are commonly found in components without architecture and horticultural evidence.

In areas where horticulture is not possible or where it is limited by the growing season, an Archaic-style subsistence economy of hunting and gathering continued to be practiced until the adoption of the horse altered subsistence patterns. The term "Late Prehistoric" is commonly used to describe post-Archaic, non-horticultural archaeological assemblages. In these areas, the transition from the Archaic to the Late Prehistoric stage is marked by the addition of ceramic artifacts, use of the bow and arrow, and smaller projectile points. Architectural remains have been found in nonhorticultural Late Prehistoric contexts in the Gunnison Basin (Rood 1998) and in the

Wyoming Basin (Thompson 1989; Harrell 1989). Dating the Archaic-Late Prehistoric transition has been difficult. The transition may have occurred around A.D. 1000-1300 in the southern Rocky Mountains (Black 1991) and somewhere between A.D. 300 and 600 in the Great Basin (Thomas 1981; Holmer 1986). These scenarios all indicate that a shift from the Archaic stage to the Late Prehistoric stage probably took place over an extended period from A.D. 1 to 1300. Therefore, in the absence of a dated local sequence, a date of A.D. 500 is used in this context as an end of the Archaic stage. This date splits the difference of the dates offered above. The discussion below is not broken into the traditional Early, Middle, and Late Archaic stages. The lack of dated components and associated artifacts assemblages in the Rio Grande Basin does not allow the stage to be reasonably split up into periods or phases. At some time in the future, it may be possible to break the Archaic into periods. The sites are discussed from oldest to youngest based on projectile point sequences from other areas. Whether these sequences are applicable to the Rio Grande Basin is yet to be demonstrated.

Archaic Lifeways and Processes

Guthrie et al. (1984:35-36) state that the Archaic in the Colorado mountains is "characterized by long-term stability and continuity in adaptive strategies relating to the environment." The general strategy was hunting and gathering by nomadic groups traveling through mountain drainages and passes. The only appreciable difference over time was an increase in the use of plant resources, as indicated by increasing amounts of ground stone implements. Although these statements are generally true and cannot be directly contradicted by data from the Rio Grande Basin, recent research indicates that the Archaic stage was probably much more variable than once thought. Environmental changes such as the Altithermal drought undoubtedly affected how Archaic populations lived and exploited their environments. Kelly (1995) presents a strong case of the variability of hunter-gatherers in regard to subsistence practices, mobility, group size, and social and political structures. Regarding the Archaic as a period of long-term stability and continuity in adaptive strategies may only serve to hide significant differences in the adaptive strategies of Archaic populations.

The earliest classification of Archaic archaeological assemblages in the San Luis Valley was by Renaud (1942a, 1942b, 1943, 1944, 1946). He classified the archaeological materials along the Rio Grande as the "Upper Rio Grande culture." Based on work in northern New Mexico, Honea (1969) formally defined the culture as the Rio Grande complex dating from 6950 to 5950 B.P. The archaeological assemblage that made up this complex contained smooth-stemmed projectile points; percussion-based flaked stone technology; predominance of side scrapers; bifacial knives, choppers, gravers, unshaped one-hand manos; and the use of black tool stones including basalt, obsidian, and dark-colored cherts (Honea 1969:67). Reed (1981a:63) suggests that the upper Rio Grande valley represents a distinct culture area extending from the Continental Divide down through the San Luis Valley and into New Mexico.

Rio Grande complex materials have been compared to the Oshara Tradition of northern New Mexico, and the stemmed Rio Grande point has been compared to Oshara tradition Jay and Bajada points, which date between 7850 and 5150 B.P. (Irwin-Williams 1973; Moore 1994). Because most reports concerning the archaeology of the San Luis Valley and adjacent mountains use the Oshara tradition as a main comparative phase sequence, a discussion of this tradition is in order.

The Oshara Tradition was conceived as a cultural developmental sequence leading to Basketmaker and Pueblo cultures in northern New Mexico. The tradition consists of five phases: the Jay (7450-6750 B.P.), Bajada (6750-5150 B.P.), San Jose (5150-3750 B.P.), Armijo (3750-

2750 B.P.), and En Medio (2750-1550 B.P.[A.D. 400]). These phases were constructed based on fieldwork near Albuquerque on the Anasazi Origins Project (Irwin-Williams 1967, 1968, 1973, 1994). Jay phase tool kits contain stemmed, weakly shouldered projectile points, lanceolate bifacial knives, and well-made side scrapers. Bajada phase tool kits contain stemmed points with basal indentations, fewer bifacial knives, well-made side scrapers, large chopping tools, and poorly made side scrapers or irregular flakes. The San Jose tool kits include stemmed projectile points with serrated blades, increasing amounts of poorly made side scrapers, and large chopping and ground stone tools. The Armijo and En Medio tool kits are similar to San Jose, except ground stone becomes an increasingly larger portion of the tool kit, and projectile points become more variable to include expanding stem, contracting stem, and corner-notched forms. Inferred subsistence practices included mixed foraging and hunting in the Jay and Bajada phases, increasing dependence on plant foods in the San Jose, and introduction of maize agriculture in the Armijo phase. The En Medio Phase is characterized by a shift from hunting and gathering to a sedentary, horticulture-based Basketmaker culture.

Recent research in northern New Mexico and elsewhere in the Basin and Range and southern Colorado Plateau provinces suggests that the Oshara Tradition is less internally cohesive than once conceived and may not be applicable to the northern Rio Grande. Stuart and Gauthier (1981:44-47) question the applicability of an in situ development from the Archaic into Pueblo II times and prefer the more generic taxonomic scheme used by Wendorf (1954) that has an undivided Archaic stage ending around A.D. 600. Stuart and Gauthier (1981:47) contend that "we know too little about Archaic occupations of the upper Rio Grande to be comfortable with any generalizations." The material content of the phases and hypothesized subsistence practices of each phase are still under debate. For example, Jay phase sites have been found to contain ground stone implements and date to an earlier time (7850 B.P.) than originally proposed for the Oshara tradition (Wiens 1994; Vogler et al. 1982). Another difference is that while Irwin-Williams sees a mixed hunting and foraging economy in the Jay and Bajada phases, Judge (1973) sees the Jay and Bajada subsistence as comparable to Paleoindian big game hunters with an emphasis on modern fauna, and a broad-based subsistence economy not coming about until the San Jose phase. The transition from the Oshara to sedentary horticulturists is also under question. Although many areas of northern New Mexico shifted to a horticultural economy by A.D. 400-500, some groups retained Archaic subsistence patterns until A.D. 900 (Hogan 1994). Finally, the contention that the Oshara represents a continuous cultural sequence throughout the Archaic is not supported by the radiocarbon evidence, which indicates periods of abandonment interspersed with periods of occupation in various areas of the southern Basin and Range and the southern Colorado Plateau provinces (Berry and Berry 1986). Even though lithic traditions were maintained over long periods of time, they were not restricted to subregions on a continuous basis (Berry and Berry 1986:321). The continuing debate over the material content, age, and subsistence patterns of the Archaic along the northern Rio Grande in New Mexico is important to the Rio Grande context area.

Another model of Archaic subsistence and settlement in the Archaic is the Mountain tradition (Black 1991). The Mountain tradition is a cultural-historical model that suggests that during the Archaic, the southern Rocky Mountains contained indigenous populations that were derived from Great Basin populations. This tradition began in the southern Rocky Mountains around 9450 B.P. and ended around A.D.1000-1300, when Numic populations entered the Rocky Mountains. Characteristics of the Mountain tradition include the use of upland environments on a year-round basis; use of a variety of stemmed, indented base and shallow corner- and side-notched projectile points, often with serrated edges; use of microtools and split cobble technology with a corresponding reduction in bifacially flaked tools; use of local tool stones; Great Basin rock art styles, and use of simple house pit architecture like that found at the Yarmony site (Metcalf and Black 1991). Black includes the Rio Grande Complex (Renaud 1942a-c, Honea 1969) in the

Mountain tradition, along with other complexes including Mount Albion (Benedict and Olsen 1978), Uncompahgre (Wormington and Lister 1956; Buckles 1971), and Magic Mountain and Apex (Irwin-Williams and Irwin 1966). Differences between the Mountain Tradition assemblages and other Archaic traditions such as the Plains, Desert Archaic, and Oshara are present, but divergence from the Plains tradition is the greatest and more similarities are seen in the Oshara tradition and less so with the Desert Archaic (Black 1991:12). The similarities may be due to a common origin of the Mountain, Desert Archaic, and Oshara traditions to the west in the Great Basin. The greater differences with the Plains tradition may be due to the Plains Archaic developing directly out of Plains-based Paleoindian cultures (Black 1991:12).

The environmental conditions of the Rio Grande Basin may have led to greater subsistence and settlement variability than is commonly assumed for the Archaic. For example, subsistence and settlement in the Closed Basin probably varied greatly as the marshes and lakes were reduced in size or eliminated during drier periods. Archaic adaptive strategies in lacustrine environments are probably quite different in terms of mobility, group size, foraging areas, and storage than in grassland or desert environments. Evidence from the Great Basin (see Janetski 1986) indicates that a lacustrine environment may support greater group size and corresponding reduction in residential mobility.

Variability in settlement patterns is suggested by the numerous architectural features that have been found throughout the intermountain west. Architectural remains dating to the Archaic have been found in the Gunnison Basin (Stiger 1981; Euler and Stiger 1981; Black 1983), on Colorado's western slope (Metcalf and Black 1991; Gooding and Shields 1985; Conner and Langdon 1983; Stiger 1986), southeastern Colorado (Rood 1990; Shields 1980), northern New Mexico (Stiger 1986; Irwin-Williams 1973), the Wyoming Basins (Armitage et al. 1982; Harrell et al. 1997; Eakin 1984; Walker et al. 1997; Reust et al. 1993; Hoefer 1987, 1988; Harrell and McKern 1986; Newberry and Harrison 1986; McGuire et al. 1984; McKern 1987), in western North Dakota (Simon and Kiern 1983), on the Columbian Plateau (Leonhardy and Rice 1970), and the central Great Basin (O'Connell 1975; Thomas 1982). Temporally, most of the Colorado and Wyoming Archaic stage architectural sites are clustered in the Early Archaic, but architectural features are also known from later Archaic contexts. Known Archaic stage architectural features include posthole patterns, mud and pole structures, masonry structures, shallow house pits, and more complex pithouses. The pithouses at Yarmony (Metcalf and Black 1991), Medicine House (McGuire et al. 1984), and Maxon Ranch (Harrell and McKern 1986) are all Early Archaic features that suggest possible seasonal sedentism and food storage (Metcalf and Black 1997; Eckerle 1997). Possible social changes brought about by seasonally sedentary behavior might include increased trade (Kelly and Todd 1988), increased territorial conflict, possible social differentiation between group members, and maybe the development of more complex social relationships than the nuclear family and band structure normally attributed to hunters and gatherers (Yellen and Harpending 1972).

Population growth and population movements are other Archaic lifeways topics that are neglected when Archaic adaptation is regarded as stable. Radiocarbon curves from the Wyoming Basin (Metcalf 1987) and the southern Colorado Plateau and southern Basin and Range (Berry and Berry 1986) all show tremendous increases in the number of Late Prehistoric/Formative radiocarbon dates. The trend in Archaic dates in these areas is a rise, albeit erratic, from low numbers of dates in the earlier part of the Archaic, to higher numbers near the end of Archaic. These trends possibly indicate population growth. The number of Archaic dates in upland areas such as the Gunnison Basin (Jones 1984) is greater than those of the preceding Late Prehistoric stage, possibly indicating a preference for upland areas during the Archaic and for locations lower in elevation during the Late Prehistoric. The rise in dates may simply reflect greater site visibility over time; thus, the curves may reflect sampling error. The rise could also be caused by the use of certain feature types which tend to have greater archaeological visibility This is a complex argument, and environmental factors forcing reductions or abandonment of areas surely played a role. However, slowly rising populations would have affected Archaic subsistence and settlement patterns in a number of ways, including the use of lower ranked food resources, movement into less productive areas formerly unoccupied, development of territories, and possibly social mechanisms to regulate access to and use of critical resources.

Relationship to Paleoindian Stage

An important question regarding the Archaic stage is the relationship of Archaic populations to Paleoindian populations. Were the Paleoindians direct precursors of the Archaic groups, or did the Archaic groups replace the Paleoindian? Irwin-Williams (1973:4-5) believes that the great differences in Paleoindian (Cody complex) and Oshara tool kits preclude any generic connection. Judge (1982) considers the Jay materials as Paleoindian, and Honea (1969) sees Jay points as similar to Hell Gap points, having developed from Angostura points of the Plains. Black (1991) sees the Mountain tradition as beginning in the late Paleoindian stage with origins in the Western Pluvial Lakes Tradition (Willig et al. 1988). Pitblado (1993) has suggested that mountain Paleoindian sites represent a generalized subsistence strategy, rather than big game hunting as was practiced on the Plains. This suggests that local Archaic populations could have developed directly out of mountain-oriented Paleoindian groups.

Relationship to the Late Prehistoric/Formative Stage

The end of the Archaic stage is marked on the Plains and in the Southwest by the introduction of horticultural practices and ceramics, along with an increase in sedentism. Where horticulture was not possible or of limited utility, Archaic-style hunting and gathering continued (see Guthrie et al. 1984). Most often the presence of small side- and corner-notched projectile points and/or the presence of ceramics is used to mark the transition from the Archaic to the Late Prehistoric.

Does the use of new technologies also mark the movement of different populations into the Rio Grande Basin? Movement of Numic populations into the Rocky Mountains is certain, but the timing of the movement is uncertain. Sometime after A.D. 1000 the Numic-speaking Ute people moved into the southern Rocky Mountains (Reed 1994). This suggests a population replacement or absorption of the resident Archaic populations. The process of replacement, whether through direct replacement or absorption implies different mechanisms that would have affected social and economic conditions of both the resident and immigrant groups. These changing conditions should be reflected in subsistence and settlement patterns and possibly in artifact assemblages.

Archaic Sites by Subarea

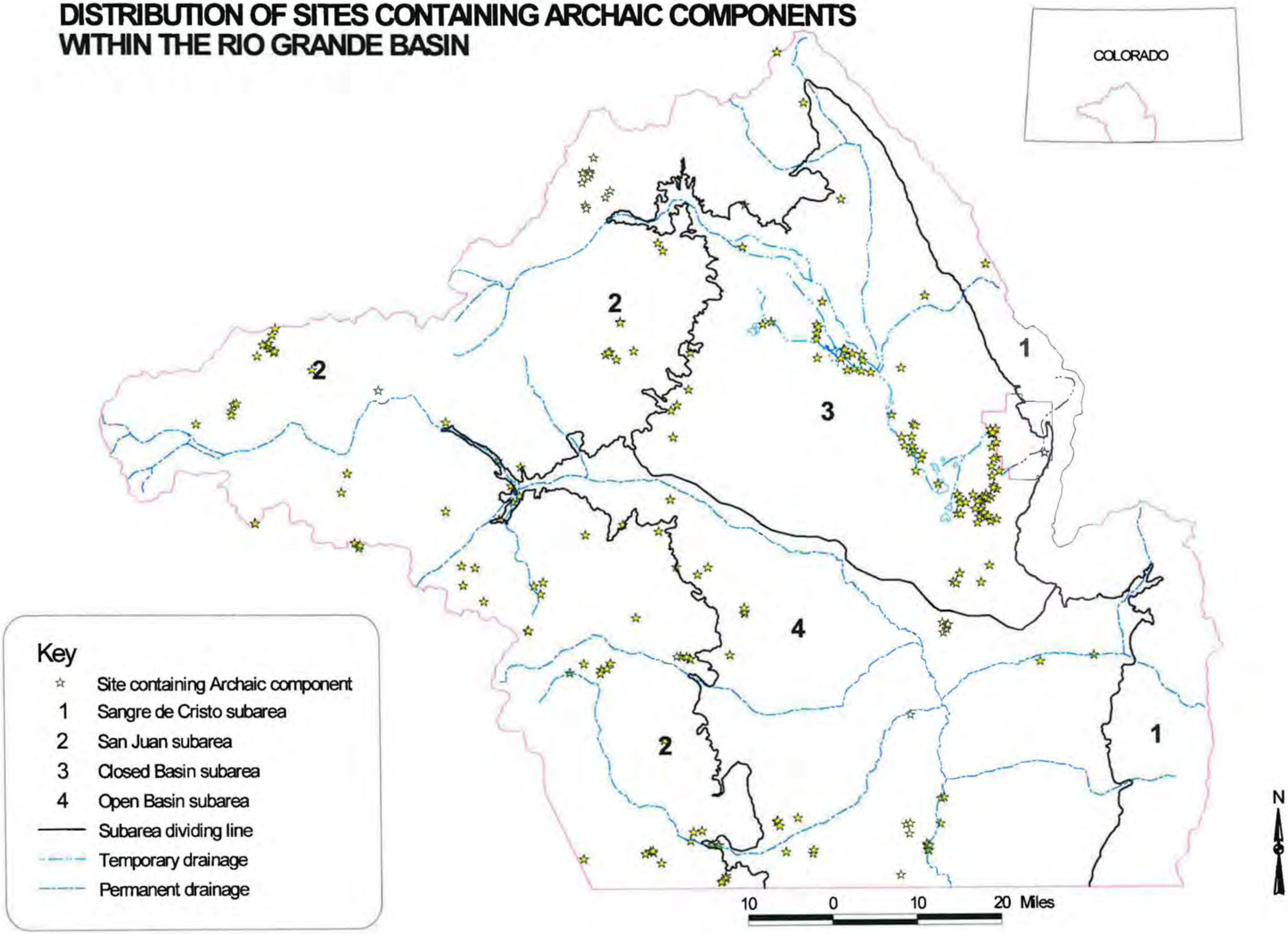
Archaic sites have been recorded in all four of the Rio Grande Basin subareas (Figure 6-28). The following section discusses the recorded sites by subarea.

Closed Basin Subarea

Archaeological investigations that have resulted in the recording of Archaic sites in the Closed Basin include those by Renaud (1942b, 1944), Van Elsacker (1972), Blanca Wildlife Refuge survey (Dick 1975), Closed Basin project (Button 1980, 1981, 1982a, 1982b, 1982c, 1982d, 1982e, 1984, 1985a, 1985b, 1987), SLAP (Haas 1981, 1982), Poncha San Luis Valley 230 kV transmission line project (Conner et al.1980), and various inventories by the CAS. Button (1987) and

FIGURE 6-28

DISTRIBUTION OF SITES CONTAINING ARCHAIC COMPONENTS WITHIN THE RIO GRANDE BASIN



Gadd (1985) provide summaries of many of the sites found in the Closed Basin. These investigations have identified approximately 100 Archaic components and isolated finds. The majority of these sites are concentrated in areas that are presently covered with sand dunes and seasonal lakes and ponds, such as the Dry, San Luis, Russell, and Mishak lakes areas. All of these sites have been classified as Archaic based on projectile point styles.

The oldest Archaic sites in the Closed Basin contain lanceolate Jay points. Irwin-Williams (1973) has dated such points from 5500 to 4800 B.C. Jay points were found on sites 5AL123 and 5SH517 on the Closed Basin project (Button 1987). Both of these sites are scatters of fire-cracked rock and lithic debitage located near seasonal wetlands. Basalt and obsidian dominate the debitage assemblages on both sites.

Sites or isolated finds containing stemmed, indented base Bajada points (4800-3200 B.C.) have been found at six sites and three isolated finds in the Closed Basin (Button 1987; Haas 1981; Billman 1983; Gadd 1985). The majority of these sites are large artifact scatters found in proximity to seasonal wetlands or lakes. Of the six sites, three contain large amounts of basalt and other dark materials; the other three contain large amounts of chert and quartzite.

The Closed Basin and San Luis Valley Archaeological projects (Button 1987; Gadd 1985) contain 30+ sites and isolates containing projectile points that appear similar to Plains or Great Basin types, as well as Oshara Tradition types. These types include bifurcate-stemmed varieties such as Pinto, Duncan-Hanna, and San Jose; shallow side-notched points attributed to the Oshara Armijo phase; corner-notched points attributed to the Oshara En Medio phase and the Ironstone phase of the Uncompahgre sequence (Buckles 1971); and rounded-stem points attributed to the Uncompahgre Horsefly phase. Points resembling those found at Magic Mountain Apex complex Zones D and C (Irwin-Williams and Irwin 1966) and Elko corner-notched points (Holmer 1986) have been recovered in the northern portion of the Closed Basin (Conner et al. 1980).

The data from the Closed Basin indicate a general projectile point sequence that progresses from lanceolate forms such as Jay in the earlier part of the Archaic to bifurcate-stemmed forms, and to a variety of corner and side-notched forms toward the end of the Archaic. Lacking excavation data and accompanying stratigraphic and age information, the temporal status of the Closed Basin points is unknown and can only be inferred from sequences from other regions.

Most of the Closed Basin archaeological sites are open camps containing debitage and fire-cracked rock scatters, approximately half of which contain ground stone implements such as metate fragments or manos. Many of these sites are located around seasonal wetland marshes and lakes. Lithic scatters and isolated finds have also been found. Other site types found include a few burials, and on the western margin of the basin, a few rock art panels, rockshelters, and an open architectural site. The rock art sites include 5SH51, the La Garita rock art site and 5SH1492 (Frye 1995a). Both are found at the juncture of the valley floor and the foothills north of Del Norte. At the La Garita site, 11 rock art panels are found in association with rockshelters, ground stone, and En Medio points. The rock art was compared to Archaic, Uncompahgre, and Ute styles (Frye 1995a). At 5SH1492, six rock art panels were found in association with a rockshelter and a 5.5 x 4.5 m diameter stone enclosure. Projectile points on the site are Archaic corner-notched (Elko?), Armijo, and Late Prehistoric. Some of the rock art is attributed to Archaic abstract curvilinear styles (Cole 1990). The open architectural site is 5SH346, located at the valley-foothill margin south of Saguache at an elevation of 2560 m (8400 ft). The site contains fire-cracked rock clusters, a collapsed and burned structure, and projectile points described as McKean (Kirkish and Beardsley 1979). The structure is not otherwise described.

The Closed Basin report (Button 1987:Table 10) and SLAP Appendix A (Gadd 1985) provide some information on the use of certain lithic materials on Archaic sites. Basalt and obsidian are common on many sites, but so are quartzite and various cherts. Button (1987) attributes the red and gold cherts found on sites to the Trout Creek chert source (Chambellan et al. 1984), which is found in Mississippian-age limestone near Buena Vista. It is possible that this chert was derived from a closer source, since surface exposures of similar Mississippian limestone occur on the flanks of the Sangre de Cristos east of Villa Grove and north of Saguache in the Kerber Creek area (Tweto 1979a). Red and gold cherts are also found in the Tertiary-age Fish Canyon tuffs southeast of Gunnison (Hoefer and Taylor 1999). Similar tertiary-age volcanic deposits are widespread in the San Juan Mountains (Tweto 1979a), and chert sources could exist in these areas.

The only radiocarbon-dated Archaic component in the Closed Basin is 5AL80/81, on the Blanca Wildlife Refuge. This site was test excavated by CSU-LOPA in 1977 (Jones 1977) and further investigated by the University of UNC (Farmer 1978). Test excavations in this dune site exposed a cultural level containing stained sand, charcoal, and fish bone. The charcoal returned a radiocarbon age of 1670 +/- 55 B.P., A.D. 280, placing the site in the later portion of the Archaic. A projectile point recovered on the site bears some resemblance to Magic Mountain MM32, which was found under the Woodland level at Magic Mountain. Artifacts recovered from the site included fragments of bird bone (possibly beads), small mammal bone, fragments of ground stone, utilized flakes, biface fragments, scrapers, and flakes of obsidian, chert, quartzite, and basalt. The fish bone was identified as Rio Grande chub *(Gila nigriscens)* and buffalofish (subfamily Ictiobinae). Buffalo fish need 3.7-4.6 m (12-15 ft) of water to survive (Jones 1977:45), indicating that the Dry Lakes area was a lacustrine environment around 1670 B.P. As part of the analysis for the project, Jones (1977) compared hypothetical water levels necessary to support fish populations on the Blanca Wildlife Refuge to the locations of sites recorded by ASC (Dick 1975). He found that 91.79 percent of the 134 sites were located above the postulated water level at 2292 m (7520 ft) in elevation. Since nearly 50 percent of the refuge is below this elevation, the environment must have been very wet with lakes and marshes interspersed between dry land.

Open Basin Subarea

Only 11 sites and 19 isolated finds attributable to the Archaic have been recorded in the Open Basin. These sites were recorded during the SLAP (Gadd 1985; Haas 1981), the Rio Grande Rock Art project (Frye 1995a), surveys at the Monte Vista National Wildlife Refuge (Lewis 1991), and several BLM projects (Weimer 1991).

The oldest Archaic sites in the Open Basin include a lithic scatter with a Bajada point at 5CN247 (Gadd 1985; Haas 1981), and a lithic scatter with a stemmed, weakly shouldered point at 5CT246 (Weimer 1991). Both sites contain basalt flakes and few tools other than the projectile points. The only feature on the sites is a collapsed cairn of unknown age at 5CN247.

Lithic scatters have also been recorded at 5CN204 (Gadd 1985; Haas 1981), 5CN759 (Spero 1994), and 5RN480 (Lewis 1991). These sites are all flake scatters with stemmed, indented-base or corner-notched points attributed to Pinto, San Jose, En Medio, and Elko types.

Rock art and/or architectural features have been recorded at six sites. Site 5CN651 contains stemmed, concave base points and side-notched with expanding stem points in association with stone circles and stone walls made of basalt (Weimer 1989a). The site also contains buff-colored plain ware and corrugated ware. It is unclear if the architectural features are associated with the ceramics or projectile points. On the east side of the San Luis Valley at 5CT260 (Haas

1981; Gadd 1985; Frye 1995a) rock art panels that contain abstract curvilinear styles are comparable to both Archaic and Upper Rio Grande pueblo styles.

Sites 5CT88, 5CN776, 5RN491, and 5RN522 contain rock art in association with stone structures. At 5CT88, on a bluff overlooking Smith Reservoir near Blanca (Frye 1995a), 15 rock art panels and six stone structures are present. Projectile points found on the site range from San Jose to Basketmaker II types. The rock art is composed of a sunburst, a possible Kokopelli, and abstract rectilinear and curvilinear forms. The structures are stone circles and semicircles 2.6 to 5 m in diameter. They are all made of basalt boulders and are aligned along an east-facing bluff. The site has a commanding view of Blanca Peak, and Frye (1995a) believes that the site may have had ceremonial purposes. It has not been determined if the rock art or architecture is associated with Archaic or later occupations. Site 5CN776, on Cat Creek at the valley/foothill juncture on the west side of the valley (Frye 1995a), contains rock art panels of zoomorphic, anthropomorphic, and abstract curvilinear forms, and a circular stone structure. The structure is made of basalt boulders and is 3.1 x 1.4 m in size. The site is attributed to an Archaic or later occupation based on the rock art styles. Sites 5RN491 and the Dry Creek rock art site, 5RN522, are also located on the west side of the San Luis Valley at the juncture of the valley floor and the San Juan foothills (Frye 1995a). Site 5RN491 contains a lithic scatter and ground stone in association with a rock wall and a rock enclosure. The rock art on the site consists of sun symbols, zoomorphs, and various lines. A projectile point found on the site is shallowly corner-notched with a rounded base. The Dry Creek rock art site contains a rock art panel with abstract curvilinear styles attributed to the Archaic. The site also contains two dry-laid rock walls.

The isolated finds consist of a variety of projectile point types including Elko corner-notched, En Medio corner-notched, San Jose, Pinto, Armijo, and possibly a Gypsum contracting stem. The isolates were recorded by SLAP (Gadd 1985; Haas 1981) in the San Luis Hills southeast of Alamosa along Hansen's Bluff, at the Monte Vista National Wildlife Refuge (Lewis 1991), and on the west side of the San Luis Valley by the RGNF (Spero 1994).

San Juan Subarea

Approximately 62 sites and 36 isolated finds attributable to the Archaic have been recorded in the San Juan subarea. The vast majority of these sites have been recorded on timber sales conducted by the RGNF from 1975 through 1997. Other inventory projects include Wolf Creek Pass East (Shafer 1978), the Weminuche Wilderness inventory (Webster 1984), SLAP (Gadd 1985), and a variety of small inventory projects.

Excavations were conducted in 1981 at two sites in the Piedra Pass area (Reed 1981a, 1981b, 1984). Although these sites are just outside the context area on the other side of the Continental Divide, they are the only sites that have radiocarbon dates for Archaic deposits in or near the San Juan subarea.

The Piedra Pass sites, 5ML45 and 5ML46, are located at elevations over 3350 m (11,000 ft) just below the crest of the Continental Divide and south of the context area. The sites were test excavated using 26 1 x 1m test units at 5ML45 and 10 1 x 1 m units at 5ML46. Charcoal recovered from the test excavations provided corrected radiocarbon ages of 3460 +/- 210 B.C., 3720 +/- 170 B.C., and 5900 +/- 190 B.C. at 5ML45; and 1820 +/- 220 B.C. at 5ML46 (Reed 1981a:31-33). The charcoal used in the dating was derived from levels within excavation units and not from features. Obsidian hydration analysis of the artifacts was problematical, producing ages older and younger than the radiocarbon ages. Artifacts recovered at the sites include debitage, bifacial knives, scrapers, cores, a few utilized flakes, and two metate fragments. The metate fragments were recovered in Concentration C of 5ML45, which also yielded the oldest date on the site. Projectile point types recovered include large corner- and side-notched; Elko eared; stemmed, square base; and Gypsum contracting stem at 5ML45 and Armijo and large corner-notched at 5ML46. Tool stones used at the sites include igneous materials such as basalt and obsidian, and a variety of cherts and quartzite. Of the four concentrations investigated at the two sites, dark igneous materials dominate only Concentration A at 5ML45. Cherts and quartzite dominate the three other concentrations. The sites are interpreted as habitation sites. One of the associated tasks was probably plant processing, based on the presence of the ground stone. The macrofloral analysis for the site notes that a number of charred seeds of known food plants were found in the excavations, but provenience on the samples is poor due to frost heaving and bioturbation problems at the site. The tools and the debitage at the sites indicate tool repair or production of new tools from biface blanks or flakes. Little primary debitage is present. No bone was found at the sites. Test excavations have been conducted on a number of sites in the RGNF (Shafer 1978; Spero 1982n, 1987d), but no radiocarbon ages are available from these projects.

The remainder of what is known archaeologically for the San Juan Mountains in the Rio Grande drainage is based on surface scatters of material found on inventory projects. Most of these materials are isolated projectile points and lithic scatters. Sites and isolated finds containing pre-4950 B.P. stemmed point styles such as Jay, Bajada, Pinto and side-notched forms similar to Northern side-notched have been found at 15 locations. These locations range in elevation from 2627 m (8620 ft) to 3596 m (11,800 ft). The distribution of these points also seems to be limited geographically; most are confined to Conejos and Rio Grande counties. The northernmost site is in the La Garita mountains just north of Del Norte.

The sites with the older projectile point forms include five isolated finds, eight lithic scatters, and two open camps. The open camps are 5ML45 (Reed 1981a, 1981b, 1984), discussed previously, and 5HN154 (Webster 1984). Site 5HN154 contains a scatter of debitage and ground stone and late Paleoindian lanceolate and early Archaic side-notched projectile points. The site is located at an elevation of 3389 m (11,121 ft). Site 5CN510 is located along the Conejos River at an elevation of 3005 m (9860 ft). This site is a lithic scatter that contains late Paleoindian points and Archaic stemmed shouldered points.

Later Archaic projectile point forms (post-4950 B.P.) are widespread through the San Juan Mountains and have been reported at more than 70 site and isolate locations. Later Archaic types described in the reports and on site forms include corner-notched with rounded bases, corner-notched, Elko corner-notched and eared, En Medio, San Jose, Armijo, Apex, Gypsum, and Hanna.

Types of the later Archaic sites are dominated by lithic scatters (25) and isolated finds (23). Two sites, the Dog Mountain petroglyph site 5RN330 (Spero 1987d) and 5SH1499 (Frye 1995a), contain rock art and are classified as possibly Archaic based on abstract curvilinear styles. Six sites are classified as open camps, primarily on the basis of ground stone implements in the artifact assemblages. Site 5CN172 (Spero 1980b), located on a tributary of the Conejos River, appears to be one of the more complex sites in the San Juan subarea. This open campsite contained 16 projectile points comparable to San Jose, Apex, and Duncan-Hanna types, 10 scrapers, and ground stone implements. Notably absent on most of the site forms for the San Juan area are hearths and fire-cracked rock.

Rockshelters are present at 5SH1499 and 5RN330. Open architectural features such as rock walls, stone circles, and hunting blinds are found at three sites. Site 5RN330 contains dry-laid rock walls. A hunting blind was recorded at 5RN118 (Shafer 1978), and a stone circle was recorded at the Big Spring Stone Circle site (5SH325). The stone circle measures 5 x 5 m and is thought to have been ceremonial (Doering and Spero 1980). Associated with the circle was charcoal, burned bone, a lithic scatter, and projectile points described as Archaic. This site is located in the mountains west of Saguache at an elevation of 2740 m (8990 ft).

Sangre de Cristo Subarea

Only one site attributable to the Archaic stage has been recorded in the Sangre de Cristo Mountains. Site 5SH327 is located at an elevation of 3535 m (11,600 ft) near Venable Pass northeast of Crestone. The site is a lithic scatter that contains a corner-notched projectile point (Doering and Spero 1980; Gadd 1985). The lack of recorded sites in the Sangre de Cristo Mountains is probably a function of several factors, including the lack of archaeological inventory; extremely rugged and steep topography, particularly in the northern part of the range; and a high proportion of private land in the Culebra Range.

Evaluation of the Database

The extant database for the Archaic stage in the Rio Grande Basin is based almost solely on inventory data of variable quality. With the exception of the Piedra Pass sites (Reed 1981a, 1981b, 1984) and 5AL80/81 on the Blanca Wildlife Refuge (Jones 1977), data from stratified, dated contexts are not available. Most of the site forms provide basic descriptions of the materials on the sites and the topographic location of the sites. Less detail is paid to intersite material distributions, descriptions of tools other than projectile points, and site condition. The geomorphological context of sites is rarely described in enough detail to be useful. Other problems include variable terminology to describe cultural affiliations, tool types, and material sources, and generally poor-quality site sketches, artifact drawings, and photographs. On many site forms, features are described in minimal detail. The lack of feature description is particularly prevalent where stone structures are present. On many site forms these features are mentioned, but are rarely described.

The survey data indicate that the Closed Basin and the San Juan Mountains were heavily utilized during the Archaic stage. The number of sites that have been located indicates continuous occupation throughout the Archaic. Little is known of the Archaic occupation of the Sangre de Cristo and the Open Basin subareas. In the case of the northern Sangre de Cristos, the extremely rugged topography of the mountains may have precluded occupation, but this cannot be demonstrated until further investigations are conducted. Large areas of the Open Basin and the Culebra Range are private land and have been subjected to fewer investigations than publicly held land in the San Juan Mountains and the Closed Basin.

The lack of data from excavation contexts is pronounced. Information on plants and animals exploited, feature types, stratigraphic relationships, radiocarbon dates, and paleoenvironmental data (e.g., pollen) is not available. Although the survey data indicate occupation of the Rio Grande basin throughout the Archaic, how Archaic populations utilized the area is unknown.

Archaic Stage Research Questions

Guthrie et al. (1984) discuss a number of research questions for the Colorado mountains that are applicable to the Rio Grande context area. These research questions, as well as additional research questions, are presented below.

- What is the nature of Archaic settlement systems in the San Luis Valley and surrounding mountains?

Is there evidence for indigenous occupation, as well as seasonal use of the area? Differences in settlement patterns should be distinguishable by site location variables, site structure, and artifact/feature assemblages. These variables probably overlap, but the differences should be discernible. Because it is quite likely that the mountains and San Luis Valley were occupied with indigenous groups and were visited seasonally by outside groups, what is the nature of the relationship? The projectile points from the study area are most comparable to those of the Oshara Tradition, but simple comparisons leave out the important question of who is influencing whom, and what social, political, economic, and demographic mechanisms structure the influence. For example, the Oshara Tradition (Irwin-Williams 1973) was originally conceived as a developmental sequence leading to Basketmaker and Pueblo cultures. Cultures such as Renaud's Upper Rio Grande culture were seen as related, and by extension, derived from the Oshara tradition. It is now known that the Oshara sequence was not continuous, but is characterized by breaks in occupation (Berry and Berry 1986). Other research theorizes that the Upper Rio Grande culture was a local expression of the Mountain tradition (Black 1991). Research focusing on the interactions and mechanisms of interaction between different areas is needed. It is conceivable that the Archaic in northern New Mexico was actually derived from populations to the north, or more likely, that similar projectile point sequences are the result of complex interactions through time and across space and influenced heavily by changes in environmental conditions.

- What is the temporal sequence of prehistoric occupations in the study area?

(Guthrie et al. 1984:38) noted that reliable chronologies are needed for the mountains. This is still true for the Rio Grande drainage. Reliable local chronologies are not available for the San Luis Valley and surrounding mountains. Assignment of ages to projectile points and artifact assemblages is still accomplished by reference to sequences from other areas. Until local chronological sequences are built, it will be difficult to address many other research questions. The only Archaic radiocarbon ages in the study area are from the Blanca Wildlife Refuge (Jones 1977) and the Piedra Pass sites (Reed 1981a, 1981b, 1984). Additional dates, in association with artifact assemblages and subsistence remains, are needed. Radiocarbon sequences from other areas of Colorado indicate fairly consistent occupation of the Colorado mountains throughout the Archaic. Is this true of the San Juan and Sangre de Cristo mountains?

- What are the local subsistence economies and how did they change over time?

How were the San Luis Valley and surrounding mountains used to support prehistoric populations? What resources were exploited and when were these resources exploited? The Smithsonian Paleoindian excavations and the investigations at the Blanca Wildlife Refuge indicate that the floor of the San Luis Valley was at times an extensive wetland supporting marshland resources. Was the subsistence economy during the Archaic similar to wetland adaptations in the Great Basin (Janetski 1986; Janetski and Madsen 1990). Did climatic variations cause the wetlands to expand and contract over time? If so, how did Archaic populations react to these changes? How were the mountains exploited? Although it is likely that higher elevations were used only in the warmer months, how were the mid and lower elevation foothills used?

- What is the geomorphic context of Archaic sites in the study area?

An important variable in archaeological research is the geomorphic context of a site. Older sites are more likely to be damaged by wind and water erosion and thus are less likely to yield usable information. The geomorphic processes that affect sites over time are rarely addressed in local research. Button (1987:VII26-31) asserts that intact, buried deposits are rare in the sand deposits of the Closed Basin, but cautions that each site must be evaluated independently. The process of eolian-caused aggradation and deflation has probably served to destroy the integrity of many sites and preserve others. The geomorphology of sites within the Closed Basin has been examined somewhat but other areas in the context region have not received the same attention. Even though cultural deposits in mountainous areas are notorious for being shallow and frequently turbated, little has been done to explore site preservation in alluvial settings along streams or in many of the alluvial fans at the valley floor-foothill juncture. There are undoubtedly many areas of the context region where archaeological deposits have been preserved.

- What are the availability and distribution of lithic resources in the context region, and did the distribution of these resources affect settlement patterns?

The most frequently encountered material on Archaic sites is debitage from the manufacture of stone tools, and the tools themselves. The source of the stone used to make the tools is frequently used to help investigate settlement and trade questions. The key to using material sources as proxy data for settlement or trade questions is knowing where the material source area is located and whether the source was exploited prehistorically. A number of source areas have been identified in the San Juan Mountains and in the southern San Luis Valley (see section on lithic sources, this volume). The sources include several types of chert, obsidian, rhyolite, basalt, and quartzite. These materials occur in bedrock outcrops and in alluvial gravels. For the most part, source materials on the floor of the San Luis Valley are scarce, meaning that materials must be gathered from secondary deposits or the resources must be gathered from the mountains. Understanding the availability of material sources would help in estimating settlement areas, movement/trade patterns, and resource exploitation. There is also the question of usage of different materials over time. Finally, is the use of dark materials such as basalt and obsidian a valid observation for Archaic complexes in the Rio Grande Basin?

- What are the temporal context and function of the stone structures encountered in the context area and are Archaic housepits present in the basin?

Numerous stone structures have been recorded in the Open Basin and in the foothills on the western side of the San Luis Valley. Many of the structures are associated with Archaic projectile points and rock art that is attributed to Archaic styles. Late Prehistoric artifacts and rock art are also frequently present. Are these structures Archaic in age? Are these structures related to the stone structures found in southeastern Colorado (Kalasz 1989)? They have been hypothesized to be ceremonial and habitation structures. Why are some stone structures devoid of cultural material, while others are associated with many artifacts and other features? If these structures are Archaic in age, what does that mean in terms of settlement systems? Do Archaic-style house pits and pithouses exist in the basin? These features have been found in many other areas of Colorado, New Mexico, and Wyoming in an Archaic context.

- How are Archaic sites structured and is variation in site structure apparent across time and geographic area?

The arrangement of artifacts and features within the site can provide clues to the length of time a site was occupied and possibly the number of occupants on the site. Binford (1978, 1983) notes that activities around features such as hearths are patterned and that subsequent cleanup around hearths is also patterned. Sites which are occupied for minimal lengths of time by small task-oriented groups are relatively simple in structure. As sites are occupied for longer periods of time, they tend to become more ordered in ways visible in an archaeological deposit.

Data Needs for the Archaic Stage

The lack of investigations other than surveys in the context area means that almost any new data would be a contribution. The data needs listed below are some of the more pressing:

- Survey data from the Sangre de Cristo and Open Basin subareas. Little is known of these areas and survey data to identify site types and geomorphic/physiographic contexts would be an important contribution.
- Surveys in any portion of the basin designed to address site locations, site types, artifact and feature types, and environmental variables. Better use of GPS and GIS technologies would aid in this effort.
- Excavation data from both single-occupation and stratified sites in all subareas. These data include, but are not limited to radiocarbon dates, pollen and macrofloral remains, faunal remains, temporally and functionally diagnostic tools in association with datable features, site structure information, site formation studies, and taphonomic studies.
- Paleoenvironmental reconstructions. Soil and pollen studies need to be conducted at excavated sites in all of the subareas to aid in the reconstruction of paleoclimates. This is particularly important in studies of the wetland environments in the Closed Basin and the climate in the mountains during the Archaic.
- Identification of lithic source areas and better descriptions of source materials. Any obsidian materials, whether found on survey or in excavations, need to be submitted for source analysis.
- Geomorphological studies to determine potential site locations and information related to site preservation and destruction.
- Dates for the rock art and stone structures found in the Open Basin and foothills of the San Juan Mountains. These rock art panels and features frequently contain motifs and materials that are similar to both Archaic and Late Prehistoric styles.
- Reanalysis of older collections such as those made by DU in the 1940s and analysis of private collections. Downing (1981) examined a sample of the Renaud material, but many recorded site assemblages in the Rio Grande Basin are still unexamined. Many of these sites are key to understanding the prehistory of the area, but they have not been investigated using modern theory and methods. Analysis of private collections can be used to determine the geographic distribution of projectile points and other tools.

LATE PREHISTORIC/CERAMIC STAGE

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Definition of the Late Prehistoric/Ceramic Stage

Guthrie et al. (1984) notes that Willey and Phillips' (1958) Formative stage definition includes the presence of agriculture, or any other subsistence economy of comparable effectiveness, that is successfully integrated into well-established, sedentary village life. According to this definition, the Rio Grande Basin has no real Formative stage. However, based on the number of sites that contain Formative stage traits identifiable from other cultural areas, especially the Southwest, the area was influenced by Formative groups from surrounding geographical areas.

As noted in the Archaic stage discussion, the date of transition between the beginning of the Late Prehistoric stage/Ceramic stage and the end of the Archaic in the Rio Grande Basin is not known. It seems possible that in most areas of the Rio Grande Basin, an Archaic hunting and gathering lifestyle probably continued through the Late Prehistoric even though certain traits, generally thought to be indicative of this period rather than of the Archaic, are found at a number of cultural resource locations. No sites within the Rio Grande Basin have chronological data that could be used to suggest a reliable beginning date for the Late Prehistoric stage.

For the purpose of this discussion, a date of ca. A.D. 500 is considered the beginning of the Late Prehistoric stage, although it should be made clear that this date is arbitrary. The end of the Late Prehistoric is easier to define. The Late Prehistoric stage can be considered to end in the Rio Grande Basin at approximately A.D. 1600, when Spanish contact and influences can be verified by historic accounts.

Late Prehistoric/Ceramic Stage Lifeways

Although a formal "Formative stage" lifestyle with the presence of agriculture and sedentary villages, as described by Willey and Phillips (1958) does not appear to have occurred within the Rio Grande Basin, some modified levels of horticulture may have been possible. The average growing season today in the area is relatively short (ca. 120 days), but certain protected microclimates may have supported limited agriculture during the Late Prehistoric that could have been supplemented by traditional hunting and gathering. Just south of the Rio Grande Basin, along the foothills of the Sangre de Cristo Mountains in northern New Mexico, there is evidence for semisedentary and possibly sedentary Apache occupation during the Late Prehistoric and later temporal periods (Stuart and Gauthier 1981). Perhaps this scenario should not be eliminated from consideration in the Rio Grande Basin until evidence to the contrary has been verified. Even though total dependence on agriculture probably did not occur in the Rio Grande Basin, use of the area or influences (trade) by formative groups to the south, east, and west are evidenced by the occurrence of ceramics, corn, and possibly by projectile point styles. A detailed discussion of ceramics in the Rio Grande Basin is included in Special Topics, this volume.

Archaeologically, this stage is normally considered to be associated with a change in projectile point sizes, which is thought to be the result of the introduction of the bow and arrow. Projectile points are generally much smaller than Archaic styles and include both side- and corner-notched varieties. Some of the points also exhibit basal notches. A preliminary analysis of tool stone materials commonly found associated with these point styles within the Rio Grande Basin suggests that chalcedony, chert, and obsidian were the most commonly utilized tool stone materials for projectile points during this temporal period. Quartzite and basalt were apparently used less frequently (see lithic procurement discussion, this volume). Other associated artifact types found within the Rio Grande Basin often include ground stone and fire-cracked rock.

Ceramics also appear during this time period, but if and how their use actually affected settlement and subsistence within the Rio Grande Basin are not known. Hunters and gatherers could have carried limited numbers of ceramics with them on their seasonal rounds, so their existence at numerous site locations does not necessarily imply even a limited horticultural, sedentary lifeway.

One of the significant questions concerning lifeways during the Late Prehistoric stage within the Rio Grande Basin centers around the questions of wetland adaptations. Information from several researchers (Button 1987; Burns 1981; Jones 1977) is suggestive of population increases and/or intensive adaptation to wetland environments within the Closed Basin during the end of the Archaic and during the majority of the Late Prehistoric stage. The numbers of Late Prehistoric stage sites found in association with the existing and prehistoric locations of wetlands is obvious when examining site distributions near the San Luis, Mishak, and Russell lakes and adjacent areas. Questions regarding the adaptation to wetlands in the Rio Grande Basin are similar to those in the Great Basin (Janetski and Madsen 1990) and include those such as how use of wetlands affected demography and settlement/subsistence patterns.

Exactly when the Utes arrived in Colorado and other portions of the west is an ongoing topic of discussion, and theories of expansion of Numic groups are many (Madsen and Rhode 1994). Reed (1994:188) discusses the artifact types and features that are traditionally attributed to Numic Groups in western Colorado and eastern Utah, including side-notched and triangular points, Shoshonean knives, wickiups, culturally peeled trees, and brown ware ceramics. Many of these artifact and feature types are found at sites within the Rio Grande Basin and are often attributed to the Late Prehistoric or Protohistoric stages. If and when these defined Ute traits can actually be verified as attributable to Ute groups within the Rio Grande Basin is not clear. Reed's (1994) data suggest that the appearance of brown ware ceramics in the archaeological record at ca. A.D. 1100 may indicate Numic expansion into eastern Utah and western Colorado at that time, or at least the manufacture of these ceramics at that time. If this is true, it would be logical to assume that Utes would have been in the Rio Grande Basin sometime after A.D. 1100.

Late Prehistoric/Ceramic Sites by Subarea

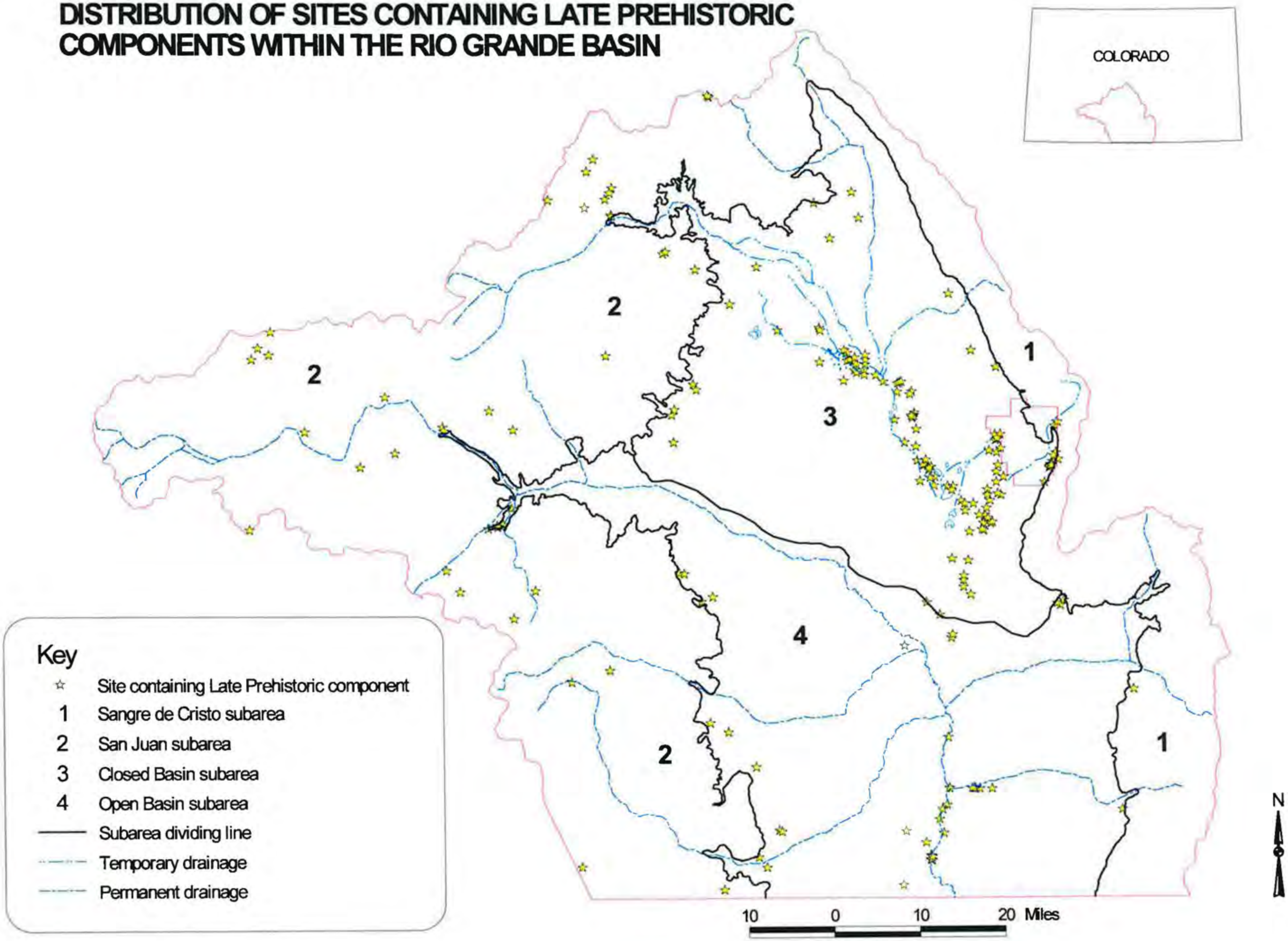
A discussion of the existing site database for resources affiliated with the Late Prehistoric stage is included below by subareas. Site types assigned to this time period in the OAHP database include open lithic scatters, open camps, sheltered and open architectural camps, rock art, butchering sites, ceramic scatters, burials, quarries, and various architectural features such as stone enclosures, stone circles, game blinds, and stone alignments. Figure 6-29 depicts locations of the Late Prehistoric stage sites within the Rio Grande Basin. The following discussion is based on information obtained from OAHP site forms unless otherwise cited.

Sangre de Cristo Subarea

The Sangre de Cristo subarea contains the fewest Late Prehistoric resources of all the subareas. The southern half is privately owned and only one resource, an isolated Late Prehistoric stage projectile point, has been formally documented in the area. Undoubtedly, this area contains many additional undocumented sites that are likely to date to the Late Prehistoric stage.

FIGURE 6-29

DISTRIBUTION OF SITES CONTAINING LATE PREHISTORIC COMPONENTS WITHIN THE RIO GRANDE BASIN



The northern half of the area is included within the RGNF, but in general, is very steep and rugged, and only one isolated find has been officially recorded within this portion of the Sangre de Cristo subarea. This resource is located on the eastern edge of the Great Sand Dunes National Monument. The Sangre de Cristo subarea includes Medano and Mosca passes, both of which would have provided easy access to the eastern Plains. In addition, this area is just above the boundary between major ecological zones: the mountains to the east and the pinyon/juniper and sagebrush/grassland communities to the west. The lowest elevations of the area would have been an ideal location to procure the maximum available flora and fauna from both ecosystems. Water would have been readily available from Medano and Mosca creeks as well as from nearby springs. It is likely, then, that additional, undocumented Late Prehistoric stage resources exist within this subarea.

San Juan Subarea

Late Prehistoric sites within the San Juan subarea are widely dispersed, with the largest number located along the upper Rio Grande drainage corridor, and also several sites are located along major tributaries of the Rio Grande including Conejos Creek, South Fork, and Embargo Creek. The majority of the sites appear to be open lithic scatters, with a few open camps, two stone circle sites, one rockshelter/rock art site, and two chert quarry sites. At least 11 sites containing ceramics are also located within this area. A large percentage of the sites within the San Juan subarea have been recorded during compliance surveys for the RGNF.

The open lithic scatters within the San Juan subarea usually contain flakes, occasional tools, and one or more small corner- or side-notched points. The two stone circle sites include 5SH325 (one circle) and 5SH354 (30 circles). Both sites are located south of Saguache Creek in the northern portion of this subarea. Site 5SH1499 is a complex site containing two rockshelters, five rock art panels, a small corner-notched point, and numerous additional lithic artifacts. It is located north of Saguache Creek and east of Cochetopa Pass. The chert quarry sites (5SH1113 and 5SH1114) are both located on the Continental Divide southwest of Poncha Pass. Site 5SH1113 contains green chert and 5SH1114 exhibits gold, brown, and green cherts.

One especially significant site is 5SH903, a probable kill/processing site located on the northwestern edge of the valley. This site was tested by Spero (1982n) and a 1 x 1 m unit contained an incredibly rich deposit of artifacts including projectile points and other tools and flakes, red ocher, a quartz crystal, numerous pieces of burned and unburned animal bone, charcoal, and faunal remains. The projectile point styles suggest affiliation with the Late Prehistoric/Protohistoric stages. Based on the amount of materials in a datable context, site 5SH903 could have significant potential to help build a local chronology for this temporal period, as well as add a great wealth of data on subsistence strategies.

Examples of ceramic sites within the San Juan subarea include 5CN784, containing seven sherds (glazed ware and biscuit ware), a bone awl, and one flake; 5HN104 with 12 Black-on-white sherds (similar to McElmo/Mesa Verde Black-on-white designs); 5ML233, with four unidentified ceramic fragments, ground stone, several lithic tools and bone; and 5ML30 and 5RN55, containing fragments of globular vessels described as Ute. Additional sites containing ceramics include 5SH264, with micaceous ceramics similar to Taos or Apachean, ca. A.D. 1550-1890; 5CN789, containing fragments of a seed jar similar to Regressive Pueblo ware, ca. A.D. 1300-1700; and 5CN821, containing fragments of a culinary vessel with micaceous temper, similar to Pueblo types dating from A.D. 1000 to 1200 (OAHP site files; Rohn 1982).

Site 5SH1458, the Saguache Shelter, is located west of the town of Saguache and was excavated by C. T. Hurst in 1939 (Hurst 1939). Before excavation, it exhibited a number of low rock walls on the surface. Excavation of the entire rockshelter produced a large number of artifacts including pottery, corn, turkey feathers, bone, ground stone, animal hair, various stone tools and flakes, bone beads, coiled basketry, animal bone, fiber and hafting material, turquoise, an arrow foreshaft, a stone fetish, and line and turkey track petroglyphs. The projectile points consisted of small corner-notched points. Lithic material types were described as jasper, chert, agate, quartzite, andesite, flint, obsidian, moss agate, chalcedony, and opal (Hurst 1939:59). Hurst describes the site as Ute; however, no absolute dates were obtained. The cultural materials are suggestive of Late Prehistoric and later occupation, especially Pueblo influences based on the pottery, corn, and turquoise.

Corn has also been reportedly recovered at another site located in the eastern portion of the Rio Grande Basin in the foothills below Blanca Peak (Gadd 1985). The site context for this discovery is not known.

Closed Basin Subarea

The largest number of Late Prehistoric sites has been recorded within the Closed Basin subarea. Most of the sites are clustered along San Luis Creek, especially in the vicinity of the San Luis Lakes and along the lower portions of Saguache Creek. Additional clusters of sites are located along the eastern edge of the Great Sand Dunes National Monument in the vicinity of Medano and Mosca creeks. Another small group of sites is clustered in the foothills transition zone on the western edge of the subarea, north-northeast of Del Norte.

Site types represented include open camps, open lithic scatters, open and sheltered architectural sites (stone circles and rockshelters), and rock art. By far, open camps are the most prevalent site type in the area.

The largest and most dense cluster of sites is located in the vicinity of the San Luis Lakes in the area generally west and southwest of the Great Sand Dunes National Monument. This area has more than 25 large and complex open camps, many of which are multi-component. For example, several sites (5AL29, 5AL93, 5AL94, 5AL99, 5AL113, and 5AL123) contain projectile points comparable to Paleoindian through the Late Prehistoric styles found elsewhere. Several additional multi-component open camps (5AL8, 5AL95, 5AL98, 5AL105, 5AL107, 5AL108, 5AL109, 5SH178, 5SH181, and 5SH348) contain projectile point styles suggestive of Archaic through Late Prehistoric occupation. These sites often contain extensive evidence of utilization and probable reuse including large numbers of ground stone artifacts, fire-cracked rock, and lithics artifacts. Many are located in dune blowouts and adjacent to playas. These site locations are suggestive of a lacustrine adaptation.

Six sites in the San Luis Lake vicinity contain ceramics, some with identified ties to the south and east: 5AL8 (unidentified), 5AL29 (plain gray ware), 5AL146 (one cord-marked), 5AL153 (two unidentified plain wares and one B/W of probably Pueblo III affiliation), 5AL154 (three Taos Incised), 5SH178 (an unidentified red sherd), and 5SH181 (an unidentified sherd).

The area on the east side of the Great Sand Dunes contains several open lithic scatters and open camps. Two of the sites contain ceramics. Site 5SH309 contains corrugated sherds, one incised sherd and one unidentified bowl fragment; and 5AL405 contains several sherds of an unidentified plain ware.

The lower Saguache Creek area also exhibits evidence of extensive utilization similar to the San Luis Lakes area to the southeast. Site types include open camps and open lithic sites, with open camps being the most numerous. Many of the sites contain evidence of multiple occupation from Paleoindian to Late Prehistoric. Two sites contain ceramics (5SH967 has four cord-marked sherds and 5SH976 has 15 plain ware sherds).

The site types located in the foothills in the western portion of the Closed Basin subarea include open architectural, sheltered architectural, and rock art. Site 5SH50 contains one stone circle. Site 5SH1492, 5SH1494, and 5SH1495 all contain rockshelters, rock art panels, various lithic artifacts including projectile points, and ground stone.

Open Basin Subarea

The Open Basin subarea is also relatively unknown for the Late Prehistoric primarily due to the large amount of private land and the lack of formally recorded sites. Several of the sites were found in the 1930s and 1940s by Renaud (1933, 1946) and are located along the Rio Grande and just to the east along Culebra Creek. Several additional sites are located on the west edge of the Open Basin north of the Conejos River (northwest of the town of Antonito). Overall, the types of sites located in this area seem to be more varied than those within the San Juan subarea. Site types include lithic scatters, open camps, and an architectural site with a dry-laid stone enclosure. Three of the four open camps contain ceramics and are located along the Rio Grande/Culebra Creek area. Site 5CT145 contains 17 plain brown ware sherds and 8 Pueblo-type polished or slipped gray ware sherds, a quartzite disk, ground stone, flakes, and side- and corner-notched points. Site 5CT151 contains 11 sherds, an unidentified projectile point, and ground stone. Site 5CT168 has one micaceous sherd, numerous pieces of ground stone (11 metates and 3 manos) and other lithic tools and debitage.

Evaluation of the Database

As with the Archaic stage resources, most of the data for the Late Prehistoric/Ceramic stage within the Rio Grande Basin is based solely on surface inventory, and the quality of data is oftentimes marginal, at best. Most of the site forms provide basic descriptions of the materials on the site but little in the way of interpretive data. Projectile points and other potential diagnostics such as ceramics are often not analyzed or illustrated, making chronological interpretations questionable. As with the Archaic site descriptions, the geomorphological context of the sites is rarely described in enough detail to be useful to interpret the site or make significance statements regarding potential for obtaining additional data through excavation.

The existing survey data are obviously biased to some extent because surface inventories have been conducted extensively in some areas (portions of the Closed Basin and certain areas of the San Juan subarea) whereas other areas, such as the Open Basin and Sangre de Cristo subareas, have few if any formally surveyed areas.

An examination of the existing database for sites listing affiliation with the Late Prehistoric indicates that nearly all of the sites are "dated" through projectile point comparisons with other nearby areas. For example, a site has often been considered Woodland or Pueblo-like based on one or two projectile points styles with no absolute dates or other supporting data. This points to the major need for obtaining well-dated local projectile point chronologies for the Rio Grande Basin for the Late Prehistoric.

Late Prehistoric Stage Research Questions and Data Gaps

Guthrie et al. (1984:51-52) identified several critical research domains for the Formative/Ceramic period including the issue of indigenous populations versus influence and/or utilization by groups from outside the area, and subsistence strategy questions relating to continuance of an Archaic lifestyle for the Late Prehistoric stage. These general research topics are still applicable.

Obviously, the lack of subsistence, chronological, and technological data from excavations or other focused studies is a significant data gap for the Late Prehistoric stage. Because the data from the surface surveys are primarily descriptive in nature, analysis and interpretation of excavation data would add much needed substance to the overall database for the Late Prehistoric stage.

Several general and specific research questions are relevant to the Late Prehistoric in the Rio Grande Basin:

- When did the transition between the Archaic and Late Prehistoric occur in the Rio Grande Basin? Dating of sites containing ceramics, small points, and/or corn or other cultigens would be important for identifying this transition.
- How and/or did the use of the bow and arrow and other traditionally used trait markers for this period affect subsistence strategies or relate to changes in the subsistence record in the Rio Grande Basin?
- Can cultural affiliation such as Ute and Apache be assigned to specific sites dating to this temporal period and if so, what artifacts or set of characteristics are the best indicators?
- How did Formative stage groups influence the archaeology in the Basin? Was it primarily through trade or did these groups from the southwest and east actually utilize the area as well? Can the type of influence (trade or direct use or a combination of both) be determined archaeologically?
- Did indigenous groups or others live year-round in the Rio Grande Basin during the Late Prehistoric? If so, where did they come from and when?
- Was horticulture practiced at any level within the Rio Grande Basin during the Late Prehistoric or were corn and other cultigens traded or taken from other areas? Climatically, which areas of the Rio Grande Basin would have had the best potential to support horticultural practices?
- What does variation in tool stone utilization mean in relation to subsistence patterns and use of the Rio Grande Basin during the Late Prehistoric?
- When did the transition to the Protohistoric stage occur and were the Utes the primary inhabitants of the Basin at that time, as suggested by early historical references?
- Does any archaeological evidence suggest population increases at any time during the Late Prehistoric? This has been suggested by Burns (1981) and others, but verifiable supporting evidence is necessary to fully substantiate this hypothesis. Sites attributable to the Late Prehistoric stage appear to be numerous within the Rio Grande Basin but are they perhaps just more visible or better preserved than other components?

- How did climatic conditions affect aboriginal subsistence patterns during the Late Prehistoric? Did the existence and utilization of wetlands increase in the Rio Grande Basin during the Late Prehistoric? If so, how did they affect demography, subsistence, and regional influences?

- Do any geographical/regional differences occur in settlement/subsistence patterns in the Rio Grande Basin during the Late Prehistoric?

- When did Utes first enter the area and how did their lifestyle change by the beginning of the Protohistoric stage?

- How did use of the Rio Grande Basin during the Late Prehistoric compare or differ from use in the Southwest, Rocky Mountains, Plains, and Great Basin? Stiger (1998) discusses issues such as environmental change and patterns of cultural change over large-scale regions based on his work in the upper Gunnison Basin. With the exception of projectile point comparison, little work has been focused on comparing the Late Prehistoric stage cultural processes within the Rio Grande Basin to those of surrounding regions. For example, how do the sites and cultural patterns in the Rio Grande Basin compare overall (not just the point styles) with sites described as part of the Oshara tradition such as the Armijo and En Medio Phases described by Irwin-Williams (1973:9-13)? A larger and more refined database is needed for the Rio Grande Basin to begin to better understand topics such as local and regional cultural patterns and change during the Late Prehistoric.

Data Needs for the Late Prehistoric Stage

Several types of data are necessary to answer these research questions:

- A basic data need is to excavate, date, and compare sites that contain a variety of associated artifacts, features, and subsistence data. As shown by Stiger (1998) at the Tenderfoot site, these data can be obtained from sites that do not necessarily contain deeply stratified remains. For example, some of the intensively utilized areas around the San Luis Lakes may contain a wealth of chronological, subsistence, and technological information in fairly shallow deposits.

- Development of a local chronology based on absolute dates rather than on general comparisons with data from other regions is crucial to interpretation of this temporal period. In the past, comparisons of projectile points from certain nearby areas may have resulted in major biases toward the interpretation of connections with or influence from these areas. Other areas with similar styles of artifacts often have not been discussed or considered when analyzing projectile points. Future research should be directed toward recovery of subsistence data and obtaining absolute dates from well-defined, stratified sites or single-component sites such as 5SH903, and development of a local chronology based on the results of this work.

- Development of additional paleoenvironmental reconstructions and analysis of existing paleoenvironmental information are significant goals to help understand subsistence, demography, and culture change/adaptation during the transition between the Late Archaic and the Late Prehistoric. Additional climatic data would help to support or refute the idea that an increase in moisture resulted in a significant increase in the distribution of wetlands in the area, especially the Closed Basin, during the end of the Late Archaic and into the Late Prehistoric.

- Another avenue for future research is to reexamine existing collections of artifacts. Although several of the early sites excavated by Hurst and Renaud did not yield absolute dates, the artifact collections are significant and could be reexamined and analyzed with current methods to further define the cultural processes that occurred during the Late Prehistoric. Collections from amateurs are another source of potential data, especially for the areas of the Rio Grande Basin where little to no formal archaeological research has been conducted.

- Additional, quality survey data are needed from all of the subareas, but especially from the Sangre de Cristo and Open Basin areas to identify the full range of settlement/subsistence patterns and trends during the Late Prehistoric within the Rio Grande Basin. These data should focus on identification of site locational data, site types and functions, lithic sources utilized, and intra- and intersite patterning.

- Additional studies of lithic sources for tool stone materials utilized during the Late Prehistoric are important to understanding local and regional settlement and subsistence patterns. It is not known if chronological or regional differences exist in tool stone use in the Rio Grande Basin. For example, current data suggest that quartzite and basalt were utilized less frequently for certain tools during the Late Prehistoric. If this is true, what are the explanations for this variation from other temporal periods?

- Ceramics found within the Rio Grande Basin need to be dated, described, analyzed, and compared to known dated types in other nearby areas. Ceramics should be collected from all sites for comparative analysis. Collection and detailed analysis is necessary because of the scarcity of ceramics in the Rio Grande Basin and our lack of knowledge regarding regional influences and local technological patterns related to ceramics.

PROTOHISTORIC STAGE

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Protohistoric Stage Definition

The Protohistoric stage was defined by Guthrie et al. (1984:7) as "a Post Formative Archaic Stage." Because there was probably no true Formative stage in the Rio Grande Basin, this definition is not particularly relevant for this area. Perhaps in the future, a more appropriate definition can be applied specifically for this temporal period in the Rio Grande Basin that would be indicative of the end of the Late Prehistoric stage and the beginning of Spanish contact and influences.

Archaeologically, the Protohistoric stage is usually characterized by Euroamerican trade goods including guns, metal projectile points, and other metal items such as knives and cooking pots; flaked glass artifacts; glass beads; horse trappings; small side-notched, corner-notched, and unnotched points used with the bow and arrow; wickiups; culturally peeled trees; Uncompahgre brown ware ceramics; and rock art exhibiting horses and riders.

Protohistoric Lifeways

In general, it appears at present that a hunting and gathering lifestyle continued in the Rio Grande Basin throughout the Protohistoric stage until the removal of Indians to the reservations in the late 1800s.

The Spanish from New Mexico had made documented expeditions into the San Luis Valley by 1684 (Espinosa 1939:81) and it is likely that earlier contacts had been made prior to this time. Perhaps the most obvious direct result of this contact was that the Rio Grande Basin inhabitants were able to obtain horses. Utes are likely to have acquired horses from the Spanish around 1640 (Ewers 1980:3). Exactly how the horse changed settlement and subsistence patterns is not known, but it can be surmised that the potential occupational range for any one group would have been greatly increased. When and to what degree the Rio Grande Basin inhabitants obtained other Euroamerican trade goods is not known, but Ute bands occupying southern Colorado were known to have had long-standing trade relationships with the Pueblos in the Rio Grande Valley in northern New Mexico by the late 1500s. It is likely that Ute-Spanish trade probably began to develop during the earliest settlement years (Conner et al. 1980).

Based on historical references, it appears that several identifiable cultural groups lived in and/or utilized the Rio Grande Basin during the Protohistoric (Meyers 1950), including the Ute, Comanche, Apache, Navajo, Arapaho, Cheyenne, and northern Pueblo (Taos, Tewa, and Tesuque). Other more distant groups may also have visited the area but there is no evidence to identify specific cultural affiliation with potential sites or artifacts. Utes are traditionally referred to as the primary inhabitants of the San Luis Valley based on the earliest written documentation by the Spanish through the late 1800s. For example, Utes and Apaches apparently joined forces in 1779 to help Juan Bautista de Anza fight the Comanches, who had come into the area from the south (Meyers 1950:26). The Mouache band of the Utes reportedly ranged along the eastern slope of the Rockies, the San Luis Valley, and south almost to Santa Fe, New Mexico (Crum 1996:138). The Kapote band also utilized the San Luis Valley and ranged into northern and central New Mexico.

According to older residents of the southern San Luis Valley, Navajos often came into the southern part of the valley to hunt and trade prior to the Civil War (Meyers 1950:78a). Other historical references state that during the early 1800s, several Pueblo groups such as the Tesuque and Tewa would come into the Valley in the late summer and fall to hunt bison, deer, antelope, and elk (Meyers 1950:78a). This tradition of hunting by the northern Pueblo groups extended at least until the 1880s, when Indians from the northern Pueblos reportedly rode the train into the San Luis Valley to hunt in the Mogote area in the vicinity of the Conejos River (Meyers 1950:78a). Jicarilla Apaches from the vicinity of Dulce, New Mexico, reportedly traveled to Blanca Peak even into the 1930s (Hansen 1974).

Exactly what kind of relationship all of these groups had with each other and the Utes who reportedly controlled the area is not known. Most of the historical references to activities during the Protohistoric/Historic stage seem to be focused on the battles that occurred. What kinds of interaction (e.g., trade, intermarrying) that went on between these times of conflict is unknown.

Assuming that the Utes were the primary occupants of the Rio Grande Basin during the Protohistoric stage, questions about when and where they came from are still under discussion (Madsen and Rhode 1994), and theories of expansion of the Numic groups are many and varied. Reed (1994:188) discusses the artifact types and features that are traditionally attributed to Numic groups in western Colorado and eastern Utah, such as Desert side-notched and Cottonwood Triangular projectile points, Shoshonean knives, wickiups, culturally peeled trees, and brown ware ceramics. Reed (1995:120-128) and Madsen and Rhode (1994:188) suggest that brown ware sherds may be the most reliable archaeological indicator of Numic groups.

Detailed discussion of the archaeology of Ute sites in Colorado is found in *The Archaeology of the Eastern Ute: A Symposium* edited by Nickens (1988). It is clear from these articles that defining identifiable Ute traits is a complex issue. Stiger (1998) also addresses the problems involved in identifying ethnic trait markers and questions the traditional approach of reconstructing social relationships to define cultural/ethnic traits. In the Rio Grande Basin, a Ute affiliation has been applied to various site types and sites containing certain artifacts. Specific site types assigned as Ute include wickiups, tree platforms, culturally peeled trees, rock art with certain stylistic form and/or depictions of firearms and horseback riders. Artifacts often used to indicate Ute affiliation include small side- and corner-notched and some basally notched points, metal projectile points or other tools such as knives, flaked or utilized glass artifacts, glass beads, plain brown ware or Uncompahgre brown ware ceramics, and game traps. Although these attributes may not be totally reliable (see Reed [1995] and Stiger [1998]), they are included until further research for this area can provide more evidence to suggest whether they be retained or deleted as indicators of Ute occupation of the Rio Grande Basin.

Although other culturally distinct groups, such as the Apache, Navajo, and Comanche, have been documented historically as using the Rio Grande Basin during the Protohistoric stage, no sites in the database have been specifically assigned to these groups.

Protohistoric Sites by Site and Artifact/Feature Type

Based on OAHP site files, 51 Protohistoric sites exist within the Rio Grande Basin (Figure 6-30). Examples of likely Protohistoric sites are discussed below. A detailed discussion of ceramics and culturally peeled trees is included in Special Topics, this volume.

Wickiup sites include 5SH242 (Nickens 1979), the Elk Track War Lodge, located along Old Cochetopa Pass within the San Juan subarea (Figure 6-31). This structure was first

FIGURE 6-30
DISTRIBUTION OF SITES CONTAINING PROTOHISTORIC COMPONENTS WITHIN THE RIO GRANDE BASIN

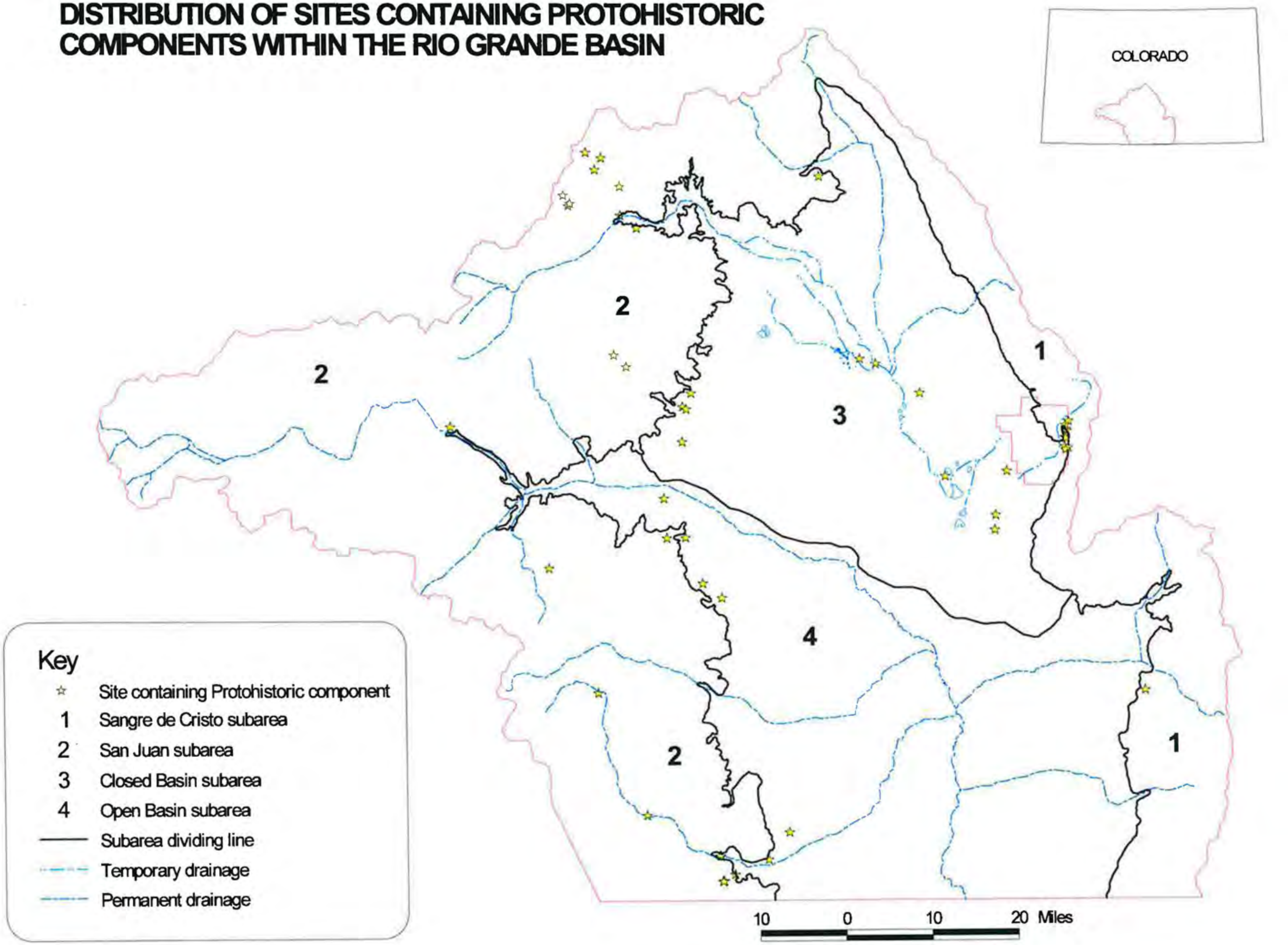

Figure 6-31. Wickiup site 5SH242, the Elk Track War Lodge. Photograph taken in 1976 by Marilyn Martorano prior to removal of lodge.

documented and photographed by the Huschers in the 1930s or 1940s (Terry and Gilchrist 1988:213), and officially recorded as a site by Forest Service archaeologists Marilyn Armagast (now Martorano) and Vince Spero in 1976. It was subsequently documented in detail and disassembled by the RGNF and OAHP in 1978 (OAHP site form), and is now part of an interpretive exhibit at the Ute Indian Museum in Montrose, Colorado. The wickiup was conical and consisted of more than 70 aspen poles, with spruce or pine bark around the base of the structure. The structure was large, approximately 3 m in diameter on the outside, and exhibited a doorway facing west. No artifacts were observed but there was evidence of a hearth in the center of the structure. No date was obtained for the structure, although based on the excellent condition of the poles, it was estimated to be less than 200 years old. Two additional wickiups were reported in the area by the Huschers but have not been relocated. Another site, containing at least one free-standing wickiup, has been reportedly located in a remote area north of the Great Sand Dunes National Monument (Stuart Snyder, personal communication 1998).

Although conical timbered structures (wickiups) are often considered to be affiliated with the Ute, research has shown that while wickiups date to the known Ute period of occupation, assignment of cultural affiliation to a wickiup such as 5SH242 would be questionable (Scott 1988). This would be especially true in the Rio Grande Basin because of the large number of historically documented ethnic groups known to have occupied or utilized the area during the Protohistoric stage.

Remains of free-standing wickiups are easy to identify, but wickiups described as lean-to styles that often consist of a few poles or branches laid against a standing tree (Scott 1988:47) are harder to recognize in the field. This type of wickiup has not been formally identified within the Rio Grande Basin, yet it is likely to exist and may be found when areas are examined more carefully with these types of potential structural remains in mind.

Culturally peeled trees are another resource type that may be unnoticed during normal eyes-to-the-ground surveys. These resources should be expected in any elevational zones containing ponderosa pine. Additional descriptions and research questions are included in the culturally peeled tree section of Special Topics, this volume.

Additional sites contain various traits normally affiliated with the Protohistoric. Several sites (including 5SH267, 5SH336, 5SH374, and 5CN100) contain utilized and/or flaked glass artifacts. A metal projectile point was recorded at 5SH1214 in the San Juan subarea east of North Pass, and Martorano (personal communication 1999) reported an isolated metal point that was found in the San Luis Hills of the Closed Basin subarea. Glass beads have been recorded at 5RN11 in the Open Basin subarea on the west edge of the valley, north of the Alamosa River. This site contains a burial, rock art, shell and glass beads, flakes, and an unidentified ceramic fragment. Several sites containing Ute-style rock art are located in the foothills transition zone north of Del Norte in the San Juan subarea (5SH51, 5SH1458, 5SH1477, 5SH1492, 5SH1496, and 5SH1497) and several additional sites include 5RN179, 5RN330, 5RN492, 5RN497, and 5RN523. Other sites with Ute style rock art include 5RN179 and 5RN330 in the San Juan subarea south and southwest of Del Norte, and 5RN492, 5RN497, and 5RN523 in the Open Basin subarea southeast of Del Norte. Site 5SH5 contains a lithic scatter and possible game trap attributed to Ute occupation, and is located on the boundary between the San Juan and Closed Basin subareas, south of Saguache Creek.

Plain brown ware ceramics have been recorded on a number of sites within the Rio Grande Basin (see ceramic section in Chapter 7, Special Topics), but in most cases they have not been described or studied in a detail. Based on existing descriptions, comparisons to described Ute types of ceramics (see Reed 1995:122-124) are not possible for most ceramic resources.

Evaluation of the Database

As with the Late Prehistoric stage and the Archaic stage resources, the majority of data for the Protohistoric stage within the Rio Grande Basin is based solely on surface inventory, and the quality of data is oftentimes marginal. Most of the site forms provide very basic descriptions of the materials and features on the site, but very few sites have absolute dates for any of the artifacts or features assigned to this temporal period. Proper descriptions and mapping of features such as game traps and wickiups are vital for site interpretation and for making site significance statements for this time period. As noted in the pertinent sections of Chapter 7, Special Topics, complete analysis of ceramics and culturally peeled trees is also crucial for future comparative analysis of traits that are indicative of the Protohistoric stage in the Rio Grande Basin.

The existing survey data are obviously biased to some extent because surface inventories have been conducted extensively in some areas (portions of the Closed Basin subarea and certain areas of the San Juan subarea), whereas other areas, such as the Open Basin and Sangre de Cristo subareas, have few if any formally surveyed areas. A better sample of sites from each subarea would also be helpful for comparative analysis of regional influences and adaptations.

Protohistoric Stage Research Questions and Data Gaps

Guthrie et al. (1984) identify three major research domains for the Protohistoric stage:

- A critical problem is whether known cultural groups of the Protohistoric stage can be identified archaeologically.
- A second research domain is a range of questions regarding indigenous populations, demography, and influence and/or use of the area by groups from other regions.
- The third area of research includes the topic of contact period sites and such questions as changes in technology and social organization during this time, and how to identify contact period sites archaeologically. Horn (1999) discusses some of the issues involved in the identification and interpretation of artifacts traditionally thought of as indicating non-Native American groups (e.g., tin cans and other metal, buttons, glass, etc.) as artifacts also utilized and reused during the Protohistoric stage by Native American groups such as the Ute.

These research questions are all still relevant today. Additional and related research questions applicable to the Protohistoric stage in the Rio Grande Basin are listed below:

- When did the transition between the Late Prehistoric and the Protohistoric really occur within the different geographical areas of the Rio Grande Basin?
- How did settlement and subsistence change after the horse was adopted into the lifestyles of the prehistoric occupants within the different geographical areas of the Rio Grande Basin?

- Can cultural affiliation such as Ute and Apache be assigned to specific sites dating to this temporal period? If so, what artifacts or set of characteristics are the best indicators?

- Did climatic conditions affect prehistoric settlement and subsistence in the Rio Grande Basin during this temporal period? For example, are certain artifacts or features such as culturally peeled trees indicators of environmental stress?

- How did interregional interaction affect the inhabitants of the Rio Grande Basin during the Protohistoric stage? The Rio Grande drainage is unique because of the amount of early influence from Spanish exploration and from early Hispanic occupation, but the possible effects of this contact on the aboriginal inhabitants and in the archaeological record have yet to be identified and researched.

- What was the extent of Native American use of the Rio Grande Basin (especially northern Pueblo groups) after the 1870s when the Utes were officially removed from the area, and how did this affect the archaeological record?

Data Needs for the Protohistoric Stage

Several types of data are necessary to answer these questions for the Protohistoric:

- A basic data need is to date sites that contain a variety of associated artifacts, features, and subsistence data associated with the Protohistoric stage. Culturally peeled trees are one of the few Protohistoric resources that have been dated and they provide a small glimpse of Protohistoric lifeways in the Rio Grande Basin. Protohistoric sites containing artifacts or features that have potential to provide chronological, subsistence, and cultural adaptation data would be considered especially important to address the known research gaps.

- Future work for the Protohistoric stage should also be directed toward historic archival research and continuance of Native American consultation efforts. A wealth of information is available from these additional sources of data for this time period and should be viewed as potentially important sources of information. These data will help to define what cultural groups utilized the Rio Grande Basin during the Protohistoric stage, how these various groups interacted with each other and with groups outside the region, and how the archaeological remains for this time period can identified and interpreted. Using historic and ethnographic data and information from Native American consultation in combination with archaeology will help to understand the complex cultural processes that occurred in the Rio Grande Basin during this temporal period. New ideas to explain site patterning and variability, among others, may result from future research.

- As with the earlier temporal periods, additional quality survey data are necessary for the Protohistoric stage. It is especially important to obtain detailed descriptions of features and artifacts that are dated to this period and to obtain information from all of the subareas. This will help define how the area was utilized geographically when certain types of artifacts and trade goods became commonly available to area residents or visitors, and to what extent and how other nearby Native American groups or non-natives (e.g., Spanish and Euroamerican explorers, settlers, miners) influenced lifestyles in the Rio Grande Basin.

- Paleoenvironmental and climatic data exist for certain areas of the Rio Grande Basin, such as the eastern edge of the Closed Basin. These data need to be compared to Protohistoric sites such as the culturally peeled trees to search for potential cultural patterns relating to climatic changes. A similar study by Stuart and Gauthier (1981) compared climatic data based on tree-ring dates with historically known events such as raids, epidemics, and starvation related to Apache groups. Most of the Apache raids, for example, appeared to correlate with periods of drought. Perhaps similar correlations of cultural events or certain site characteristics may be found to relate to climatic variability within the Rio Grande Basin.

- Once a more comprehensive database is gathered for the Protohistoric stage in the Rio Grande Basin, overall settlement/subsistence patterns should be examined in a regional context. For example, how did cultural adaptation in the Rio Grande Basin differ from other nearby areas such as the Southwest, Plains, Rocky Mountains and Great Basin?

SITE TYPES AND SITE DISTRIBUTION WITHIN THE RIO GRANDE BASIN

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Foothill Engineering Consultants, Inc.

Introduction

The following discussion concerns the distribution of sites by type in the study area, regardless of site age. The purpose is to provide baseline information on what types of sites are in the area and where they are found. The number and distribution of sites across the context area are partially dependant on the amount and location of cultural resource investigations conducted within each subarea. Unfortunately, no acreage figure can be derived on the amount of survey in the context area; the information in the project reports and OAHP database is too variable to calculate survey acreage. However, the Closed Basin (Button 1980, 1981, 1982a, 1982b, 1982c, 1982d, 1982e, 1984, 1985a, 1985b, 1987) and SLAP projects (Haas 1981, 1982; Gadd 1985) have provided a fairly good sample of survey areas covering a number of topographic and environmental zones in the Closed Basin, Open Basin, and the lower elevations of the San Juan subarea. Numerous timber sale surveys in the RGNF provide samples for the San Juan subarea. The Sangre de Cristo subarea has received only minimal amounts of survey. The northern Sangre de Cristos are extremely steep and rugged, and those surveys that have taken place (Grant 1980; Doering and Spero 1980) have resulted in the recordation of a few sites and isolated finds. The southern portion of the Sangre de Cristo range in Costilla County contains a high amount of private land that has not been inventoried. For the most part, the number and types of sites in the Sangre de Cristos are unknown. Another area which has received little investigative attention is the central part of the San Luis Valley around Monte Vista and Alamosa and along the Rio Grande from Del Norte to Alamosa. Some work has been done at the Monte Vista Wildlife Refuge (Lewis 1991) and some SLAP sample areas were near Alamosa, but for the most part this area of the valley is private land under cultivation.

The site types used in this discussion are based on OAHP site types. The site types are open lithic scatters, open camps, open and sheltered architectural sites, sheltered camps and lithic scatters, quarries or lithic procurement areas, kill or butchering sites, rock art, burials, and culturally peeled trees (referred to as cambium trees in the OAHP database). The distribution of these sites is discussed below along with the internal variation in each site type. The information on these sites was taken from the OAHP database and are generally not referenced.

Open Lithic Scatters

Open lithic scatters are sites containing only lithic debitage and flaked stone tools (Figure 6-32). Open lithic scatters have been recorded at 654 locations in the study area and are the most common site type. The scatters are present in all subareas. Lithic scatters are widely distributed in the San Juan and Closed Basin subareas, which probably reflects the numerous surveys in these areas rather than settlement preferences. Lithic scatters are found at high elevations in both the San Juan and Sangre de Cristo mountains and in the lower elevations of the Open and Closed basins.

Open Camps

Open camps are those sites containing lithic debitage and flaked stone tools, as well as one or more of the following: ceramics, ground stone implements, fire-cracked rock, hearths, burned bone, or middens. These sites are located in open topographic contexts. Open camps have been recorded at 426

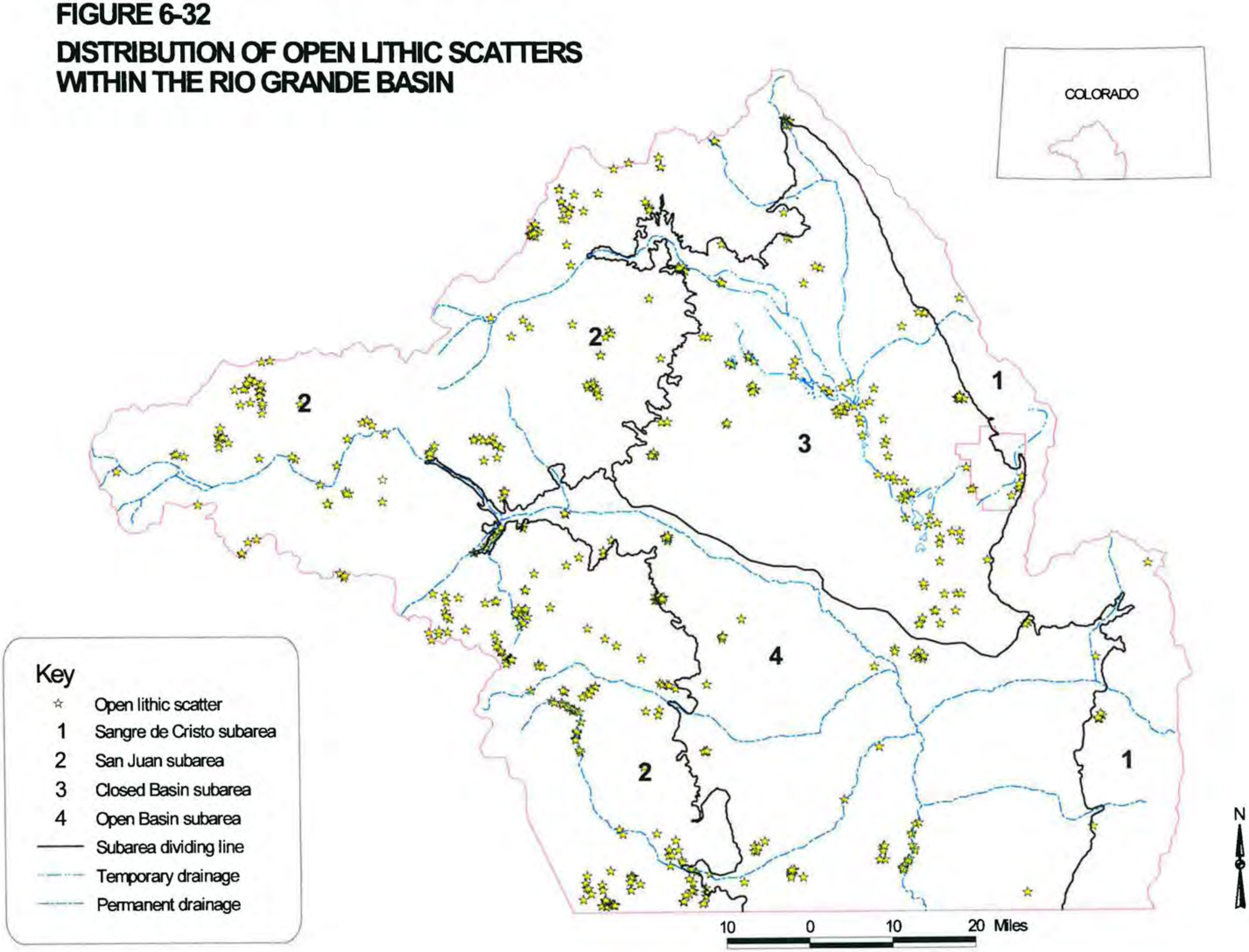


FIGURE 6-32
DISTRIBUTION OF OPEN LITHIC SCATTERS
WITHIN THE RIO GRANDE BASIN
COLORADO
1
2
3
4
Key
Open lithic scatter
1 Sangre de Cristo subarea
2 San Juan subarea
3 Closed Basin subarea
4 Open Basin subarea
Subarea dividing line
Temporary drainage
Permanent drainage
10 0 10 20 Miles
N

locations in the study area (Figure 6-33). Most of these sites have been classified as open camps based on the presence of fire-cracked rock. Ground stone implements have been found on approximately one-half of the open camps and ceramics have been found on 81 of these sites. The distribution of open camps is more restricted than that of the lithic scatters. Open camps are concentrated in the Dry Lakes, San Luis Lakes, and San Luis Creek area of the Closed Basin, and along or near tributary creeks of the Rio Grande, Alamosa River, and Saguache and Conejos creeks. A number of open camps are also located at or near the 2590 m (8500 foot) elevation contour on the west side of the San Luis Valley. This area is a transitional environmental zone between the lower valley floor and the pinyon-juniper and ponderosa pine forests of higher elevations.

The majority of the open camps are located in the Closed Basin. Though this may be a sampling phenomenon, the high concentration of open camps in the Dry and San Luis lakes area may indicate a settlement preference for this area. As demonstrated by the Paleoindian research (see this volume) in the Closed Basin and at 5AL80/81 (Jones 1977), the area probably contained lakes and marshes interspersed with dry land and sand dunes. This wetland environment probably varied in size over time, but it was undoubtedly an important area in terms of subsistence and settlement. In contrast, the San Juan Mountains contain relatively fewer open camps. Sites in the higher mountains are predominantly lithic scatters lacking fire-cracked rock, hearths, and ground stone. Those sites that do contain these materials are located proximate to major streams or tributaries, or to mountain passes. Identification of open camps in mountainous environments may be a problem of visibility. The types of rock used in fires may be difficult to identify and problems with solifluction, frost heaving, and bioturbation may obliterate hearths. The high organic content and generally dark color of soils may make it difficult to identify hearths or similar features, particularly during surface inventories.

Open Architectural Sites

Sites containing open architectural features have been found at 111 sites in the study area (Figure 6-34). Open architecture includes cairns, stone structures of various shapes, dry-laid stone walls, hunting blinds, a wickiup, and a possible pithouse. Sites with open architectural features are concentrated along the Rio Grande and its tributaries in the Open Basin, along the western margin of the San Luis Valley and the lower foothills of the San Juan Mountains, and along Saguache Creek and its tributaries. A few open architectural sites have been recorded in the high elevations of the San Juan and Sangre de Cristo mountains.

Stone structures in the San Luis Valley have been the object of the earliest archaeological studies in the area. Renaud (1942a, 1942b) recorded a number of stone enclosures, stone fences, and tipi rings in the Open Basin and in the Saguache area, but the descriptions are very basic. It is not clear from his descriptions if the tipi rings are similar to tipi rings common on the northwestern Plains or to the large basalt boulder rings that have been recorded in the context area. Some of Renaud's stone fences may also be rock walls or stone semicircles recorded on later surveys. Structures built of stone logs and rubble and thought to be antelope traps (Boyd 1940) are known in the Saguache area, as are a number of stone structures. The area around Saguache also contains several sites with multiple structures. In the 1940s, Huscher and Huscher (1943) recorded a number of sites that contained stone walls and up to 40 stone structures, both oval and D-shaped. Later work by Joe Ben Wheat and the CU Museum also recorded stone-walled structures in the Saguache area (OAHP site files). Additional structures have been recorded on the SLAP (Gadd 1985), the Rio Grande Rock Art Project (Frye 1995a), and by various small surveys. Just fewer than half of the open architectural sites contain stone structures (n=48). The features described as stone circles, semicircles, or habitations range in size from 0.8 m to over 9 meters in diameter. Most have a long axis of four to five meters. The shapes vary from circular to ovular to more

FIGURE 6-33

DISTRIBUTION OF OPEN CAMPS WITHIN THE RIO GRANDE BASIN

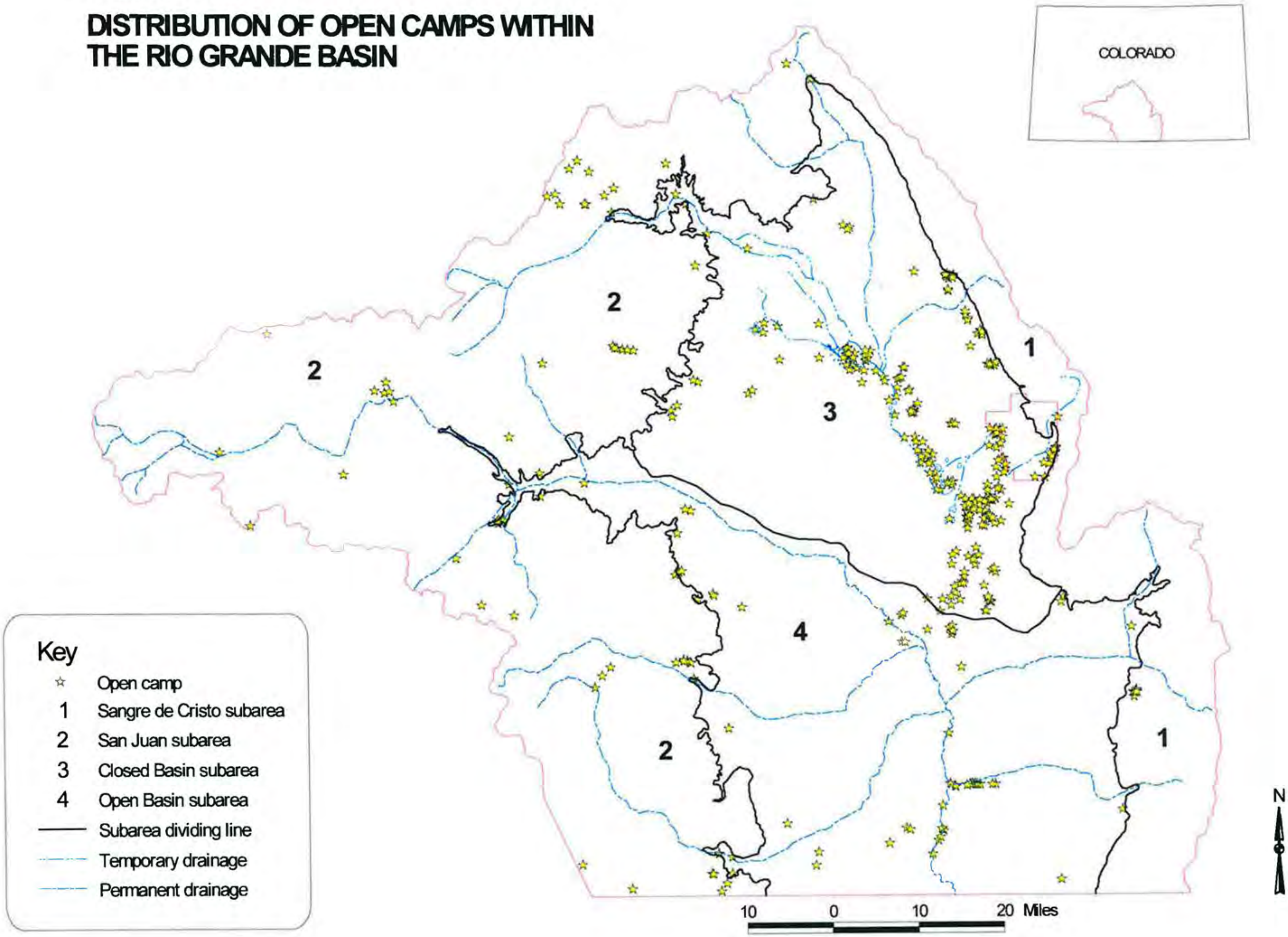
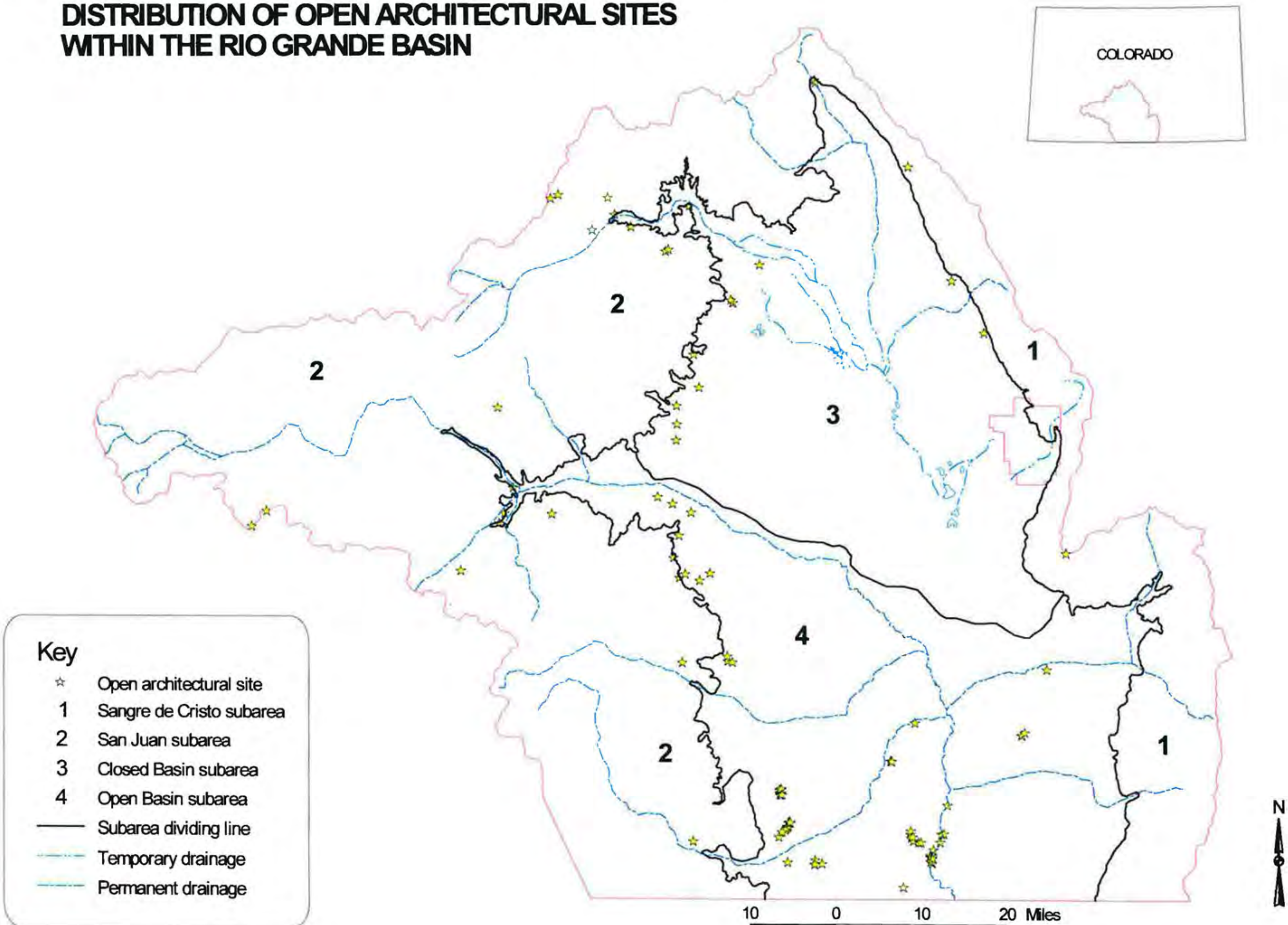


FIGURE 6-34
DISTRIBUTION OF OPEN ARCHITECTURAL SITES WITHIN THE RIO GRANDE BASIN



rectangular. The stone used to make these features is predominantly basalt or some other type of volcanic rock. The height of walls, which are all dry-laid, vary from 10 cm to more than 80 cm. These features are sometimes associated with stone walls. The stone walls are also dry-laid and range in length from one to six meters. Stone walls are found in association with stone circles and semicircles, in association with rockshelters, and individually. Stone structures with more than one room are rare. Site 5CN565 has a main stone circle measuring 5.4 x 4.1 m with a possible antechamber 3.7 x 4.3 m in size (Haas 1981). No cultural material was found with these features. Some of the stone structures in the Saguache area are described as having more than one room (Huscher and Huscher 1943). Other structures have been interpreted as having ceremonial functions (Frye 1995a; Spero 1985a). These sites are sometimes associated with rock art and/or rockshelters and are usually found along the lower Rio Grande or along the western margin of the valley. Cultural material associated with stone structures is variable; at many sites no prehistoric artifacts are present, while at others lithic debitage, ceramics, ground stone, rock art, and burned bone have been found. The temporal context of many of the structures listed as prehistoric in the OAHP database is questionable due to poor descriptions on site forms. Some of the structures could be historic early Hispanic structures, rather than aboriginal features. The closest comparison to stone structures outside the Rio Grande Basin is with the numerous Ceramic stage stone structures in the Arkansas River Basin of southeastern Colorado (Kalasz 1989; Ireland 1971). Numerous dry-laid and stacked stone structures are present in southeastern Colorado, but their relationship to the Rio Grande Basin structures is unknown. The cultural and temporal context of these structures should be considered an important research question for the area.

Seventeen cairns have been reported in the Open Basin (Haas 1981, 1982; Gadd 1985). The cairns occur individually or in groups of two to four. Many of the cairns have little or no associated cultural material. The temporal context of many of the cairns is unknown.

Structural remains have been found at several higher mountain sites. In the San Juan Mountains, site 5HN151 is a lithic scatter associated with an E-shaped rock alignment. The alignment is 6 x 3 m and consists of dry-laid rock in two courses (Webster 1984). The site is on the Continental Divide Trail. Other high-altitude stone structures are at 5RN17, the Lost Lake site (Beardsley 1976), at an elevation of 3121 m (10,240 ft). This site contains three stone circles and two semicircles of dry-laid rock. Hunting blinds consisting of stacked rock, logs, and brush have been recorded at 5ML32 and 5RN118 near Wolf Creek Pass (Shafer 1978) and at 5SH135 northwest of Saguache near Cochetopa Pass. Additional sites with game blinds include 5RN107, 5SH264, and 5SH657. Other sites with structures in the San Juan Mountains include 5CN803 and 5RN323 (Spero 1983c). Site 5CN803 contains two large stone circles, which may be ceremonial in function, on the ridge between the Conejos River and Fox Creek. Site 5RN323, the Sentinel Fortification, is a series of stone enclosures above the town of South Fork. The structural remains recorded at the highest elevation are located atop Blanca Peak in the Sangre de Cristo Range. The site, 5AL321/5CT169/5HF194, contains a 2.0-2.5 m wide pit surrounded by a 0.3-0.6 m high rock wall that was described on the Wheeler-Hayden surveys of 1874-1875. (Meyers 1950; Rhoda 1876). The site may have functioned as a lookout, vision quest site, or eagle trap (Black 1990).

Other structural remains in the context area include a possible pithouse and a wickiup. The potential pithouse is located at site 5SH346 in the form of a collapsed and burned structure (Kirkish and Beardsley 1979). No other description of the structure is given. The wickiup is 5SH242, the Elk Track Wickiup (Armagast and Spero 1976). This conical wickiup is made of wood poles and large pieces of bark were located near the doorway. The wickiup was found northwest of Saguache and was first documented and photographed by the Huschers (Terry and Gilchrist 1988). The original description of the site refers to three wickiups, but when the site was rerecorded in 1976 only one wickiup was found.

Sheltered Sites

Sheltered sites include those found in association with rockshelters, alcoves, and caves. Sheltered sites have been found at 66 locations in the study area (Figure 6-35). Sheltered sites are predominantly found on the western valley margin at the valley/foothill juncture. In this area, the alluvium of the valley floor comes into contact with Tertiary period volcanic rocks including lavas, breccias, tuffs, and conglomerates (Tweto 1979a). Differential weathering of the easily eroded alluvium and more resistant volcanic materials has resulted in the formations of rockshelters and alcoves. A few sheltered sites are found in association with basalt formations in the Open Basin. Evidence of camps has been found in 39 shelters, while 13 of the shelters contain only lithic debris. Architectural features are found in or near 20 shelters and rock art is associated with 14 shelters. No sheltered sites have been recorded above 2473 m (9000 ft) in the San Juan Mountains, in the Closed Basin east of the San Juan foothills, or in the Sangre de Cristo Mountains.

Other Site Types

Other site types recorded in the context area include rock art, quarries and lithic procurement areas, burials, culturally peeled trees, and kill sites. Rock art panels have been found at 44 locations. Most of the rock art is found along the Rio Grande or its tributaries in Conejos and Costilla counties, and along the western margin of the San Luis Valley. Often the rock art is found in association with sheltered sites and/or sites with stone structures. No rock art sites have been found in the Sangre de Cristo Mountains, the central and eastern portions of the Closed Basin, or above 2743 m (9000 ft) in the San Juan Mountains.

Areas where lithic materials were procured include six locations. One site, 5CT31, is the King Turquoise Mine. It is thought that prehistoric procurement of turquoise took place at this location, but historic mining activities may have obliterated the evidence. Sites where chert was procured include sources in the southern Open Basin (5CN230), near Cumbres Pass (5CN35) and two sites (5SH1113 and 5SH1114) on the Continental Divide north of Saguache (Kane 1987). A rhyolite source (5HN132) has been recorded near Pole Mountain and the Rio Grande headwaters. Additional areas where materials suitable to manufacture stone tools have been found include quartzite deposits west of Saguache, basalt near the headwaters of the Conejos River (5CN146), rhyolite just east of Creede (5ML62/5RN169), chert west of Saguache (5SH387), and obsidian in the Beaver Creek area (Spero 1987c; Burns 1981). None of these additional areas displays any prehistoric quarrying features or other evidence of prehistoric use. No source areas have been recorded in the Sangre de Cristo Mountains or in the Closed Basin.

Burials have been found at 18 locations, most of which are in the eastern Closed Basin. Others have been found along the western margin of the San Luis Valley. Culturally peeled trees, locations where the inner bark of ponderosa pines has been obtained, include three specific areas: the Great Sand Dunes, along Fox Creek and Conejos Creek, and in the Cochetopa/North Pass area. Kill sites, those sites where large animals were killed and/or butchered, have been found at five locations (Figure 6-36). Four are in the Closed Basin near the Great Sand Dunes. These sites include the Stewart's Cattle Guard, Linger, and Zapata sites, all Folsom sites (see Paleoindian section, this volume). The fifth, 5SH903, is an open camp containing a possible kill site and butchered bone (Spero 1982n). The site is in the San Juan Mountains near Cochetopa Pass and probably dates to the Late Prehistoric stage.

FIGURE 6-35
DISTRIBUTION OF SHELTERED SITES WITHIN THE RIO GRANDE BASIN

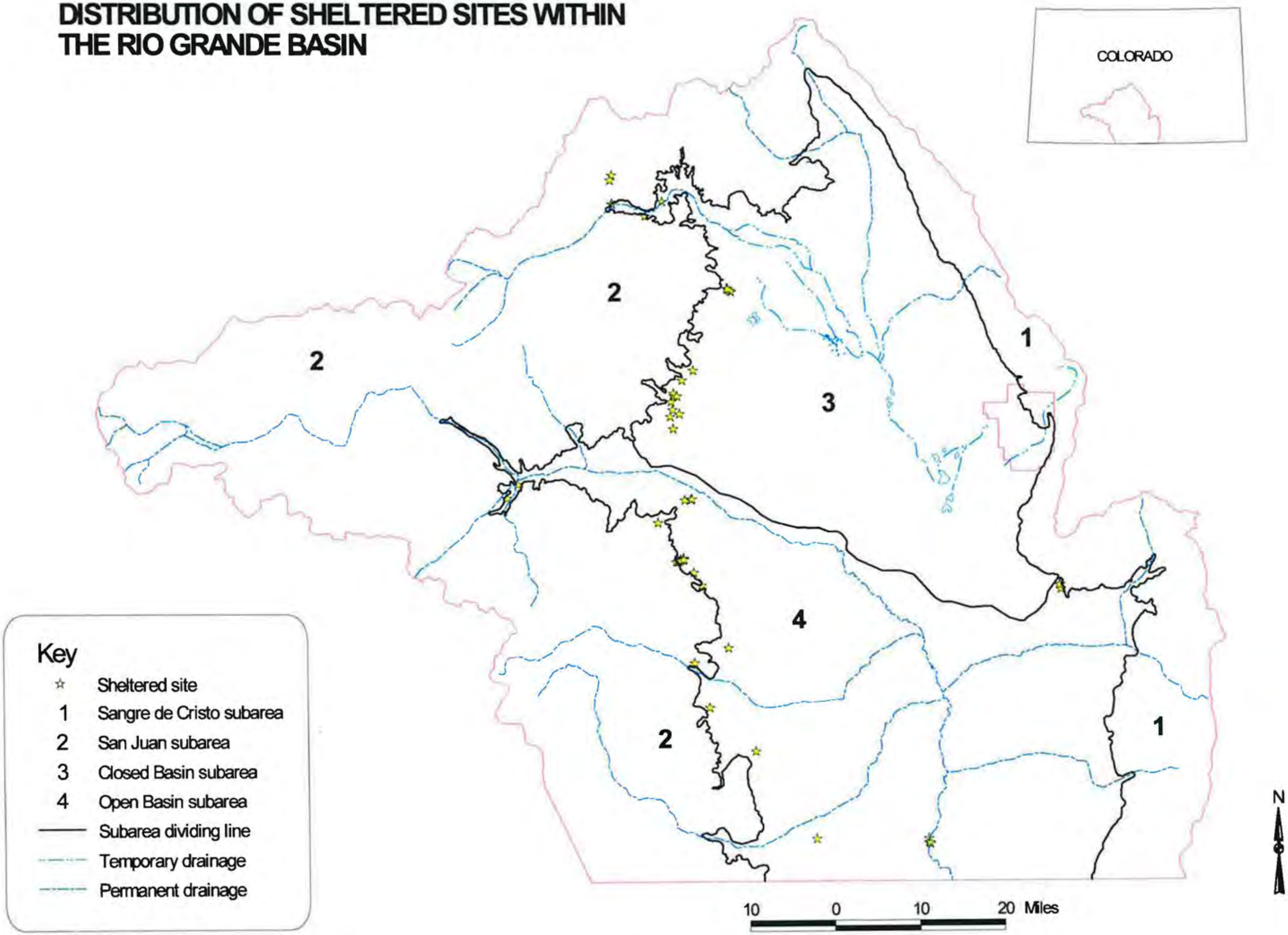
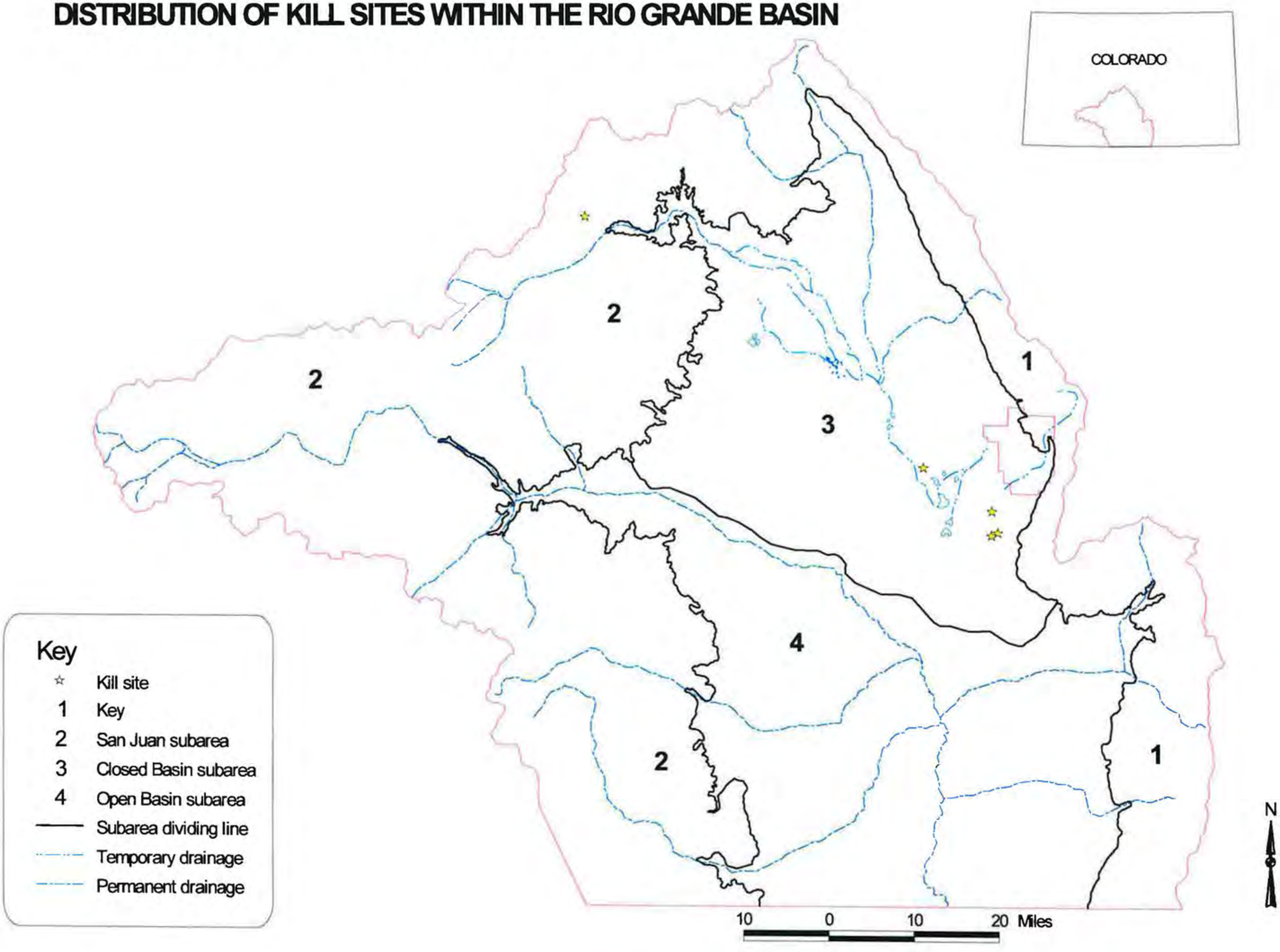


FIGURE 6-36
DISTRIBUTION OF KILL SITES WITHIN THE RIO GRANDE BASIN



Chapter 7
SPECIAL TOPICS

INTRODUCTION

This section provides more detailed discussion of several topics that were not covered in any detail in Chapter 6. Some of these topics were mentioned by Guthrie et al. (1984), but the information was difficult to access. The special topics include culturally peeled ponderosa pine trees, ceramics, rock art, distribution and sources of lithic materials, and human skeletal material.

CULTURALLY PEELED PONDEROSA PINE TREES

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Background/History of Research

Ponderosa pine *(Pinus ponderosa)* trees in the Rio Grande Basin are generally found between 2286 and 2743 m (7500 and 9000 ft) in elevation, on benches, or on plateaus with west and south aspects. They are generally located above the floor of the San Luis Valley. Based on the environmental parameters, the areas with the highest potential to contain culturally peeled ponderosa pine trees within the Rio Grande Basin are the perimeters of the valley floor up to an elevation of perhaps 2743 m (9000 ft) or slightly higher. Other species of trees, such as cottonwood, fir, and larch, have also reportedly been peeled aboriginally to obtain bark substances (Martorano 1981); however, all of the documented culturally peeled trees within the Rio Grande Basin are ponderosa pine.

The first known documentation of a culturally peeled tree in the Rio Grande Basin was completed in 1968 by Hobart Dixon, Professor of Biology at ASC (Dixon, personal communication 1978). Dixon compared the scars on several ponderosa pine trees at the Great Sand Dunes National Monument with those described as cultural in Montana by Thain White (1954). Dixon also dated the scar on tree 5SH1238.1 through dendrochronological analysis to the year 1838. No additional research was conducted on the peeled trees within the Rio Grande Basin until the late 1970s, when Marilyn Armagast Martorano began research for her Master's degree. The research, conducted from 1978 through 1980, resulted in a thesis entitled *Scarred Ponderosa Pine Trees Reflecting Cultural Utilization of Bark* (Martorano 1981). Two of the three concentrations of peeled trees examined for that study are located in the Rio Grande Basin. The largest group is located at the Great Sand Dunes National Monument within the Closed Basin subarea and contains 130 culturally peeled ponderosa pine trees exhibiting 146 scars. The Smithsonian site numbers and numbers of scarred trees are as follows: 5SH309 (1 tree), 5SH1035 (72 trees), 5SH1238 (9 trees), 5SH1261 (43 trees), 5SH1472 (1 tree), 5SH1473 (1 tree), 5SH1474 (1 tree), 5SH1475 (1 tree), and 5SH1476 (1 tree). The second largest concentration of peeled trees is located in the vicinity of Rabbit Canyon near Old Cochetopa Pass in the San Juan subarea.

Twenty-two sites containing approximately 154 culturally peeled ponderosa pine trees have been recorded within the entire Rio Grande Basin (Figure 7-1). Three additional locations are known to contain peeled trees but have not been formally recorded: the site in the vicinity of Rabbit

Canyon near Old Cochetopa Pass (containing eight peeled trees); approximately 5+ peeled trees located in the vicinity of Zapata Creek, south of the Great Sand Dunes National Monument; and at least five peeled trees located between the town of South Fork and Beaver Creek Reservoir.

The recorded peeled trees within the Rio Grande Basin are found in three discrete locations (see Figure 7-1). The area containing the largest number of peeled trees is located at site 5SH1035 at the Great Sand Dunes National Monument in the vicinity of Medano Creek, between the dunes and the Sangre de Cristo Mountains. An example of one of the peeled trees at this location is shown in Figure 7-2. The trees are located near the boundary of the Closed Basin and Sangre de Cristo subareas. One hundred thirty peeled trees are located in this area. In addition, several unrecorded peeled trees are known to exist in the same general area, but farther south near Zapata Creek. A second group of peeled trees is located in the vicinity of Conejos Creek west of the town of Antonito. Approximately 18 peeled trees are located in this area. These trees are also located near the boundary of two subareas, the Open Basin and the San Juan. A third group of trees is located in the vicinity of Saguache Creek within the San Juan subarea. Approximately six peeled trees are found in this area.

Why these trees are distributed in this pattern is not known; some of the clustering may be caused by sampling error, these areas may contain the most peeled trees that were not harvested for timber in the past, or the pattern of peeled tree locations may relate to settlement/subsistence patterns. Nearly all of the documented culturally peeled trees within the Rio Grande Basin are located in the vicinity of mountain passes including Medano Pass, Mosca Pass, La Manga Pass, North Pass, and Cochetopa Pass. These passes were undoubtedly utilized during prehistoric and historic times, and nearby resources, such as the trees, would have been easily accessible.

Uses of Bark and the Peeling Process

Research has shown that these culturally peeled trees are living artifacts reflecting Native American utilization of bark and bark substances during the late eighteenth to the early twentieth centuries (Martorano 1981, 1988 and 1990). Tree bark and bark substances are known to have been utilized by various Native American groups for a variety of functions. The outer bark of trees was utilized aboriginally to construct trays, baskets, and cradleboards, and was used as a building material for roofs and walls of structures. Resin and pitch from the peeled sections of trees were used as adhesives and as waterproofing agents for baskets and other objects. Medicinally, the inner bark and sap were used as a poultice or drink for many types of disorders such as tuberculosis, stomach troubles, cuts, infections, rheumatism, heart troubles, gonorrhea, and colds. The inner bark of most varieties of pine has also been used by Native Americans as a delicacy or sweet food, and as an emergency food in cases of starvation (Martorano 1981). A nutritional analysis of the inner bark of ponderosa pine indicates that it has significant nutritional value (Martorano 1982). One pound of inner bark provides 600 calories, a large amount of calcium and iron, and also magnesium, zinc, phosphorous and other nutrients. It is also reportedly high in Vitamin C.

Based on information obtained from Kutenai descriptions of bark peeling in Montana (White 1954), and physical characteristics of the trees and scars, the hypothesized tree peeling process was as follows:

Initially, a small scar may have been produced in the bark of a chosen tree to test-sample the bark substance. This was probably accomplished by cutting a narrow horizontal line into the bark with

FIGURE 7-1
DISTRIBUTION OF CULTURALLY PEELED TREES WITHIN THE RIO GRANDE BASIN

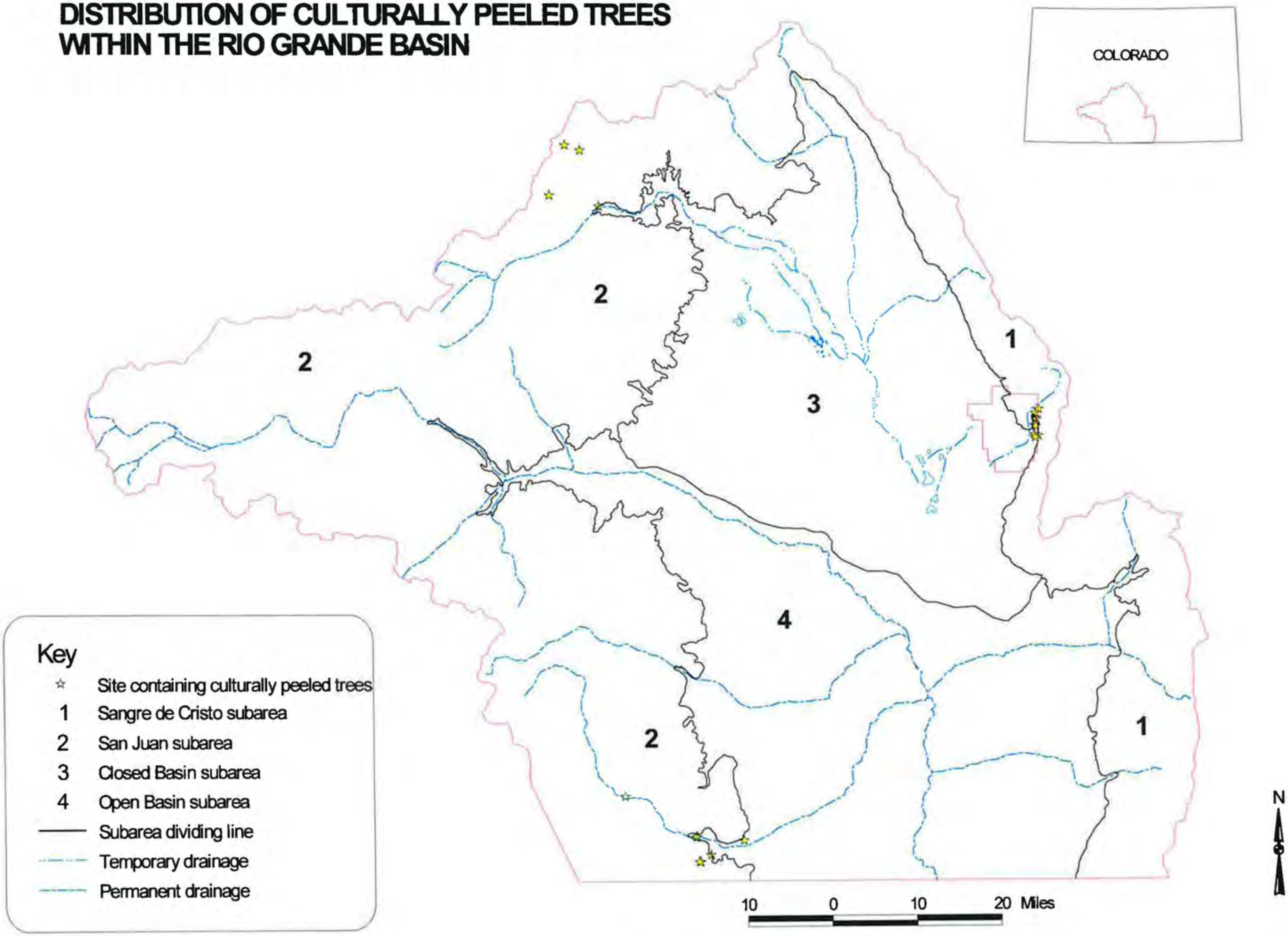

Figure 7-2. View of a typical scar of a culturally peeled ponderosa pine tree (5SH1035.48). The tree was peeled in 1826. Photo by Marilyn Martorano.

a sharpened tool and then stripping a piece of bark from the trunk. This step may have been skipped and a wide initial cut produced if the bark was to be utilized as an emergency food or if large slabs of bark were needed. Otherwise, if a test scar was made and the bark sample proved desirable, it is likely that the scar was then enlarged, presumably by widening the original horizontal cut-line and then stripping the bark upward and/or downward from the trunk. This step may have involved the use of a tool (a debarking stick) to aid in prying off the bark strips or slabs.

What was done with the bark next apparently was dependent on how the bark substance was to be utilized. If the outer bark was employed as a building material, the slabs may have been left unmodified; if the bark was used to form items such as trays or cradleboards, the slabs would have been shaped accordingly. If the inner bark or juices were utilized, they were probably collected by scraping the pieces of outer bark and/or the tree trunk. If the pitch was used, the tree may have been left for a short time to allow the resin to collect on the surface of the scar where it could be scraped off at a later time.

In the 1900s, the Kutenai in Montana reportedly used a scraper made from a metal baking powder can, and prior to that, from a mountain sheep horn. The scraping of the inner bark was completed in the vicinity of the stripped trees because the slabs of outer bark were too bulky and heavy to be taken to camp. Once removed from the outer bark, the inner strips were then prepared for storage and consumption. They could be cut into small strips and rolled into balls or tied into knots and packed in green leaves to prevent them from drying out. The peeling process among the Kutenai was undertaken primarily by women in the spring, when the sap in the tree was running.

Culturally Peeled Tree and Scar Characteristics

The following discussion of tree and scar characteristics is based on the peeled trees located at the Great Sand Dunes National Monument, the location of the largest concentration of peeled trees within the Rio Grande Basin. The scars of trees peeled for cultural use vary in size and shape but have several distinguishing features. They are usually oval or rectangular with one or more points. The bottom of the scar is usually 30-91 cm above ground level, although some scars extend to the ground. Many of the scars exhibit cut lines that are even and straight and 7-10 cm in length across the lower end of the scar. This evidence suggests that the cut lines are the result of ax cuts. Other cut marks are jagged, which would indicate that perhaps the cutting was done with a sharpened stone rather that a metal tool.

The circumference of the trees is generally large but varies from 1.14 m to 3.6 m. The circumference varies depending on the age and health of the tree and environmental conditions, especially the relationship of the tree to ground water sources. An additional observation of the general appearance of the scarred trees is that the majority of the peeled trees seem to exhibit an orange-colored outer bark, whereas nearby unpeeled ponderosa pine trees of similar size exhibit a darker outer bark. Perhaps the appearance of the colored outer bark has some relationship to the procurement objectives of the debarker, e.g., the inner bark may have a different taste, or it may be easier to peel certain types of trees.

The surfaces of the scars also vary in appearance. Most are somewhat weathered with varying amounts of resin coating. This resin layer gives the scarred surface of most of the trees a bright yellowish orange appearance. Differential weathering patterns and variations in amounts of resin have resulted in a gray or brown coloration of some scars. A number of the scars also exhibit a charred surface, probably from ground fires which would have easily burned the resin on the scar surface. A few of the scars also exhibit nails or fence staples, and others have been affected by insects and birds, especially woodpeckers, who have produced large and small holes in some of the dead trees.

The scars range in size from small (10 cm in length x 5 cm in width) to so wide that they almost girdle the entire tree (2.69 m in length x 1.25 m in width). In general, the scars are from two to four times longer than they are wide. This is understandable, because it is easier to peel a tree lengthwise along the trunk than from side to side. As suggested in Martorano (1981), the smaller scars may represent "test scars" made to sample the bark. An average-sized scar would be approximately 0.43 m wide x 1.2 m long. A study replicating the bark peeling process indicates that approximately one pound of inner bark would have been available from a scar this size (Martorano 1982).

Ten percent of the 130 peeled trees at the Great Sand Dunes National Monument exhibit multiple scars. Ten trees display two scars, two have three scars, and one has four scars. Based on dendrochronological analysis, some of the multiply-scarred trees appear to have been peeled at the same time, and others have scars that were obviously peeled a number of years apart. If several people were peeling one tree at the same time, the result could be one wide scar or perhaps two or more separate scars. If a tree was peeled once and then peeled again at a later time, the existence of the first scar probably affected the decision to peel the same tree again. Perhaps it was easiest to begin peeling the bark adjacent to an existing scar, or if the bark substances were used as food or medicine, it is likely that an existing scar would indicate to the debarker that the bark of that tree was useful or edible.

Dendrochronological Analysis/Cultural Affiliation

Dating the peeling event through dendrochronology is conducted by comparing a core sample from the scarred area of the tree, which has stopped adding growth rings, with a core from the healthy portion of the same tree or other nearby trees. Because unpeeled or healthy bark continues to add growth rings, the difference in ring numbers between peeled and unpeeled sections indicates the time elapsed since peeling. If a master tree-ring chronology is available for the area, the tree rings can also be compared to that chronology. Tree-ring analysis is important because it is possible to determine the actual year the bark was peeled from the tree, the age of the tree when peeled, and the age of the tree today. By examining a cross section of these trees, it is sometimes even possible to determine what season the bark-peeling was done (Swetnam 1984).

Dendrochronological analysis has been conducted on 38 peeled trees within the Rio Grande Basin. Thirty-four of the dated scars are from the Great Sand Dunes area within the Closed Basin and four are from the San Juan subarea. Table 7-1 lists the scar dates for these peeled trees. The scar dates range from 1793 to possibly as recently as the 1920s-1950s. The majority date prior to 1847. Evidence to tie the culturally peeled trees found within the Rio Grande Basin to historic Utes is based on dendrochronological analysis, historical accounts, and Native American consultation. The period from the early to late 1800s was a time of vast changes in many parts of Colorado, including the San Luis Valley. As more and more outsiders (miners, ranchers, and farmers) entered the state, the Utes, who were reportedly the primary inhabitants, were quickly pushed out of their traditional hunting and camping areas, and food became scarce. Also during this time, there were several documented periods of drought (Mangimelli 1990:24), especially during the early 1800s (1805-1810 and the 1820s) and the 1850s through the 1870s. These climatic conditions may have caused additional stresses to the aboriginal population, especially a decrease in animal and plant resources.

Table 7-1. Dendrochronological Dates for Culturally Peeled Trees.

Site/Tree/Scar No.	Scar Date
5SH1035.2	1827
5SH1035.3	1822
5SH1035.4	Pre-1825
5SH1035.5	1816
5SH1035.6	Pre-1843
5SH1035.9	1846
5SH1035.10	Pre-1816
5SH1035.13	1830
5SH1035.14	Pre-1837
5SH1035.15-1	1826
5SH1035.15-2	1826
5SH1035.16-1	1826
5SH1035.17-1	1928
5SH1035.17-2	1959(?)
5SH1035.18	Pre-1831
5SH1035.19-1	Pre-1857
5SH1035.20-1	Probably 1844
5SH1035.20-2	Probably 1916
5SH1035.20-3	Probably 1938
5SH1035.21-1	1864
5SH1035.21-2	1890
5SH1035.26-1	1846
5SH1035.26-2	1834
5SH1035.31	1824
5SH1035.35	1820
5SH1035.41	1874
5SH1035.42	1815
5SH1035.44-2	1873
5SH1035.48	1826
5SH1035.51	1831
5SH1035.55	1820
5SH1035.59	1821
5SH1238.1	1838
5SH1261.44	October 1799-April 1800
No site number*	1793
No site number*	1865
No site number*	1868
No site number*	1869

*These trees are located in the Rabbit Canyon/Cochetopa Pass area.
From Martorano (1981).

One historical sighting is definitely supportive of this interpretation. In 1853, 40 Ute families living in the San Luis Valley along the Culebra and Costilla rivers, south of the Great Sand Dunes National Monument within the Open Basin subarea, were observed eating bark of pine and aspen because of the scarcity of game (San Luis Valley Historical Society, Inc. 1969). At times, all major groups of Utes reportedly ate bark substances. They were known to have eaten the sap from aspen trees as a delicacy, and the Northern Utes were reported to have tied small strips of the inner bark from pine trees into bundles and eaten them with salt (Smith 1974). In addition, other documents and informants state that inner bark was harvested by the Utes and utilized for several other purposes (Martorano 1990). It was used medicinally as a tonic to "clean them out." The Utes also reportedly used inner bark as a thickening agent for meat soups and made a bark tea. This would suggest that, at least at times, inner bark substances were used as part of regular subsistence.

Because bark was already known to the Utes as an edible item, resorting to bark as an emergency food in times of starvation would have been a logical occurrence. It is hypothesized that population dislocations factored with environmental stresses may have stimulated the intensive utilization of bark by Utes in parts of Colorado, including the San Luis Valley. All evidence to date suggests that Utes are the Native American group most likely to have utilized these trees; however, other Indians and Hispanic groups were also living in and using the Rio Grande Basin during the eighteenth and nineteenth centuries, so potential tree peeling by these other groups requires further research. Thomas Swetnam's research with peeled trees in New Mexico (1984) suggests that the Gila Apache were peeling ponderosa pine trees as an emergency food in the 1860s. Neil Judd (1954:343) notes that in the early 1900s in the vicinity of Chaco Canyon, the Navajo reportedly were cutting off the bark from yellow (ponderosa) pine for medicine. Both Apache and Navajo have been documented historically in the Rio Grande Basin during the Protohistoric/Historic periods, suggesting that in addition to the Utes, these groups may have potentially peeled some of the trees.

It is not known whether the numbers and sizes of scars at the Great Sand Dunes sites represent evidence of bark utilization from normal seasonal subsistence practices over a number of years, or whether "normal" utilization of bark would have resulted in many fewer and/or smaller scars on trees. If the Utes were pressured into utilizing bark for emergency food sources by settlers and miners, there should be a marked increase in the numbers and sizes of the scars of culturally peeled trees through time beginning in the 1820s (when Mexico began efforts to colonize the valley) through the1850s (when farmers from San Luis first moved to the edge of the Sangre de Cristos just south of the dunes), during the 1860s and early 1870s, and ending when the Utes were moved out of the area onto reservations (Trimble 1981; Athearn 1985:49-80). The scar dates obtained from the peeled trees at the Sand Dunes generally support this idea except that so far, there are very few scars that date between the 1850s and the mid-1870s. However, only a few peeled trees outside of site 5SH1035 have been dated, so additional dates from the other 100+ scars may help clarify the dates of use and reasons for the utilization of tree bark in this area.

Culturally Peeled Tree Discussion and Research Questions

Research questions relevant to culturally peeled ponderosa pine trees within the Rio Grande Basin include the following:

- Were the trees peeled as emergency measures or as part of a regular seasonal subsistence strategy, or did both types of use occur?

- Did patterns of bark utilization change over time due to environmental and/or population stresses? For example, did the sizes of the scars increase when the bark was utilized as an emergency source of food?

- Does seasonality of the peeling event suggest reasons for bark use, e.g., would winter peeling indicate starvation?

- Were inner bark substances utilized most often in specific locations such as near campsites, trails, or mountain passes?

- Were certain trees selected for peeling because of differences in taste, smell, or ease in bark removal?

- Why were certain trees peeled up to three or four separate times, yet other nearby trees of similar size and age were not utilized? Did certain trees taste better than others or was it easier to begin peeling the bark next to an existing scar?

- Are variations in scar morphology based on differences in intended uses of the bark? For example, would small scars indicate medicinal use of the inner bark and larger scars suggest other uses?

- Can the specific cultural affiliation of the tree peelers be identified based on scar characteristics, dates of the peeling event, or location of the tree?

- Can the tools utilized in the debarking process be identified by the cut lines or other marks remaining on the scar? Would metal, wood, or bone tools create different types of cuts or marks on the scar surface?

- How did bark peeling fit into seasonal subsistence patterns, and can locations of peeled trees be utilized to hypothesize seasonal movements during the Protohistoric/Historic period? For example, if trees were peeled primarily in the early spring, would it suggest seasonal movement and/or occupation at that time of year?

- Can the distribution of culturally peeled trees be compared to scar dates to hypothesize seasonal movements and migrations of specific cultural groups such as the Ute, Apache, or Navajo? Do peeled trees located closer to the Great Basin date earlier than those in the Rio Grande Basin, suggesting potential migration routes?

- Results of dendrochronological analysis suggest that the bark harvesting in the Rio Grande Basin occurred from as early as 1793 to as recently as the early 1900s. What is the actual temporal span for bark peeling of ponderosa pine trees within the Rio Grande Basin, and who were the cultural groups responsible for the peeling? Is it possible that Spanish or other non-native groups also peeled trees within the Rio Grande Basin? How does the bark peeling in this area compare to use of bark in surrounding regions?

- Do regional differences exist in the peeling of ponderosa trees within the Rio Grande Basin (e.g., dates of utilization, reasons for peeling, methods of peeling, and cultural affiliation of the peelers)?

- How do culturally peeled trees in the Rio Grande Basin compare (e.g., physical attributes and dates of use) to other identified peeled trees in the surrounding regions (e.g., Southwest, Great Basin, Rocky Mountains)?

To address these questions, one of the major research goals for the study of culturally peeled ponderosa pine trees within the Rio Grande Basin is to locate and record all of the remaining peeled trees. These trees have only been recorded as cultural resources within the past 15 to 20 years, so many of the earlier surveys did not identify and record existing peeled trees. Because the maximum lifespan of a ponderosa pine tree is 300-600 years (Fowells 1965:414), many of the remaining culturally peeled trees are nearing the end of their lives. At a minimum, recording of the culturally peeled trees should include the following:

- Documenting the location of each tree, preferably using GPS technology.
- Photographing the tree and scar using black-and-white and color film, including an overview of the scar and tree and close-up shots of the scar showing the surface of the scar and any ax cuts or other tool marks.
- Recording the scar size (length and width), height of the scar base above the ground, direction the scar faces, description of ax or other cut marks on the scar, and condition of the tree and scar such as the presence of fire or insect damage.
- Noting potential for dendrochronological analysis (e.g., if the tree is rotting or dead, it would hinder the obtainment of good dendrochronological dates).
- Excavating at the base of the peeled tree. This is recommended based on the results of work conducted by Fort Lewis College in 1990, 1992, and 1993 (Duke and Charles 1992; Duke 1997). Lithic artifacts, bone and bone tools, and a piece of historic worked glass were recovered from excavations around the base of three peeled trees within the SJNF. This research suggests that excavation may yield additional data to help interpret how the trees were peeled, what tools were utilized, who (ethnic affiliation and gender) was responsible for the peeling, and during what season the peeling was taking place.

Dendrochronological coring and analysis of these culturally peeled trees can be difficult because of the large size of the trees (some have circumferences of up to 3.6 m). Tension and compression wood, rot, insect, fire, and other damage can all cause problems in core sample removal and interpretation. Swetnam (1984) has offered suggestions for improving the core removal process that may help to obtain better samples for dendrochronological analysis, but more sampling and research are still needed to perfect these methods.

Although ponderosa pine trees are the only species currently documented as having been culturally peeled in the Rio Grande Basin, it is possible that other species, such as cottonwood, Douglas-fir, and lodgepole pine, were also peeled. Churchill (1979) recorded several hundred peeled Douglas-fir and lodgepole pine trees in eastern Oregon, and Griswold and Larom (1954) reported more than 80 culturally peeled cottonwood trees in western Montana. These other tree species are all located within the Rio Grande Basin and should be considered when examining an area for possible culturally peeled trees.

Future research on these culturally peeled trees will allow a more accurate interpretation of peeled trees as cultural resources and will increase our knowledge of the role of bark utilization in Native American subsistence, especially during the post-contact to reservation period. An expanded database that includes descriptive data of the scars and scar dates will also answer additional research questions regarding seasonality of use, reasons for the peeling (especially regarding different sizes of scars and use patterns), migrations and seasonal rounds of native populations, effects of environmental and sociological stress on human populations in general and specifically during the nineteenth century, and cultural adaptation. These questions can be addressed through the following:

- More detailed analysis and comparison of the physical attributes of the scars and study of the cut marks on the scars to determine the types of tools (metal, bone, or wood) and peeling methods utilized during the bark removal process. A comparison of these attributes through time may reveal information regarding cultural and environmental adaptation (see below).

- Obtainment of additional scar dates through dendrochronological analysis to provide a larger baseline sample of dates for more comprehensive interpretation of use of the area over time. For example, scar size could be compared to dates of the peeling events and scar dates could be compared to known environmental conditions such as periods of drought and known significant historical events in the area.

- Additional Native American consultation with Utes and other groups, such as the Apache and Navajo, to learn more about traditional practices regarding tree peeling and bark procurement. Questions regarding the gender of the tree peelers may also be addressed.

- Additional nutritional analysis of the inner bark and sap to determine other potential nutrient values (e.g., vitamin content) of bark and bark substances.

- Excavation around the base of selected peeled trees to obtain information about the actual tree peeling process (tools utilized) and other associated activities that may have occurred on site (Duke and Charles 1992; Duke 1997).

CERAMICS

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Overview

Based on the OAHP database files, approximately 129 resources within the Rio Grande Basin contain ceramics (Figure 7-3). Unfortunately, very few of these ceramics have been analyzed in any detail. On most of the OAHP site forms, ceramics are mentioned only briefly in the artifact description, and the assigned types and cultural affiliations are often questionable. Rohn (1982) and Button (1987) provide some preliminary information on ceramics in the Rio Grande Basin, but this data is limited in scope. Rohn analyzed ceramics from four sites in the Rio Grande National Forest (5ML30, 5RN55, 5HN104 and 5SH264). Sites 5ML30 and 5RN55 contain probable Ute ceramics, site 5HN104 contains 11 Black-on-white sherds representing two vessels with probable Pueblo origins of ca. A.D. 1050-1400, and site 5SH264 contains micaceous sherds suggesting Apachean cultural affiliation, ca. A.D. 1550-1900. Button (1987) discusses evidence of 27 ceramic vessels recovered during survey work on the Closed Basin Project. The majority of the sherds are described as common northern New Mexico utility wares (Taos Incised and corrugated wares), with a few other types represented such as cord-marked, indeterminate plain ware, and surface roughened (Button 1987:VI-14).

To provide at least a preliminary view of the types of ceramics that have been found within the Rio Grande Basin as a whole, the known sites containing ceramics were divided into five basic categories (some sites contain more than one type and were included in more than one category): 1) Southwestern ceramics, 48 locations; 2) cord-marked ceramics, 6 locations; 3) plain ware, 31 locations; 4) micaceous ceramics, 6 locations; and 5) unknown or other types, 46 locations.

The recorded Southwestern ceramic types have been described with the following general and specific ceramic terminology: Black-on-white, Pueblo ware, Pueblo II, Chaco Pueblo II, Pueblo III, corrugated, Abiquiu Black-on-gray, Biscuit A, Bandelier Black-on-gray, Biscuit B, Santa Fe Black-on-white, Pueblo painted, Taos incised, Piedra Black-on-white, glazed ware, Rio Grande, Cundiyo Indented, Dinitah Gray, Gobernador Indented, Kana-a Black-on-white, and Awakami or Galesteo. The sites containing these resources are found in the Open Basin subarea, primarily along the southern reaches of the Rio Grande; in the Closed Basin around the San Luis and Mishak lakes; the Great Sand Dunes National Monument; and in the foothills along the western edge of the Open Basin (Figure 7-4). No recorded sites within the Sangre de Cristo subarea contain identified Southwestern style ceramics. Within the San Juan subarea, sites exhibiting Southwestern ceramics extend from the area north of Saguache Creek to an area northwest of the town of Creede, and to an area in the very southwestern corner of the San Juan subarea.

Associated site types range from isolated sherds to complex sites containing numerous artifacts such as lithic artifacts, bone, and ground stone. Some of the complex sites containing ceramics, described as Pueblo-like by Renaud in the early 1930s and 1940s, are from the Rio Grande area of the Open Basin and the Saguache area of the Closed Basin. An example is site 5SH1458, the Saguache Shelter, containing Pueblo-like ceramics, corn, an arrow shaft, bone beads, turquoise, a fetish, animal bone, and bone needle and awl. Unfortunately, none of these sites has been dated chronometrically.

FIGURE 7-3
DISTRIBUTION OF SITES CONTAINING CERAMICS WITHIN THE RIO GRANDE BASIN

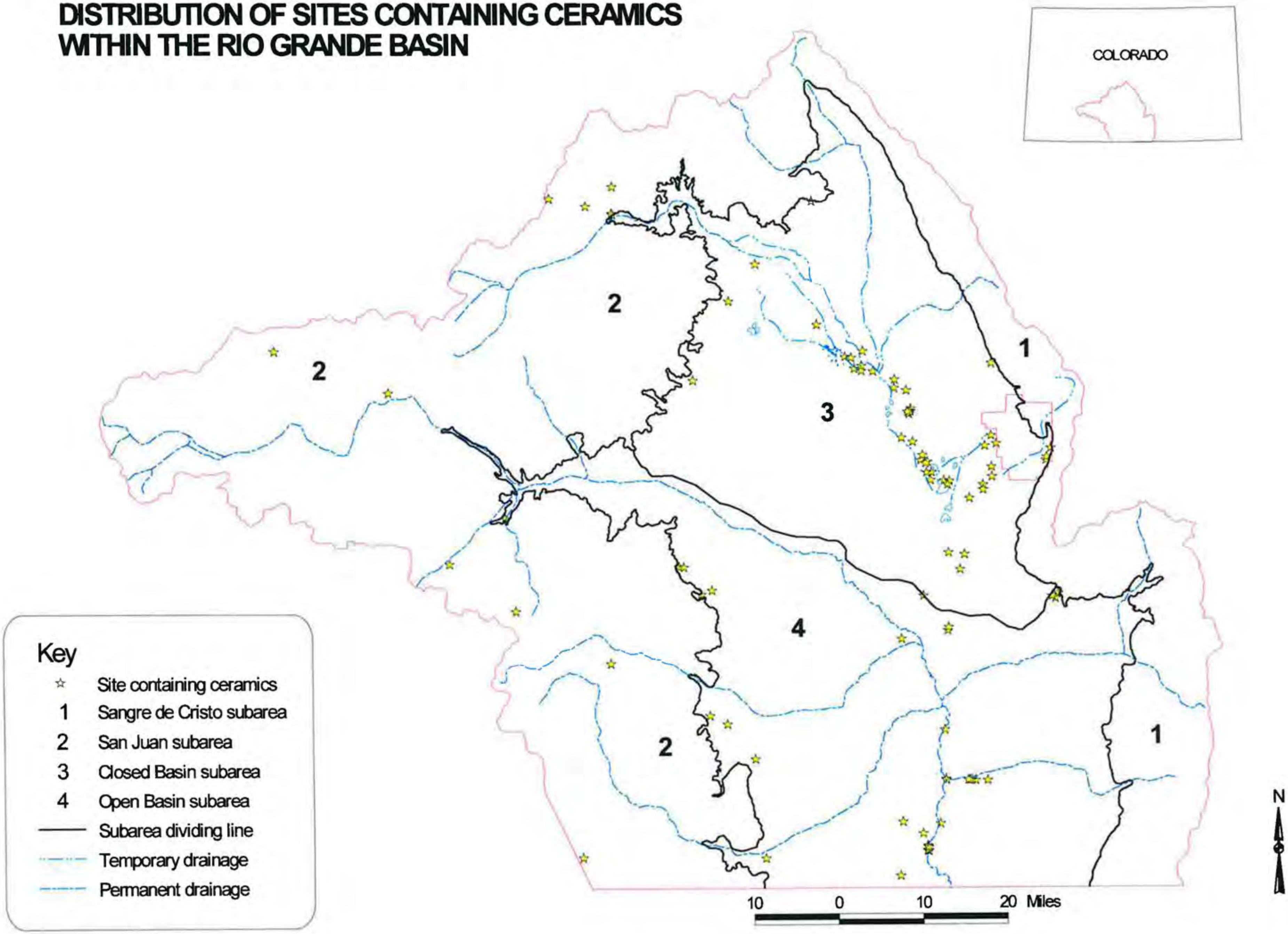
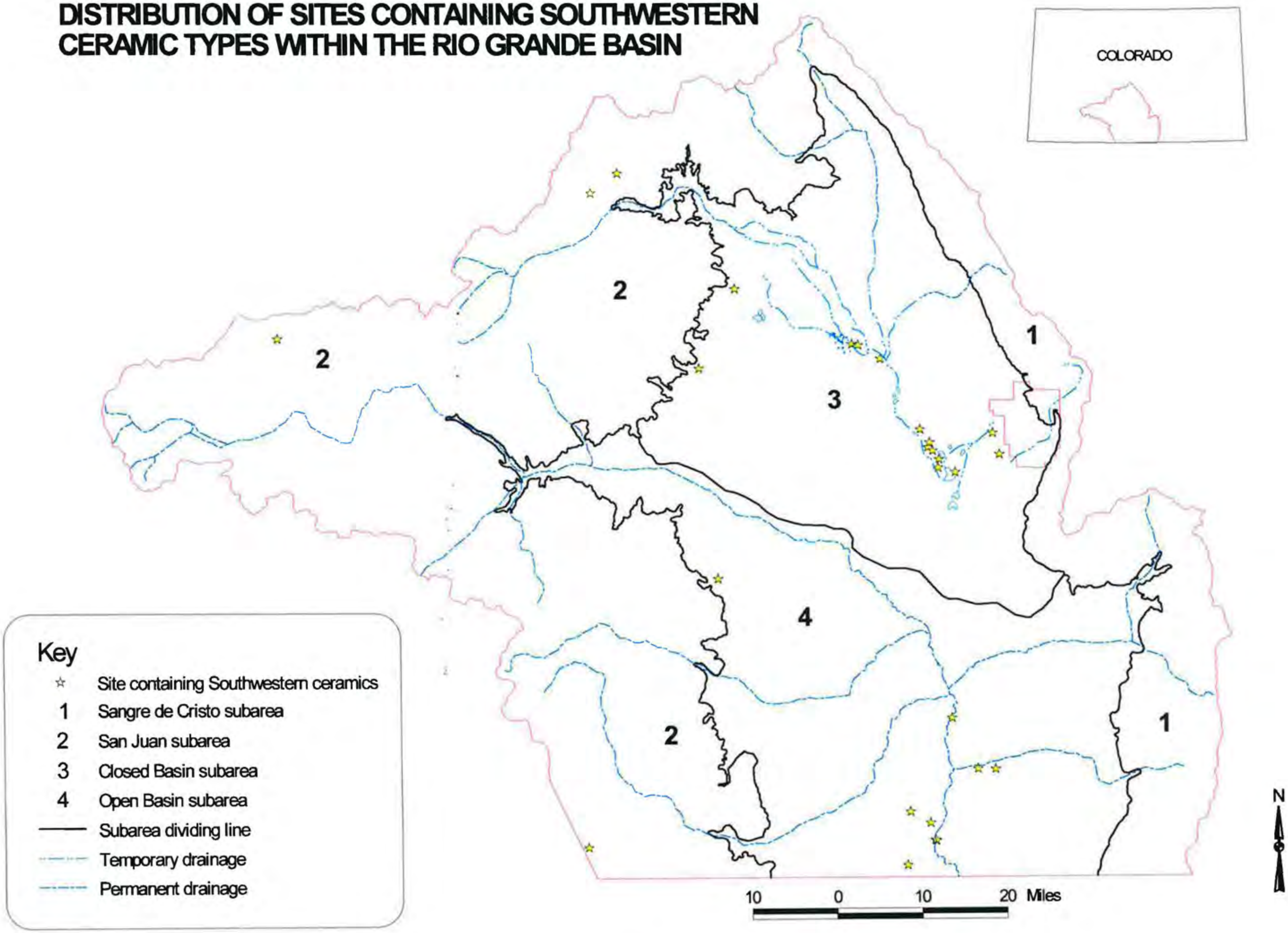


FIGURE 7-4

DISTRIBUTION OF SITES CONTAINING SOUTHWESTERN CERAMIC TYPES WITHIN THE RIO GRANDE BASIN



Cord-marked ceramics have been found at six locations, all within the eastern portion of the Closed Basin subarea (Figure 7-5). Specifically, they are located in the proximity of San Luis Lakes, and slightly to the north in an area containing small clusters of lakes and wetlands. Cord-marked ceramics suggest ties to Woodland cultures located in eastern Colorado. All of the recorded locations with Cord-marked ceramics are found within approximately 22 miles of either Mosca Pass or Medano Pass which both would have provided easy access to the Wet Mountain Valley and ultimately to the Plains. Based on the small percentage of sites containing these ceramics, influences from this direction were apparently minor compared to those from the south.

The sites containing plain ware are located within all of the subareas with the exception of the Sangre de Cristo subarea (Figure 7-6). They appear to be located primarily within the Open and Closed Basin subareas. In the Closed Basin they are clustered around San Luis Lakes and extend north along San Luis Creek to the area of Mishak Lakes. In the Open Basin they are found primarily along the Rio Grande. In most cases, the plain ware ceramics have not been described or analyzed in enough detail to define an associated cultural affiliation, although some have been described as possible Ute wares.

Reed (1995:122-124) describes Ute ceramics in Colorado as a probable local variation of Southern Paiute utility ware. He notes that they are also similar to the pottery of the Shoshone of Wyoming, Athapaskan pottery types such as Dinetah Gray, and Sangre de Cristo Micaceous. Because Ute ceramics traits are not as clearly defined as those of other ceramic types, detailed analysis of plain ware ceramics is important in order to delineate the range of variation found in the Rio Grande Basin and the potential for assigning cultural affiliation.

Micaceous ceramics have been found at six locations within the Rio Grande Basin (Figure 7-7). These locations are varied and include two areas along the lower Rio Grande, one location east of Russell Lakes (south of Saguache), one location in the foothills west of Alamosa, and two areas west of Saguache (one along Saguache Creek and another near Cochetopa Pass). The micaceous wares within the Rio Grande Basin have been described in the literature as similar to Apachean, Ute, Picuris, and Taos ceramics. For example, the two micaceous sherds from 5RN11 resemble the historic pottery produced by Taos and Picuris groups based on the mica content but not on the color (Downing 1981:155). Site 5CT168 contains a micaceous sherd that is similar to the Cimarron Micaceous type (Apachean) but it is noted that during post-contact times, the Utes were also reported to have micaceous wares, either traded or copied from the northern Pueblo groups (McCargo 1995).

The ceramics categorized as unknown/other include unspecified types and others such as punctate (unidentified and Dismal River), unidentified incised, stamped, surface roughened, and indented (Figure 7-8). These sites are located within all of the subareas, except the Sangre de Cristo, but they are concentrated around the Great Sand Dunes National Monument, San Luis Lakes and just to the north along Saguache Creek, along the lower Rio Grande, and in the foothills along the western edge of the Closed Basin. At least some of these ceramics could probably be identified more specifically if they were described more completely and analyzed for temper and other attributes.

FIGURE 7-5

DISTRIBUTION OF SITES CONTAINING CORD-MARKED CERAMICS WITHIN THE RIO GRANDE BASIN

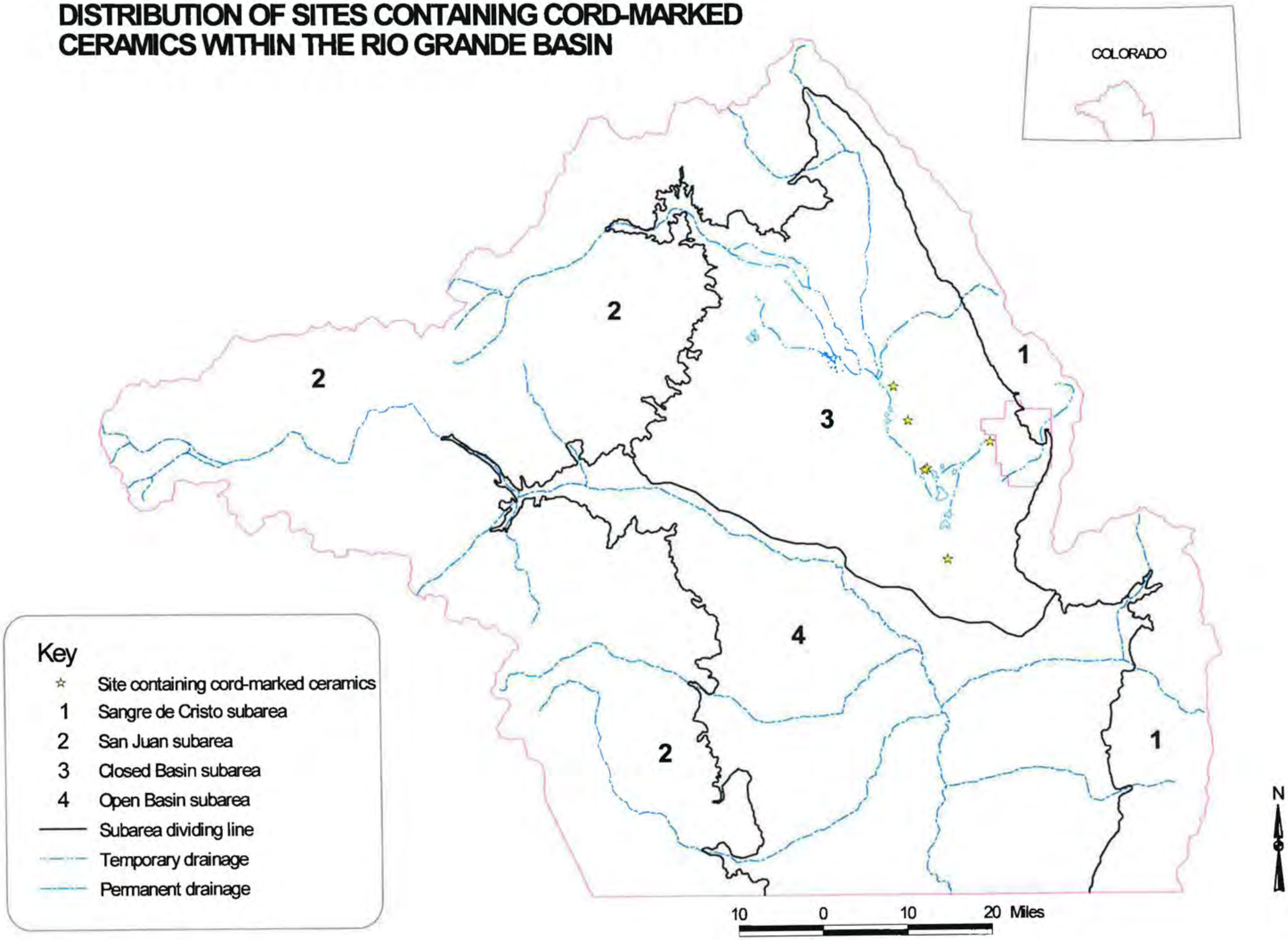


FIGURE 7-6

DISTRIBUTION OF SITES CONTAINING PLAIN WARE CERAMIC TYPES WITHIN THE RIO GRANDE BASIN

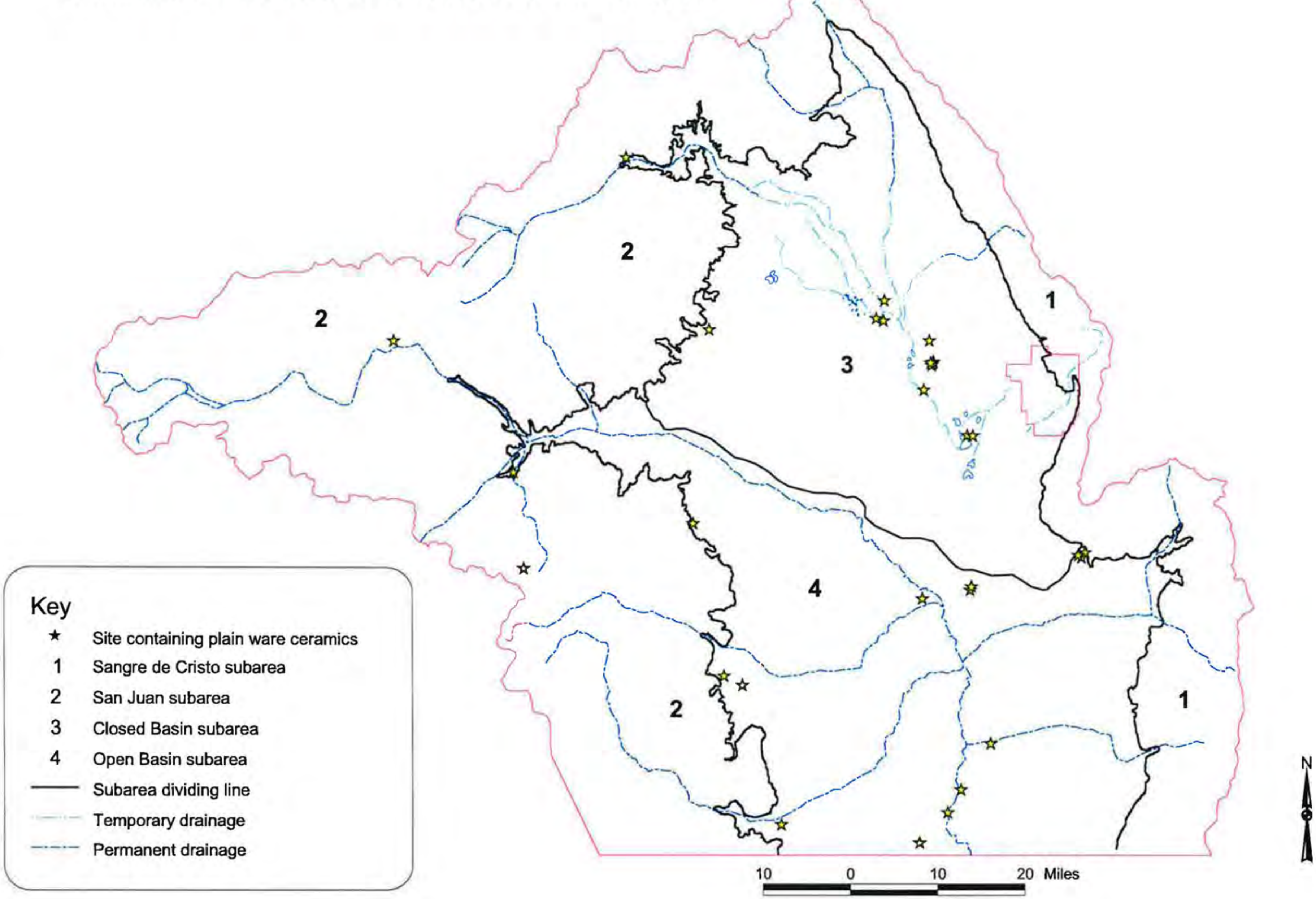


FIGURE 7-7

DISTRIBUTION OF SITES CONTAINING MICACEOUS CERAMIC TYPES WITHIN THE RIO GRANDE BASIN

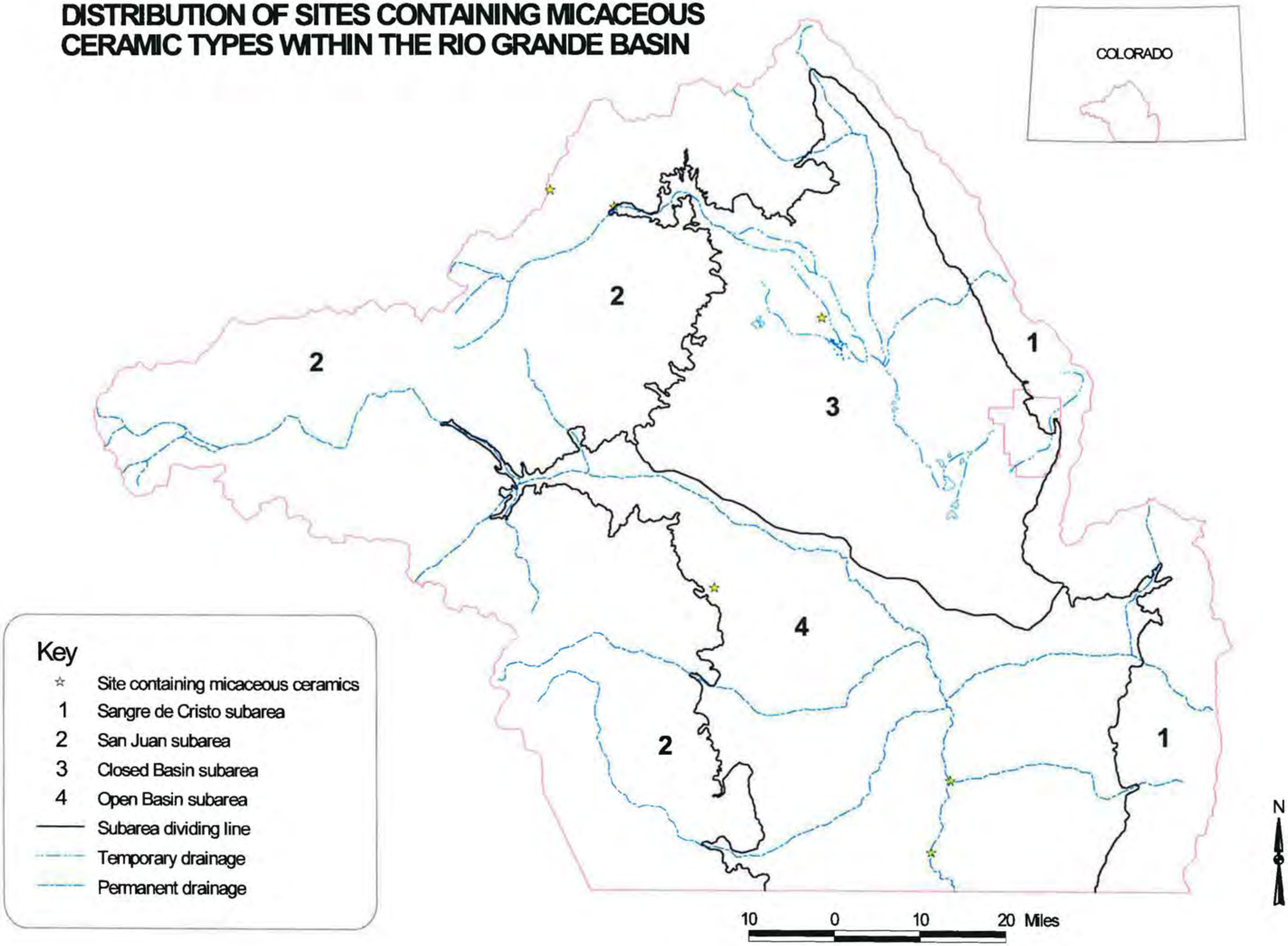
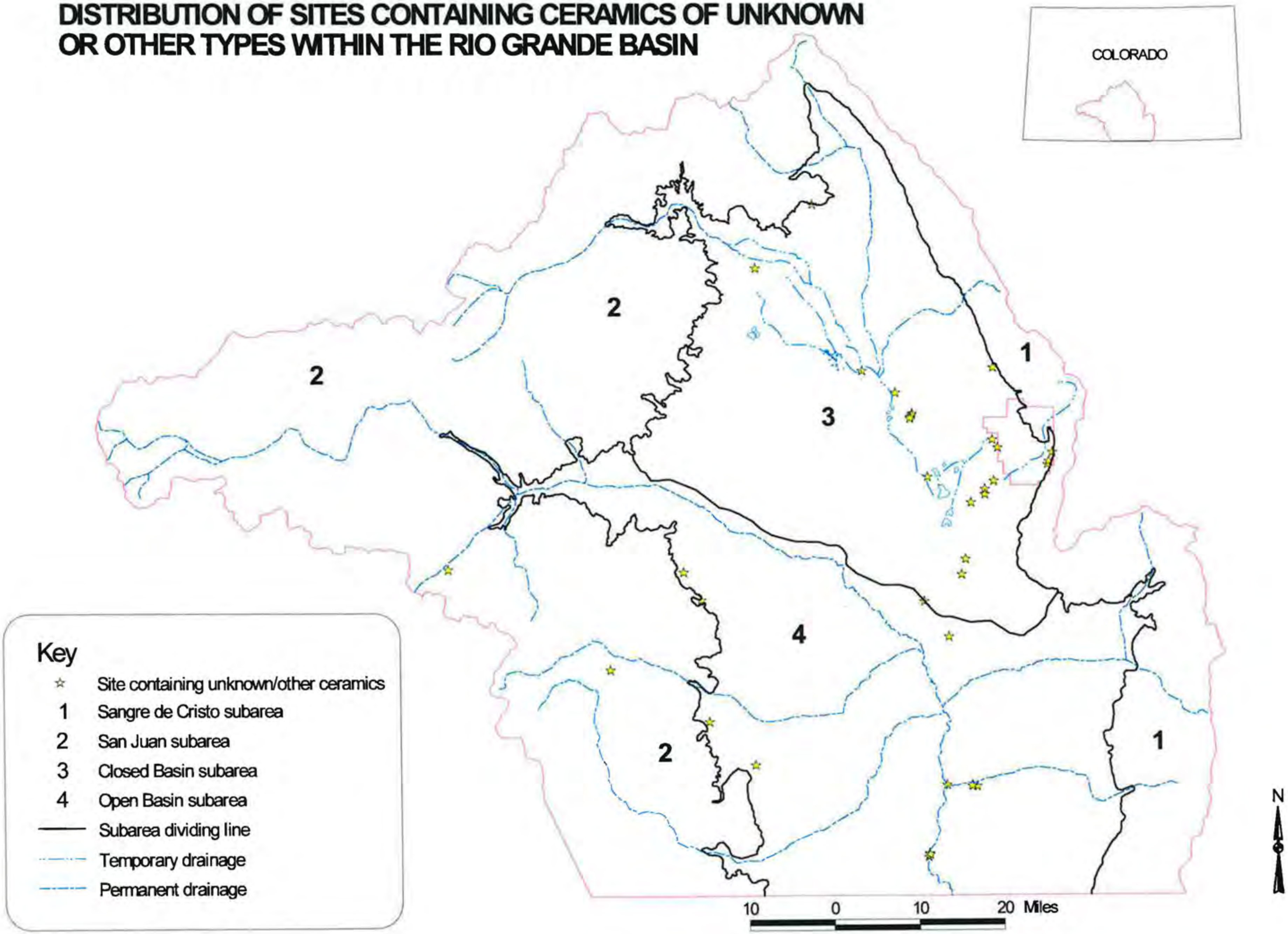


FIGURE 7-8

DISTRIBUTION OF SITES CONTAINING CERAMICS OF UNKNOWN OR OTHER TYPES WITHIN THE RIO GRANDE BASIN



Ceramic Research Questions and Data Needs

The following discussion includes major research goals regarding ceramics in the Rio Grande Basin:

- Ceramics have been described and documented within the Rio Grande Basin from the earliest investigations conducted by Renaud in the 1930s and 1940s to recent work by Hoefer (1998), but there have been no attempts to synthesize the ceramic data for the area. Production of a detailed synthesis would be difficult using the present database. As mentioned previously, the existing ceramic descriptions are often minimal and few sherds have been properly analyzed. In many cases, collected ceramic samples would have to be reexamined to obtain any useful descriptive or comparative data. Although time consuming, this task would be valuable since ceramic analysis can provide information related to potential cultural affiliation, temporal period, and geographic origin and composition of the sample. Few sites within the Rio Grande Basin have been excavated and absolute dates are almost nonexistent for the Late Prehistoric and Protohistoric stages; therefore, these types of data would be significant for future research. It is recommended that all ceramics found in the future be analyzed and described as to construction technique, finishing and thinning patterns, firing methods, core traits (temper and clay), surface traits, shapes and sizes of vessels, decorations, and any variations such as stick impressions or punctate designs.

- Distributional patterns of ceramic sites have been discussed briefly by Button (1987), who noted that in the Closed Basin, the ceramic sites tend to be located on the edge of wetlands. He suggests several possible explanations for these wetland ceramic locations: 1) that there was a heavier use of wetland environments during the Ceramic stage, 2) the wetlands were more numerous during this time, 3) wetland sites tended to be camps where a more diverse range of activities occurred that would be more likely to include the use of ceramics, or 4) that activities undertaken prehistorically around wetlands may have required more use of ceramics. More detailed research is needed to clarify the issues relating to ceramic site and wetland distributions in the Closed Basin as well as in the other portions of the Rio Grande Basin.

- Related closely to the previous topic is the question of when ceramics first appeared within the Rio Grande Basin. What are the earliest types found in the area and how do they compare to nearby geographical areas?

- How does the distribution of ceramics vary geographically within the Rio Grande Basin?

- With what site types are ceramics associated and how does the site type distribution vary geographically and temporally?

- A major research topic regarding the ceramic types found within the Rio Grande Basin is cultural affiliation. For example, does evidence of cord-marked ceramics indicate use of the area by Woodland groups from the east, or are they locally-produced wares or trade items utilized by indigenous peoples. The question of Ute ceramics has been discussed by several authors (Reed 1994; Reed 1988; Hill and Kane 1988) yet there is still no definitive answer that can be applied to the Rio Grande Basin. Utes in the Rio Grande Basin may have utilized trade wares from the Southwest, the west, or the east; they may have manufactured their own ceramics styled after any of these other ceramic types, or Southwestern groups or others may have utilized the Basin and brought their own ceramics with them; or all or some of the above scenarios could have occurred. Because no documented Ute, Apache, Navajo, or Pueblo sites have been excavated and dated in the area, this research topic is open for interpretation. Again, more detailed ceramic analysis would eventually provide the quality database to allow more focused research on this topic. Additional historic archival research may also prove useful to help define which ceramic associated groups were more likely to have been in certain portions of the area historically. For example, as late as 1864 it was reported that there were 145 Indian slaves in Conejos and Costilla counties, 110 of which were Navajo (San Luis Valley Historical Society 1969). Where were these slaves located and were any of them making or utilizing ceramics that may be recovered in archaeological deposits?

- A related research question is what changes were brought about by interregional influences within the Rio Grande Basin from the beginning of the Late Prehistoric to the historic period? Being able to confidently assign cultural affiliation to ceramic sites would assist in answering these and other settlement/subsistence questions for the Late Prehistoric and later temporal periods.

- Another research question concerns the possibility that some of the ceramic specimens found within the Rio Grande Basin are historic Spanish in origin. Dick (1968:77) noted that a series of new pottery types appeared after A.D. 1640 in Spanish colonial settlements and occasionally in Indian villages. Distribution of these wares reportedly extended into the Rio Grande Basin as far north as the town of Antonito, in the southern San Luis Valley. Described ceramic types include Casitas Red-on-brown (also referred to as Manzano ware) (Hurt and Dick 1946:282), Powhoge Polychrome, Kapo Black, El Rito Micaceous Slip, Carnue Plain, and Petaca Micaceous (Dick 1968:80-86). If historic Spanish ceramics exist in the Rio Grande Basin, were they brought to the area from farther south or were they manufactured locally? Were any Indian groups in the Rio Grande Basin also utilizing these wares? These questions should be considered, especially when examining ceramics found in the southern portions of the Rio Grande Basin, where Spanish influences/occupation were the most common.

ROCK ART

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Introduction

Forty-four rock art sites have been recorded within the Rio Grande Basin study area (Figure 7-9), with the majority found in the foothills of the San Juan Mountains on the western edge of the San Luis Valley. Concentrations of rock art are also found adjacent to the Rio Grande in the south-central portion of the valley and on the east side of the valley in the drainages of Trinchera and Sangre de Cristo creeks. The rock art appears to be varied temporally and stylistically including Archaic, Pueblo, and Ute motifs and probably others based on comparisons with Cole (1987, 1988, 1990). Most of the rock art sites were recorded in a project designed to document basic locational and content information to assist future researchers (Frye 1995a).

Rock Art Description

A general description follows of rock art images and topographical locations where they occur. Only a limited attempt has been made to suggest temporal and cultural affinity; this is beyond the scope of this document considering the present level of site documentation.

Rock Art Sites in the West-Central Foothills South of the Rio Grande

Rock art sites in foothill terrain on the west-central edge of the San Luis Valley, south of the Rio Grande, are found mostly in an area of northeast-trending intermittent drainages located between permanent Rock and San Francisco creeks (see Figure 7-9; Table 7-2). Vegetation is generally composed of pinyon, Rocky Mountain juniper, Indian ricegrass, currant, rabbitbrush, fringed sage, Arizona fescue, western wheatgrass, and blue grama grass. At lower elevations the pinyon and juniper may be absent.

The Rock Creek site, the largest known petroglyph site in the Rio Grande Basin, is located about 6.5 km (4 mi) south of Monte Vista. It is on the side of a south-facing ridge above Rock Creek near where the creek issues into the wide expanse of the San Luis Valley. This unrecorded site is located on an approximately 120-meter-long section of rock faces or on large boulders that have become detached. The petroglyphs, noted by Captain E. L. Berthoud in 1883, were described in the memoir of Colonel Garrick Mallery (Jeancon 1926). Berthoud described the site as being on volcanic rock at the entrance of the canyon of the Piedra Pintada Creek, which is now known simply as Rock Creek. Petroglyph figures were reported as being composed of dots instead of solid lines. Pictured are figures on horseback, one with a large spear. An evident battle scene is also depicted. Jeancon (1926) notes that the site was at the end of two trails, one used by the Utes on their way from Pagosa Springs and the other coming from the south which was used by the Jicarilla Apache.

FIGURE 7-9

DISTRIBUTION OF ROCK ART SITES WITHIN THE RIO GRANDE BASIN

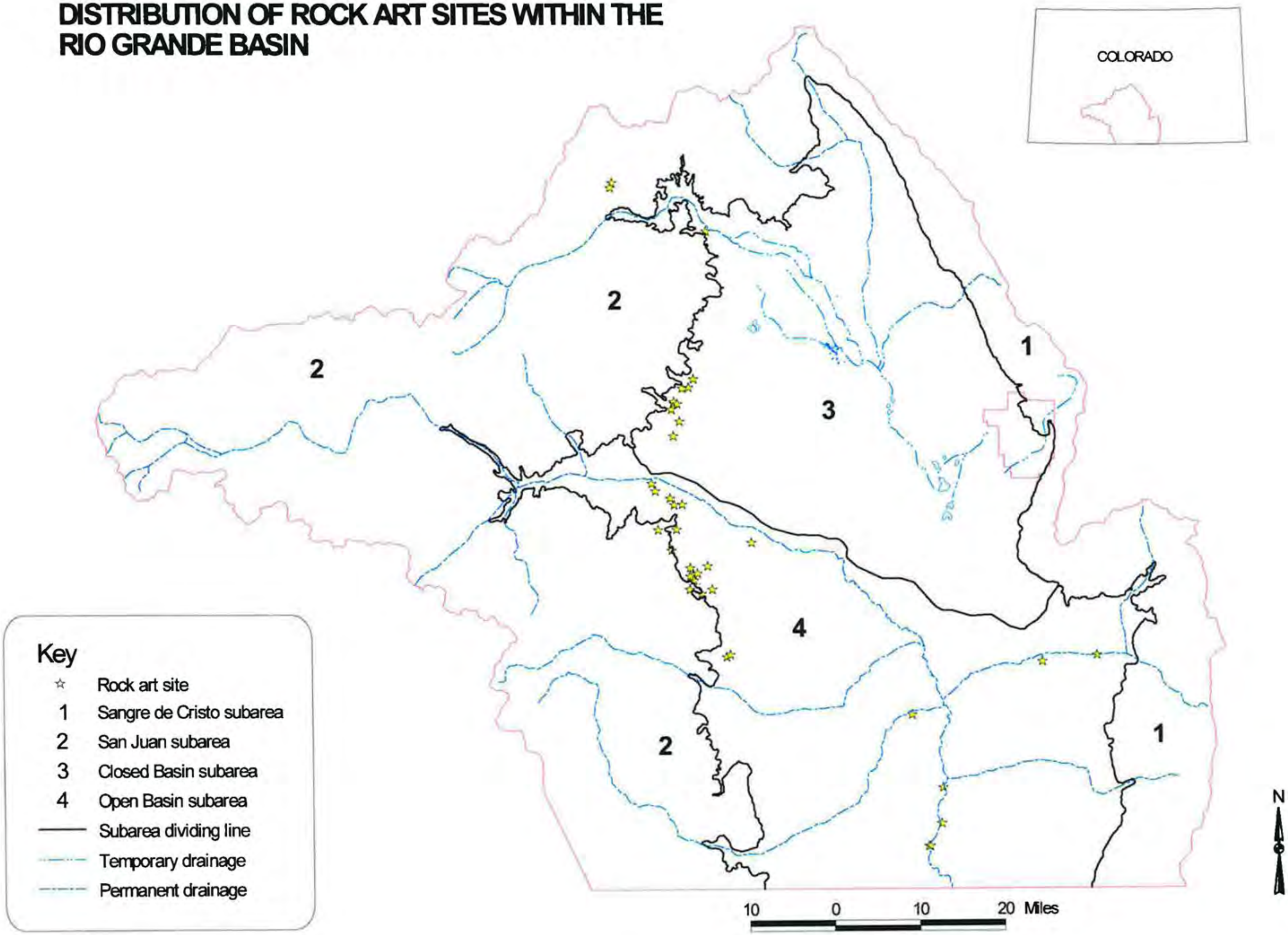

Table 7-2. Representative Rock Art Sites of the West-Central Foothills South of the Rio Grande

Site	Location	Rock Art Attributes
5RN522	Southeast-facing side of a volcanic tuff outcrop at the mouth of a low canyon. Nearest permanent water source is Rock Creek located 4 km south.	9 petroglyph panels and 2 dry-laid stone structures. Elements include anthropomorphic figures, wavy lines, zoomorphs, a rayed circle, a bear paw print, zigzag lines. Possibly Archaic based on the presence of abstract curvilinear lines.
5RN1 (Figure 7-10)	South-facing side of a Fish Canyon Tuff outcrop above an intermittent drainage. Nearest permanent water is Rock Creek, 1.6 km southwest.	15 petroglyph panels including horizontal rows of dots, abraded vertical lines, abstract curvilinear lines, connected anthropomorphic figures, zigzag patterns, deer-like animal tracks, wavy lines, rayed circles, grids, star-like figures. Possibly Archaic based on presence of abstract curvilinear lines. Superimposition of figures is seen. Heavily vandalized.
5RN330 (Figure 7-11)	Rock shelter on the south-facing point of Dog Mountain, a prominent conical feature in foothill terrain.	2 petroglyph panels including a stylized bird-like figure 2.0 x 0.5 m in size. Surface blackened prior to panel formation. Elements that make up the bird figure include dotted lines, parallel vertical lines, a rake, diagonal cross-hatching, and a curved line. Other figures include concentric circles and a grid. Possibly Archaic based on curvilinear style and presence of concentric circles. Test excavation attests to the presence of buried cultural remains. Not vandalized.
5RN488	South-facing side of an intermittent drainage in the foothills below Pintada Mountain.	Rock art, found on 2 rhyolite boulders, consists of anthropomorphic males which are pecked. A stone structure and a metate were found on the site.
Rock Creek (not recorded)	Side of south-facing ridge of a permanent drainage in the foothills below Pintada Mountain. Site is near the location where the creek enters the broad expanse of the San Luis Valley.	Rock art, found on volcanic rock faces and detached large boulders, consists of a bird figure with wings of suspended parallel lines, anthropomorphs with staffs and large heads, a large-handed anthropomorph with an arc of dots above the hands, boar track figures, a horned animal on hind legs with atlatl prong figure in back, and human figures, some with horns.

Observation of the Rock Creek site reveals an extensive display of petroglyphs of various styles located on rock faces and large boulders. Superimposition is seen and several animal figures have additions made to existing antlers. Figures noted include a possible bird with wings formed of suspended parallel lines, anthropomorphic figures with staffs and large heads, a large-handed anthropomorphic figure with an arc of dots above, an anthropomorphic figure with an ornate staff, horizontal parallel and vertical rows of dots, wavy lines, bighorn sheep-like figures, bear track-like figures, a circle of dots, a horned animal on its hind legs with an atlatl prong in the back, an anthropomorphic figure with two arcs above, and human figures, some horned.

The Rock Creek site is almost totally unvandalized because the owners safeguard the site and allow only limited visitation. One reason why this site should be considered the most important rock art site in the Rio Grande Basin is that it exhibits much less vandalism than most. Systematic recording of the site should be pursued with the landowner's permission.

Figure 7-10. View of petroglyphs at 5RN1 on an outcrop of Fish Canyon Tuff. Photo by Vince Spero.

Figure 7-11. View of petroglyph at 5RN330, Dog Mountain. The figure, which measures approximately 2 m in length, resembles a bird in flight. Photo by Vince Spero.

Foothill Terrain North of the Rio Grande at West Edge of the San Luis Valley

Concentrations of rock art are found in the area between Carnero and La Garita creeks, which drain the La Garita Mountains to the west (see Figure 7-9; Table 7-3). This area is dissected by dry drainages forming low canyons, some to 25 m in depth. Vegetation is generally composed of pinyon, Rocky Mountain juniper, Indian ricegrass, currant, rabbitbrush, fringed sage, Arizona fescue, western wheatgrass, and blue grama grass. At lower elevations the pinyon and juniper may be absent.

Table 7-3. Representative Rock Art Sites in Foothill Terrain North of the Rio Grande at West Edge of the San Luis Valley.

Site	Location	Rock Art Attributes
5RN1486	Small rock shelter in a large boulder in a low canyon. Aspect is east.	2 panels of red pictographs including anthropomorphic males, attached human-like figures, quadrupeds, slanted vertical lines, and parallel horizontal lines.
5SH48 Listed on NRHP 6/5/75 (Figure 7-12)	Located adjacent to Carnero Creek on a volcanic outcrop.	2 rock art panels containing 54 red pictographs depicting spirals, crescents, bird tracks, rain, ladders, centipedes, three-tooth comb, stick figures, chains, animal figures, bear-like figure, turkey, lines in a circle, bow and arrows, horse shoes, rattlesnake, horse and rider, slash marks, water symbols, cardinal direction sign, men in canoes, and circles within a circle with 12 radiating lines inside. A rock shelter is associated with the site.
5SH1492	Small rock shelters in large boulders located in an area of numerous large boulders and short cliff faces dissected by numerous intermittent drainages. Shaw Springs located 8 km south.	6 panels of red pictographs and solid-pecked, stipple-pecked, and scratched petroglyphs. Elements include quadrupeds, a horned animal, attached human-like figures, circles, wavy lines, and a bisected circle. A stone structure is located on site.
5SH1497	Located in Witches Canyon, a low canyon feature between Carnero and La Garita creeks. Aspect is southwest.	3 panels of red pictographs in an 80 x 40 m area. Elements include attached human-like figures, outlined circles, a crescent-shaped figure, a rayed circle, and parallel vertical lines. An open lithic site 5 m away contains a Late Prehistoric type point.

Figure 7-12. View of images at 5SH48, Carnero Creek pictograph site. Photo by Vince Spero.

Adjacent to the Rio Grande in the South-Central San Luis Valley

Concentrations of rock art are also found adjacent to the Rio Grande on basalt outcrops, low canyon walls, and boulders in the south-central portion of the San Luis Valley to the New Mexico border and beyond (see Figure 7-9; Table 7-4). Vegetation consists of rabbitbrush, yucca, and prickly pear cactus.

Table 7-4. Representative Rock Art Sites Adjacent to the Rio Grande in the South-Central San Luis Valley.

Site	Location	Rock Art Attributes
5CT23	Basalt outcrop adjacent to and on the east side of the Rio Grande at the confluence of a dry drainage. Aspect is west.	4 panels of petroglyphs include a rayed circle, a zoomorph enclosed by 2 circles, abstract curvilinear lines, circles, squiggles, a complex abstract design, and connected circles. Possibly Late Archaic based on abstract curvilinear elements depicted. Nearby are 4 dry-laid stone enclosures, ceramics, and ground stone.
5CT262	Located on a basalt outcrop in a low canyon adjacent to and on the east side of the Rio Grande.	4 scratched and pecked rock art panels with rayed circles, a zoomorph, a closed rectangular design, a tailed circle, a horizontal line, and outlined circles.

East Side of the San Luis Valley above Trinchera and Sangre de Cristo Creeks

Rock art panels are found on basalt boulders and outcrops on ridges above Trinchera and Sangre de Cristo creeks (see Figure 7-9; Table 7-5). These sites are on the east edge of the San Luis Valley near the town of Fort Garland. Vegetation is generally blue grama grass, Indian ricegrass, yucca, and pinyon/juniper.

Table 7-5. Representative Rock Art Sites Found on the East Side of the San Luis Valley above Trinchera and Sangre de Cristo Creeks.

Site	Location	Rock Art Attributes
5CT88	Located in the "Basaltic Hills," a dissected mesa above Trinchera and Sangre de Cristo creeks. Aspect is north. Trinchera Creek is 1.3 km north.	15 panels of rock art include rayed circles, abstract curvilinear wavy lines, an anthropomorphic figure with large hands, incorporated vertical and horizontal cracks, nested V-shaped lines, wavy lines, abstract zigzag lines, and a three-pronged rake. Eight stone structures are located on site. Possibly Late Archaic based on the presence of abstract curvilinear lines and figures.
5CT260	Located on an outcrop of basalt at the base of a southwest-facing steep ridge above Trinchera Creek. Location is where Trinchera Creek issues into the San Luis Valley at its eastern edge. Panels are found on individual basalt boulders.	20 panels of rock art include abstract curvilinear lines, anthropomorphic figures, plant-like figures, cracks incorporated into designs, connected circles, rayed circles, shield-like figures, a circle dissected by a vertical line, concentric circles, an abstract grid, and an enclosed oval grid. Possibly Late Archaic as all panels are consistently composed of abstract curvilinear lines with circles and grids also occurring.

Discussion of Rock Art Distribution in the Rio Grande Basin

Rock art within the four identified areas differs in locational and stylistic attributes. Rock art sites located south of the Rio Grande in the foothills of the San Juan Mountains generally consist of petroglyphs on volcanic tuff outcrops and boulders. They also usually have an association with intermittent drainages, which may have contained active springs in the past, as indicated by a present tendency for more lushly vegetated areas in or adjacent to the drainages. Larger sites, such as 5RN1 and the unrecorded Rock Creek petroglyph site, are found in this area, indicating relatively heavy use of the area through time, as indicated by evident superimposition at these sites. Dry-laid stone structures, located near a number of the recorded rock art sites, may indicate associated habitation, probably seasonal. A Late Archaic affiliation is indicated for most sites, although the larger sites also exhibit evidence, such as horse-like depictions and other possible historic figures, that the rock art was produced later.

Rock art sites located north of the Rio Grande in the foothills of the San Juan Mountains are generally located in small rockshelters, some of which are within large volcanic boulders. A significant portion of the rock art consists of pictographs, generally red in color. Attached human-like figures are common. A Late Prehistoric affiliation is probable as pigment in exposed locations appears to fade significantly over time, and therefore older pictographs have probably not been preserved. Historic elements are also present at sites in the area.

Rock art sites adjacent to the Rio Grande in the south-central San Luis Valley occur mostly on outcrops, low canyon walls, and basalt boulders. Petroglyph elements are well represented and include rayed circles, circles, zoomorphs, abstract curvilinear lines, and abstract designs. Probable Late Archaic affiliation is assigned to these sites based on the presence of abstract designs and circle figures.

Rock art sites found on the east side of the San Luis Valley above Trinchera and Sangre de Cristo creeks tend to be multipaneled petroglyphs on basalt outcrops. Common elements include rayed circles, abstract curvilinear lines, wavy lines, and connected circles. Incorporation of cracks into the designs is also an observed trait. A Late Archaic affiliation is likely based on the presence of abstract designs and circle figures.

Rock Art Research Needs

The following items are identified as major future research needs for rock art in the Rio Grande Basin:

- Existing site records need to be refined and updated.
- Additional inventory is needed to 1) record rock art that is known but unrecorded, 2) search for other locations that appear likely to contain rock art, and 3) follow up on reports from the public regarding potential rock art locations.
- A thesis or other research endeavor is needed to gather and synthesize the known rock art data for the Rio Grande Basin and compare those data with rock art from nearby regions.

Specific research needs for rock art resources include determination of:

- Methods of production
- Pigments used (if pictographs)
- Temporal/cultural placement based on comparison of style and motif
- Temporal placement based on patination, superimposition of styles, radiocarbon dating of pigments, lichen growth rates, depth of geologic deposits covering designs, rate of erosion of figures, association with artifacts, ethnographic identification, and subject matter
- Rock art interpretations through analysis of symbolism
- Locational patterns of rock art including associated geologic conditions
- Tools used during production
- Rock art constructed as "solar markers."

DISTRIBUTION AND SOURCES OF LITHIC MATERIAL IN THE RIO GRANDE BASIN

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Sources of lithic materials available to prehistoric people in the Rio Grande drainage include chert, quartzite, basalt, obsidian, and rhyolite. Most of these materials can be found in the context area (Figure 7-13), especially in the San Juan Mountains in outcrops of bedrock or as cobbles in alluvial gravel (Charles 1997). Source areas may occur in the Sangre de Cristo Mountains, but none have been documented. Actual source areas or quarries are not numerous and it is possible that undiscovered procurement areas exist. The following are potential sources of lithic raw material for artifacts found in the Rio Grande drainage. Some of these sources are associated with prehistoric procurement activities while others show no evidence of having ever being used as a source area. Some of the source areas have been assigned Smithsonian site numbers, although others are documented only in the RGNF files. Following the description of lithic source areas is a discussion of the distribution of projectile points by material type in the RGNF.

Chert Sources

Embargo Creek Chert (5RN278)

This raw material concentration consists of fractured chunks of chert, some of which appear to be of a grade suitable for the manufacture of stone tools. No apparent procurement activity is noted at the source. The chert is eroding out of a southeast-facing ridge slope near Embargo Creek at an elevation of 2847 m (9340 ft). The size of the deposit is about 5 x 15 m. The grade of the material ranges from poor to excellent and the colors found are red, orange, brown, and gold. The geologic formation containing the chert has not been identified.

Cumbres Pass Chert (5CN35)

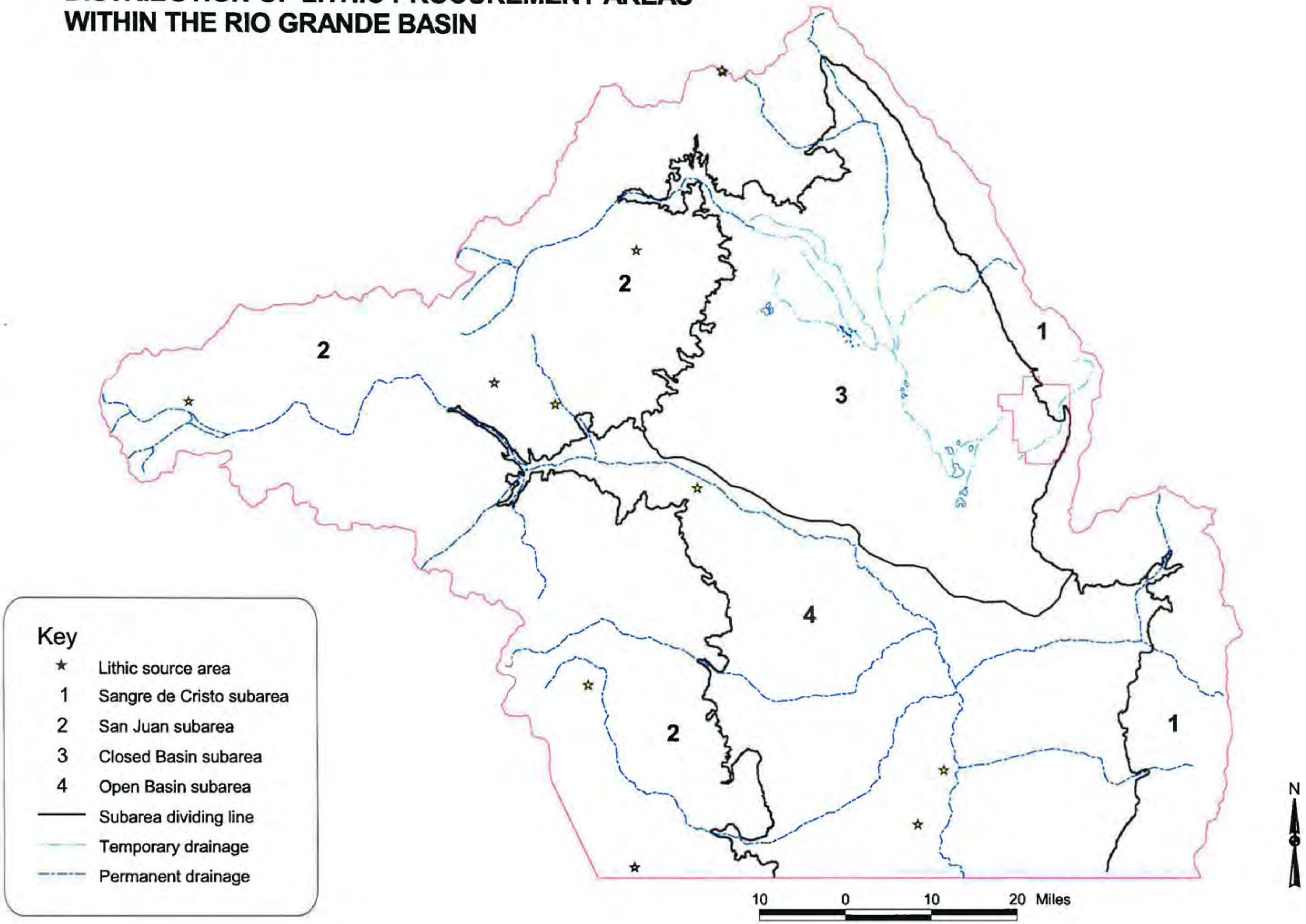
The Cumbres Pass chert source contains cobbles of gray and yellow chert. This source, thought to have a wide distribution in the general area of Cumbres Pass, is under investigation by the RGNF to determine its variety and areal extent. The geologic formation containing the chert has not been identified.

Mississippian Limestone Cherts

A possible chert source for Rio Grande Basin toolstone is in Mississippian-age limestones and dolomites, such as the Leadville and Manitou limestones. These cherts come in a variety of colors including red, gold, and yellow. Often chert of this type is referred to as Trout Creek Chert, named for the procurement area on Trout Creek near Buena Vista (Chambellan et al. 1984). Mississippian limestone cherts are also found at the Mosca Quarry (Charles 1997), located at the headwaters of Coldwater and Mosca creeks, which flow into the Piedra River north of Pagosa Springs. The quarry location would have been easily accessible by prehistoric people in the Rio

FIGURE 7-13

DISTRIBUTION OF LITHIC PROCUREMENT AREAS WITHIN THE RIO GRANDE BASIN



Grande Basin by several passes through the San Juan Mountains. Lithic material found at the Black Mountain Folsom site (5HN55) is tentatively identified as being from the Mosca Quarry or another source having a similar geologic origin (Pegi Jodry, personal communication 1997). The Mississippian limestones also outcrop in other locations in the San Juan and Sangre de Cristo mountains including the Kerber Creek area west of Villa Grove and the northern Sangre de Cristo range east of Villa Grove. Another outcrop is located near Sargents, Colorado (Tweto 1979a).

Spring Gulch Chert

The Spring Gulch source consists of fractured chunks that are scattered across a west-facing ridge slope above Spring Gulch. Spring Gulch flows into the Rio Grande near Wagon Wheel Gap. Elevation ranges from 2926 to 2987 m (9600 to 9800 ft). A variety of grades of chert is represented and the color of the material is mostly brown and weak red, with lesser amounts of very pale brown, light gray/grayish brown, dark reddish gray, white, and black. No evidence of prehistoric procurement is evident. The source area is estimated to be about 20 acres in size. The geologic formation containing the chert has not been identified.

Schrader Creek Chalcedony Source

Chert in the form of a clear chalcedony occurs in nodule form in the Schrader Creek area of the Pinos Creek drainage southwest of Del Norte. The nodules are found scattered on low ridges in the general area with no particular concentrations noted. Chalcedony projectile points and other artifacts of similar material are found at sites in the Schrader Creek area, including 5RN175 and 5RN176. The geologic formation containing the chalcedony has not been identified.

5SH1113 and 5SH1114

Two sites along the Continental Divide contain cobbles of chert that range in color from green to gold to brown (Kane 1987). The chert cobbles on both sites have been utilized, as evidenced by cores and primary flakes on the sites. The sites are located in the Bonanza area of the northern San Juan Mountains. The geologic formation containing the chert has not been identified, but it is likely the cherts are derived from Tertiary-age volcanic tuffs, which are common in this area (Tweto 1979a).

Fish Canyon Tuff Cherts

Large areas of the San Juan Mountains contain exposures of Fish Canyon tuffs. This formation is known to contain red, yellow, brown, and black cherts. Aboriginal use of Fish Canyon cherts has been documented at site 5GN2919 southeast of Gunnison, Colorado (Hoefer and Taylor 1999). It is likely that similar source areas are located in the San Juan Mountains.

Basalt Sources

San Antonio Mountain Basalt

A basalt source, estimated at nearly 6,000 acres in size, has been identified on San Antonio Mountain in the southern portion of the San Luis Valley in New Mexico. A substantial amount of quarrying activity was observed on the site (Spero 1981g). Outcrops of basalt were observed in the 2743 to 3322 m (9000 to 10,900 ft) elevation range. Deposits include numerous cobbles from 5 to 25 cm in size. Sites on the RGNF, especially in Conejos County, have artifacts manufactured from a similar looking material.

Other Basalt Sources

Renaud (n.d.) notes that at sites NM 2 and NM 3, west of the Rio Grande in northern New Mexico, basalt was locally found in the form of boulders. The sites were also littered with large cores, flakes, blanks, artifact fragments, and biface fragments of basalt.

Obsidian Sources

Beaver Creek Obsidian

The Beaver Creek obsidian source reported by Spero (1987c) is a 150-acre area where obsidian nodules, from 0.4 to 4.0 cm in size, are found. No evidence of quarrying is apparent. The obsidian concentration is located along the ridge between the Park and Beaver creek drainages, which flow into the South Fork of the Rio Grande. Burns (1981) has characterized the obsidian, but no artifacts subjected to the same analysis could be determined to have originated from the potential source.

Jemez Obsidian

A number of artifacts of obsidian from the Rio Grande drainage are thought to originate from the Jemez Mountains of New Mexico (Burns 1981), suggesting travel down the Rio Grande and/or some kind of a trade network in the Jemez Mountain area.

Quartzite Sources

Alkali Spring (Trickle Mountain) Quartzite

A source for quartzite raw material has been identified by RGNF archaeologists immediately northwest of Alkali Spring, which forms an intermittent drainage flowing into Saguache Creek, about 5 km (3 mi) to the south (Alkali Spring is located near the center of the USGS Trickle Mountain, Colorado 7.5' quadrangle). The quartzite occurs in a 10 to 15 m thick exposure of Dakota Sandstone consisting of fine- to-medium-grade, ferruginous orthoquartzite (James 1971). The Dakota Sandstone formation outcrops on a number of ridge sides above intermittent drainages. Evidence of quarrying activity was observed. The material includes light gray, pinkish-gray, weak red, pale red, brown, and dark gray varieties. The colors and quality of material noted in a preliminary investigation are consistent with quartzite artifacts found in the general area of Saguache Creek.

Rhyolite Sources

Pole Mountain Rhyolite (5HN132)

A source of rhyolite raw material, found in the Pole Mountain area near the headwaters of the Rio Grande, is similar to artifacts found on the RGNF as referenced in Spero (1982k). The source area has been recorded as site 5HN132 and is found on an east-facing ridge between two intermittent drainages on Pole Mountain. The Rio Grande is located about 1 km (0.6 mi) to the southeast. Scattered rhyolite cobbles are found on the south-facing, eroded ridge side. The source is located within 100 m of site 5HN131, an open lithic scatter. The raw material located at the source area is pale red and is similar to the artifactual material found at 5HN131.

Turquoise Sources

Several sources of turquoise have been found in the San Luis Valley that contain evidence, or are suspected, of being exploited prehistorically. Site 5CN31, the King Turquoise Mine, is located in the San Luis Hills in the Open Basin. It is rumored to have been exploited by Pueblo Indians. The evidence for prehistoric use is said to include quarry pits, crude stone hammers, and ungulate horns used as picks. The historic mining operations may have destroyed any evidence of prehistoric use. The historic turquoise quarry is located east of Manassa on the western bank of the Rio Grande (Renaud 1942b; Meyers 1950:15). Deposits of turquoise are also located in the northern part of the San Luis Valley near Villa Grove (Weigand et al. 1977).

Distribution of Projectile Points by Material Type in the RGNF

Projectile points from the RGNF were reviewed to help describe the use of chert, basalt, obsidian, chalcedony, quartzite, and rhyolite materials by geographic area within the mountainous portion of the Rio Grande Basin. One-hundred sixty projectile points, recorded from 1978 to 1997 on the RGNF, were used to view the distribution of material types. The projectile points were recorded during cultural resource inventories conducted prior to projects such as timber sales and land exchanges. The survey areas do not constitute a statistical sample, but do represent all geographic areas of the RGNF.

Projectile point distribution is identified by specific drainage or by the terms "southern Rio Grande," defined as the watershed area south of Monte Vista; the "middle Rio Grande," defined as the drainage area from Monte Vista west to the South Fork of the Rio Grande; and the "upper Rio Grande," from the confluence of the South Fork of the Rio Grande to the headwaters of the Rio Grande, above Creede. The following trends are apparent in the RGNF:

- Chert projectile point distribution favors the Saguache Creek watershed, in the northern portion of the Rio Grande drainage, and is lowest in the southern and the upper Rio Grande watersheds.

- Basalt projectile point distribution favors the southern portion of the Rio Grande drainage, whereas in the Saguache Creek watershed, basalt points are few.

- Obsidian projectile points are in greatest abundance in the Conejos River watershed in the southern portion of the Rio Grande drainage. The upper Rio Grande also has a significant number of obsidian points, but the Saguache Creek watershed exhibits a low frequency of obsidian points.

- Chalcedony projectile point frequency is highest in the Saguache Creek and the upper Rio Grande watersheds. The Conejos and Alamosa river watersheds exhibit low frequencies of chalcedony points.

- The distribution of quartzite projectile points highly favors the Saguache Creek watershed. A major quartzite source in the Saguache Creek watershed is indicated. The source may be the Alkali Springs Quartzite source, near Trickle Mountain, or some other unknown source. Quartzite points are almost entirely missing in the assemblage from the southern portion of the Rio Grande drainage.

- Rhyolite projectile point distribution favors the upper Rio Grande watershed, possibly because of a local source of rhyolite, such as the Pole Mountain area near the Rio Grande headwaters.

NATIVE AMERICAN HUMAN SKELETAL REMAINS IN THE RIO GRANDE BASIN

Vince Spero
Rio Grande National Forest

Native American skeletal remains have been found at 18 locations in the Rio Grande Basin (Figure 7-14). The OAHP database lists three other sites (5CN26, 5CN31, and 5SH51) as containing burials, but the site documentation does not list any human skeletal material. Analysis by physical anthropologists has been conducted on only a few of the remains. The analyses provided a description of the remains and their condition, and provided insights pertaining to age, sex, race, time since death, and cause of death. The following summarizes the skeletal material recovered in the Rio Grande Basin with the exception of sites 5AL523 and 5AL544. Three of sites listed below do not have Smithsonian site numbers. The information on these skeletal remains comes from the RGNF files.

Human Remains from an Unknown Location near San Luis, Costilla County

Skeletal remains from an unknown location near the town of San Luis in the southeastern part of the valley, consist of a nearly complete cranium plus two right parietal fragments which have been glued together. The entire cranium was shellacked at some point in the past. The cranium was brought to the RGNF in 1990 by a woman whose late husband had possession of the cranium for approximately 20 years. Information indicates that the remains were excavated during the 1950s. Four maxillary teeth are present and there is moderate to severe dental attrition present. The remains appear to be of an Native American adult male who was 30 to 40 years of age at the time of death, based on tooth wear and loss plus partial closure of some cranial vault sutures. Specific cultural affiliation could not be determined (Hoffman 1993).

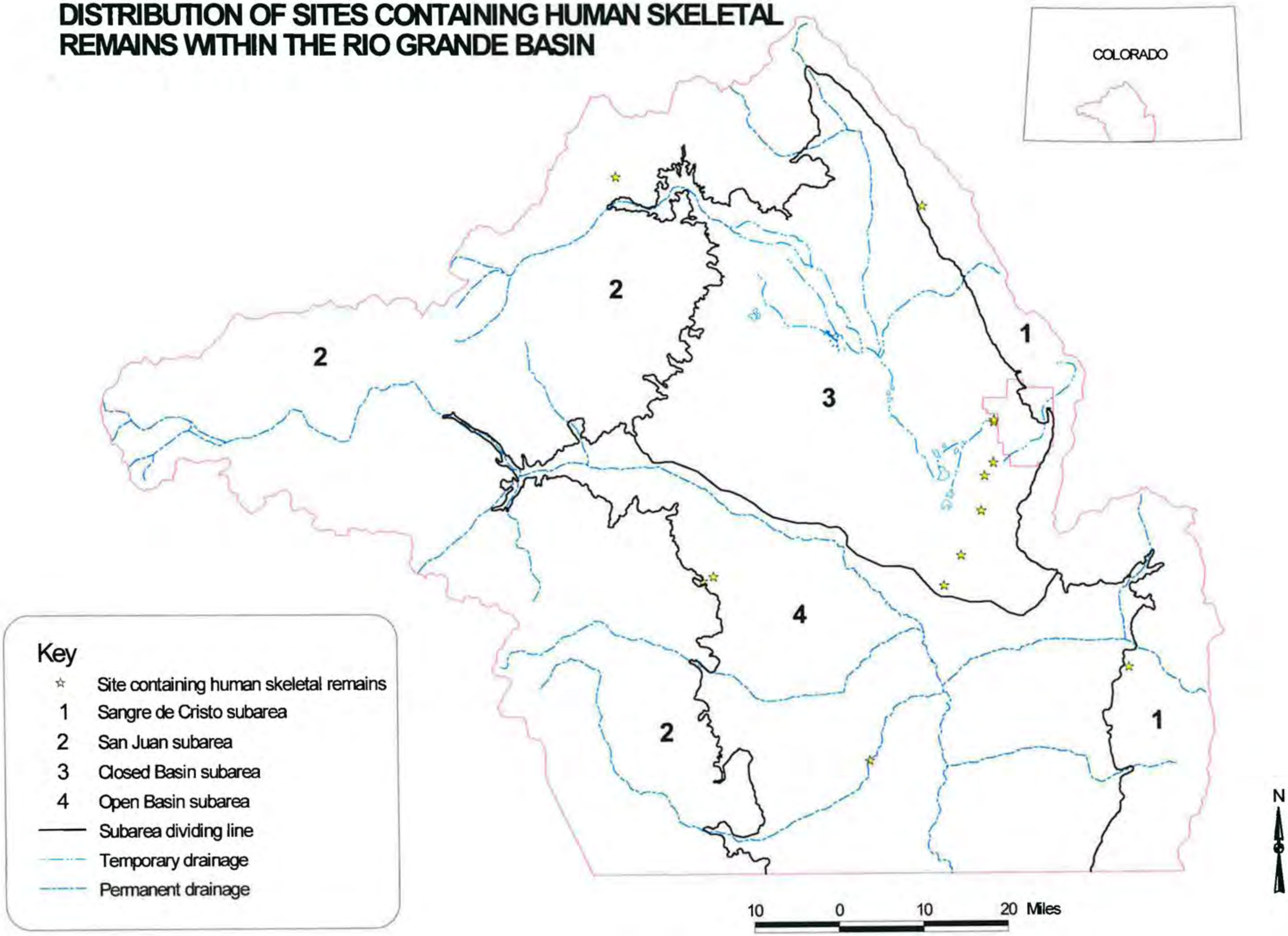
Human Remains from the Natural Arch Area, Saguache County

The remains of a single adult Native American male, more than 40 years old at the time of death, were found in a shallow, recent grave in the foothills north of Del Norte in the spring of 1994. Its appears that the skeleton was used as a part of a display or in a context where the bones were handled over an extended period of time, perhaps in a teaching setting or as a part of a personal collection. Much of the bone has evidence of having been coated with some kind of material in the past. Some bones were glued for repair while others were glued in normal articulation. The remains may represent a secondary burial or dumping (Hoffman 1994).

Human Remains from near La Garita, Saguache County

In 1993, a human calvarium and a rib were found at the bottom of a rocky, south-facing slope above La Garita Creek at an elevation of 2444 m (8020 ft). The individual is probably an adolescent or subadult. Antiquity of the remains is estimated as being more than 100 years. Indications are that the individual may be Native American, although this estimate is considered very speculative. The estimation of ancestry is based on the context of the skeletal remains found near a possible Ute burial feature as well as the slight flattening of the lower occipital bone. A rocked-in cavity of a large boulder, possibly associated with the skeletal remains, was found 30 m to the north up the rocky slope. It appears that soil was used to cover the upper surface of the boulder. A Ute elder present during the removal of the burial stated that the rocked-in boulder was consistent with Ute burial practice (Hatch 1994).

FIGURE 7-14
DISTRIBUTION OF SITES CONTAINING HUMAN SKELETAL REMAINS WITHIN THE RIO GRANDE BASIN



Sites 5AL5, 5AL7, and 5AL8

Sites 5AL5, 5AL7, and 5AL8 are located in the Dry Lakes area of the Closed Basin. All were recorded by Renaud during the DU investigations. Each of these sites is an open camp that Renaud listed as containing human remains. These sites have been rerecorded by Weimer (1989b) or CAS and no mention is made of human remains. These remains have not been analyzed and no information is available on their disposition.

Site 5AL100

Site 5AL100 was recorded by CAS in 1979. When the site was recorded it was listed as an open camp. Local informants told the site recorders that a burial was exposed on the site in 1960. No further information is available on the remains.

Human and Canid Remains from 5AL396

The skull and postcranial skeletal remains of a Native American woman about 50 years of age at death were found in the fall of 1989 at site 5AL396. Also recovered from the site was an articulated left arm of a second individual (probably female) and partial canid skeletal remains. The remains were observed lying in an unflexed, semireclining, somewhat sprawling position not usually associated with a burial. The remains were recovered along an Alamosa County road right-of-way in an area of low sand dunes. Nonskeletal material found at the site includes 29 whole and numerous fragments of juniper seed beads found concentrated immediately below the upper thoracic vertebrae (CAS, San Luis Chapter 1989).

Site 5CN6

Site 5CN6 was recorded by H. C. Meyers of DU in 1950. The site consisted of an open camp with stone structures and a burial. The DU site card lists the burial as being collected. Martin Weimer (1989b) rerecorded the site in 1987 and described the site as heavily vandalized. No information is available on the burial.

Ojito Creek Burial (5CT121)

The Ojito Creek burial (5CT121) was excavated in 1984 by Van Tries Button with assistance from CAS (Button 1984). The burial was found eroding out of a terrace of Ojito Creek in the Open Basin. The burial was in a flexed position in a pit, the top of which was 2 m below present ground surface. The pit's diameter was 1.5 m and the depth was 1 m. It contained a nearly complete skeleton and several bones from an unidentified quadruped. No artifacts were found in association with the burial. The age is estimated at 200-300 years, based on the soil profile. The remains were sent to Colorado College for curation. No analysis of the remains is available.

Sites 5RN11 and 5RN12

Both sites 5RN11 and 5RN12 are rock art sites located in the foothills of the San Juan Mountains. In 1981, personnel from the Office of the Colorado State Archaeologist excavated a nearly complete skeleton from 5RN11. No other data are available for this burial. Several years earlier, the landowners of 5RN12 excavated human remains at a rockshelter on the site. The disposition of these remains is unknown.

Site 5SH137

Researchers from DU recorded a campsite and burial at this location in the 1950s. Site 5SH137 was rerecorded by Martin Weimer in 1987, who found eight circular stone structures on the site (1989b). No mention is made of a burial.

Flattened Skull Site (5SH350)

The Flattened Skull Site (5SH350) is an open camp recorded by CAS. Local collectors had recovered projectile points ranging from the Early to Late Archaic on the site. Skeletal remains, primarily cranial and vertebral fragments, were found on the site. The remains were analyzed by Dennis Van Gerven and S. G. Sheridan of CU Boulder. They determined the remains were a female of 50+ years of age.

Cotton Creek (5SH1047)

Skeletal remains were found in 1985 eroding from a bank of Cotton Creek at an elevation of 2664 m (8740 ft) in the Sangre de Cristo Mountains. The remains consist of most of a cranial vault with the facial skeleton and cranial base missing. The remains appear to be those of a female Native American adult probably 40 to 50 years of age at the time of death. Antiquity is estimated as being Early Historic or Late Prehistoric. Specific cultural affiliation could not be determined (Hoffman 1986; Spero 1985a).

Site 5SH1069, Indian Spring Burial

In April of 1986, skeletal remains were found by an Alamosa resident at Indian Spring, located just west of the Great Sand Dunes National Monument on State of Colorado land. The location is near the eastern edge of the San Luis Valley at an elevation of 2341 m (7680 ft). The burial was found within the boundary of a large prehistoric open camp called the Indian Spring site (also referred to as Medano Mammoth Site, 5SH181), but was given a separate site number of 5SH1069. Excavation yielded what is thought to be a secondary, bundle-type burial as indicated by a tight cluster of remains, lack of articulation, and absence of many of the bones. Disturbance by vandals could also have resulted in the disarticulated arrangement of the skeletal material. Analysis suggests that the individual is a Native American male of 40+ years of age. Racial determination is based on cranial morphology, degree of dental attrition, and burial context (Hoffman 1987; Spero 1986d).

NATIVE AMERICAN PERSPECTIVES

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Certain geographic locations and archaeological sites in the drainage of the Rio Grande are either considered, or have the potential to be considered, culturally important to Native American people. A traditional cultural property can be defined as "one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1994:1). Cultural properties of importance to Native American people may be considered eligible to the National Register of Historic Places (NRHP) due to their cultural "significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices" (Parker and King 1994:1). Review of ethnographic literature followed by consultation with tribal members is often needed to determine if Native American cultural properties exist on a given landscape (Parker and King 1994). Protection of cultural sites from damage or the effects of nearby development is often considered important by Native American people (Stoffle et al. 1995).

According to Kelley and Francis (1994), places considered culturally significant by the Navajo can include archaeological site and feature types such as petroglyphs and pictographs, cairns, hunting traps, battlefields, clay sources, quarries, certain types of artifacts, and culturally significant caches of stones, such as crystals and smaller stone piles. Examples of natural feature types which may be culturally important are mountains, canyons, springs, and areas where culturally significant plants or mineral deposits are collected (Kelley and Francis 1994).

Site and feature types that may be of cultural significance to the Southern Ute are identified as stone circles, circular stone structures, wickiups, platform burials, stone alignments, stone structure remains identified as vision quest sites, cairns, petroglyphs, pictographs, burial sites, battle or massacre sites, lithic quarries, caves, and rockshelters (Frost 1992). General areas identified by the Southern Ute as being culturally significant include the areas of the Great Sand Dunes National Monument and the Baca Land Grant, near Crestone.

The Pueblo people have identified the Dry Lakes area west of Blanca Peak as being the place the Tewa refer to as the "Sandy Place Lake to the North" (Creamer and Haas 1991). Geary (1997:21-25) discusses an origin myth of the Tewa that suggests origins at the "Sandy Place Lake" in the vicinity of the Great Sand Dunes National Monument. Harrington (1916) also indicates that the San Luis Valley is the point of emergence for the Tewa. Geary (1997) mentions a Taos Pueblo origin story, similar to that of the Tewa, that suggests the location of emergence near the summit of Blanca Peak.

Blanca Peak and its surroundings in the Sangre de Cristo Mountains, called Sisnaajini by the Navajo, is "revered and respected" as the mountain spiritually representing the "eastern main beam that encompasses the traditional homeland of the Navajo" (Martin 1995). Traditional Navajos travel to the mountain where soil, plants, and spring water are collected and used in important ceremonies. The protection of gathering rights on the mountain is of major concern to Navajo people (Martin 1995).

Blanca Peak also has an association with archaeological site 5AL321/5CT169/5HF194, consisting of a what may be the remains of a rock enclosure on the summit of the peak. A rock enclosure was originally reported by Gilbert Thompson, a member of the Wheeler Survey who made the first recorded assent of Blanca Peak in 1874. Thompson stated that there was a circular depression covering almost the entire summit of the peak that was probably used by Indians as a shelter for sentinels watching the broad expanse of the San Luis Valley (Bueler 1974:6). In 1875, members of the Hayden Survey climbed Blanca Peak and reported a "curious circular excavation 6 to 8 feet across, surrounded by a wall of loose rock 1 to 2 feet high which must have been the work of an Indian" (Bueler 1974:6). Blanca Peak was field checked in 1990 by Vince Spero, RGNF Archaeologist, and Kevin Black, Assistant State Archaeologist of Colorado, resulting in the recording of a stone enclosure feature which may be the one reported in 1874 and 1875. It is also possible that the structure found is associated with the many modern-day climbers of Blanca Peak who build stone structures to shield themselves from the wind.

In order to help protect Native American cultural sites from the effects of natural resource projects and land development, the RGNF and the BLM San Luis Resource Area actively consult with the following tribal groups:

- Southern Ute Indian Tribe
- Uintah and Ouray Ute Indian Tribe
- Ute Mountain Ute Indian Tribe
- Hopi Tribe
- Jicarilla Apache Tribe
- Navajo Nation
- All Indian Pueblo Council
- Five Sandoval Indian Pueblos
- Ten Southern Pueblo Governors Council
- Eight Northern Indian Pueblo Council

The NPS, Great Sand Dunes National Monument, has also conducted formal consultation with the Southern and Northern Utes. Most of this consultation has been specifically undertaken to address issues concerning the culturally peeled trees at the Great Sand Dunes. The primary goals of the consultation were to solicit data regarding the interpretation and protection of culturally peeled trees found within the monument.

MANAGEMENT RECOMMENDATIONS

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It is extremely important to formulate management recommendations for future research in the Rio Grande Basin. Determination of the general philosophy for decision-making regarding significance criteria is one of the crucial tasks. The ability to look beyond biases is another significant step toward making future research more meaningful and useful. The following section attempts to address these concerns and provides general and specific management recommendations for the Rio Grande Basin.

Property Types and Significance Criteria

As noted in Guthrie et al. (1984), site significance is based on the potential of each site to scientifically address specific research questions. Research domains relevant to each prehistoric temporal period for the Rio Grande Basin have been identified and discussed within the Paleoindian, Archaic, Late Prehistoric, Protohistoric, and Special Topics sections. A short summary of some of the major research concerns and data requirements for each of the temporal periods is included below.

Paleoindian Stage

Great strides have been made in our level of knowledge of the Paleoindian use of the Rio Grande Basin due to the efforts of Margaret A. Jodry, Dennis Stanford, and Vince Spero. Many of the Paleoindian research domains currently under investigation at the Cattle Guard and Black Mountain sites, such as paleoenvironmental reconstruction, exchange systems, technology, resource utilization and seasonality, and social organization, are relevant to other stages as well. Many other questions still remain about the Paleoindian stage, such as what happened after Folsom occupation ended. Because of the great number of Paleoindian sites in the Rio Grande Basin, this area also seems to be a prime location for conducting research into possible pre-Clovis occupation.

Archaic Stage

Although surface evidence suggests a significant use of the Rio Grande Basin during the Archaic, little formal testing or excavation has been conducted to address the research domains such as climatic and cultural adaptational changes from Paleoindian to Archaic, and from the Early to Late Archaic; types and extent of outside influences from the Southwest, Rocky Mountains, Great Basin, and Plains areas; possibility of the presence of a localized Mountain tradition; how the proposed Upper Rio Grande Culture or Complex fits into the local chronology; demography through time; exchange systems; technology; resource utilization; and types and extent of adaptations to high elevations.

An example of the type of research that could be conducted at Archaic sites in the area is the settlement modeling begun by Kevin Jones (1977) at the Blanca Wildlife Refuge. As of now, local Archaic chronologies are based primarily on comparative projectile point styles, and a major research need is to develop a chronology based on absolute dates. Many of the Archaic stage research topics could be addressed by focusing on sites with potential to yield chronological, technological, and subsistence data.

Late Prehistoric/Ceramic Stage and Protohistoric Stage

Although formal Formative stage occupation does not appear to be likely within the Rio Grande Basin, a number of sites contain Formative stage diagnostics such as Pueblo and Woodland ceramics and Woodland-like projectile points. Again, more research is needed to determine the extent and type of influence and/or use of the area by Formative groups.

Preliminary analysis of existing survey data indicates heavy use of the Rio Grande drainage during the Late Prehistoric stage. Although many sites appear to date to this temporal period, most of the same research questions applicable to the Archaic are also relevant for these later stages. The Rio Grande Basin is unique because of the amount of early influence from Spanish exploration and from early Hispanic occupation, but the possible effects of this in the archaeological record are yet to be identified and researched.

Cultural affiliation of sites dating to Late Prehistoric and Protohistoric stages is another significant research domain. One site type, culturally peeled trees, may be a key to studying cultural affiliation, as well as subsistence, environmental change, and adaptation during the Protohistoric. Culturally peeled trees are especially important because they can be accurately dated through dendrochronological analysis, sometimes to the season of a specific year. Other resources containing Late Prehistoric and Protohistoric remains in a datable context could also yield significant information to the known database.

Geographical Considerations

Geographically, major data gaps occur in basic information in the Open Basin and Sangre de Cristo subareas. This is due to several reasons, such as the large percentage of private lands, high elevations and rough terrain, the isolated nature of much of the area, and the lack of any formal archaeological work. A major goal for these geographical areas is basic data collection to determine site locations, site types, integrity, chronology, and cultural affiliation. Some of this will likely have to be done through methods other than through compliance-related work. In locations where much of the land is private, conveying the significance of cultural resources through public education may be one of the keys in the future to site identification, preservation, and research in this area. A new avocational group called the San Luis Valley Archaeological Network has been recently formed and is active in the area. This organization is a prime resource for conveying cultural resource values to the general public, and in the future may take on a valuable role by actually doing some of the basic survey and site identification, especially on private land.

Specific research questions related to the Open Basin and Sangre de Cristo subareas include the need to identify the types of prehistoric utilization and changes in settlement and subsistence patterns through time; extent of influence from or to the Southwest, Rocky Mountains, Great Basin, and Plains; and how use of the areas differed through time from that of the Closed Basin and San Juan subareas.

Geographically, much more is known about the archaeology of the Closed Basin and San Juan subareas, but a large percentage of these areas has also never been formally surveyed. In addition, much of the existing database and associated chronologies, with the exception of the Black Mountain and Cattle Guard Paleoindian excavations and a few other minor test excavations, are built primarily from surface survey data and comparisons of projectile point styles with types from other regions. Obviously there is a need to identify and excavate sites from the Archaic and Late Prehistoric stages that contain chronological, technological, and subsistence data.

Key Research Domains

Based on all of the geographical areas and all of the prehistoric temporal periods, several key research domains have been recognized and include the following:

- Local Chronology - One of the major research issues for the Rio Grande Basin is the lack of absolute dates for building a local chronology. With the exception of the Paleoindian stage, prehistoric chronologies within the Rio Grande Basin are based primarily on comparative projectile point typologies from other regions. This has resulted in considerable biases in determining dates of sites and in interpreting regional influences.

- Subsistence - Subsistence data are generally lacking for the Archaic and later stages primarily because of the lack of excavated sites. A number of sites, such as 5SH903, have good potential to yield significant subsistence data.

- Technology - Questions regarding prehistoric technology through time within the Rio Grande Basin have not been specifically addressed except for the Paleoindian stage. A related research topic is lithic procurement and how lithic resource use varied geographically and chronologically.

- Paleoenvironmental Reconstruction - Only recently has work been focused on paleoenvironmental reconstruction within the Rio Grande Basin (e.g., Grissino-Mayer et al. 1998; Jodry et al. 1989; Reasoner and Jodry 1998a; and Shafer 1989). This type of information is crucial to understanding the interactions between prehistoric populations and changes in climate, and hydrologic and biotic regimes.

- Interregional Influences - How, when, where, and why groups from other regions influenced prehistoric settlement and subsistence patterns through time in the Rio Grande Basin, and seasonal use versus year-round occupation of the area, are significant research concerns. The area exhibits traits that suggest influence or use by specific groups from areas to the west, south, and east, but defining the types of interactions that occurred with these groups through time has not been accomplished. The question of whether there were indigenous mountain populations in the area has only begun to be examined. Study of potential travel routes in and out of the Rio Grande Basin and exchange systems (trade) patterns are other research domains related to interregional influences.

- Demography - The study of prehistoric populations (size, density, and distribution) through time within the Rio Grande Basin is an important research domain for all stages and has not been adequately addressed. For example, it has been hypothesized that there was an increase in populations related to increased use of wetlands during the later Archaic and into the Late Prehistoric. Significant data are needed to address these research domains.

- Cultural Affiliation - How to accurately assign cultural affiliation to prehistoric resources within the Rio Grande Basin is an ongoing topic of discussion that is relevant to other parts of Colorado as well. Significant data gaps still remain regarding definite traits that indicate Ute use of the area. Many other groups also reportedly utilized parts of the Rio Grande Basin, making cultural affiliation of sites a major research concern.

- Social Organization - The question of social organization of the prehistoric groups utilizing the Rio Grande Basin is perhaps one of the least-known research domains and will require detailed inter- and intrasite data.

National Register of Historic Places Criteria and Significance

Site significance is also based on criteria for the NRHP found at 36 CFR 60.4 as follows:

> The quality of significance in American history, architecture, archaeology, and culture 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

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) that are associated with the lives of persons significant in our past; or

(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) that have yielded, or may be likely to yield, information important in prehistory or history.

Prehistoric site types eligible under criterion (a) are probably uncommon within the Rio Grande Basin but could potentially include battle sites, or sites with evidence of early Spanish contact or exploration. Site types eligible under criterion (b) are probably also rare but could include resources related to known, important Native American leaders who utilized the Rio Grande Basin during the latter part of the Protohistoric stage. Prehistoric sites eligible under criterion (c) could include site types such as rock art, and habitation structures such as wickiups.

Most of the significant prehistoric resources found in the Rio Grande Basin are eligible for the NRHP under criterion (d) because they have yielded or have good potential to yield information important to our knowledge of prehistory. Site types could include almost every kind of prehistoric site type, but would include at a minimum the following: open and sheltered camps, open and sheltered architectural sites, lithic scatters, lithic procurement areas, special use sites, kill and butchering sites, rock art sites, burials, and culturally peeled trees.

Key site characteristics that would provide information to address the identified research domains and NRHP significance criteria would include sites with good integrity of remains and one or more of the following characteristics:

- stratified, multicomponent sites with clearly defined cultural components
- well-preserved, single-component sites with datable materials
- sites with subsistence and/or technological data from any temporal period
- sites with datable and functionally definable features (e.g., hearths, wickiups, game traps, stone structures, peeled trees)
- sites with diagnostic tools and artifacts (projectile points, ceramics)
- unique or unusual site types (burials, drive lanes, game traps, sites with evidence of corn or other cultigens)

Future Research Directions

To know where and how to focus future research, it is important to summarize the key facts about the archaeology of the Rio Grande Basin.

- Although archaeological research was begun in the 1930s in the area, generally it was sporadic until the last 20 years; since the 1970s, most of the work has been conducted in the mountainous portions in the RGNF, or on specific, small projects in the San Luis Valley.
- The known archaeology of the drainage has not been synthesized and no recent research design has been completed to guide past work in the area.
- Only a minute portion of the Rio Grande Basin has been surveyed, and the only large-scale excavation data have come recently from the work on the Black Mountain and Cattle Guard Paleoindian sites.
- A large percentage of the Rio Grande Basin, especially in the San Luis Valley proper, consists of private land that has undergone little development or exploration that would initiate Section 106 requirements under the National Historic Preservation Act (NHPA). Unfortunately, this does not mean that the archaeological resources have not been impacted. Much of the area has either been grazed or cultivated. Surface artifact collection has also occurred on much of the private and public lands. With the exception of the RGNF land, only a few project-specific surveys and limited testing projects have been conducted on state and federal holdings. Therefore, much of the area has not ever been formally examined, and many sites have not been recorded or evaluated.
- Due to the vast areal expanse and isolated nature of the Rio Grande drainage corridor, formal protection of known significant cultural resources is difficult.

Although there are approximately 2,129 prehistoric resources in the OAHP database as of 1998, it should be clear from the context data that our knowledge of the prehistory of the Rio Grande Basin is minimal. The future of archaeological research in the Rio Grande Basin, however, presents exciting and challenging opportunities. Important research topics include the basic themes of settlement/subsistence, culture history, demography, regional influences and chronological variation, climatic change and cultural adaptation, exchange systems, technology, resource utilization and seasonality, cultural affiliation, and social organization. Special considerations for the area include the need to develop a local chronology based on absolute dates, determine how the different geographical regions of the area varied climatically, and analyze how each was utilized through time. Recent Paleoindian research has yielded a wealth of significant data and should be continued and expanded to address questions related to pre- and post-Folsom occupation. Additional paleoenvironmental reconstruction and geomorphological assessments will assist in laying the groundwork for interpretation of all Paleoindian and other, later occupations. Archaic stage research needs are significant, but the potential for obtaining the required data is high. One of the primary needs is for excavated data from intact, single- or multicomponent sites containing chronological/subsistence data. Research needs for the Late Prehistoric/Protohistoric stages are similar to the Archaic but include specific questions, for example, regarding cultural affiliation, and effects of Euroamerican contact and occupation on native populations. In addition to ordinary research requirements, Native American consultation and archival research will be required to address these research topics.

Though research objectives seem to be focused on obtaining data from the excavation of sites and from additional paleoenvironmental reconstruction, surface survey is still valuable for adding baseline information to the database. The key is to add quality data, i.e., good site maps, detailed and accurate descriptions of artifacts and features, geomorphological data about the site and its surroundings, meaningful statements regarding site significance and investigative potential, quality artifact drawings and/or photographs (with a scale) of all potentially diagnostic artifacts including ceramics, and accurate locational information. It is also important to remember the biased consequences of defining site dates totally on comparative projectile point chronologies. If future researchers in the Rio Grande Basin can focus their efforts in these directions, knowledge of prehistoric lifeways within this area will increase dramatically.

One final note is appropriate regarding the potential for future investigations utilizing GIS. The GIS approach taken for this context has resulted in a database with incredible potential to help evaluate the prehistory of the Rio Grande Basin in the future. For compilation of this document, GIS technology was used to produce maps of site distribution by site type and temporal period. The production of these maps only scratched the surface as to the future potential of using GIS to sort and map various types of data to assist in evaluation of site information. As the database for the Rio Grande Basin grows and is refined in the future, the possibilities will increase for using GIS to assist archaeologists in examining local as well as regional cultural patterns and trends. This is just one of the exciting possibilities for future work in the Rio Grande Basin.

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APPENDIX A

Summary Tables of Sites by Site Type and/or Attributes

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Paleoindian Stage Sites within the Rio Grande Basin

SITE NO.	USGS 7.5'QUADRANGLE	UTM AVAILABLE
5AL101	Medano Ranch	Yes
5AL102	Zapata Ranch	Yes
5AL113	Zapata Ranch	Yes
5AL123	Medano Ranch	Yes
5AL162	Medano Ranch	Yes
5AL172	Medano Ranch	Yes
5AL203	Hooper West	Yes
5AL215	Baldy	Yes
5AL28	Medano Ranch	Yes
5AL29	Hooper East	Yes
5AL387	Baldy	Yes
5AL9	Zapata Ranch	No
5AL90	Zapata Ranch	Yes
5AL91	Dry Lakes	Yes
5AL93	Medano Ranch, Zapata Ranch, Liberty, Sand Camp	Yes
5AL94	Zapata Ranch	Yes
5AL97	Zapata Ranch, Medano Ranch	Yes
5AL99	Dry Lakes	Yes
5CN11	Terrace Reservoir	No
5CN272	Kiowa	Yes
5CN510	Platoro	Yes
5CN663	Manassa NE	Yes
5HN55	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5RN119	Beaver Creek Reservoir	Yes
5RN214	Dog Mountain	Yes
5RN306	Summitville	Yes
5SH1004	Bonanza 15'	No
5SH3	Lake Mountain	Yes
5SH366	Deadman Camp	Yes
5SH515	Crestone	Yes
5SH518	Deadman Camp	Yes
5SH519	Moffat South	Yes
5SH77	Moffat South	Yes
5SH8	Moffat North	Yes
5SH867	Deadman Camp	Yes
5SH933	Moffat South	Yes
5SH934	Moffat South	Yes
5SH935	Moffat South	Yes
5SH945	Mirage	Yes
5SH947	Moffat South	Yes
5SH954	Sheds Camp	Yes
5SH956	Moffat South	Yes

Paleoindian Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5'QUADRANGLE	UTM AVAILABLE
5SH958	Moffat South	Yes
5SH964	Deadman Camp SW	Yes
5SH984	Moffat South	Yes
5SH949	Unknown	Unknown
5SH973	Unknown	Unknown
5SH1207	Unknown	Unknown
5SH1461	Unknown	Unknown
5SH1763	Unknown	Unknown
TOTAL	50 sites, 3 without UTMs	

Archaic Stage Sites within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL10	Zapata Ranch, Medano Ranch	Yes
5AL101	Medano Ranch	Yes
5AL103	Medano Ranch	Yes
5AL104	Medano Ranch	Yes
5AL105	Medano Ranch	Yes
5AL106	Medano Ranch	Yes
5AL107	Medano Ranch	Yes
5AL108	Medano Ranch	Yes
5AL109	Medano Ranch	Yes
5AL110	Medano Ranch	Yes
5AL111	Medano Ranch	Yes
5AL112	Medano Ranch	Yes
5AL113	Zapata Ranch	Yes
5AL123	Medano Ranch	Yes
5AL133	Dry Lakes	Yes
5AL147	Medano Ranch	Yes
5AL148	Medano Ranch	Yes
5AL150	Hooper East	Yes
5AL155	Deadman Camp	Yes
5AL160	Medano Ranch	Yes
5AL170	Medano Ranch	Yes
5AL172	Medano Ranch	Yes
5AL178	Hooper East	Yes
5AL181	Medano Ranch	Yes
5AL182	Dry Lakes	Yes
5AL183	Medano Ranch	Yes
5AL186	Medano Ranch	Yes
5AL194	Dry Lakes	Yes
5AL202	Dry Lakes	Yes
5AL221	Baldy	Yes
5AL223	Baldy	Yes
5AL227	Baldy	Yes
5AL234	Baldy	Yes
5AL235	Baldy	Yes
5AL268	Hooper East	Yes
5AL276	Hooper East	Yes
5AL283	Dry Lakes	Yes
5AL29	Hooper East	Yes
5AL344	Zapata Ranch	Yes
5AL345	Medano Ranch	Yes
5AL346	Dry Lakes	Yes
5AL352	Dry Lakes	Yes

Archaic Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL356	Hooper East	Yes
5AL404	Zapata Ranch	Yes
5AL8	Zapata Ranch, Medano Ranch	Yes
5AL90	Zapata Ranch	Yes
5AL91	Dry Lakes	Yes
5AL93	Medano Ranch, Zapata Ranch, Liberty, Sand Camp	Yes
5AL94	Zapata Ranch	Yes
5AL95	Zapata Ranch	Yes
5AL96	Zapata Ranch	Yes
5AL97	Zapata Ranch, Medano Ranch	Yes
5AL98	Medano Ranch	Yes
5AL99	Dry Lakes	Yes
5CN157	Osier	Yes
5CN159	Osier	Yes
5CN165	Osier	Yes
5CN168	Osier	Yes
5CN171	Osier	Yes
5CN172	Fox Creek	Yes
5CN173	Fox Creek	Yes
5CN175	Fox Creek	Yes
5CN176	Fox Creek	Yes
5CN204	Kiowa Hill	Yes
5CN206	Kiowa Hill	Yes
5CN247	Kiowa Hill	Yes
5CN25	Antonito	Yes
5CN272	Kiowa	Yes
5CN293	Kiowa	Yes
5CN294	Kiowa	Yes
5CN339	Antonito	Yes
5CN376	Antonito	Yes
5CN377	Antonito	Yes
5CN378	Antonito	Yes
5CN384	Antonito	Yes
5CN393	Antonito	Yes
5CN415	Antonito	Yes
5CN510	Platoro	Yes
5CN532	Platoro	Yes
5CN59	Red Mountain	Yes
5CN611	Greenie Mountain	Yes
5CN612	Green Mountain	Yes
5CN614	Archuleta Creek	Yes
5CN617	Greenie Mountain	Yes
5CN618	Greenie Mountain	Yes

Archaic Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN619	Greenie Mountain	Yes
5CN621	Greenie Mountain	Yes
5CN632	La Jara Canyon	Yes
5CN651	Kiowa Hill	Yes
5CN676	Mesito Reservoir	Yes
5CN749	Red Mountain	Yes
5CN752	Red Mountain	Yes
5CN755	Red Mountain	Yes
5CN759	Fox Creek	Yes
5CN760	Fox Creek	Yes
5CN761	Fox Creek	Yes
5CN776	Fulcher Gulch	Yes
5CN779	Osier	Yes
5CN8	Kiowa Hill	Yes
5CN801	Pikes Stockade	Yes
5CN803	Osier	Yes
5CN806	Osier	Yes
5CN9	Kiowa Hill	Yes
5CT23	Sky Valley Ranch	Yes
5CT246	Mesito Reservoir	Yes
5CT260	Fort Garland	Yes
5CT262	Kiowa Hill	Yes
5CT88	Blanca	Yes
5HN108	Slumgullion Pass	Yes
5HN111	Slumgullion Pass	Yes
5HN112	Slumgullion Pass	Yes
5HN121	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN123	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN153	Cimarrona Peak	Yes
5HN154	Cimarrona Peak	Yes
5HN219	Finger Mesa	Yes
5HN220	Finger Mesa	Yes
5HN223	Finger Mesa	Yes
5HN224	Finger Mesa	Yes
5HN227	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN71	Finger Mesa	Yes
5HN97	Slumgullion Pass	Yes
5HN98	Slumgullion Pass	Yes
5HN99	Slumgullion Pass	Yes
5ML170	Beaver Creek Reservoir	Yes
5ML172	Bristol Head	Yes
5ML234	Lake Humphreys	Yes
5ML236	Creede	Yes
5ML290	Workman Creek	Yes
5ML292	Workman Creek	Yes

Archaic Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5ML32	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML34	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML45	Palomino Mountain	Yes
5ML46	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML64	Wagon Wheel Gap	Yes
5ML83	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML84	Elwood Pass	Yes
5RN110	South Fork West	Yes
5RN118	Beaver Creek Reservoir	Yes
5RN217	Dog Mountain	Yes
5RN23	South Fork West	Yes
5RN267	Del Norte Peak	Yes
5RN300	Horseshoe Mountain	Yes
5RN303	Del Norte Peak	Yes
5RN305	Summitville	Yes
5RN326	South Fork West	Yes
5RN330	Dog Mountain	Yes
5RN415	Jasper	Yes
5RN442	Del Norte Peak	Yes
5RN473	South Fork West	Yes
5RN474	Fulcher Gulch	Yes
5RN476	Fulcher Gulch	Yes
5RN480	Fulcher Gulch	Yes
5RN491	Del Norte	Yes
5RN499	Dog Mountain	Yes
5RN522	Monte Vista	Yes
5RN84	South Fork West	Yes
5RN93	Elwood Pass	Yes
5RN95	Elwood Pass, Summitville	Yes
5SH1079	Moffat South	Yes
5SH1080	Swede Corners, Harrence Lake	Yes
5SH1204	North Pass	Yes
5SH1205	North Pass	Yes
5SH1206	North Pass	Yes
5SH1207	North Pass	Yes
5SH1208	North Pass	Yes
5SH1209	North Pass	Yes
5SH1210	North Pass	Yes
5SH135	Trickle Mountain	Yes
5SH1387	Klondike Mine	Yes
5SH1429	Harrence Lake	Yes
5SH1492	Twin Mountains SE	Yes
5SH1494	Twin Mountains SE	Yes
5SH1499	Trickle Mountain	Yes
5SH163	Lookout Mountain	Yes

Archaic Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH1659	Twin Mountains SE	Yes
5SH178	Liberty	Yes
5SH181	Sand Camp, Liberty	Yes
5SH325	Laughlin Gulch	Yes
5SH327	Chester	Yes
5SH328	Lookout Mountain	Yes
5SH335	Lookout Mountain	Yes
5SH346	Lime Creek	Yes
5SH347	Sand Camp	Yes
5SH348	Liberty	Yes
5SH350	Sand Camp	Yes
5SH351	Liberty	Yes
5SH358	Harrence Lake	Yes
5SH360	Harrence Lake	Yes
5SH365	Deadman Camp	Yes
5SH395	Bonanza	Yes
5SH396	Villa Grove	Yes
5SH407	Moffat South	Yes
5SH411	Harrence Lake	Yes
5SH425	Harrence Lake	Yes
5SH435	Poncha Pass	Yes
5SH461	Saguache	Yes
5SH466	Mirage	Yes
5SH51	Twin Mountains SE	Yes
5SH517	Deadman Camp	Yes
5SH520	Moffat South	Yes
5SH525	Moffat South	Yes
5SH54	Lookout Mountain	Yes
5SH55	Lookout Mountain	Yes
5SH564	Deadman Camp	Yes
5SH867	Deadman Camp	Yes
5SH901	Lookout Mountain	Yes
5SH902	Lookout Mountain	Yes
5SH912	Deadman Camp	Yes
5SH933	Moffat South	Yes
5SH936	Moffat South	Yes
5SH938	North Pass	Yes
5SH939	North Pass	Yes
5SH944	Laughlin Gulch	Yes
5SH947	Moffat South	Yes
5SH953	Sheds Camp	Yes
5SH956	Moffat South	Yes
5SH962	Moffat South	Yes
5SH965	Moffat South	Yes
5SH971	Moffat South	Yes
5SH984	Moffat South	Yes
5SH986	Moffat South	Yes
TOTAL	222 sites, none without UTMs	

Late Prehistoric Stage Sites within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL10	Zapata Ranch, Medano Ranch	Yes
5AL100	Dry Lakes	Yes
5AL103	Medano Ranch	Yes
5AL104	Medano Ranch	Yes
5AL105	Medano Ranch	Yes
5AL106	Medano Ranch	Yes
5AL107	Medano Ranch	Yes
5AL108	Medano Ranch	Yes
5AL109	Medano Ranch	Yes
5AL113	Zapata Ranch	Yes
5AL123	Medano Ranch	Yes
5AL139	Alamosa East, Baldy	Yes
5AL146	Hooper East	Yes
5AL149	Dry Lakes	Yes
5AL150	Hooper East	Yes
5AL153	Hooper East	Yes
5AL154	Hooper East, Medano Ranch	Yes
5AL156	Hooper East	Yes
5AL158	Hooper East	Yes
5AL159	Hooper East	Yes
5AL167	Medano Ranch	Yes
5AL169	Medano Ranch	Yes
5AL17	Baldy	No
5AL185	Dry Lakes	Yes
5AL202	Dry Lakes	Yes
5AL21	Medano Ranch	Yes
5AL212	Baldy	Yes
5AL218	Baldy	Yes
5AL22	Medano Ranch	Yes
5AL270	Hooper East	Yes
5AL29	Hooper East	Yes
5AL306	Zapata Ranch	Yes
5AL322	Dry Lakes	Yes
5AL358	Hooper East	Yes
5AL359	Medano Ranch	Yes
5AL360	Medano Ranch	Yes
5AL370	Hooper East	Yes
5AL372	Alamosa East	Yes
5AL384	Medano Ranch	Yes
5AL389	Baldy	Yes
5AL398	Zapata Ranch	Yes
5AL399	Zapata Ranch	Yes
5AL4	Dry Lakes	Yes
5AL403	Zapata Ranch	Yes
5AL405	Zapata Ranch	Yes
5AL459	Zapata Ranch	Yes
5AL461	Zapata Ranch	Yes
5AL463	Zapata Ranch	Yes
5AL467	Zapata Ranch	Yes

Late Prehistoric Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL470	Zapata Ranch	Yes
5AL472	Zapata Ranch	Yes
5AL5	Dry Lakes	Yes
5AL505	Zapata Ranch	Yes
5AL6	Medano Ranch	Yes
5AL7	Medano Ranch	Yes
5AL79	Dry Lakes	Yes
5AL8	Zapata Ranch, Medano Ranch	Yes
5AL88	Zapata Ranch	Yes
5AL93	Medano Ranch, Zapata Ranch, Liberty, Sand Camp	Yes
5AL94	Zapata Ranch	Yes
5AL95	Zapata Ranch	Yes
5AL97	Zapata Ranch, Medano Ranch	Yes
5AL98	Medano Ranch	Yes
5AL99	Dry Lakes	Yes
5CN12	Fulcher Gulch	No
5CN14	Centro	Yes
5CN15	Antonito	Yes
5CN174	Fox Creek	Yes
5CN182	Kiowa	Yes
5CN256	Kiowa Hill	Yes
5CN26	Vicente Canyon	Yes
5CN270	Kiowa Hill	Yes
5CN370	Antonito	Yes
5CN424	Centro	Yes
5CN511	Platoro	Yes
5CN639	Fox Creek	Yes
5CN64	Lobatos	No
5CN651	Kiowa Hill	Yes
5CN674	Mesito Reservoir	Yes
5CN675	Mesito Reservoir	Yes
5CN679	Mesito Reservoir	Yes
5CN7	Pikes Stockade	No
5CN747	Red Mountain	Yes
5CN784	Archuleta Creek	Yes
5CN8	Kiowa Hill	Yes
5CN9	Kiowa Hill	Yes
5CT100	Fort Garland	Yes
5CT11	Mesito Reservoir	No
5CT121	Ojito Peak	Yes
5CT145	Mesito Reservoir	Yes
5CT146	Mesito Reservoir	Yes
5CT149	Mesito Reservoir	Yes
5CT15	Mesito Reservoir	Yes
5CT150	Mesito Reservoir	Yes
5CT151	Mesito Reservoir	Yes
5CT153	Mesito Reservoir	Yes
5CT168	Mesito Reservoir	Yes
5CT18	Kiowa Hill	Yes

Late Prehistoric Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CT2	Kiowa Hill	Yes
5CT23	Sky Valley Ranch	Yes
5CT27	Not in database	No
5CT33	Taylor Ranch	Yes
5CT4	Kiowa Hill	Yes
5CT5	Kiowa Hill	Yes
5CT6	Kiowa Hill	Yes
5CT7	Kiowa Hill	Yes
5CT8	Kiowa Hill	Yes
5CT9	Lasauses	Yes
5CT91	Fort Garland	Yes
5CT99	Fort Garland	Yes
5FN922	Antonito	Yes
5HN104	Slumgullion Pass	Yes
5HN121	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN123	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN153	Cimarrona Peak	Yes
5HN227	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5ML12	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5ML14	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML18	Pool Table Mountain	Yes
5ML233	Mount Hope	Yes
5ML289	Spar City	Yes
5ML30	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML34	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML64	Wagon Wheel Gap	Yes
5ML65	Wagon Wheel Gap	Yes
5RN108	Beaver Creek Reservoir	Yes
5RN11	Fulcher Gulch	Yes
5RN110	South Fork West	Yes
5RN117	Beaver Creek Reservoir	Yes
5RN118	Beaver Creek Reservoir	Yes
5RN12	Greenie Mountain	Yes
5RN134	South Fork East	No
5RN201	Dog Mountain	Yes
5RN203	Dog Mountain	Yes
5RN445	Del Norte Peak	Yes
5RN51	Beaver Creek Reservoir	Yes
5RN55	Elwood Pass	Yes
5RN87	Pool Table Mountain	Yes
5SH1015	Crestone	Yes
5SH1035	Liberty, Medano Pass	Yes

Late Prehistoric Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH1079	Moffat South	Yes
5SH1082	Harrence Lake	Yes
5SH1084	Moffat South	Yes
5SH1109	Villa Grove	Yes
5SH1110	Villa Grove	Yes
5SH1113	Bonanza	Yes
5SH1114	Bonanza	Yes
5SH1205	North Pass	Yes
5SH1214	North Pass	Yes
5SH1261	Medano Pass, Liberty	Yes
5SH135	Trickle Mountain	Yes
5SH143	Laughlin Gulch	Yes
5SH1458	Trickle Mountain	Yes
5SH146	Klondike Mine	No
5SH1492	Twin Mountains SE	Yes
5SH1494	Twin Mountains SE	Yes
5SH1495	Twin Mountains SE	Yes
5SH1499	Trickle Mountain	Yes
5SH172	Sand Camp	No
5SH173	Crestone	No
5SH176	Liberty	No
5SH177	Liberty	No
5SH178	Liberty	Yes
5SH179	Sand Camp	Yes
5SH180	Sand Camp	No
5SH181	Sand Camp, Liberty	Yes
5SH2	Saguache	Yes
5SH264	North Pass	Yes
5SH325	Laughlin Gulch	Yes
5SH329	Lookout Mountain	Yes
5SH347	Sand Camp	Yes
5SH348	Liberty	Yes
5SH350	Sand Camp	Yes
5SH351	Liberty	Yes
5SH354	Laughlin Gulch	Yes
5SH358	Harrence Lake	Yes
5SH365	Deadman Camp	Yes
5SH397	Moffat North	Yes
5SH414	Harrence Lake	Yes
5SH48	Twin Mountains SE	Yes
5SH480	Deadman Camp	Yes
5SH481	Deadman Camp	Yes
5SH484	Deadman Camp	Yes
5SH485	Deadman Camp	Yes
5SH487	Deadman Camp	Yes
5SH488	Deadman Camp	Yes
5SH50	Twin Mountains SE	Yes
5SH519	Moffat South	Yes
5SH522	Deadman Camp	Yes

Late Prehistoric Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH525	Moffat South	Yes
5SH547	Trickle Mountain	Yes
5SH564	Deadman Camp	Yes
5SH605	Graveyard Gulch	Yes
5SH607	Swede Corners	Yes
5SH650	Crestone	Yes
5SH73	Trickle Mountain	Yes
5SH74	Lime Creek	No
5SH75	Lime Creek	No
5SH77	Moffat South	Yes
5SH867	Deadman Camp	Yes
5SH868	Deadman Camp	Yes
5SH932	Moffat South	Yes
5SH933	Moffat South	Yes
5SH934	Moffat South	Yes
5SH935	Moffat South	Yes
5SH936	Moffat South	Yes
5SH938	North Pass	Yes
5SH956	Moffat South	Yes
5SH958	Moffat South	Yes
5SH961	Moffat South	Yes
5SH962	Moffat South	Yes
5SH963	Deadman Camp	Yes
5SH965	Moffat South	Yes
5SH967	Deadman Camp	Yes
5SH968	Deadman Camp	Yes
5SH969	Deadman Camp	Yes
5SH971	Moffat South	Yes
5SH974	Moffat South	Yes
5SH975	Deadman Camp	Yes
5SH976	Deadman Camp	Yes
5SH985	Deadman Camp SW	Yes
5SH989	Rito Alto Peak	Yes
TOTAL	222 sites, 15 without UTMs	

Protohistoric Stage Sites within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL10	Zapata Ranch, Medano Ranch	Yes
5AL100	Dry Lakes	Yes
5AL104	Medano Ranch	Yes
5AL153	Hooper East	Yes
5CN100	Red Mountain	Yes
5CN143	Fox Creek	Yes
5CN144	Fox Creek	Yes
5CN145	Fox Creek	Yes
5CN370	Antonito	Yes
5CN528	Fox Creek	Yes
5CN529	Fox Creek	Yes
5CN530	Fox Creek	Yes
5CN638	Spectacle Lake	Yes
5CN639	Fox Creek	Yes
5CT121	Ojito Peak	Yes
5SH1472	Liberty	Yes
5SH1473	Liberty	Yes
5SH1474	Liberty	Yes
5SH1475	Liberty	Yes
5SH1476	Liberty	Yes
5ML64	Wagon Wheel Gap	Yes
5RN11	Fulcher Gulch	Yes
5RN179	Del Norte Peak	Yes
5RN330	Dog Mountain	Yes
5RN492	Del Norte	Yes
5RN497	Dog Mountain	Yes
5RN523	Dog Mountain	Yes
5SH1013	Lake Mountain	No
5SH1035	Liberty, Medano Pass	Yes
5SH1205	North Pass	Yes
5SH1214	North Pass	Yes
5SH1238	Liberty	Yes
5SH1261	Medano Pass, Liberty	Yes
5SH1458	Trickle Mountain	Yes
5SH1477	Graveyard Gulch	Yes
5SH1492	Twin Mountains SE	Yes
5SH1496	Twin Mountains SE	Yes
5SH1497	Twin Mountains SE	Yes
5SH242	North Pass	Yes
5SH309	Liberty	Yes
5SH329	Lookout Mountain	Yes
5SH336	Lookout Mountain	Yes

Protohistoric Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH374	North Pass	Yes
5SH386	North Pass	Yes
5SH5	Lake Mountain	Yes
5SH51	Twin Mountains SE	Yes
5SH71	North Pass	Yes
5SH73	Trickle Mountain	Yes
5SH933	Moffat South	Yes
5SH956	Moffat South	Yes
5SH976	Deadman Camp	Yes
TOTAL	51 sites, 1 without UTMs	

Open Lithic Scatters within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL128	Dry Lakes	Yes
5AL137	Baldy	Yes
5AL140	Alamosa East	Yes
5AL141	Alamosa East	Yes
5AL144	Dry Lakes	Yes
5AL151	Hooper East	Yes
5AL163	Hooper East	Yes
5AL164	Medano Ranch	Yes
5AL168	Medano Ranch	Yes
5AL173	Medano Ranch	Yes
5AL177	Medano Ranch	Yes
5AL18	Blanca	No
5AL194	Dry Lakes	Yes
5AL197	Dry Lakes	Yes
5AL198	Dry Lakes	Yes
5AL199	Baldy	Yes
5AL2	Dry Lakes	No
5AL20	Medano Ranch	Yes
5AL201	Dry Lakes	Yes
5AL205	Baldy	Yes
5AL206	Baldy	Yes
5AL208	Baldy	Yes
5AL210	Baldy	Yes
5AL213	Baldy	Yes
5AL215	Baldy	Yes
5AL216	Baldy	Yes
5AL217	Baldy	Yes
5AL27	Medano Ranch	Yes
5AL271	Hooper East	Yes
5AL275	Hooper East	Yes
5AL278	Hooper East	Yes
5AL288	Baldy	Yes
5AL327	Twin Peaks	Yes
5AL342	Zapata Ranch	Yes
5AL343	Zapata Ranch	Yes
5AL346	Dry Lakes	Yes
5AL349	Dry Lakes	Yes
5AL351	Dry Lakes	Yes
5AL354	Hooper East	Yes
5AL355	Hooper East	Yes
5AL356	Hooper East	Yes
5AL357	Deadman Camp	Yes
5AL363	Hooper East	Yes
5AL364	Medano Ranch	Yes
5AL365	Medano Ranch	Yes
5AL367	Hooper East	Yes
5AL368	Medano Ranch	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL373	Alamosa East	Yes
5AL397	Zapata Ranch	Yes
5AL398	Zapata Ranch	Yes
5AL534	Dry Lakes	Yes
5AL82	Dry Lakes	Yes
5AL85	Zapata Ranch	Yes
5AL87	Zapata Ranch	Yes
5AL92	Zapata Ranch	Yes
5CN1	Fox Creek	Yes
5CN100	Red Mountain	Yes
5CN101	Red Mountain	Yes
5CN103	Red Mountain	Yes
5CN105	Fox Creek	Yes
5CN106	Fox Creek	Yes
5CN107	Fox Creek	Yes
5CN108	Fox Creek	Yes
5CN109	Osier	Yes
5CN110	Osier	Yes
5CN111	Osier	Yes
5CN112	Osier	Yes
5CN113	Osier	Yes
5CN119	Red Mountain	Yes
5CN120	Red Mountain	Yes
5CN122	Red Mountain	Yes
5CN123	Red Mountain	Yes
5CN124	Red Mountain	Yes
5CN125	Red Mountain	Yes
5CN126	Red Mountain	Yes
5CN127	Red Mountain	Yes
5CN128	Red Mountain	Yes
5CN13	Centro	No
5CN131	Sky Valley Ranch	Yes
5CN15	Antonito	Yes
5CN157	Osier	Yes
5CN158	Osier	Yes
5CN159	Osier	Yes
5CN160	Osier	Yes
5CN161	Osier	Yes
5CN162	Osier	Yes
5CN163	Osier	Yes
5CN164	Osier	Yes
5CN17	Fox Creek	Yes
5CN173	Fox Creek	Yes
5CN174	Fox Creek	Yes
5CN178	Fox Creek	Yes
5CN185	Kiowa	Yes
5CN186	Kiowa	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN189	Kiowa	Yes
5CN19	Antonito	No
5CN192	Kiowa Hill	Yes
5CN193	Kiowa Hill	Yes
5CN20	Lobatos	No
5CN200	Kiowa Hill	Yes
5CN201	Kiowa Hill	Yes
5CN202	Kiowa Hill	Yes
5CN203	Kiowa Hill	Yes
5CN205	Kiowa Hill	Yes
5CN207	Kiowa Hill	No
5CN208	Kiowa Hill	Yes
5CN209	Kiowa Hill	Yes
5CN21	Antonito	No
5CN212	Sky Valley Ranch	Yes
5CN219	Sky Valley Ranch	Yes
5CN22	Antonito	No
5CN227	Kiowa Hill	Yes
5CN228	Kiowa Hill	Yes
5CN23	Antonito	No
5CN230	Kiowa Hill	Yes
5CN232	Kiowa Hill	Yes
5CN24	Fox Creek	Yes
5CN242	Kiowa Hill	Yes
5CN245	Kiowa Hill	Yes
5CN247	Kiowa Hill	Yes
5CN27	Osier	Yes
5CN29	Cumbres	Yes
5CN297	Antonito	Yes
5CN3	Kiowa Hill	Yes
5CN30	Cumbres	Yes
5CN302	Lobatos	Yes
5CN303	Antonito	Yes
5CN306	Antonito	Yes
5CN307	Kiowa Hill	Yes
5CN308	Antonito	Yes
5CN309	Antonito	Yes
5CN311	Antonito	Yes
5CN312	Antonito	No
5CN315	Antonito	Yes
5CN32	Brazos Peak 15' (Aka Chama, West Fork Rio Brazos, Toltec Mesa)	Yes
5CN326	Antonito	Yes
5CN33	Cumbres	Yes
5CN334	Antonito	Yes
5CN337	Antonito	Yes
5CN338	Antonito	Yes
5CN34	Brazos Peak 15' (Aka Chama, West Fork Rio Brazos, Toltec Mesa)	Yes
5CN342	Antonito	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN345	Antonito	Yes
5CN35	Cumbres	Yes
5CN351	Antonito	Yes
5CN352	Antonito	Yes
5CN354	Antonito	Yes
5CN36	Cumbres	Yes
5CN37	Cumbres	Yes
5CN38	Cumbres	Yes
5CN39	Cumbres	Yes
5CN40	Cumbres	Yes
5CN41	Cumbres	Yes
5CN42	Cumbres	Yes
5CN420	Centro	Yes
5CN421	Centro	Yes
5CN422	Centro	Yes
5CN423	Centro	Yes
5CN44	Cumbres	Yes
5CN45	Cumbres	Yes
5CN46	Cumbres	Yes
5CN47	Cumbres	Yes
5CN5	Mesito Reservoir	Yes
5CN50	Fox Creek	Yes
5CN510	Platoro	Yes
5CN511	Platoro	Yes
5CN512	Platoro	Yes
5CN513	Platoro	Yes
5CN52	Cumbres	Yes
5CN525	Greenie Mountain	Yes
5CN531	Platoro	Yes
5CN532	Platoro	Yes
5CN533	Platoro	Yes
5CN534	La Jara Canyon	Yes
5CN54	Terrace Reservoir	Yes
5CN55	Terrace Reservoir	Yes
5CN56	Terrace Reservoir	Yes
5CN59	Red Mountain	Yes
5CN6	Manassa	Yes
5CN601	Fulcher Gulch	Yes
5CN61	Cumbres	Yes
5CN611	Greenie Mountain	Yes
5CN615	Greenie Mountain	Yes
5CN616	Greenie Mountain	Yes
5CN618	Greenie Mountain	Yes
5CN62	Cumbres	Yes
5CN620	Greenie Mountain	Yes
5CN622	Greenie Mountain	Yes
5CN623	Greenie Mountain	Yes
5CN632	La Jara Canyon	Yes
5CN638	Spectacle Lake	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN674	Mesito Reservoir	Yes
5CN677	Mesito Reservoir	Yes
5CN683	Red Mountain	Yes
5CN684	Red Mountain	Yes
5CN685	Red Mountain	Yes
5CN686	Red Mountain	Yes
5CN687	Red Mountain	Yes
5CN693	Red Mountain	Yes
5CN741	Cumbres	Yes
5CN742	Cumbres	Yes
5CN744	Jasper	Yes
5CN745	Jasper	Yes
5CN746	Jasper	Yes
5CN748	Red Mountain	Yes
5CN749	Red Mountain	Yes
5CN750	Red Mountain	Yes
5CN759	Fox Creek	Yes
5CN766	Cumbres	Yes
5CN767	Cumbres	Yes
5CN768	Cumbres	Yes
5CN778	Spectacle Lake	Yes
5CN780	Osier	Yes
5CN793	Pikes Stockade	Yes
5CN80	Fox Creek	Yes
5CN802	Osier	Yes
5CN81	Fox Creek	Yes
5CN83	Fox Creek	Yes
5CN84	Fox Creek	Yes
5CN85	Fox Creek	Yes
5CN86	Fox Creek	Yes
5CN87	Fox Creek	Yes
5CN88	Fox Creek	Yes
5CN89	Platoro	Yes
5CN90	Osier	Yes
5CN94	Platoro	Yes
5CN96	Platoro	Yes
5CN97	Red Mountain	Yes
5CN98	Red Mountain, Platoro	Yes
5CT106	Trinchera Ranch	Yes
5CT112	Sanchez Reservoir	Yes
5CT246	Mesito Reservoir	Yes
5CT29	La Veta	Yes
5CT32	Taylor Ranch	Yes
5CT59	Ojito Peak	Yes
5CT63	Ojito Peak	Yes
5CT66	Ojito Peak	Yes
5CT67	Ojito Peak	Yes
5CT68	Ojito Peak	Yes
5CT69	Ojito Peak	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CT70	Ojito Peak	Yes
5CT96	Fort Garland	Yes
5CT97	Fort Garland	Yes
5CT98	Fort Garland	Yes
5CT99	Fort Garland	Yes
5FN922	Antonito	Yes
5HN10	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN100	Slumgullion Pass	Yes
5HN101	Slumgullion Pass	Yes
5HN102	Slumgullion Pass	Yes
5HN11	Finger Mesa	Yes
5HN12	Finger Mesa	Yes
5HN120	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN121	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN122	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN123	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN124	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN125	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN13	Finger Mesa	Yes
5HN131	Finger Mesa	Yes
5HN132	Finger Mesa	Yes
5HN151	Little Squaw Creek	Yes
5HN152	Cimarrona Peak	Yes
5HN153	Cimarrona Peak	Yes
5HN156	Cimarrona Peak	Yes
5HN178	Weminuche Pass	Yes
5HN219	Finger Mesa	Yes
5HN220	Finger Mesa	Yes
5HN221	Finger Mesa	Yes
5HN222	Finger Mesa	Yes
5HN223	Finger Mesa	Yes
5HN224	Finger Mesa	Yes
5HN227	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN240	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN424	Hermit Lakes	Yes
5HN53	Finger Mesa	Yes
5HN54	Finger Mesa	Yes
5HN55	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5HN56	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN57	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN58	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN59	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN60	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN61	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN62	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN63	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN71	Finger Mesa	Yes
5HN72	Finger Mesa	Yes
5HN9	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5HN97	Slumgullion Pass	Yes
5HN98	Slumgullion Pass	Yes
5ML1	Wolf Creek Pass 15', Wolf Creek Pass	Yes
5ML11	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML110	Wolf Creek Pass	Yes
5ML12	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5ML14	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML16	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML170	Beaver Creek Reservoir	Yes
5ML171	Bristol Head	Yes
5ML18	Pool Table Mountain	Yes
5ML19	Pool Table Mountain	Yes
5ML2	Wolf Creek Pass 15', Wolf Creek Pass	Yes
5ML20	Pool Table Mountain	Yes
5ML21	Workman Creek	Yes
5ML233	Mount Hope	Yes
5ML235	Creede	Yes
5ML237	Creede	Yes
5ML26	Workman Creek	Yes
5ML28	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5ML289	Spar City	Yes
5ML3	Wolf Creek Pass 15', Wolf Creek Pass	Yes
5ML32	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5ML33	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML34	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML35	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML36	Wolf Creek Pass 15', Wolf Creek Pass	Yes
5ML37	Wolf Creek Pass 15', Wolf Creek Pass	Yes
5ML38	Wolf Creek Pass 15', Wolf Creek Pass	Yes
5ML4	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML45	Palomino Mountain	Yes
5ML46	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML51	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML52	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML53	Workman Creek	Yes
5ML63	Wagon Wheel Gap	Yes
5ML64	Wagon Wheel Gap	Yes
5ML65	Wagon Wheel Gap	Yes
5ML66	Wagon Wheel Gap	Yes
5ML67	Wagon Wheel Gap	Yes
5ML68	Wagon Wheel Gap	Yes
5ML7	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML79	Bristol Head 15' (Aka Slumgullion Pass, Baldy Cinco, Hermit Lakes, Bristol Head)	Yes
5ML82	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML83	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML85	Elwood Pass	Yes
5RN100	Pool Table Mountain	Yes
5RN101	Pool Table Mountain	Yes
5RN102	South Fork West	Yes
5RN105	South Fork West	Yes
5RN108	Beaver Creek Reservoir	Yes
5RN109	Beaver Creek Reservoir	Yes
5RN110	South Fork West	Yes
5RN111	South Fork West	Yes
5RN112	South Fork West	Yes
5RN113	South Fork West	Yes
5RN114	South Fork West	Yes
5RN116	Beaver Creek Reservoir	Yes
5RN119	Beaver Creek Reservoir	Yes
5RN120	Horseshoe Mountain	No
5RN122	Dog Mountain	No

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5RN123	Beaver Creek Reservoir	No
5RN125	Horseshoe Mountain	No
5RN128	South Fork West	No
5RN129	South Fork West	No
5RN130	South Fork West	No
5RN131	South Fork East	No
5RN132	South Fork East	No
5RN133	South Fork East	No
5RN135	Del Norte	No
5RN170	Horseshoe Mountain	Yes
5RN179	Del Norte Peak	Yes
5RN18	Jasper	Yes
5RN180	Del Norte Peak	Yes
5RN184	Dog Mountain	Yes
5RN187	Dog Mountain	Yes
5RN189	Dog Mountain	Yes
5RN190	Dog Mountain	Yes
5RN191	Dog Mountain	Yes
5RN193	Dog Mountain	Yes
5RN198	Dog Mountain	Yes
5RN199	Dog Mountain	Yes
5RN200	Dog Mountain	Yes
5RN201	Dog Mountain	Yes
5RN205	Dog Mountain	Yes
5RN206	Dog Mountain	Yes
5RN207	Dog Mountain	Yes
5RN209	Dog Mountain	Yes
5RN210	Dog Mountain	Yes
5RN229	Del Norte	Yes
5RN231	Del Norte	Yes
5RN235	Del Norte	Yes
5RN236	South Fork East	Yes
5RN237	South Fork East	Yes
5RN238	South Fork East	Yes
5RN239	South Fork East	Yes
5RN245	Del Norte	No
5RN246	Del Norte	Yes
5RN247	Del Norte	Yes
5RN248	Del Norte	Yes
5RN249	Del Norte	Yes
5RN250	Del Norte	Yes
5RN267	Del Norte Peak	Yes
5RN300	Horseshoe Mountain	Yes
5RN301	Horseshoe Mountain	Yes
5RN302	Summitville	Yes
5RN303	Del Norte Peak	Yes
5RN304	Del Norte Peak	Yes
5RN305	Summitville	Yes
5RN306	Summitville	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5RN309	Summitville	Yes
5RN310	Summitville	Yes
5RN318	Jasper	Yes
5RN327	Summitville	Yes
5RN328	Summitville	Yes
5RN329	Summitville	Yes
5RN415	Jasper	Yes
5RN416	Jasper	Yes
5RN436	Indian Head	Yes
5RN442	Del Norte Peak	Yes
5RN443	Del Norte Peak	Yes
5RN444	Del Norte Peak	Yes
5RN445	Del Norte Peak	Yes
5RN446	Del Norte Peak	Yes
5RN447	Del Norte Peak	Yes
5RN448	Del Norte Peak	Yes
5RN449	Del Norte Peak	Yes
5RN467	South Fork West	Yes
5RN468	South Fork West	Yes
5RN477	Fulcher Gulch	Yes
5RN478	Fulcher Gulch	Yes
5RN479	Fulcher Gulch	Yes
5RN480	Fulcher Gulch	Yes
5RN481	Homelake	Yes
5RN53	Elwood Pass	Yes
5RN54	Elwood Pass	Yes
5RN56	Elwood Pass	Yes
5RN57	South Fork East	Yes
5RN59	South Fork East	Yes
5RN60	South Fork East	Yes
5RN61	Greenie Mountain	Yes
5RN62	Del Norte Peak	Yes
5RN64	Elwood Pass	Yes
5RN65	Elwood Pass	Yes
5RN66	Elwood Pass	Yes
5RN67	Elwood Pass	Yes
5RN68	Elwood Pass	Yes
5RN69	Elwood Pass	Yes
5RN70	Elwood Pass	Yes
5RN75	Beaver Creek Reservoir	Yes
5RN76	Beaver Creek Reservoir	Yes
5RN82	Del Norte Peak	Yes
5RN84	South Fork West	Yes
5RN85	South Fork West	Yes
5RN86	Pool Table Mountain	Yes
5RN87	Pool Table Mountain	Yes
5RN88	Pool Table Mountain	Yes
5RN89	Pool Table Mountain	Yes
5RN90	Pool Table Mountain	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5RN91	Beaver Creek Reservoir	Yes
5RN92	Elwood Pass	Yes
5RN93	Elwood Pass	Yes
5RN94	Elwood Pass	Yes
5RN95	Elwood Pass, Summitville	Yes
5RN96	Summitville	Yes
5RN97	Summitville	Yes
5RN98	Pool Table Mountain	Yes
5RN99	Pool Table Mountain	Yes
5SA87	Rio Grande Pyramid	Yes
5SH1	Lake Mountain	No
5SH1069	Sand Camp	Yes
5SH1083	Moffat South	Yes
5SH11	Moffat North	Yes
5SH12	Moffat North	No
5SH1204	North Pass	Yes
5SH1205	North Pass	Yes
5SH1206	North Pass	Yes
5SH1208	North Pass	Yes
5SH1209	North Pass	Yes
5SH1210	North Pass	Yes
5SH1211	North Pass	Yes
5SH1240	Lake Mountain NE	Yes
5SH1241	Lake Mountain NE	Yes
5SH1242	Lake Mountain NE	Yes
5SH1244	Lake Mountain NE	Yes
5SH1245	Lake Mountain NE	Yes
5SH1247	Lake Mountain NE	Yes
5SH1298	Sargents Mesa	Yes
5SH13	Moffat North	No
5SH1310	North Pass	Yes
5SH1311	North Pass	Yes
5SH1383	Klondike Mine	Yes
5SH14	Moffat North	No
5SH1428	Harrence Lake	Yes
5SH1429	Harrence Lake	Yes
5SH1430	Harrence Lake	Yes
5SH1431	Harrence Lake	Yes
5SH1467.1	Not in database	No
5SH1477	Graveyard Gulch	Yes
5SH1483	Lime Creek	Yes
5SH1497	Twin Mountains SE	Yes
5SH15	Moffat North	No
5SH16	Moffat North	No
5SH1659	Twin Mountains SE	Yes
5SH17	Villa Grove	No
5SH174	Moffat South	No
5SH18	Moffat North	No
5SH19	Moffat North	No

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH21	Moffat North	Yes
5SH23	Moffat North	No
5SH243	North Pass	Yes
5SH244	Lookout Mountain	Yes
5SH245	Lookout Mountain	Yes
5SH246	Lookout Mountain	Yes
5SH247	Mesa Mountain	Yes
5SH25	Moffat North	No
5SH258	Laughlin Gulch	Yes
5SH261	North Pass	Yes
5SH262	North Pass	Yes
5SH263	North Pass	Yes
5SH265	North Pass	Yes
5SH266	North Pass	Yes
5SH269	North Pass	Yes
5SH270	North Pass	Yes
5SH271	North Pass	Yes
5SH272	North Pass	Yes
5SH273	North Pass	Yes
5SH274	North Pass	Yes
5SH278	Saguache Park	Yes
5SH280	North Pass	Yes
5SH281	North Pass	Yes
5SH3	Lake Mountain	Yes
5SH309	Liberty	Yes
5SH312	Trickle Mountain	Yes
5SH326	Lookout Mountain	Yes
5SH327	Chester	Yes
5SH328	Lookout Mountain	Yes
5SH329	Lookout Mountain	Yes
5SH330	Lookout Mountain	Yes
5SH331	Lookout Mountain	Yes
5SH332	Lookout Mountain	Yes
5SH333	Lookout Mountain	Yes
5SH334	Lookout Mountain	Yes
5SH335	Lookout Mountain	Yes
5SH336	Lookout Mountain	Yes
5SH338	Whale Hill	Yes
5SH357	Moffat North	Yes
5SH359	Harrence Lake	Yes
5SH360	Harrence Lake	Yes
5SH361	Harrence Lake	Yes
5SH364	Deadman Camp	Yes
5SH385	Lookout Mountain	Yes
5SH392	Grouse Creek	Yes
5SH393	Grouse Creek	Yes
5SH43	Moffat North	No
5SH45	Moffat North	No
5SH454	Saguache	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH455	Saguache	Yes
5SH456	Saguache	Yes
5SH459	Saguache	Yes
5SH464	Mirage	Yes
5SH470	Swede Corners	Yes
5SH471	Swede Corners	Yes
5SH473	Swede Corners	Yes
5SH474	Swede Corners	Yes
5SH475	Swede Corners	Yes
5SH480	Deadman Camp	Yes
5SH486	Deadman Camp	Yes
5SH52	Bonanza	Yes
5SH520	Moffat South	Yes
5SH521	Deadman Camp	Yes
5SH524	Deadman Camp	Yes
5SH526	Deadman Camp	Yes
5SH53	Bonanza	Yes
5SH54	Lookout Mountain	Yes
5SH55	Lookout Mountain	Yes
5SH564	Deadman Camp	Yes
5SH565	Saguache	Yes
5SH566	Deadman Camp SW	Yes
5SH567	Deadman Camp SW	Yes
5SH568	La Garita	Yes
5SH570	Harrence Lake	Yes
5SH571	Harrence Lake	Yes
5SH575	Crestone	Yes
5SH577	Crestone	Yes
5SH578	Crestone	Yes
5SH581	Twin Mountains SE	Yes
5SH582	Twin Mountains SE	Yes
5SH584	Twin Mountains SE	Yes
5SH586	Laughlin Gulch	Yes
5SH587	Saguache	Yes
5SH588	Laughlin Gulch	Yes
5SH589	Laughlin Gulch	Yes
5SH59	Lake Mountain	Yes
5SH590	Laughlin Gulch	Yes
5SH594	Deadman Camp SW	Yes
5SH596	Harrence Lake	Yes
5SH597	Harrence Lake	Yes
5SH598	Crestone	Yes
5SH599	Crestone	Yes
5SH60	Lookout Mountain	Yes
5SH600	Crestone	Yes
5SH602	Rito Alto Peak	Yes
5SH603	Rito Alto Peak	Yes
5SH604	Graveyard Gulch	Yes
5SH613	Crestone	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH62	Chester	Yes
5SH623	Graveyard Gulch	Yes
5SH624	Swede Corners	Yes
5SH625	Swede Corners	Yes
5SH629	Twin Mountains SE	Yes
5SH63	Chester	Yes
5SH630	Twin Mountains SE	Yes
5SH631	Laughlin Gulch	Yes
5SH632	Laughlin Gulch	Yes
5SH633	Laughlin Gulch	Yes
5SH634	Laughlin Gulch	Yes
5SH635	Laughlin Gulch	Yes
5SH636	Laughlin Gulch	Yes
5SH637	Laughlin Gulch	Yes
5SH638	Saguache	Yes
5SH64	Chester	Yes
5SH640	Deadman Camp SW	Yes
5SH641	Deadman Camp SW	Yes
5SH643	Deadman Camp SW	Yes
5SH645	La Garita	Yes
5SH647	Deadman Camp SW	Yes
5SH649	Harrence Lake	Yes
5SH65	North Pass	Yes
5SH652	Crestone	Yes
5SH653	Crestone	Yes
5SH654	Rito Alto Peak	Yes
5SH664	Whale Hill	Yes
5SH665	Whale Hill	Yes
5SH666	Whale Hill	Yes
5SH667	Whale Hill	Yes
5SH670	Whale Hill	Yes
5SH672	Whale Hill	Yes
5SH673	Whale Hill	Yes
5SH674	Whale Hill	Yes
5SH675	Whale Hill	Yes
5SH676	Whale Hill	Yes
5SH677	Whale Hill	Yes
5SH678	Whale Hill	Yes
5SH679	Whale Hill	Yes
5SH680	Whale Hill	Yes
5SH681	Whale Hill	Yes
5SH682	Whale Hill	Yes
5SH683	Whale Hill	Yes
5SH684	Whale Hill	Yes
5SH71	North Pass	Yes
5SH78	Chester	Yes
5SH880	Deadman Camp	Yes
5SH910	Deadman Camp	Yes
5SH913	Deadman Camp	Yes

Open Lithic Scatters within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH933	Moffat South	Yes
5SH934	Moffat South	Yes
5SH942	North Pass	Yes
5SH943	Trickle Mountain	Yes
5SH954	Sheds Camp	Yes
5SH959	Moffat South	Yes
5SH964	Deadman Camp SW	Yes
5SH966	Moffat South	Yes
5SH975	Deadman Camp	Yes
5SH981	Sheds Camp	Yes
TOTAL	654 sites, 37 without UTMs	

Open Camps within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL1	Zapata Ranch	No
5AL10	Zapata Ranch, Medano Ranch	Yes
5AL100	Dry Lakes	Yes
5AL101	Medano Ranch	Yes
5AL102	Zapata Ranch	Yes
5AL103	Medano Ranch	Yes
5AL104	Medano Ranch	Yes
5AL105	Medano Ranch	Yes
5AL106	Medano Ranch	Yes
5AL107	Medano Ranch	Yes
5AL108	Medano Ranch	Yes
5AL109	Medano Ranch	Yes
5AL11	Zapata Ranch	Yes
5AL110	Medano Ranch	Yes
5AL111	Medano Ranch	Yes
5AL112	Medano Ranch	Yes
5AL113	Zapata Ranch	Yes
5AL12	Medano Ranch	No
5AL123	Medano Ranch	Yes
5AL124	Medano Ranch	Yes
5AL125	Medano Ranch	Yes
5AL126	Dry Lakes	Yes
5AL127	Dry Lakes	Yes
5AL129	Dry Lakes	Yes
5AL13	Medano Ranch	No
5AL130	Dry Lakes	Yes
5AL131	Dry Lakes	Yes
5AL132	Dry Lakes	Yes
5AL134	Dry Lakes	Yes
5AL135	Dry Lakes	Yes
5AL136	Baldy	Yes
5AL138	Baldy	Yes
5AL139	Alamosa East, Baldy	Yes
5AL14	Liberty, Zapata Ranch	No
5AL146	Hooper East	Yes
5AL150	Hooper East	Yes
5AL153	Hooper East	Yes
5AL154	Hooper East, Medano Ranch	Yes
5AL16	Baldy	No
5AL166	Medano Ranch	Yes
5AL169	Medano Ranch	Yes
5AL17	Baldy	No
5AL170	Medano Ranch	Yes
5AL171	Medano Ranch	Yes

Open Camps Within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL172	Medano Ranch	Yes
5AL174	Medano Ranch	Yes
5AL175	Medano Ranch	Yes
5AL176	Medano Ranch	Yes
5AL187	Dry Lakes	Yes
5AL19	Medano Ranch	Yes
5AL195	Baldy	Yes
5AL202	Dry Lakes	Yes
5AL207	Baldy	Yes
5AL21	Medano Ranch	Yes
5AL211	Baldy	Yes
5AL212	Baldy	Yes
5AL214	Baldy	Yes
5AL218	Baldy	Yes
5AL22	Medano Ranch	Yes
5AL23	Medano Ranch	Yes
5AL24	Medano Ranch	Yes
5AL25	Medano Ranch	Yes
5AL269	Alamosa East	Yes
5AL270	Hooper East	Yes
5AL272	Hooper East	Yes
5AL273	Medano Ranch	Yes
5AL276	Hooper East	Yes
5AL277	Hooper East	Yes
5AL279	Hooper East	Yes
5AL28	Medano Ranch	Yes
5AL280	Hooper East	Yes
5AL281	Dry Lakes	Yes
5AL282	Dry Lakes	Yes
5AL283	Dry Lakes	Yes
5AL284	Hooper East	Yes
5AL287	Dry Lakes	Yes
5AL289	Dry Lakes	Yes
5AL29	Hooper East	Yes
5AL290	Baldy	Yes
5AL3	Dry Lakes	Yes
5AL322	Dry Lakes	Yes
5AL324	Hooper East	Yes
5AL326	Medano Ranch	Yes
5AL340	Zapata Ranch	Yes
5AL341	Zapata Ranch	Yes
5AL344	Zapata Ranch	Yes
5AL345	Medano Ranch	Yes
5AL358	Hooper East	Yes

Open Camps within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL359	Medano Ranch	Yes
5AL360	Medano Ranch	Yes
5AL369	Hooper East	Yes
5AL371	Alamosa East	Yes
5AL372	Alamosa East	Yes
5AL384	Medano Ranch	Yes
5AL385	Medano Ranch	Yes
5AL386	Medano Ranch	Yes
5AL389	Baldy	Yes
5AL390	Medano Ranch	Yes
5AL391	Medano Ranch	Yes
5AL392	Medano Ranch	Yes
5AL399	Zapata Ranch	Yes
5AL4	Dry Lakes	Yes
5AL400	Zapata Ranch	Yes
5AL401	Zapata Ranch	Yes
5AL402	Zapata Ranch	Yes
5AL403	Zapata Ranch	Yes
5AL404	Zapata Ranch	Yes
5AL405	Zapata Ranch	Yes
5AL5	Dry Lakes	Yes
5AL508	Zapata Ranch	Yes
5AL510	Baldy	Yes
5AL511	Baldy	Yes
5AL530	Zapata Ranch	Yes
5AL6	Medano Ranch	Yes
5AL69	Alamosa East	Yes
5AL7	Medano Ranch	Yes
5AL70	Alamosa East	Yes
5AL71	Alamosa East	Yes
5AL72	Baldy	Yes
5AL73	Baldy	Yes
5AL74	Baldy	Yes
5AL75	Baldy	Yes
5AL76	Baldy	Yes
5AL77	Baldy	Yes
5AL78	Dry Lakes	Yes
5AL79	Dry Lakes	Yes
5AL8	Zapata Ranch, Medano Ranch	Yes
5AL80	Dry Lakes	Yes
5AL81	Dry Lakes	Yes
5AL83	Dry Lakes	Yes
5AL84	Zapata Ranch	Yes
5AL86	Zapata Ranch	Yes

Open Camps within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL88	Zapata Ranch	Yes
5AL9	Zapata Ranch	No
5AL90	Zapata Ranch	Yes
5AL91	Dry Lakes	Yes
5AL93	Medano Ranch, Zapata Ranch, Liberty, Sand Camp	Yes
5AL94	Zapata Ranch	Yes
5AL95	Zapata Ranch	Yes
5AL96	Zapata Ranch	Yes
5AL97	Zapata Ranch, Medano Ranch	Yes
5AL98	Medano Ranch	Yes
5AL99	Dry Lakes	Yes
5CN102	Red Mountain	Yes
5CN11	Terrace Reservoir	No
5CN114	Greenie Mountain	Yes
5CN12	Fulcher Gulch	No
5CN129	Terrace Reservoir	Yes
5CN172	Fox Creek	Yes
5CN182	Kiowa	Yes
5CN184	Kiowa	Yes
5CN199	Kiowa Hill	Yes
5CN213	Sky Valley Ranch	Yes
5CN216	Sky Valley Ranch	Yes
5CN217	Sky Valley Ranch	Yes
5CN24	Fox Creek	Yes
5CN249	Sky Valley Ranch	Yes
5CN321	Antonito	Yes
5CN335	Antonito	Yes
5CN4	Kiowa Hill	Yes
5CN424	Centro	Yes
5CN43	Cumbres	Yes
5CN433	Antonito	Yes
5CN48	Fox Creek	Yes
5CN49	Fox Creek	Yes
5CN617	Greenie Mountain	Yes
5CN619	Greenie Mountain	Yes
5CN621	Greenie Mountain	Yes
5CN624	Greenie Mountain	Yes
5CN625	Greenie Mountain	Yes
5CN675	Mesito Reservoir	Yes
5CN747	Red Mountain	Yes
5CN751	Red Mountain	Yes
5CN77	Fox Creek	Yes
5CN78	Bighorn Peak	Yes
5CN784	Archuleta Creek	Yes

Open Camps within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN79	Fox Creek	Yes
5CN82	Fox Creek	Yes
5CT100	Fort Garland	Yes
5CT107	Trinchera Ranch	Yes
5CT111	Sanchez Reservoir	Yes
5CT144	Mesito Reservoir	Yes
5CT145	Mesito Reservoir	Yes
5CT146	Mesito Reservoir	Yes
5CT147	Mesito Reservoir	Yes
5CT149	Mesito Reservoir	Yes
5CT15	Mesito Reservoir	Yes
5CT150	Mesito Reservoir	Yes
5CT151	Mesito Reservoir	Yes
5CT153	Mesito Reservoir	Yes
5CT154	Mesito Reservoir	Yes
5CT156	Mesito Reservoir	Yes
5CT157	Mesito Reservoir	Yes
5CT158	Mesito Reservoir	Yes
5CT165	Mesito Reservoir	Yes
5CT166	Mesito Reservoir	Yes
5CT168	Mesito Reservoir	Yes
5CT31	Taylor Ranch	Yes
5CT60	Ojito Peak	Yes
5CT61	Ojito Peak	Yes
5CT62	Ojito Peak	Yes
5CT64	Ojito Peak	Yes
5CT65	Ojito Peak	Yes
5CT71	Ojito Peak	Yes
5CT72	Ojito Peak	Yes
5CT73	Ojito Peak	Yes
5CT8	Kiowa Hill	Yes
5CT9	Lasauses	Yes
5CT91	Fort Garland	Yes
5HN154	Cimarrona Peak	Yes
5HN64	Weminuche Pass	Yes
5HN99	Slumgullion Pass	Yes
5ML10	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML236	Creede	Yes
5ML282	Workman Creek	Yes
5ML30	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML31	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes

Open Camps within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5ML44	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML5	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5ML84	Elwood Pass	Yes
5RN10	Price Creek	No
5RN11	Fulcher Gulch	Yes
5RN115	Beaver Creek Reservoir	Yes
5RN117	Beaver Creek Reservoir	Yes
5RN118	Beaver Creek Reservoir	Yes
5RN124	South Fork East	No
5RN126	Horseshoe Mountain	No
5RN134	South Fork East	No
5RN138	Greenie Mountain	No
5RN139	Dog Mountain	No
5RN14	Price Creek	Yes
5RN141	Fulcher Gulch	No
5RN15	Monte Vista	Yes
5RN183	Dog Mountain	Yes
5RN196	Dog Mountain	Yes
5RN2	Monte Vista	No
5RN218	Dog Mountain	Yes
5RN233	Del Norte	Yes
5RN241	South Fork East	Yes
5RN244	Del Norte	Yes
5RN270	Pool Table Mountain	Yes
5RN3	Homelake	No
5RN324	South Fork West	Yes
5RN4	Homelake	No
5RN5	Center South	No
5RN51	Beaver Creek Reservoir	Yes
5RN523	Dog Mountain	Yes
5RN55	Elwood Pass	Yes
5RN58	South Fork East	Yes
5RN6	Fulcher Gulch	Yes
5RN71	South Fork East	Yes
5RN8	Fulcher Gulch	No
5RN9	Monte Vista	No
5SH1015	Crestone	Yes
5SH1079	Moffat South	Yes
5SH1080	Swede Corners, Harrence Lake	Yes
5SH1081	Swede Corners	Yes
5SH1082	Harrence Lake	Yes
5SH1084	Moffat South	Yes
5SH1207	North Pass	Yes

Open Camps within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH1246	Lake Mountain NE	Yes
5SH126	Liberty, Zapata Ranch	No
5SH1261	Medano Pass, Liberty	Yes
5SH128	Grouse Creek	No
5SH129	Saguache Park	No
5SH130	Lake Mountain	No
5SH131	North Pass	No
5SH133	North Pass	No
5SH135	Trickle Mountain	Yes
5SH137	Trickle Mountain	Yes
5SH140	Lake Mountain NE	Yes
5SH142	Lake Mountain NE	Yes
5SH143	Laughlin Gulch	Yes
5SH144	Trickle Mountain	No
5SH146	Klondike Mine	No
5SH147	Saguache	No
5SH1494	Twin Mountains Se	Yes
5SH152	Hickey Bridge	No
5SH156	Moffat North	No
5SH157	Saguache Park	No
5SH159	Saguache Park	No
5SH160	Lookout Mountain	Yes
5SH161	Lookout Mountain	Yes
5SH162	Lookout Mountain	Yes
5SH163	Lookout Mountain	Yes
5SH165	Twin Mountains SE	Yes
5SH166	Twin Mountains SE	No
5SH169	Twin Mountains SE	No
5SH170	Twin Mountains SE	No
5SH171	Harrence Lake	No
5SH172	Sand Camp	No
5SH173	Crestone	No
5SH176	Liberty	No
5SH177	Liberty	No
5SH178	Liberty	Yes
5SH179	Sand Camp	Yes
5SH180	Sand Camp	No
5SH181	Sand Camp, Liberty	Yes
5SH192	Mirage	Yes
5SH20	Moffat North	Yes
5SH22	Moffat North	No
5SH24	Moffat North	Yes
5SH256	Twin Mountains SE	No
5SH259	Lookout Mountain	Yes

Open Camps within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH260	Lookout Mountain	Yes
5SH264	North Pass	Yes
5SH268	North Pass	Yes
5SH277	North Pass	Yes
5SH316	Bowers Peak	Yes
5SH347	Sand Camp	Yes
5SH348	Liberty	Yes
5SH350	Sand Camp	Yes
5SH351	Liberty	Yes
5SH358	Harrence Lake	Yes
5SH365	Deadman Camp	Yes
5SH457	Saguache	Yes
5SH472	Swede Corners	Yes
5SH48	Twin Mountains SE	Yes
5SH481	Deadman Camp	Yes
5SH482	Deadman Camp	Yes
5SH483	Deadman Camp	Yes
5SH484	Deadman Camp	Yes
5SH485	Deadman Camp	Yes
5SH487	Deadman Camp	Yes
5SH488	Deadman Camp	Yes
5SH51	Twin Mountains SE	Yes
5SH510	Crestone	Yes
5SH511	Crestone	Yes
5SH512	Crestone	Yes
5SH513	Crestone	Yes
5SH515	Crestone	Yes
5SH517	Deadman Camp	Yes
5SH518	Deadman Camp	Yes
5SH519	Moffat South	Yes
5SH522	Deadman Camp	Yes
5SH523	Deadman Camp	Yes
5SH525	Moffat South	Yes
5SH528	Crestone	Yes
5SH529	Crestone	Yes
5SH530	Crestone	Yes
5SH531	Crestone	Yes
5SH541	Crestone	Yes
5SH558	Crestone	Yes
5SH559	Crestone	Yes
5SH560	Crestone	Yes
5SH561	Crestone	Yes
5SH569	Harrence Lake	Yes
5SH572	Sand Camp	Yes

Open Camps within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH573	Sand Camp	Yes
5SH574	Crestone	Yes
5SH576	Crestone	Yes
5SH579	Rito Alto Peak	Yes
5SH591	Poncha Pass	Yes
5SH595	La Garita	Yes
5SH601	Crestone	Yes
5SH605	Graveyard Gulch	Yes
5SH611	Twin Mountains SE	Yes
5SH612	Sand Camp	Yes
5SH614	Crestone	Yes
5SH615	Rito Alto Peak	Yes
5SH616	Rito Alto Peak	Yes
5SH617	Rito Alto Peak	Yes
5SH618	Rito Alto Peak	Yes
5SH619	Rito Alto Peak	Yes
5SH620	Rito Alto Peak	Yes
5SH621	Rito Alto Peak	Yes
5SH639	Saguache	Yes
5SH642	Deadman Camp SW	Yes
5SH644	La Garita	Yes
5SH646	Sand Camp	Yes
5SH650	Crestone	Yes
5SH656	Rito Alto Peak	Yes
5SH66	North Pass	Yes
5SH669	Whale Hill	Yes
5SH67	North Pass	Yes
5SH7	Saguache	No
5SH703	Crestone	Yes
5SH73	Trickle Mountain	Yes
5SH74	Lime Creek	No
5SH75	Lime Creek	No
5SH76	Twin Mountains SE	No
5SH77	Moffat South	Yes
5SH8	Moffat North	Yes
5SH855	Liberty, Sand Camp	Yes
5SH856	Liberty	Yes
5SH857	Liberty	Yes
5SH858	Sand Camp	Yes
5SH867	Deadman Camp	Yes
5SH868	Deadman Camp	Yes
5SH903	North Pass	Yes
5SH909	Deadman Camp	Yes
5SH931	Moffat South	Yes
5SH932	Moffat South	Yes

Open Camps within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH936	Moffat South	Yes
5SH937	North Pass	Yes
5SH938	North Pass	Yes
5SH947	Moffat South	Yes
5SH948	Deadman Camp	Yes
5SH949	Moffat South	Yes
5SH950	Moffat South	Yes
5SH951	Moffat South	Yes
5SH952	Sheds Camp	Yes
5SH953	Sheds Camp	Yes
5SH956	Moffat South	Yes
5SH957	Moffat South	Yes
5SH958	Moffat South	Yes
5SH960	Moffat South	Yes
5SH961	Moffat South	Yes
5SH962	Moffat South	Yes
5SH963	Deadman Camp	Yes
5SH965	Moffat South	Yes
5SH967	Deadman Camp	Yes
5SH968	Deadman Camp	Yes
5SH969	Deadman Camp	Yes
5SH970	Moffat South	Yes
5SH971	Moffat South	Yes
5SH972	Deadman Camp	Yes
5SH973	Moffat South	Yes
5SH976	Deadman Camp	Yes
5SH977	Deadman Camp	Yes
5SH982	Moffat South	Yes
5SH983	Moffat South	Yes
5SH984	Moffat South	Yes
5SH987	Moffat South	Yes
5SH988	Rito Alto Peak	Yes
5SH989	Rito Alto Peak	Yes
TOTAL	426 sites, 50 without UTMs	

Open Architectural Sites within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL321/5CT169	Blanca Peak	Yes
5CN130	Kiowa Hill	Yes
5CN185	Kiowa	Yes
5CN187	Kiowa	Yes
5CN188	Kiowa	Yes
5CN197	Kiowa Hill	Yes
5CN198	Kiowa Hill	Yes
5CN204	Kiowa Hill	Yes
5CN206	Kiowa Hill	Yes
5CN221	Sky Valley Ranch	Yes
5CN226	Kiowa Hill	Yes
5CN243	Kiowa Hill	Yes
5CN247	Kiowa Hill	Yes
5CN25	Antonito	Yes
5CN251	Sky Valley Ranch	Yes
5CN256	Kiowa Hill	Yes
5CN287	Kiowa	Yes
5CN301	Lobatos	Yes
5CN305	Antonito	Yes
5CN317	Antonito	Yes
5CN319	Antonito	Yes
5CN320	Antonito	Yes
5CN322	Antonito	Yes
5CN323	Antonito	Yes
5CN327	Antonito	Yes
5CN328	Antonito	Yes
5CN329	Antonito	Yes
5CN331	Antonito	Yes
5CN339	Antonito	Yes
5CN340	Antonito	Yes
5CN341	Antonito	Yes
5CN343	Antonito	Yes
5CN347	Antonito	Yes
5CN350	Antonito	Yes
5CN407	Antonito	Yes
5CN541	Manassa NE	Yes
5CN542	Manassa NE	Yes
5CN543	Manassa NE	Yes
5CN550	Goshawk Dam	Yes
5CN553	Goshawk Dam	Yes
5CN560	Goshawk Dam	Yes
5CN561	Goshawk Dam	Yes
5CN562	Goshawk Dam	Yes
5CN565	Goshawk Dam	Yes
5CN566	Goshawk Dam	Yes
5CN567	Goshawk Dam	Yes
5CN568	Goshawk Dam	Yes
5CN599	Fulcher Gulch	Yes
5CN600	Fulcher Gulch	Yes

Open Architectural Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN610	Greenie Mountain	Yes
5CN651	Kiowa Hill	Yes
5CN679	Mesito Reservoir	Yes
5CN776	Fulcher Gulch	Yes
5CN777	Kiowa Hill	Yes
5CN8	Kiowa Hill	Yes
5CN801	Pikes Stockade	Yes
5CN803	Osier	Yes
5CT18	Kiowa Hill	Yes
5CT23	Sky Valley Ranch	Yes
5CT262	Kiowa Hill	Yes
5CT3	Kiowa Hill	Yes
5CT38	Blanca Se	Yes
5CT39	Blanca Se	Yes
5CT41	Blanca Se	Yes
5CT8	Kiowa Hill	Yes
5CT88	Blanca	Yes
5HN151	Little Squaw Creek	Yes
5HN154	Cimarrona Peak	Yes
5ML32	Spar City 15' (Aka Mount Hope, South River Peak, Spar City, Lake Humphrey's)	Yes
5ML55	Pool Table Mountain	Yes
5RN107	South Fork West	Yes
5RN118	Beaver Creek Reservoir	Yes
5RN13	South Fork West	No
5RN17	South Fork East	Yes
5RN192	Dog Mountain	Yes
5RN206	Dog Mountain	Yes
5RN234	Del Norte	Yes
5RN323	South Fork West	Yes
5RN488	Dog Mountain	Yes
5RN491	Del Norte	Yes
5RN492	Del Norte	Yes
5RN499	Dog Mountain	Yes
5RN522	Monte Vista	Yes
5RN523	Dog Mountain	Yes
5RN7	Fulcher Gulch	No
5SH127	Price Creek	No
5SH135	Trickle Mountain	Yes
5SH142	Lake Mountain NE	Yes
5SH1492	Twin Mountains SE	Yes
5SH1496	Twin Mountains SE	Yes
5SH153	Saguache	No
5SH164	Twin Mountains SE	No
5SH2	Saguache	Yes
5SH242	North Pass	Yes
5SH264	North Pass	Yes
5SH3	Lake Mountain	Yes
5SH325	Laughlin Gulch	Yes

Open Architectural Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH346	Lime Creek	Yes
5SH354	Laughlin Gulch	Yes
5SH5	Lake Mountain	Yes
5SH50	Twin Mountains Se	Yes
5SH514	Crestone	Yes
5SH585	Twin Mountains Se	Yes
5SH607	Swede Corners	Yes
5SH608	Swede Corners	Yes
5SH655	Rito Alto Peak	Yes
5SH657	Valley View Hot Springs	Yes
5SH660	Swede Corners	Yes
5SH668	Whale Hill	Yes
5SH671	Whale Hill	Yes
5SH73	Trickle Mountain	Yes
TOTAL	111 sites, 5 without UTMs	

Sheltered Sites within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN14	Centro	Yes
5CN256	Kiowa Hill	Yes
5CN26	Vicente Canyon	Yes
5CN283	Antonito	Yes
5CN598	Fulcher Gulch	Yes
5CN64	Lobatos	No
5CN7	Pikes Stockade	No
5CN74	Terrace Reservoir	Yes
5CN9	Kiowa Hill	Yes
5CT11	Mesito Reservoir	No
5CT16	Sky Valley Ranch	No
5CT2	Kiowa Hill	Yes
5CT4	Kiowa Hill	Yes
5CT5	Kiowa Hill	Yes
5CT6	Kiowa Hill	Yes
5CT7	Kiowa Hill	Yes
5CT89	Fort Garland	Yes
5CT90	Fort Garland	Yes
5CT92	Fort Garland	Yes
5CT93	Fort Garland	Yes
5CT94	Fort Garland	Yes
5RN1	Dog Mountain	Yes
5RN104	South Fork West	Yes
5RN106	South Fork West	Yes
5RN12	Greenie Mountain	Yes
5RN186	Dog Mountain	Yes
5RN188	Dog Mountain	Yes
5RN194	Dog Mountain	Yes
5RN197	Dog Mountain	Yes
5RN202	Dog Mountain	Yes
5RN203	Dog Mountain	Yes
5RN204	Dog Mountain	Yes
5RN206	Dog Mountain	Yes
5RN208	Dog Mountain	Yes
5RN219	Dog Mountain	Yes
5RN220	Dog Mountain	Yes
5RN232	Del Norte	Yes
5RN242	Del Norte	Yes
5RN243	Del Norte	Yes
5RN330	Dog Mountain	Yes
5SH134	Trickle Mountain	Yes
5SH139	Laughlin Gulch	No
5SH141	Lake Mountain Ne	No

Sheltered Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH1458	Trickle Mountain	Yes
5SH148	Saguache	No
5SH1492	Twin Mountains SE	Yes
5SH1493	Twin Mountains SE	Yes
5SH1494	Twin Mountains SE	Yes
5SH1495	Twin Mountains SE	Yes
5SH1496	Twin Mountains SE	Yes
5SH1497	Twin Mountains SE	Yes
5SH1499	Trickle Mountain	Yes
5SH4	Price Creek	Yes
5SH48	Twin Mountains SE	Yes
5SH51	Twin Mountains SE	Yes
5SH6	Lake Mountain Ne	Yes
5SH607	Swede Corners	Yes
5SH609	Twin Mountains SE	Yes
5SH626	Swede Corners	Yes
5SH627	Swede Corners	Yes
5SH628	Twin Mountains SE	Yes
5SH659	Swede Corners	Yes
5SH661	Swede Corners	Yes
5SH662	Swede Corners	Yes
5SH663	Swede Corners	Yes
5SH73	Trickle Mountain	Yes
TOTAL	66 sites, 7 without UTMs	

Rock Art Sites within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN256	Kiowa Hill	Yes
5CN66	Fulcher Gulch	Yes
5CN776	Fulcher Gulch	Yes
5CN777	Kiowa Hill	Yes
5CN801	Pikes Stockade	Yes
5CT23	Sky Valley Ranch	Yes
5CT260	Fort Garland	Yes
5CT262	Kiowa Hill	Yes
5CT263	Mesito Reservoir	Yes
5CT88	Blanca	Yes
5RN1	Dog Mountain	Yes
5RN11	Fulcher Gulch	Yes
5RN12	Greenie Mountain	Yes
5RN127	Del Norte	Yes
5RN136	Dog Mountain	No
5RN140	Dog Mountain	No
5RN330	Dog Mountain	Yes
5RN355	Greenie Mountain	Yes
5RN488	Dog Mountain	Yes
5RN490	Dog Mountain	Yes
5RN491	Del Norte	Yes
5RN492	Del Norte	Yes
5RN493	Del Norte	Yes
5RN494	Del Norte	Yes
5RN495	Del Norte	Yes
5RN497	Dog Mountain	Yes
5RN498	Dog Mountain	Yes
5RN499	Dog Mountain	Yes
5RN522	Monte Vista	Yes
5RN523	Dog Mountain	Yes
5RN9	Monte Vista	No
5SH1458	Trickle Mountain	Yes
5SH1486	Twin Mountains SE	Yes
5SH1492	Twin Mountains SE	Yes
5SH1493	Twin Mountains SE	Yes
5SH1494	Twin Mountains SE	Yes
5SH1495	Twin Mountains SE	Yes
5SH1496	Twin Mountains SE	Yes
5SH1497	Twin Mountains SE	Yes
5SH1499	Trickle Mountain	Yes
5SH167	Twin Mountains SE	No
5SH48	Twin Mountains SE	Yes
5SH51	Twin Mountains SE	Yes
5SH587	Saguache	Yes
TOTAL	44 sites, 4 without UTMs	

Lithic Procurement Areas within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN146	Platoro	Yes
5ML62/5RN169	Pool Table Mountain	Yes
5RN262	Del Norte	Yes
5RN278	Pine Cone Knob	Yes
5SH387	Lake Mountain	Yes
TOTAL	5 sites, none without UTMs	

Human Skeletal Remains within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL100	Dry Lakes	Yes
5AL396	Baldy	Yes
5AL5	Dry Lakes	Yes
5AL523	Not in database	No
5AL544	Not in database	No
5AL7	Medano Ranch	Yes
5AL8	Zapata Ranch, Medano Ranch	Yes
5CN6	Manassa	Yes
5CT121	Ojito Peak	Yes
5RN11	Fulcher Gulch	Yes
5RN12	Greenie Mountain	Yes
5SH1047	Valley View Hot Springs	Yes
5SH1069	Sand Camp	Yes
5SH137	Trickle Mountain	Yes
5SH350	Sand Camp	Yes
TOTAL	15 sites, 2 without UTMs	

Culturally Peeled Trees within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CN143	Fox Creek	Yes
5CN144	Fox Creek	Yes
5CN145	Fox Creek	Yes
5CN528	Fox Creek	Yes
5CN529	Fox Creek	Yes
5CN530	Fox Creek	Yes
5CN638	Spectacle Lake	Yes
5CN639	Fox Creek	Yes
5SH1472	Liberty	Yes
5SH1473	Liberty	Yes
5SH1474	Liberty	Yes
5SH1475	Liberty	Yes
5SH1476	Liberty	Yes
5SH1013	Lake Mountain	No
5SH1035	Liberty, Medano Pass	Yes
5SH1205	North Pass	Yes
5SH1238	Liberty	Yes
5SH1261	Medano Pass, Liberty	Yes
5SH309	Liberty	Yes
5SH386	North Pass	Yes
5SH71	North Pass	Yes
5SH73	Trickle Mountain	Yes
TOTAL	22 sites, 1 without UTMs	

Kill Sites within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL101	Medano Ranch	Yes
5AL29	Hooper East	Yes
5AL90	Zapata Ranch	Yes
5AL91	Dry Lakes	Yes
5SH903	North Pass	Yes
TOTAL	5 sites, none without UTMs	

Ceramic Stage Sites within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL10	Zapata Ranch, Medano Ranch	Yes
5AL139	Alamosa East, Baldy	Yes
5AL146	Hooper East	Yes
5AL150	Hooper East	Yes
5AL153	Hooper East	Yes
5AL154	Hooper East, Medano Ranch	Yes
5AL169	Medano Ranch	Yes
5AL17	Baldy	No
5AL212	Baldy	Yes
5AL218	Baldy	Yes
5AL270	Hooper East	Yes
5AL29	Hooper East	Yes
5AL358	Hooper East	Yes
5AL359	Medano Ranch	Yes
5AL360	Medano Ranch	Yes
5AL372	Alamosa East	Yes
5AL384	Medano Ranch	Yes
5AL399	Zapata Ranch	Yes
5AL4	Dry Lakes	Yes
5AL403	Zapata Ranch	Yes
5AL405	Zapata Ranch	Yes
5AL5	Dry Lakes	Yes
5AL6	Medano Ranch	Yes
5AL7	Medano Ranch	Yes
5AL79	Dry Lakes	Yes
5AL8	Zapata Ranch, Medano Ranch	Yes
5CN12	Fulcher Gulch	No
5CN14	Centro	Yes
5CN15	Antonito	Yes
5CN182	Kiowa	Yes
5CN256	Kiowa Hill	Yes
5CN26	Vicente Canyon	Yes
5CN270	Kiowa Hill	Yes
5CN424	Centro	Yes
5CN64	Lobatos	No
5CN651	Kiowa Hill	Yes
5CN7	Pikes Stockade	No
5CN747	Red Mountain	Yes
5CN784	Archuleta Creek	Yes
5CN8	Kiowa Hill	Yes
5CN9	Kiowa Hill	Yes
5CT100	Fort Garland	Yes
5CT11	Mesito Reservoir	No

Ceramic Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CT145	Mesito Reservoir	Yes
5CT146	Mesito Reservoir	Yes
5CT149	Mesito Reservoir	Yes
5CT15	Mesito Reservoir	Yes
5CT150	Mesito Reservoir	Yes
5CT151	Mesito Reservoir	Yes
5CT153	Mesito Reservoir	Yes
5CT168	Mesito Reservoir	Yes
5CT18	Kiowa Hill	Yes
5CT2	Kiowa Hill	Yes
5CT23	Sky Valley Ranch	Yes
5CT27	Not in database	No
5CT4	Kiowa Hill	Yes
5CT5	Kiowa Hill	Yes
5CT6	Kiowa Hill	Yes
5CT7	Kiowa Hill	Yes
5CT8	Kiowa Hill	Yes
5CT9	Lasauses	Yes
5CT91	Fort Garland	Yes
5CT99	Fort Garland	Yes
5HN104	Slumgullion Pass	Yes
5ML233	Mount Hope	Yes
5ML30	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5RN11	Fulcher Gulch	Yes
5RN12	Greenie Mountain	Yes
5RN134	South Fork East	No
5RN201	Dog Mountain	Yes
5RN203	Dog Mountain	Yes
5RN51	Beaver Creek Reservoir	Yes
5RN55	Elwood Pass	Yes
5SH1084	Moffat South	Yes
5SH1458	Trickle Mountain	Yes
5SH172	Sand Camp	No
5SH173	Crestone	No
5SH176	Liberty	No
5SH177	Liberty	No
5SH178	Liberty	Yes
5SH179	Sand Camp	Yes
5SH180	Sand Camp	No
5SH181	Sand Camp, Liberty	Yes
5SH2	Saguache	Yes
5SH264	North Pass	Yes
5SH358	Harrence Lake	Yes

Ceramic Stage Sites within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH365	Deadman Camp	Yes
5SH48	Twin Mountains SE	Yes
5SH480	Deadman Camp	Yes
5SH481	Deadman Camp	Yes
5SH484	Deadman Camp	Yes
5SH485	Deadman Camp	Yes
5SH487	Deadman Camp	Yes
5SH488	Deadman Camp	Yes
5SH519	Moffat South	Yes
5SH522	Deadman Camp	Yes
5SH525	Moffat South	Yes
5SH547	Trickle Mountain	Yes
5SH605	Graveyard Gulch	Yes
5SH607	Swede Corners	Yes
5SH650	Crestone	Yes
5SH73	Trickle Mountain	Yes
5SH74	Lime Creek	No
5SH75	Lime Creek	No
5SH932	Moffat South	Yes
5SH935	Moffat South	Yes
5SH938	North Pass	Yes
5SH961	Moffat South	Yes
5SH962	Moffat South	Yes
5SH963	Deadman Camp	Yes
5SH967	Deadman Camp	Yes
5SH976	Deadman Camp	Yes
TOTAL	112 sites, 14 without UTMs	

Sites Containing Southwestern Ceramics within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL10	Zapata Ranch, Medano Ranch	Yes
5AL150	Hooper East	Yes
5AL153	Hooper East	Yes
5AL154	Hooper East, Medano Ranch	Yes
5AL17	Baldy	No
5AL29	Hooper East	Yes
5AL358	Hooper East	Yes
5AL384	Medano Ranch	Yes
5CN182	Kiowa	Yes
5CN270	Kiowa Hill	Yes
5CN64	Lobatos	No
5CN651	Kiowa Hill	Yes
5CN7	Pikes Stockade	No
5CN784	Archuleta Creek	Yes
5CN8	Kiowa Hill	Yes
5CN9	Kiowa Hill	Yes
5CT11	Mesito Reservoir	No
5CT145	Mesito Reservoir	Yes
5CT151	Mesito Reservoir	Yes
5CT27	Not in database	No
5CT4	Kiowa Hill	Yes
5CT5	Kiowa Hill	Yes
5CT6	Kiowa Hill	Yes
5CT7	Kiowa Hill	Yes
5CT9	Lasauses	Yes
5HN104	Slumgullion Pass	Yes
5RN11	Fulcher Gulch	Yes
5SH1084	Moffat South	Yes
5SH1458	Trickle Mountain	Yes
5SH176	Liberty	No
5SH179	Sand Camp	Yes
5SH48	Twin Mountains SE	Yes
5SH519	Moffat South	Yes
5SH522	Deadman Camp	Yes
5SH607	Swede Corners	Yes
5SH932	Moffat South	Yes
5SH938	North Pass	Yes
TOTAL	37 sites, 6 without UTMs	

Sites Containing Cordmarked Ceramics within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL146	Hooper East	Yes
5AL358	Hooper East	Yes
5AL4	Dry Lakes	Yes
5SH181	Sand Camp, Liberty	Yes
5SH487	Deadman Camp	Yes
5SH967	Deadman Camp	Yes
Total	6 sites, none without UTMs	

Sites Containing Plainware Ceramics within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL212	Baldy	Yes
5AL218	Baldy	Yes
5AL359	Medano Ranch	Yes
5AL360	Medano Ranch	Yes
5AL372	Alamosa East	Yes
5CN14	Centro	Yes
5CN15	Antonito	Yes
5CN256	Kiowa Hill	Yes
5CN424	Centro	Yes
5CN651	Kiowa Hill	Yes
5CT100	Fort Garland	Yes
5CT153	Mesito Reservoir	Yes
5CT23	Sky Valley Ranch	Yes
5CT91	Fort Garland	Yes
5CT99	Fort Garland	Yes
5ML30	Creede 15' (Aka Wagon Wheel Gap, Creede, San Luis Peak, Halfmoon Pass)	Yes
5RN201	Dog Mountain	Yes
5RN51	Beaver Creek Reservoir	Yes
5RN55	Elwood Pass	Yes
5SH365	Deadman Camp	Yes
5SH48	Twin Mountains SE	Yes
5SH481	Deadman Camp	Yes
5SH484	Deadman Camp	Yes
5SH485	Deadman Camp	Yes
5SH487	Deadman Camp	Yes
5SH488	Deadman Camp	Yes
5SH525	Moffat South	Yes
5SH547	Trickle Mountain	Yes
5SH961	Moffat South	Yes
5SH962	Moffat South	Yes
5SH976	Deadman Camp	Yes
TOTAL	31 Sites, none without UTMs	

Sites Containing Micaceous Ceramics within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5CT168	Mesito Reservoir	Yes
5CT6	Kiowa Hill	Yes
5RN11	Fulcher Gulch	Yes
5SH264	North Pass	Yes
5SH358	Harrence Lake	Yes
5SH73	Trickle Mountain	Yes
TOTAL	6 sites, none without UTMs	

Sites Containing Unknown or Other Types of Ceramics within the Rio Grande Basin

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5AL139	Alamosa East, Baldy	Yes
5AL169	Medano Ranch	Yes
5AL212	Baldy	Yes
5AL270	Hooper East	Yes
5AL399	Zapata Ranch	Yes
5AL403	Zapata Ranch	Yes
5AL405	Zapata Ranch	Yes
5AL5	Dry Lakes	Yes
5AL6	Medano Ranch	Yes
5AL7	Medano Ranch	Yes
5AL79	Dry Lakes	Yes
5AL8	Zapata Ranch, Medano Ranch	Yes
5CN12	Fulcher Gulch	No
5CN14	Centro	Yes
5CN26	Vicente Canyon	Yes
5CN747	Red Mountain	Yes
5CT146	Mesito Reservoir	Yes
5CT149	Mesito Reservoir	Yes
5CT15	Mesito Reservoir	Yes
5CT150	Mesito Reservoir	Yes
5CT18	Kiowa Hill	Yes
5CT2	Kiowa Hill	Yes
5CT27	Not in database	No
5CT8	Kiowa Hill	Yes
5ML233	Mount Hope	Yes
5RN12	Greenie Mountain	Yes
5RN134	South Fork East	No
5RN203	Dog Mountain	Yes
5SH172	Sand Camp	No
5SH173	Crestone	No
5SH177	Liberty	No
5SH178	Liberty	Yes
5SH180	Sand Camp	No
5SH181	Sand Camp, Liberty	Yes
5SH2	Saguache	Yes
5SH480	Deadman Camp	Yes
5SH481	Deadman Camp	Yes
5SH485	Deadman Camp	Yes
5SH487	Deadman Camp	Yes
5SH605	Graveyard Gulch	Yes
5SH650	Crestone	Yes
5SH74	Lime Creek	No
5SH75	Lime Creek	No

Sites Containing Unknown or Other Types of Ceramics within the Rio Grande Basin (continued)

SITE NO.	USGS 7.5' QUADRANGLE	UTM AVAILABLE
5SH935	Moffat South	Yes
5SH963	Deadman Camp	Yes
TOTAL	45 Sites, 9 without UTMs	

APPENDIX B

Annotated Bibliography

ANNOTATED BIBLIOGRAPHY

Introduction

This section provides information on some of the literature describing the archaeology in the Rio Grande drainage basin. These documents provide basic descriptions of the archaeological resources found in the area and summarize the history of research.

Selected References

Burns, G. R.
1981 *Obsidian Hydration Analysis on Artifacts from the Rio Grande National Forest.* Unpublished Master's thesis, Department of Anthropology, Colorado State University, Fort Collins.

An obsidian hydration analysis was conducted on 122 obsidian surface artifacts from the Rio Grande National Forest. The goal of this research was to help establish a chronology for the area. In addition, 10 samples of raw material obsidian from known regional obsidian sources, mostly in New Mexico, were subjected to trace element analysis. Subsequent cluster analysis indicated that there was some use of obsidian from the Jemez Mountains in New Mexico. The obsidian hydration analysis was inconclusive. The use of surface artifacts may have limited the accurate determination of dates. Additional study using subsurface artifacts was recommended.

Button, V. T.
1987 *The Closed Basin of Colorado's San Luis Valley. Bureau of Reclamation Archeological Investigations 1976-1986.* Bureau of Reclamation, Closed Basin Division, Alamosa Colorado. Bureau of Reclamation, Southwest Regional Office, Amarillo, Texas.

This report summarizes the Bureau of Reclamation investigations on the Closed Basin Project. The report contains three main sections: a discussion of the survey methodology employed on the project, a projectile point analysis, and summary tables of the sites found during the surveys. The report also contains a summary of the testing program, but this discussion is confusing and not very informative. The report is useful for the projectile point analysis and as a summary of the site types in the area. The report also cautions that it is difficult to identify intact buried deposits in the Closed Basin.

Cassells, E.S.
1997 *The Archaeology of Colorado*, Revised ed. Johnson Books, Boulder.

Cassell's revised edition of Colorado archaeology provides a succinct discussion of Paleoindian research in the San Luis Valley.

Conner, C. E., D. L. Landgon, R. Wolf, P. K. Roebuck, and T. F. Rome
1980 *Poncha-San Luis Valley 230-kV Transmission Line Cultural Resources Inventory.* Grand River Institute, Grand Junction, Colorado. Submitted to Colorado-Ute Electric Association, Inc.

Archaeological investigation of the Poncha-San Luis Valley 230-kV transmission line in 1979 resulted in the inventory of a 200-foot-wide transect from about eight miles northwest of Alamosa to a location one-half mile west of Poncha Pass. The inventory resulted in the recording of four lithic sites in the Closed Basin associated with playa lakes. Early, Middle, and Late Archaic cultural material was found.

Gadd, P.
1985 *The San Luis Valley: A Model for Manageme*nt. Unpublished Master's thesis, Department of Anthropology, University of Denver.

This thesis is a compilation and summary of all the archaeological sites recorded in the San Luis Valley and adjacent foothills as of 1985. The valley is divided into different regions and the types of sites within the region are summarized. This is a good summary of the types of sites in the Valley, but it is less useful if information on a particular site is desired. No attempt was made to assess the validity of the site descriptions or site locations. A table of sites is presented as an appendix.

Gooding, J. D. and S. Kreuser
1980 *An Archaeological Survey of Forest Highway 7.* Highway Salvage Report No. 31, Colorado Department of Highways, Denver.

John Gooding and Susan Kreuser conducted an archaeological survey of Forest Highway 7 (Colorado Highway 149) located about 25 miles west of Creede. Recorded sites suggest utilization from Paleoindian through Archaic times. Archaic lithic materials, including rhyolite and obsidian, were identified as being related to the Oshara tradition.

Horn, J. C.
1990 *Cultural Resources Inventory of Forest Highway 69 (Forest Route 250), Rio Grande National Forest, Conejos County, Colorado.* Alpine Archaeological Consultants, Inc., Montrose, Colorado. Contract No. PX-1242-9-0935. Submitted to National Park Service, Rocky Mountain Regional Office, Denver.

In 1989 Alpine Archaeological Consultants, Inc. conducted a 400-foot-wide cultural resource inventory along seven miles of land located adjacent to the upper portion of the Conejos River on the Rio Grande National Forest. Five prehistoric sites were recorded and one was revisited. In addition, three prehistoric isolated finds were located. The research design addressed questions relating to cultural affiliation, site function, technology, extraregional relationships, and settlement patterns.

Hurst, C. T.
1939 A Ute Shelter in Saguache County, Colorado. *Southwestern Lore* 5(3):57-64.

This journal article describes the materials excavated in a rockshelter in the late 1930s. The shelter contained a variety of artifacts including ceramics, turquoise, corn, and human remains. Mark Stiger of Western State College recently relocated the site and provided a correct map location. The reported human remains were reanalyzed as nonhuman. The Saguache Shelter site number is 5SH1458.

Hurst, C. T.
1941 A Folsom Location in the San Luis Valley, Colorado, A Preliminary Report. *Southwestern Lore* 7(2):31-33.

This journal article describes the early excavations at the Linger Folsom site.

Huscher, E. and H. Huscher
1943 The Hogan Builders of Colorado. *Southwestern Lore* 9(2):1-92.

In 1943, Harold and Elizabeth Huscher inventoried and reported on stone structure remains in the Saguache area and other portions of the San Luis Valley including Wagon Wheel Gap. Sites were reported to have circular or curved walls, dry-laid masonry, and locations on high points or mesa rims. The stone structures were often found with small corner notched projectile points. This journal article remains one of the best sources for descriptions of stone structures in the area.

Jodry, M. A.
1987 *Stewart's Cattle Guard: A Folsom Site in Southern Colorado. Report of the 1981 and 1983 Field Seasons.* Unpublished Master's thesis, Department of Anthropology, University of Texas, Austin.

This thesis presents a site structural study of a large continuous block excavation (>200 m^2) containing the remains of domestic activities apparently conducted around a series of former hearths in a Folsom campsite occupied adjacent to a bison kill. Lithic refitting and surficial modification to bison bones buttress discussions of natural and cultural site formation processes. Butchery at the site is documented for an assemblage of nearly 380 bison bones. Lithic artifacts are well illustrated and their spatial distributions are discussed with respect to marrow processing, tool rejuvenation, and Folsom point production and discard.

Jodry M. A.
1992 Fitting Together Folsom: Refitted Lithics and Site Formation Processes at Stewart's Cattle Guard Site. In *Piecing Together the Past: Applications of Refitting Studies in Archaeology*, edited by J. L. Hofman and J. G. Enloe, pp. 179-209. British Archaeological Reports, International Series 578.

Jodry investigates the vertical and horizontal displacement of conjoined fragments of lithic artifacts (and some bison bone) to understand the natural (e.g., trampling, bioturbation, wind blasting) and cultural (using marrow cracking tools in more than one location, rejuvenating scrapers) behaviors affecting the spatial distribution of the Folsom assemblage at the Cattle Guard site. This article includes a larger sample of refitted lithics than that described in her 1987 thesis and provides the most detailed published account of the natural processes affecting the Cattle Guard site. Many of these processes affect other sites in the eolian sand sea on the San Luis Valley's east side.

Jodry M. A.
1996 *Archaeology of Stewart's Cattle Guard Site: Report of the 1995 Field Season.* Report on file, Paleoindian/Paleoecology Program, Department of Anthropology, Smithsonian Institution, Washington, D.C.

Internal report that provides an overview of the goals of the Smithsonian's Paleoindian/Paleoecology Program and explains why the Rio Grande Basin was chosen as a study area. Attempts to use remote sensing techniques (magnotometer and ground-penetrating radar) at the Cattle Guard site to map the distribution of subsurface bison bone and to discover hearths is described, as are the results of limited testing to ground proof three anomalies discovered with the GPR techniques. Preliminary results of test units dug to investigate radar anomalies were mixed

although one area produced the remains of a possibly roasted bison skull. Final assessment of the remote sensing data awaits further ground proofing.

Jodry M. A.
1998 The Possible Design of Folsom Ultrathin Bifaces as Fillet Knives for Jerky Production. *Current Research in the Pleistocene* Volume 15.

Expanded abstract-length article providing a detailed description and measurements of several specialized Folsom knives formally termed "ultrathin bifaces" by Ahler. These beveled knives were found in the residential camp at Cattle Guard and in a work area where hide processing took place. None were recovered in the bison kill area. Jodry proposes that these bifaces functioned as fillet knives that were particularly well-suited for cutting thin sheaths of meat for drying. She suggests the possibility that they may have been a form of woman's knife comparable to an eskimo ulu.

Jodry, M. A. and D. J. Stanford
1992 Stewart's Cattle Guard Site: An Analysis of Bison Remains in a Folsom Kill-Butchery Campsite. In *Ice Age Hunters of the Rockies*, edited by D. J. Stanford and J. S. Day, pp. 101-168. Denver Museum of Natural History and University Press of Colorado, Niwot, Colorado.

This article describes and discusses an assemblage of nearly 380 Bison bison antiquus remains and associated tools recovered in 1981 and 1983 from the residential portion of the Cattle Guard site. Taphonomic analysis of this material includes reconstruction of natural processes of site formation that resulted in very eroded skyward surfaces and better preserved groundward surfaces and density-dependent preservation of elements. Evidence for a transported assemblage (from an adjacent kill location), marrow cracking activities with associated lithic tools, and the discard of food remains are discussed. Density contour mapping of the bison bone and associated stone flakes and tools provides a pattern recognition technique for investigating site structure. This article summarizes a portion of Jodry's Master's thesis.

Jodry, M. A. and D. J. Stanford
1996 Changing Hydrologic Regimes and Prehistoric Landscape Use in the Northern San Luis Valley, Colorado. In *Geologic Excursions to the Rocky Mountains and Beyond. Fieldtrip Guidebook for the 1996 Annual Meeting of the Geological Society of America, Denver*. Special Publication 44. Colorado Geological Survey. CD-ROM Format.

Jodry and Stanford summarize the palynological records from Como, Head, and San Luis Lakes in the San Luis Valley and relate this information to terminal Pleistocene Folsom archeology. This article provides a published summary of vegetative change at San Luis Lake as reconstructed from pollen data dating to the Little Ice Age (the subject of Jeanne De Lanois' unpublished Master's thesis from the Department of Geosciences, University of Arizona, Tucson). This is one of several summary articles dealing with the geology and hydrology of the upper Rio Grande Basin that result from a recent GSA fieldtrip to the San Luis Valley. Available in CD-ROM format only.

Jones, K. T.
1977 *Archaeological Test Excavations at the Blanca Wildlife Refuge in the San Luis Valley*. Reports of the Laboratory of Public Archaeology No. 12, Colorado State University, Fort Collins.

This report describes the test excavations conducted at the Blanca Wildlife Refuge in 1977. The research design focuses on the relationship of site locations and lacustrine resources. The Blanca Wildlife Refuge is located on the eastern edge of the Closed Basin about 10 miles northeast of Alamosa. The test excavations focused on site 5AL80/81, where a midden containing fish bone was found. Identified bone included gilia or Rio Grande chub and buffalofish. Three projectile points found at the site, although not found in test units, are identified as Late Archaic types. A radiocarbon date of A.D. 280 was obtained from the midden level. Attributes of buffalofish habitat indicate that an extensive lake system, at least 12 feet deep, must have been present in the Closed Basin at the time of midden formation. Locations of 92 percent of the 137 known prehistoric sites in the refuge would be found on the shoreline of playa lakes if the water were hypothetically raised the 12 feet needed for buffalofish survival. This is one of the few reports in the context region to test questions of subsistence and settlement.

Kessler, R. E.
1995 *Re-Tracing the Old Spanish Trail-North Branch*. Adobe Village Press, Monte Vista, Colorado.

Kessler's useful book brings several historic journals together in one place and excerpts those portions dealing specifically with travel in the Rio Grande Basin, Colorado. Beginning with Anza in the late 1600s and continuing with government surveyors (such as Fremont and Gunnison), trappers, adventurers, and settlers in the 1800s, the reader is able to gain quick access to accounts that might be difficult to obtain. A biographical sketch of each journalist and the purpose of each trip are also included.

Klesert, A. L.
1982 A Predictive Model of Aboriginal Site Location within the Rio Grande National Forest. In: *Studies of the Prehistoric and Historic Cultural Resources of the Rio Grande National Forest, Colorado*. Centuries Research, Inc., Montrose, Colorado.

Using attributes from 220 recorded sites on the Rio Grande National Forest, Klesert formulated a statistical site predictive model. The results of the analysis suggest that a low degree of slope, vertical proximity to a permanent water source, and the local presence of clearings are the most diagnostic variables to predict prehistoric site locations in the Rio Grande National Forest.

Martorano, M. A.
1981 Scarred Ponderosa Pine Trees Reflecting Cultural Utilization of Bark. Unpublished Master's thesis, Department of Anthropology, Colorado State University, Fort Collins.

This thesis describes the peeled ponderosa pine trees found at the Great Sand Dunes National Monument. The thesis develops a cultural context for tree peeling and describes how the trees were peeled and how the bark was used. Most of the peeled trees are attributed to the Utes, but some of the tree-rings are more recent, suggesting other groups may have also peeled the trees.

Mauz, K.
1993 Snow Mesa Rocks: Lifeway Reconstruction Through Trace Element Analysis and Lithic Sourcing of Siliceous Artifacts, Snow Mesa, San Juan Mountains, Colorado. Senior Honor's thesis, Colorado College, Colorado Springs.

Kathy Mauz conducted a research-oriented inventory on Snow Mesa pertaining to trace element analysis and the sourcing of siliceous artifacts. Trace element analysis of chert, quartzite, and obsidian led to lithic procurement strategy assumptions including the use of native and foreign chert sources, the use of at least three quartzite sources, and the use of obsidian from at least four different areas, including one in the Jemez Mountains of New Mexico.

Nelson, C. E. and D. A. Breternitz
1970 The Denver Chapter Paleo-Point Project of 1969. *Southwestern Lore* 36:32-33.

Nelson and Breternitz report on Paleoindian points found in the San Luis Valley, as well as throughout Colorado, by private collectors. A relatively large number of points from Alamosa County were reported, indicating that the San Luis Valley was probably extensively used by Paleoindians.

Nickens, P. R.
1979 *Prehistoric Cultural Resources of the Rio Grande National Forest, South-Central Colorado.* Prepared for the USDA Forest Service under Contract No. 53-82-AK-8-01151 Centuries Research, Inc., Montrose, Colorado.

The purpose of this report was to compile and evaluate data on 133 archaeological sites recorded from 1975 to 1979 on the Rio Grande National Forest. Eight of the sites were shovel-tested, resulting in one instance of finding cultural material subsurface deposits. A limited obsidian hydration analysis was conducted on 10 flakes of obsidian and a typological analysis of 46 projectile points was completed by Alan Reed. The study indicates evidence of utilization of the Rio Grande National Forest from about 10,900 B.P. to 150 B.P. The majority of sites are attributed to the Archaic tradition with similarities to Archaic Picosa assemblages in northern New Mexico.

Pearsall, A.
1939 Evidences of Pueblo Culture in the San Luis Valley. *Southwestern Lore* 5(1):7-9.

Al Pearsall explored along the Rio Grande to the New Mexico border. He reported on evidence of Pueblo pottery in the San Luis Valley upon finding Bandelier Black-on-gray pottery near the Rio Grande south of Alamosa. Pearsall was an amateur who collected all over the San Luis Valley. Along with the work of Renaud, this is one of the earliest descriptions of San Luis Valley archaeology.

Reed, A. D.
1981 *Archaeological Investigations of Two Archaic Campsites Located Along the Continental Divide, Mineral County, Colorado.* Nickens and Associates, Montrose, Colorado. Report submitted to Colorado Department of Natural Resources, Division of Wildlife, Denver.

Alan Reed conducted test excavations at sites 5ML45 and 5ML46 in August of 1981. Research goals included establishing a chronology of occupation, discerning site function, and determining of cultural affiliations. The sites are located on Piedra Pass, in the San Juan Mountains, at an elevation of 3475 m (11,400 ft). These sites are just outside the context area on the western slope of the Continental Divide. A total of 36 randomly placed 1 x 1 m test units was excavated, revealing buried cultural strata. Radiocarbon dates indicate that 5ML46 is the most recently occupied site, dating to 3820 B.P., while 5ML45, Concentration A dates between 5720 B.P. and 5460 B.P. These test excavations were also reported in 1984 in *Southwestern Lore*, 50(2):1-34.

Renaud, E. B.
1946 *Archaeology of the Upper Rio Grande Basin in Southern Colorado and New Mexico.* Archaeological Series, Sixth Paper. Department of Anthropology, University of Denver.

Etienne Bernardeau Renaud, as DU's director of the Archaeological Survey of the High Plains from 1930 to 1947, performed archaeological inventory work in the Rio Grande drainage in Colorado and in northern New Mexico. Renaud defined the "Upper Rio Grande Culture" in 1944, as extending on both sides of the Rio Grande into New Mexico. Sites were classified by Renaud as campsites, lookouts, and crescent-shaped windbreaks, which sheltered identified work areas. Lithic materials associated with the Upper Rio Grande Culture were usually of black stone consisting of basalt and obsidian. Artifact types found include cores; unifacial side scrapers; ovate, discoidal, and blade shaped bifaces; bifacial choppers; drills; gravers; pounders;, and oval, roundish, or subrectangular manos. Projectile points are described as being relatively long, broad, and shouldered with ground lateral edges.

Rohn, A. H.
1982 Analysis of Pottery Recovered from Sites in the Rio Grande National Forest, Colorado. In *Studies of the Prehistoric and Historic Cultural Resources of the Rio Grande National Forest, Colorado.* Centuries Research, Inc., Montrose, Colorado.

Ceramic sherds were collected from four sites on the Rio Grande National Forest. Analysis of the sherds identified the following types: Taos Micaceous; Puebloan, similar to McElmo/Mesa Verde Black-on-white; and Ute wares.

Scott, L. J. and D. T. Seward
1981 Pollen and Macrofossil Analysis at 5ML45 in Mineral County, Colorado. In *Archaeological Investigations of Two Archaic Campsites Located Along the Continental Divide, Mineral County, Colorado*, by A. D. Reed, pp. 69-82. Nickens and Associates, Montrose, Colorado. Report submitted to Colorado Department of Natural Resources, Division of Wildlife, Denver.

A pollen and macrofossil analysis was conducted in association with the test excavations at site 5ML45 on Piedra Pass. The pollen record indicated the dominant plant taxa present at the high elevation mountain site included *Pinus*, Cheno-ams, *Artimesia*, low-spine Compositae, *Senecio*, Graminae, Rosaseae, *Cercocarpus*, *Saxifraga*, and Umbelliferae. Macrofossil analysis indicated that 13 subalpine type plants were present with most suited to cold, moist, subalpine environments. Burned seeds of seven plants known to have been used prehistorically were found.

Shafer, J. A.
1978 *An Archaeological Survey of Wolf Creek Pass East.* Highway Salvage Report No. 26, Colorado Department of Highways, Boulder.

An archaeological survey of Wolf Creek Pass East by Judy Ann Shafer identified sites along approximately 16 miles of the U.S. Highway 160 expansion corridor, in the drainage of the South Fork of the Rio Grande. The inventory resulted in the recording of 24 prehistoric sites and 27 isolated finds. Projectile point styles found included Eden, Duncan, Hanna, En Medio, Basketmaker III, and Woodland. Groundstone and dry-laid stone structures were also found.

Spero, V.

1982 *Test of Site 5SH903, Test Square 1.* Rio Grande National Forest. Manuscript on file, supervisor's office, Rio Grande National Forest, Monte Vista, Colorado.

Test excavations were conducted at site 5SH903, located in the Cochetopa Hills region of the Rio Grande National Forest. Cultural material found within 5SH903 Test Square-1 included six projectile point fragments, red ocher fragments, a quartz crystal, a perforator, a side/end scraper with spokeshave, a biface fragment, two scraper fragments, and numerous interior flakes. Animal bone, both burned and unburned, was found in relatively heavy concentration. Based upon projectile point typology the six projectile points found were identified as possibly being Ute in origin. Charcoal collected from the site has not been subject to ^{14}C analysis. Few potential Ute sites have been excavated in this area and the possibility of deeper cultural levels exists.

Spero, V.

1985 *Site 5RN330: Dog Mountain Shelter and Petroglyphs Test Square 1, Cultural Resource Inventory Report 1985.* Manuscript on file, Rio Grande National Forest, Monte Vista, Colorado.

This report documents the limited test excavation conducted at site 5RN330, the Dog Mountain petroglyphs and rock shelter. Upon initial recording, the site consisted of two petroglyph panels and associated surface scatter of chipped stone artifacts and ground stone. After site testing, it was determined that the site contains buried cultural levels containing artifacts, charcoal lenses, and floral and faunal remains. Charcoal collected from the test unit has not been subject to ^{14}C analysis. The main petroglyph figure is formed of pecked lines, pecked, spots, and scratched lines forming a bird figure 2.03 m x 0.45 m in size on the ceiling and the wall of the rock shelter. The rock art is comparable with the Archaic curvilinear style common to the Great Basin.

Webster, L. D.

1982 An Evaluation of Four Aboriginal Sites in the Rio Grande National Forest, Colorado. In *Studies of the Prehistoric and Historic Cultural Resources of the Rio Grande National Forest, Colorado.* Centuries Research, Inc., Montrose, Colorado.

An in-depth evaluation of four prehistoric sites, chosen as types that are representative of the Rio Grande National Forest, was conducted under contract to describe site function, available resources, site locational factors, tool function, raw material sources, chronological and cultural affiliation, and possible external relations. Site 5CN94 was determined to be a multiple-activity, short-term campsite based on a large number of flakes and tools, relatively high tool diversity, presence of ground stone, and a large surface area. Site 5CN158 represents a special activity chipping and game processing site that possibly is one location in a matrix of game procurement and processing sites. Adjacent sites indicate a Middle Archaic occupation. 5SH264 is a short-term campsite with a large number of flakes and a high tool diversity, suggesting emphasis on game processing. 5HN55 is a Folsom locale consisting of a Folsom preform base, a completed Folsom tip, a finely flaked scraper, and flakes that appear to be of the same material as the Folsom preform. This site has been subsequently tested and excavated.

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