Archaeological Sites Inventory of the High Priority Portions of Training Areas 1, 2, 3, 4, 5, 6, 11, 13, and H of the Pinon Canyon Maneuver Site, Las Animas County, Colorado

by

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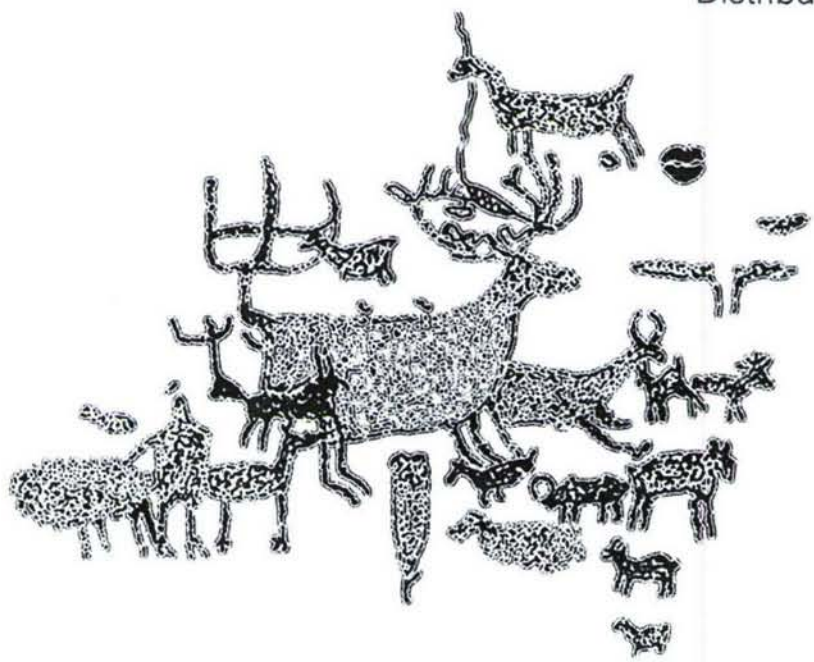

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14. ABSTRACT

During a 5,793 acre archaeological survey at the Pinon Canyon Maneuver Site, Las Animas County, Colorado, 112 sites and 77 isolated artifacts were identified. The Pinon Canyon Maneuver Site is a large military base used by the United States Army as a maneuver area for mechanized tracked and wheeled vehicles. Live-fire training occurs within two large ranges on a periodic basis. Most sites are cultural material scatters or places where fragments of chipped-stone flaking debris, chipped-stone tools, or ground-stone tools are exposed on the modern ground surface. Nearly a quarter of the project sites, however, contain the remnants of stone houses such as tipi rings or Apishapa phase architectural units. Most of the projects sites were found along canyon edges where access to food and non-food resources was good. The types of artifacts identified by archaeologists at these locations indicate canyon areas were utilized from the Paleoindian stage to the historic period.

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prehistory, archaeology, Pinon Canyon, Paleoindian, Archaic, Late Prehistoric, lithics, Las Animas County, Colorado, rock art, ceramics

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FOREWORD

The archeological investigations reported in this manuscript are an important part of the Fort Carson Cultural Resources Management Program whose goal is to maintain the largest possible area for military training while protecting significant cultural and environmental resources. The current study of Training Areas 1, 2, 3, 4, 5, 6, 11, 13, and H is part of an integrated plan that takes a long-term systematic approach to meeting identification, evaluation, and resource protection requirements mandated by the National Historic Preservation Act. While meeting legislated requirements, this project also provides a valuable contribution to our knowledge of the prehistory and resources of Las Animas County, Colorado. Through an Interagency Service Agreement, the National Park Service, Midwest Archeological Center (MWAC), assists Fort Carson in accomplishing its cultural resources goals and meeting its legal obligations. New Mexico State University completed the reported project under a cooperative agreement with the MWAC.

Fort Carson began cultural resource studies on the Pinon Canyon Maneuver Site in 1983, immediately following the purchase of these lands. The Cultural Resource Program takes a multidisciplinary approach, combining archeological theory and historical methods with geological, geomorphological, botanical, and statistical techniques and procedures in order to focus its efforts to locate, evaluate, and protect significant cultural resources. Professional studies and consultations with Native American tribes have resulted in the identification of National Register of Historic Places eligible sites and districts. The cultural resources of Fort Carson and the Pinon Canyon Maneuver Site represent all major prehistoric and historic cultural periods recognized in the Great Plains and Rocky Mountains. Sites of the Paleoindian, Archaic, and Ceramic stages are present as are sites from the Fur Trade era, 19th century Hispanic and Euroamerican settlements, early 20th century homesteading and ranching, and World War II and Cold War era military sites. The project reported here completes the first phase of the archeological inventory program – identification and documentation of archeological sites to determine their National Register of Historic Places (NRHP) eligibility.

The Cultural Resources Management Program is in the Directorate of Environmental Compliance and Management (DECAM). The directorate is tasked with maintaining Fort Carson's compliance with federal, state, and local environmental laws and mandates. The DECAM holistic management philosophy holds that all resources are interrelated. Decisions affecting one resource will impact other resources. The decisions we make today will affect the condition of Department of Army lands and resources for future training, research, and recreation. Mission requirements, training resources, wildlife, range, soil, hydrology, air, and recreation influence cultural resources management decisions. Integrating compliance and resource protection concerns into a comprehensive planning process reduces the time and effort expended on the compliance

process, minimizes conflicts between resource protection and use, allows flexibility in project design, minimizes costs, and maximizes resource protection.

Federal laws protect the resources on the Pinon Canyon Maneuver Site and Fort Carson. Theft and vandalism are federal crimes. Protective measures ensure that Army activity does not inadvertently impact significant cultural and paleontological sites. Fort Carson does not give out site location information nor are sites developed for public visitation. Similar resources are located in the Picketwire Canyonlands where public visits can be arranged through the U.S. Forest Service, Comanche National Grasslands in La Junta, Colorado.

Fort Carson endeavors to make results of the resource investigations available to the public and scientific communities. Technical reports on cultural resources are on file at the Fort Carson Curation Facility (Building 2420) and the Colorado State Historic Preservation Office. They are also available through the National Technical Information Service, Springfield VA. Selected reports have been distributed to public libraries in Colorado. Three video programs produced by Fort Carson are periodically shown on Public Broadcasting Stations. Non-technical reports on the prehistory, history, and rock art of southeastern Colorado have been distributed to schools and libraries within the state. Fort Carson continues to demonstrate that military training and resource protection are mutually compatible goals.

Thomas L. Warren
Director
Directorate of Environmental Compliance and Management
Fort Carson, Colorado
February 2007

Popular Abstract

During a 5,793 acre archaeological survey at the Pinon Canyon Maneuver Site, Las Animas County, Colorado, 112 sites and 77 isolated artifacts were identified. The Pinon Canyon Maneuver Site is a large military base used by the United States Army as a maneuver area for mechanized tracked and wheeled vehicles. Live-fire training occurs within two large ranges on a periodic basis. Most sites are cultural material scatters or places where fragments of chipped-stone flaking debris, chipped-stone tools, or ground-stone tools are exposed on the modern ground surface. Nearly a quarter of the project sites, however, contain the remnants of stone houses such as tipi rings or Apishapa phase architectural units. Most of the projects sites were found along canyon edges where access to food and non-food resources was good. The types of artifacts identified by archaeologists at these locations indicate canyon areas were utilized from the Paleoindian stage to the historic period.

Professional Abstract

Archaeologists from New Mexico State University surveyed approximately 5,793 acres of the Pinon Canyon Maneuver Site in the summer of 2002. A total of 112 archaeological sites and 77 isolated finds were identified. Site types included lithic scatters, prehistoric cultural material scatters with architectural or habitation features, lithic quarry locations, historic sites, and rock art locales. Of these, 20 are eligible for inclusion in the NRHP and six require eligibility testing.

Acknowledgments

We are grateful to the many individuals and organizations that have contributed to the overall success of this project; several deserve special mention. The support of the Directorate of Environmental Compliance and Management, United States Army, Fort Carson, is greatly appreciated. Specifically, we appreciate Pamela Cowen, Randy Korgel, Tom Warren, and Kelly (Dean) Wright for providing support, in a great variety of ways, throughout the project. Steven DeVore coordinated efforts for the National Park Service, Midwest Archaeological Center. Other Park Service personnel deserving thanks include Missy Baier, Mike Chidley, Jason Jurgena, and Megan Young. All are thanked for their professionalism and hard work.

The dedication and expertise of the New Mexico State University field personnel who worked long hours, often in harsh weather or while being devoured by gnats, made this project a success. Their dedication, commitment, and high standards are gratefully acknowledged. Kelli Barnes and Roche Lindsey served as crew chiefs and the field crew included Ben Foerstner, Gary Jessop, Emily Pope, Steve Snyder, and Amanda Wintcher. Special thanks to volunteers Calalee Maechtle and Pam Rasfeld for their assistance.

In addition, we appreciate Office Administrator, Renee Beltran, and Laboratory Director Bonnie Newman. They provided much needed support during the project and diligently dealt with problems, budgets, changes, and other shortcomings that had to be addressed. We are indebted to Elaine Nimmo who photographed the project lithic artifacts.

Specialized analysis and consultations also contributed to overall project success. Richard E. Hughes, the director of Geochemical Research Laboratory, identified obsidian material specimens and Erica Hill of Northern Technical Resources identified select faunal remains from project site 5LA10000. Specialists from Geochron Laboratories provided a radiocarbon age determination for a carbon sample from 5LA1000 as well.

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1.0 Introduction

This report describes the results of archaeological investigations conducted within Training Areas 1, 2, 3, 4, 5, 6, 11, 13, G, and H on the Pinon Canyon Maneuver Site (PCMS), Las Animas County, Colorado. This research was accomplished during six sessions in the 2002 summer field season; beginning late May and ending early in August (Table 1.1). New Mexico State University (NMSU) accomplished the undertaking by means of cooperative agreement (No. 1443-CA-6000-98-016) with the National Park Service (NPS), Midwest Archeological Center, who administered and supported the fieldwork with personnel and high quality equipment. The Directorate of Environmental Compliance and Management (DECAM), Fort Carson, Colorado funded the project and assisted our efforts by providing state-of-the-art electronic tools such as computers and global positioning system (GPS) units.

All sites described and interpreted in this report were encountered within Priority 1 survey areas (Appendix II), as defined by Kvamme (1990:IV 6-83), in several of the smaller military Training Areas (TAs) of the base (Figure 2.2). TAs 1 and 2 were situated at the northwest edge of the PCMS, and primarily along the north and west edge of the Big Arroyo Hills. When combined, they were over 3,800 ac in size. Their Priority 1 survey area totals (from a derived 27 individually designated survey areas) were 706.36 and 854.19 ac, respectively. TAs 3 through 6 were found at the southwest corner of the PCMS, and between the installation boundary fence and Hogback landform. TA 3, approximately 2,066 ac in size, was found west of the Hogback and has been bisected by upper Van Bremer Arroyo. Seven survey areas were examined for a total of 51.75 ac. From west to east, the remaining TAs in this area were 4 (2,631.47 total ac, with 506 ac of high priority acreage in 12 survey areas), 5 (1,142 TA ac, five survey areas with 667 ac of Priority 1), and 6 (2,924 training ac and 704 high priority ac in 16 survey areas). The remaining portion of our survey work occurred in Stage Canyon (TA H), Upper Welsh Canyon (TA G), and the breaks between Bent Canyon Arroyo and the Black Hills (TAs 11 and 13). A total of 2,302 ac were surveyed in these areas independent of Kvamme's high priority model.

The objectives for our survey investigations were four-fold. The first was to identify cultural resources (paleontological, prehistoric, or historic archaeological sites) located within the project area. The second objective involved determining National Register of Historic Places (NRHP) eligibility for the sites. Objective three was to provide recommendations for the protection of sites potentially impacted by mechanized military maneuvers. The forth objective was to recommend additional survey or excavation work, including data recovery, if needed. This project, and data recovered from it, will ultimately enable the Department of the Army to comply with the requirements of Sections 106 and 110 of the National Historic Preservation Act of 1966, to assess potential effects on cultural properties as part of the Archeological Resources Protection Act of 1979, and to fulfill the mitigation measures outlined in the Integrated Cultural Resources Management Plan for Fort Carson and the PCMS and the 1985 Memoranda of Agreement between Fort Carson, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

Table 1.1: Survey Data for the 2002 Survey Season at the PCMS.

Survey Data	Survey Session						
	First	Second	Third	Fourth	Fifth	Sixth	Total
Number of Sites	16	25	35	20	13	3	112
Study Areas Surveyed	17	41	-	-	-	1	-
Acreage for Session	1601	2226	470	701	785	10	5793
Non-Eligible Sites	12	16	28	17	11	2	86
Needs Data	0	5	1	0	0	0	6
Eligible sites	4	4	6	3	2	1	20
Isolated Finds	15	27	13	5	13	4	77
Start Date	5/28	6/12	6/26	7/10	7/24	8/7	-
End Date	6/6	6/20	7/4	7/18	8/1	8/11	-

Cultural resources, in the form of historic properties in most cases, must undergo a significance determination process (King 1998:224). The National Register Criteria (36 CFR 60.4), as well as details regarding their application, appear in *National Register Bulletin 15* (National Register 1991). If a property fulfills the criteria, has integrity, and does not fall under one of the criteria considerations (i.e., cemeteries, birthplaces, graves, reconstructed properties) it is eligible for the NRHP and impacts on it must be considered under Section 106. Integrity is in the eye of the beholder. For sites on the PCMS this usually means that archaeologists believe that a property is intact enough to be further studied. Traditional Cultural Properties are also considered to have integrity. The *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (National Register Bulletin 38, 1990) states, "[T]he integrity of a traditional cultural property must be considered with reference to the views of traditional practitioners; if its integrity has not been lost in their eyes, it probably has sufficient integrity to justify further evaluation."

The guidelines set forth in the National Register Criteria define five categories of historic properties including buildings, structures, objects, sites, and districts. In the current project, as is the case for all PCMS projects, the majority of the cultural remains encountered during survey were classified as sites. In *National Register Bulletin 15* a site is defined as "the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value regardless of the value of any existing structure."

Sites were determined significant or not based on any or all of the four NRHP criteria. For the most part, the eligible sites recorded in this project were deemed eligible under Criteria D ("...have yielded, or may be likely to yield, information important in prehistory or history"). Sites with distinct styles of rock art or early and relatively unknown types of projectile points were determined eligible under Criteria C ("...embody the distinctive characteristics of a type, period, or method of construction...")

In previous PCMS research projects, Andrefsky's (1990) four "research domains" have been used to aid in the evaluation of prehistoric sites. These include chronology, paleoenvironments, settlement-subsistence systems, and exchange and mobility. If data related to these research domains can be recovered, the site should be evaluated as significant for the NRHP. The research themes, chronology, population dynamics, technology, settlement and subsistence strategies (i.e., site type and locational variability, economy, and architecture), rock art, and geomorphology and Paleoclimate descriptions in Zier and Kalasz (1999:43) were also consulted to aid project personnel in making site eligibility and significance determinations. These guide NMSU's overall effort at the PCMS and produce, in the end, more scholarly research.

One hundred and twelve sites and 77 isolated finds are discussed in this report. Results from the fieldwork indicate that 20 sites should be nominated to the NRHP, while a total of 81 sites are not significant and require no further work. Six sites exhibit cultural and natural evidence suggesting that buried cultural materials may be below the modern ground surface. In these cases, Phase II testing will be necessary to determine the significance and integrity of these sites. Justifications for eligibility determinations are given in the section pertaining to the eligibility recommendation for each of the sites investigated, and in Appendix I. Site descriptions for the eligible and "needs data" sites are presented in Chapter IV and non-eligible sites are described in lesser detail in Chapter V. All materials derived from the 2002 survey project including notes, forms, photographic prints and negatives, scaled drawings, and artifacts are currently curated DECAM Curation Facility (Building 2420), Fort Carson, Colorado.

2.0 PHYSICAL AND CULTURAL BACKGROUND

2.1 Physical Background of the PCMS

The PCMS is located in southeastern Colorado, approximately 35 mi north of New Mexico and 100 mi west of Kansas. Regionally, the PCMS is located along the western edge of the Central Great Plains physiographic province and on a smaller scale, it is in the northern portion of Las Animas County in southeastern Colorado. Approximately 235,604 ac in size, the PCMS exhibits much landform variation. It is bordered on the north side by the Big Arroyo and Bear Springs Hills; on the west by Colorado State Highway 350; and on the south and east by the Purgatoire River. Major drainages in the area include, from south to north, Van Bremer Arroyo, Taylor Arroyo, Lockwood Canyon, Red Rock Canyon, Welsh Canyon, Bent Canyon, Iron Canyon, and Minnie Canyon (Figure 2.1). Tributaries of these drainages, generally flowing towards the south and east, bisect the grassy steppes and the broad alluvial fans formed at the bases of the hill landforms.

The plains, low hills, and canyons of the PCMS range in elevation from 1341 to 1768 m (4400 to 5800 ft) above sea level (asl), and with in them, four topographic units (i.e., landscape settings), have been designated as units of analysis for geomorphological and geoarcheological investigations (Schuldenrein et al. 1985:25). These fixed units are the Steppes, Hogback, Arroyo/Canyons, and the Hills. Within our 2001 survey areas, primarily the Hills and Hogback landforms are present, though a few units are to be found in Steppe settings.

2.2 Geology and Hydrology

Sedimentary rocks dominate PCMS exposures, ranging in age from Triassic through Quaternary (Evanoff 1998). The oldest surfaces are those of Dockum Group red sandstone, a series of fine-grained and horizontally bedded fluvial, lacusterine, and paleosol deposits. Horizontally situated above Dockum outcrops are the Entrada Sandstone, Bell Ranch Formation, and the Morrison Formation rocks of the Jurassic period. Three Morrison units or members are recognized for the area—a gypsum sequence at the base, limestone in the middle, and a sequence of interfingering mudstone and sandstones on top. Next, in ascending order, are rocks of the Cretaceous period; strata from the Dakota Group were deposited first and are comprised of the Lytle Formation, Glencairn Formation, Mesa Rica Sandstone, Pajarito Sandstone, and a sequence of unnamed transitional units. These are the resistant and massive beds that form the canyon edges throughout the installation. Upper Cretaceous deposits include the Graneros Shale, Greenhorn Formation, Carlile Shale, and the Niobrara Formation, and these dominate the erosional surfaces at the western edge of the base.

Rising along the southwest edge of the PCMS is the Tertiary age landform referred to locally as the Hogback. This upright oriented basalt intrusion was injected into the Cretaceous strata, then as the area was subjected to subsequent erosional processes, the upper edge of the dike was exposed at the surface. Sedimentary rocks showing evidence for contact metamorphism border the dike. It is here, that shales have been converted into argillite; a lithic raw material sought after by the prehistoric inhabitants of the PCMS since Paleoindian times. Some of the more recent soil deposits on the military installation are alluvial, pediment sediment,

and colluvial deposits of Holocene age. These are visible on the modern ground surface as surficial clayey silt, earthflow deposits, or terrace gravels.

Permanently available water, in the form of surface water sources, is abundant over the PCMS, but within our 2001 project area locations, only intermittent arroyos and seasonal springs in the Timpas, Luning, Van Bremer, Stage, and Bent drainages would have contained water.

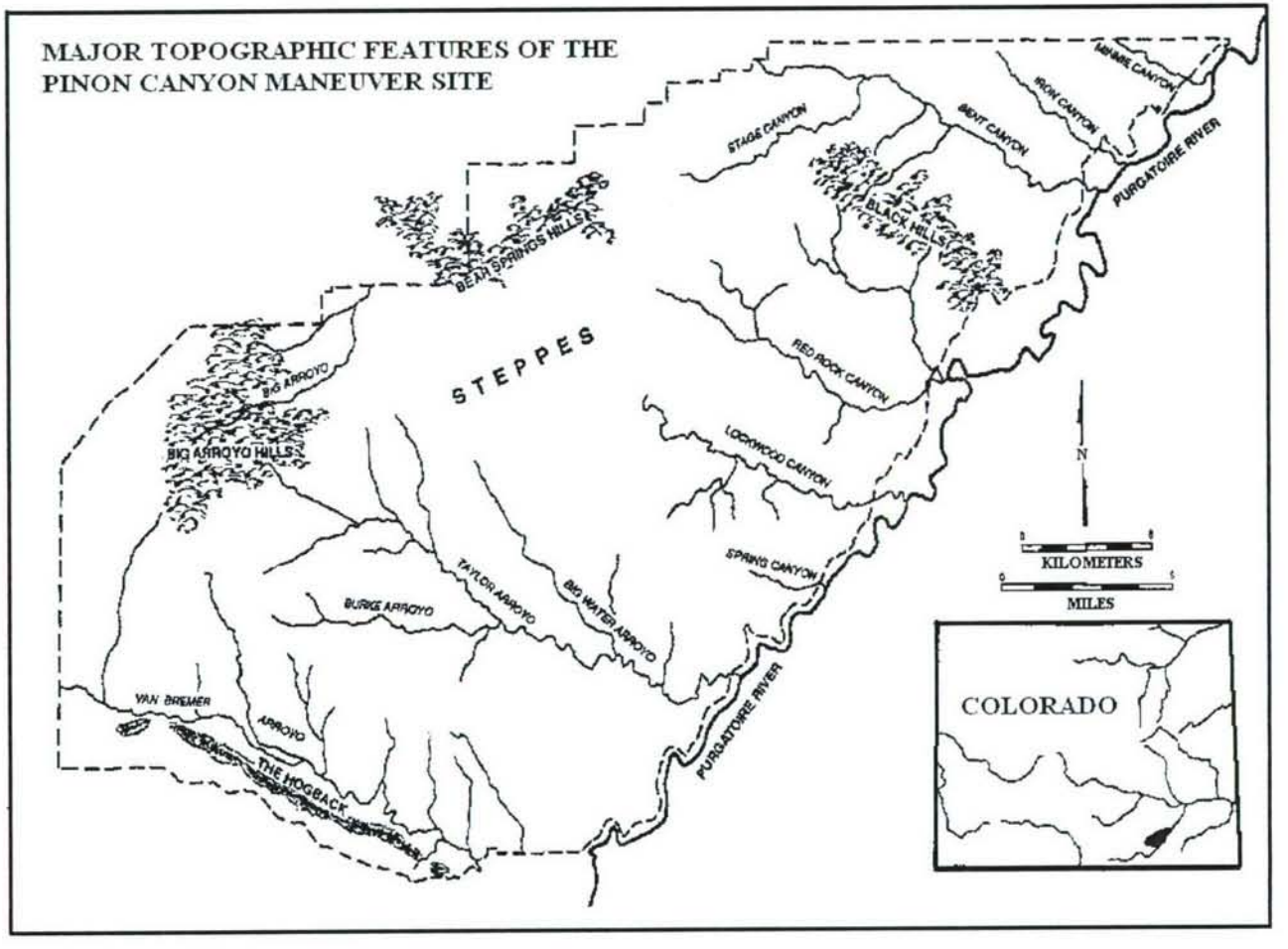
2.3 Modern Climate

Weather records from two nearby stations, Trinidad Airport Weather Station (1948-1996) and Timpas 13SW, provide our climate data. The Trinidad station reveals that Las Animas County experiences its greatest moisture between May and August. The time between November and February is usually the driest. Annual precipitation for Las Animas County is about 12.9 inches, with yearly snowfall totals averaging 40.2 inches; most snow usually occurs in March (7.1 inches), November (6.3 inches), and December (6.4 inches). The average yearly temperature in Las Animas County is 51.7 F. This ranges from a yearly low of 31.4° F in January to a high of 73.5° F in July.

Timpas 13SW weather station furnishes climatic data from a location closer to the PCMS, but unfortunately it was only in use between 1978 and 1993. Data recovered from this station indicates that the average yearly precipitation was 14.9 inches. Wettest months are those between May (2.09 inches) and August (2.06 inches), and the driest ones are December (.60 inches) and January (.57 inches). Total yearly snowfall averages 33 inches with the most accumulating in the month of March (11.6 inches). The average yearly temperature in Timpas is 52.7°, with a low of 29.5° in December and a high of 74.3° in August. The mean maximum temperature ranges from 92.1° F in July to 42.3° F in December, and the average number of days with temperatures below 0 degrees F is eight and the number of days with a minimum temperature of less than 32 degrees F is 152. Temperatures exceed 90 degrees F 60 days of the year, and an average annual growing season (142 days) begins in mid-May and ends in early October.

2.4 Paleoclimate and Paleoenvironment

A basic outline for regional climate change can be found in Zier and Kalasz (1999) and Antevs' (1955) general model for Holocene climatic changes. Antevs' (1955) refers to a series of warming and cooling events which began roughly 13,000 years before present and ended with the "Little Ice Age" (AD 1550-1700). Brunswig (1992) presents an excellent synthesis of local Paleoindian paleoclimates and environments, and how they changed through time.


MAJOR TOPOGRAPHIC FEATURES OF THE
PINON CANYON MANEUVER SITE
STAGE CANYON
MINT CANYON
IRON CANYON
MEURE CANYON
PURGATOIRE RIVER
BLACK HILLS
BEAR SPRINGS HILLS
STEPPES
BIG ARROYO
BIG ARROYO HILLS
RED ROCK CANYON
LOCKWOOD CANYON
SPRING CANYON
TAYLOR ARROYO
BIG WATER ARROYO
BURKE ARROYO
VAN BREMER
ARROYO
THE HOGBACK
PURGATOIRE RIVER
N
KILOMETERS
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COLORADO

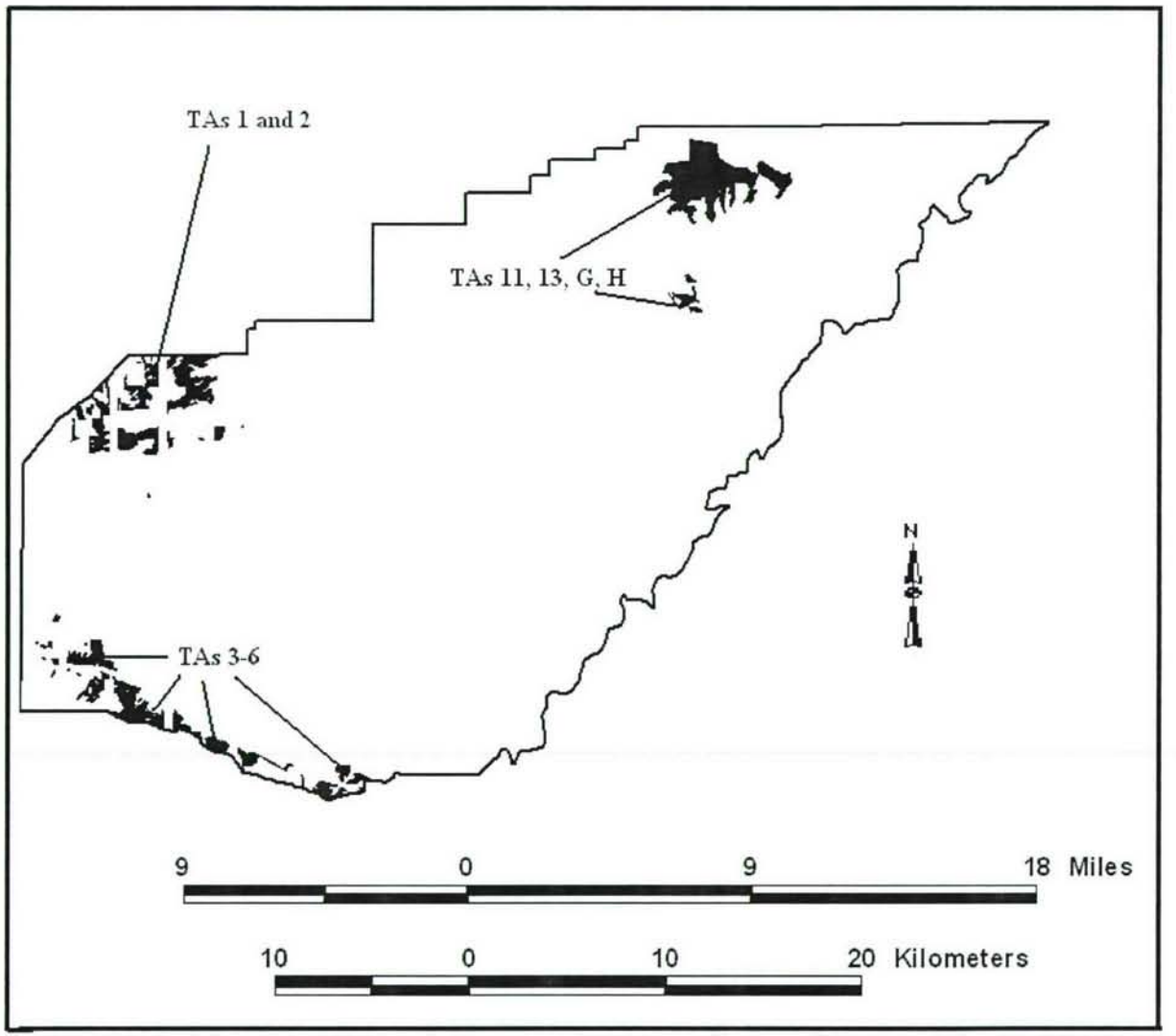


Figure 2.2: TA locations on the PCMS designated for survey in 2002.

At the end of the Pleistocene – Brunswig's (1992:6) Early Pre-Clovis subperiod (21,000 to 14,500 BP) – the climate in Colorado was cold and dry. Grasslands dominated the environment, though spruce-pine forests and areas of alpine tundra have been identified.

During the Late Pre-Clovis period (14,000 to around 11,500 BP) warmer and more mesic conditions prevailed. On a large scale, and outside of Colorado, the global temperature was about 6° C cooler during periods of maximum glacial advance, as cooling was more pronounced at the poles than at the equator (Barry and Chorley 1987; Crowley and North 1991).

Temperatures continued to warm during the Clovis period (11,500 to 10,950 BP). Southeastern Colorado exhibited a tall-grass prairie environment, and mixed spruce-pine forests expanded their range. Through the Folsom period (10,950 to 10,250 BP) and into the Plano period (10,250 to 7800 BP) climatic conditions stabilized into approximately those we experience today. In Folsom period landscapes (Brunswig 1992:12-14), PCMS vegetation is both tall- and short-grass prairie with scattered pine and spruce forests. Deciduous woodlands are present around the major watercourses.

Approximately 8000 yrs ago conditions began to warm and dry on the Plains and in western North America. Benedict (1979) interprets two droughts, both during the Early Archaic period (7000 to 6500 BP and 6000 to 5500 BP). Johnson and Holliday (1986) also suggest that two droughts occurred, one during the Early Archaic period (6400 to 5500 BP), and one in the Middle Archaic period (5000 to 4500 BP). In southeastern Colorado the vegetation changed to desert plants (Zier and Kalasz 1999:23), and in the PCMS Schuldenrien et al. (1985) postulate widespread arroyo cutting events, little pedogenic soil development, and the formation of localized dune fields. Information from Trench 1C on the Barnes site (5LA9187) supports Altithermal aridity between 7600 and 5500 BP (Kuehn 2002:57-59).

In the Middle Archaic period (5000 to 3000 BP) cooler and moister conditions led to the expansion of grasslands and riparian forests on a large scale (McDonald 1992). In West Carrizo Canyon, and on a local level, Feiler (1994:42) notes much drier conditions at this time.

Locally, Late Archaic period (3000-1850 BP) climatic data is conflicting. Scott-Cummings and Moutoux (2001:262), based on PCMS pollen information, identify primarily warmer and wetter conditions with distinct periods of aridity after 2470 BP. Loendorf et al. (1996:279-280) also note a wetter climatic trend between 2500 and 1000 BP. These data are not in agreement with Feiler (1994:42) or Schuldenrien et al. (1985), who note drier conditions during the Late Archaic.

Generally, paleoenvironmental conditions of the Late Prehistoric stage are marked by a return to overall mesic conditions, with several noteworthy fluctuations. Based on Schuldenrein et al. (1985) and McDonald's (1992) data, the Developmental period conditions in southeast Colorado were characterized by aridity. Scott-Cummings and Moutoux' (2001:262) pollen study indicates a period of decreased moisture near the end of the period.

At the end of the Diversification period, a drought has been suggested sometime around AD 1200 (Baerris and Bryson 1965:216; Bryson et al. 1970; Schiavitti et al. 2001:237; Wendorf

1960:62). Schuldenrien et al. (1985) and Scott-Cummings and Moutoux (2001:262) provide supporting evidence for xeric conditions on the PCMS. Dry and warm conditions continued until the Little Ice Age when the climate became moister and colder. At the Crow's Roost site north of the PCMS, McDonald (1992) recovered supporting evidence in his Component A sediments. Feiler (1994:44) identifies cooler temperatures around 430 BP. Conditions after the Little Ice Age are essentially those of the modern era.

2.5 Flora and Fauna

The vegetation within the project area, and southeastern Colorado in general, is strongly affected by soils, climate, aspect, grazing (prior to 1983), and military use. Twenty-six plant communities are found in the PCMS and these are further described and listed in Shaw et al. (1989). The uplands or hill portions support such species as pinon and ponderosa pine, juniper, mountain mahogany, skunkbrush, and scrub oak. Indian ricegrass, black and hairy grama, threeawn grasses, and alkali sacaton are common in the understory. The floodplains along the river and canyon edges support stands of aspen, greasewood, saltbush, cottonwood, currant, sedges, rushes, American plum, rabbitbrush, American elder, hackberry, gooseberry, willow, and wildrye. The steppes or grasslands in the central portions of the military facility support galleta, pale wolfberry, onions, needlegrass, prickly pear, ground cherries, chokecherries, sand dropseed, sunflowers, sagebrush, tumblegrass, squirreltail, coneflower, goldenrod, globemallow, eriogonum, snakeweed, little bluestem, cholla, muhly, soapweed, yucca, wheatgrass, winterfat, and the grama grasses.

Numerous species of migratory and native fauna inhabited the project vicinity prior to and during its early settlement and were available for exploitation by both prehistoric and historic populations. Commonly observed animals present in the area today include pronghorn, elk, mule deer, bighorn sheep, coyote, red-tailed hawk, cottontail and jack rabbit, prairie dog, bobcat, badger, and porcupine. Small mammals and nongame mammals found in the area are snowshoe hare, squirrel, muskrat, weasel, ringtail, shrew, mole, chipmunk, woodrat, mouse, bat, vole, ground squirrel, pocket gopher, skunk, and fox (swift and red). Both mountain lion and black bear have been seen in the area, bears likely through seasonal migration. Reptiles constitute a major portion of the grassland environment with species such as the western bullsnake, prairie rattlesnake, racers, garter snakes, western hognose snake, corn snake, short-horned lizard, and painted turtle. Birds present include bald and golden eagles, turkeys, owls, sparrows, western meadowlark, jays, woodpeckers, quail, and a number of others. A more extensive discussion regarding fauna can be found in Fitzgerald et al. (1994). Several prehistorically significant species, such as bison, grizzly bear, and gray wolf were removed from the area in historic times. The Purgatoire River and many of the larger pools of standing water in the larger canyons would have provided a variety of fish (Bramblett 1989) and other freshwater animal resources.

2.6 Cultural Overview of the PCMS

This section provides a brief overview of the prehistory in southeastern Colorado. This information is derived from contributions by Zier and Kalasz (1999), Gunnerson (1987), Lintz and Anderson (1989), Carrillo (1990), Hanson and Chirinos (1989), Butler (1988), and others, who provide us with a fairly complete picture of the prehistoric and historic sequence for

southeastern Colorado. The proposed cultural taxonomy for the Arkansas River Basin (Zier and Kalasz 1999) will be the framework used in this report. In general, the prehistory of the Arkansas River Basin is divided into three stages, ten periods, and two phases (Table 2.1).

The Paleoindian Stage is the earliest occupation in eastern Colorado that is accepted by most North American archaeologists. One of the most interesting debates in American archaeology deals with whether human occupation of the New World predates ca. 11,500 BP. Putative occupations predating 11,500 BP are referred to as pre-Clovis occupations. To date there are few accepted sites in the Americas that predate 11,500 BP, though the Cactus Hill (Adovasio and Page 2002) site in southeastern Virginia, the Topper site in South Carolina (Goodyear 2002), and the Meadowcroft (Adovasio and Carlisle 1988) rockshelter site in Pennsylvania have apparent pre-Clovis age artifacts. The most noteworthy and generally widely accepted pre-Clovis site is Monte Verde (Dillehay 1989; Meltzer et al. 1997) in southern Chile. No apparent pre-Clovis remains have been encountered in southeastern Colorado or the PCMS, but the triangular projectile points encountered at Meadowcroft and Cactus Hill may eventually key very early occupations.

Paleoindians were nomadic hunters and gatherers who arrived in the New World approximately 11,500 BP. Most archaeologists believe that they descended from the human populations who entered North America from eastern Asia by walking across a land bridge connecting modern day Siberia with Alaska that was temporarily exposed by the lowering of the sea level at the end of the Wisconsin glaciation. Members of these first groups were thought to be composed of small, highly mobile populations who rapidly increased in number as they spread throughout the Americas through the ice-free corridors that opened up as the glaciers retreated. In North America, Paleoindians have left behind stone, bone, and ivory tools, but because perishable items are seldom found on sites, little is known regarding many of their ways of life.

Zier and Kalasz (1999) recognize four periods of the Paleoindian Stage in southern Colorado: Pre-Clovis (>11,500 BP), Clovis (11,500-10,950 BP), Folsom (10,950-10,250 BP), and Plano (10,250-7800 BP). Though archaeologists have recorded Paleoindian sites from Alaska to South America, Paleoindian artifacts are rare in the PCMS and are found as isolated tool fragments in mixed occupational surface assemblages. As of this report, archaeologists at the PCMS have recovered approximately 15 Paleoindian projectile points. In field seasons since the TA 10 and 12 field work, another ten have been identified. There are several known Paleoindian sites found in areas outside of the PCMS in nearby southeastern Colorado and northeastern New Mexico, including Olsen-Chubbuck, Hahn, and the type site for the Folsom period, located approximately 49 km directly south in New Mexico. Folsom points recovered as isolates have been found at Red Top Ranch, the Fort Carson Military Reservation, the Flank Field Storage Area, the Mid-Huerfano Project Area, and the Cyprus Mines Hanson Project Area (Zier and Kalasz 1999:74). Jack Hofman has identified a Folsom camp site near the town of Calhan, Colorado 172 km to the northwest.

In general, Paleoindian remains are often associated with Pleistocene megafauna such as mammoth and an extinct ancestor of the bison. This association led many archaeologists to suggest that Paleoindian subsistence was almost exclusively based on big game animals.

However, recent studies have shown that Paleoindian people were hunters and gatherers and exploited a variety of small animals such as rodents, turtles, alligators, fish, birds, prairie dogs, cotton and jackrabbits, and marmots (Dixon 1999) with the occasional large mammoth (Judge in Adovasio and Page 2002:128), bison, or horse. During the Plano period the occurrence of ground-stone tools indicates an increase in vegetal food processing and suggests that Paleoindians had a broader subsistence base than was once recognized.

Table 2.1: Classificatory Scheme for the Arkansas River Basin (from Zier and Kalasz 1999).

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

Paleoindian occupations in Colorado are recognized by the appearance of the diagnostic lanceolate, fluted Clovis points, fluted Folsom points, Midland points, and projectiles from the later Plainview, Milnesand, Agate Basin, Hall Gap, Cody, and Allen/Fredrick complexes. Associated artifacts include burins, bifaces, cutting tools, scraping tools, gravers, cores, and debitage. Clovis sites are also known to have prismatic blades, blade cores, and blade tools in their assemblages (Collins 1999:45-71). Sites of the Folsom age contain ultrathin bifaces and radial fracture tools. At the PCMS, we primarily deal with surface artifact remains so, without proper contextual information, it is unknown whether other items from the Paleoindian tool kit have been encountered. Hofman (personal communications, 2001) indicates that a blade tool from a personal collection found near the PCMS could be of Paleoindian age.

Archaeological sites in southeastern Colorado from the Archaic stage are more abundant. During this stage the hunting and gathering strategy employed by the Paleoindians appears to have continued, though much more diversified food sources were sought. This change in food sources is thought to have been due, in part, to the retreat of the glaciers at the end of the ice age,

however the disappearance of the larger mammals may have had as much to do it. The Archaic stage is subdivided into three periods: Early (7,800-5,000 BP), Middle (5,000-3,000 BP), and Late (3,000-1850 BP). The oldest rock art encountered thus far in the PCMS is found at Archaic sites. These are usually composed of abstract designs, but animal forms are also known (Loendorf 1989:354).

Archaic sites yield grinding stones, large stemmed and notched projectile points, other bifacially and unifacially made chipped-stone tools, flake tools, and worked bone and shell. Unnotched and unstemmed projectile points also occur. Archaic site types include open campsites, rockshelters, subterranean structures, lithic and ground-stone scatters, and quarry sites (Zier and Kalasz 1999:100-137). There are known special function sites, such as game drive sites or stone ring sites, but these have been found outside of the PCMS. Features associated with Archaic sites include hearths and hearth remnants (piles of heat altered stone), rock art panels, pit features, and burned rock middens.

The transition from the Archaic to the Late Prehistoric Stage is characterized by the appearance of fired clay pottery and the emergence of agriculture. There is evidence to suggest that the bow-and-arrow were adopted at this time. Most of the sites discussed in this report date to the Late Prehistoric Stage, which is divided into three periods: Developmental (1850 to 900 BP), Diversification (AD 1050-1450), and Protohistoric (AD 1450-1725). Other terms, such as Apishapa Phase and Sopris Phase, are employed to divide the Diversification Period (Campbell 1969; Gunnerson 1987; Zier and Kalasz 1999).

Mobility decreased and sedentism increased from the Developmental Period (AD 100-1050) to the Diversification Period (AD 1050-1450) as attested to by the presence of stone slab structures. In the PCMS, these structures tend to be small (approximately 2-3 m in diameter), circular structures with upright slabs. More architectural units and elements, such as enclosing or dividing walls also appear in rockshelters at this time.

Environmental information regarding the Late Prehistoric Stage has been developed through excavations at sites in Welsh Canyon. Schiavitti et al. (2001:2) concludes, based on pollen evidence, that Welsh Canyon experienced wet and dry cycles during the Ceramic Stage (Diversification Stage). Even though these climatic conditions were not severe, some were associated with what appears to be a population increase throughout Welsh Canyon. Adaptive response to these changes seems to have taken the form of diversification of subsistence practices, and an increase in trade and exchange with groups or individuals outside of southeastern Colorado.

The arrival of non-Native Americans and the introduction of the horse at around 300 BP characterize the Protohistoric Period. Horses with riders are depicted on numerous rock art panels throughout the region during this time. In the early 1700's the Jicarilla Apache lived south of Raton Pass. The Carlana Apache lived north of the Purgatoire River and the Penxaye Apache frequented the area east of the Purgatoire (Schroeder 1965:57). There was active trade between the Plains Apache and the Pueblo Indians of this period. Carrillo (1990:7) indicates that Pueblo traders exchanged corn, pottery, and blankets for Apache deerskins, buffalo hides meat, and tallow. In the early 18th century the Utes and Comanche moved onto the plains, driving the

Apache southward. The *Comanchero* period (1786 to 1860) brought Spaniards, New Mexicans, and the Comanche together for trading on the southern plains (Kenner 1969:78-97), and at the same time, New Mexican buffalo hunters known as *ciboleros,* hunted throughout the region.

Spanish explorers had penetrated into Colorado by the early 1700's. The Purgatoire River is said to have received its name because Spanish soldiers had died here and did not receive last rites. Perhaps members of the Bonilla and Humana expedition of 1594 (Taylor 1963) were the servicemen mentioned in this account. The river's Spanish name, "Rio de las Animas", means river of souls, to which was later added "Perdidas en Purgatorio," or lost in Purgatory. But the majority of scholars (Friedman 1989; Thomas 1924:289-299) believe that the Humana expedition went into Kansas and not Colorado, however. A skeleton in Spanish armor found in a canyon near La Junta (Jeancon 1925) and chain mail found here in 1981 (Carrillo, personal communications, 1993) collaborate nicely with the legend.

The French Canadian brothers, Paul and Peter Mallet, are credited with the first expedition up the Arkansas and Purgatoire River valleys while traveling to Santa Fe in 1739 (Taylor 1959:8). On the journey, they apparently found stones bearing Spanish inscriptions on the banks of the Arkansas River (Folmer 1939:163-167). Although their exact route is not known, they may have followed the prehistoric Indian trade route, which would later become known as the Santa Fe Trail (Church and Cowen 2003).

American military expeditions into Colorado began in 1806 with that of Zebulon Pike. The expedition of Major Long, traveling from the Arkansas River south to the Canadian River, in 1820, is thought to have followed the deep red rock canyons of the Purgatoire River and Chacuaco Canyon for several days (Tucker 1963:185-199). This seems to be the earliest written record documenting Euro-American exploration in the area of the PCMS.

In 1821, William Becknell set out from Missouri to trade with the Comanches, but learning of the new opportunities opened by Mexican independence, proceeded to Santa Fe. The old trade route he took across the plains and over Raton Pass became known as the Mountain Branch of the Santa Fe Trail (Taylor 1971:3). The Mountain Branch of the Santa Fe Trail more or less follows State Highway 350 along the Timpas Creek drainage, and site 5LA4965 represents the small segment that passes through PCMS land holdings (Johnson and Carrillo 1987).

Bent's Fort was established as a trading post on the Santa Fe Trail in about 1830. It was located on the north bank of the Arkansas River, which defined the international border between the United States and Mexico. Taylor (1959:15) indicates that the Cheyenne, Comanche, Arapaho, Ute, Kiowa, and others were actively trading at Bent's Fort (approximately 45 km north of the PCMS). Later, sometime between 1846 and 1852, the Cheyenne and Arapaho occupied the territory north of the Arkansas, the Jicarilla lived south of the Ratons, the Ute occupied the upper Purgatoire Drainage, and the Kiowa settled where the Purgatoire River Canyon down cut red sandstone (Taylor 1959:29). The last reference applies specifically to PCMS lands, as the Purgatoire River and red sandstone contact is found at the confluence of Welsh and Red Rocks Canyon.

The end of the Mexican-American War in 1848 produced a change in national boundaries; land in southern Colorado and New Mexico became U.S. territory. Over the next three decades appreciable changes transpired throughout the region as the Anglo presence increased. Merchants and miners came west on the Santa Fe Trail, and the Homestead Act of 1862 lured settlers from across the United States and Europe with the promise of nearly free land. This insurgence necessitated service from "the states," and both stage lines, and later national railways were the result. Buffalo were slaughtered nearly to extinction by 1874, and Native Americans, settlers, buffalo hunters and rustlers clashed at this time.

Fort Wise, named for a Virginia Governor, was constructed along the bottomlands of the Arkansas River near Bent's New Fort in the summer of 1860 (Taylor 1971:18). It was renamed Fort Lyon in 1862, flooded in June 1867, then relocated about 30 miles upriver near present day Las Animas. Various cavalry and infantry units were stationed here and charged with patrolling the Santa Fe Trail, escorting stage and mail coaches, and protecting settlers from Indian depredations.

The Mountain Branch of the Santa Fe Trail went from Fort Lyon, to Bent's Old Fort and then proceeded southwest to Trinidad. Stage stations had been established in 1861 at Gray's Ranch (4 miles east of Trinidad) and at Iron Spring (Taylor 1971:78). Barlow and Sanderson were awarded a mail contract in April 1866, and added new stations at Hole-in-the-Prairie (near Model, Colorado) and Hole-in-the-Rock (near Thatcher, Colorado) according to Friedman (1989:50).

In the spring of 1871, Barlow & Sanderson's Southern Overland Mail & Express Company established a new route that left the Santa Fe Trail at Iron Spring and meandered southeast through Sheep Canyon to what would later be PCMS lands. PCMS sites 5LA4967 and 5LA5040 (Johnson and Carrillo 1987) represents segments of this route, which crossed the head of the Bent Canyon (PCMS site 5LA3179, Church and Cowen 2003), and then proceeded from east to west through Stage Canyon, to upper Lockwood Canyon (5LA5454, Johnson and Carrillo 1987) along Military Service Roads (MSRs) 1 and 1a. From the Lockwood Canyon stage stop, the trail (PCMS site 5LA5039) continued southwest across the prairie to the Hogback Stage Station (5LA5824, Hunt 1998), and then to Gray's Ranch, and subsequently Trinidad (Taylor 1971:153; Jones 2003). A home station, providing meals and a change of horses, was opened at aforementioned Bent Canyon in April 1871. The stage route was later rerouted closer to the Purgatoire as described in a June 1875 Las Animas Leader article reporting that the first stage station was at Alkali, 20 miles out from West Las Animas. Approximately a quarter of a mile beyond, the road then branched, and the left fork went to the Nine Mile Bottom, eventually passing through Fagin and Brown's sheep camp, otherwise known as Vogel station (approximately 11 miles from Alkali). From here, it was then 15 miles further to Bent Canyon station (Taylor 1971:167).

In the end, the stage line was short-lived. The Las Animas Leader (Aug 27, 1874) proclaimed the day that the Atchison, Topeka and Santa Fe (AT&SF) Railroad reached town. By the spring of 1876, the AT&SF had reached Pueblo (Leader Feb 25, 1876), and the Denver &

Rio Grande was providing service to Trinidad (Taylor 1971:21). The Southern Overland Mail and Express Company terminated service on the Purgatory route on September 1, 1876 (Taylor 1971:173).

The Supplement to the Official Records (Hewett 2001) provides details of troop movements near or through the PCMS during the Civil War. In August, 1862, 1st Colorado Cavalry and 2nd Colorado Volunteer Infantry were stationed at Pleasant Valley Camp, midway between Fort Lyon, Colorado and Fort Union, New Mexico, under orders to protect mail and wagon trains on the Mountain Branch of the Santa Fe Trail. They also escorted horses to the Quartermaster at Fort Union. Troops were again stationed at this post, later referred to as Gray's Ranch, the following two summers. They responded to reports of Indian depredations on the Purgatoire River in January, 1864 and were stationed at Iron Spring Stage Station from July to September because of "Indian troubles." Santa Fe Trail historian Margaret Long, who interviewed area residents, believed there was a fort at the Hole in the Rock stage station used for protection, or by the military escorts patrolling the area (Simmons 2001:154).

Troops remained stationed at Fort Lyon through the 1870's and when the stage road was relocated, patrol duties shifted to the Purgatoire Road. In 1873 companies of the 6th Cavalry were sent to 9 Mile Bottom and Red Rocks to intercept Indians in those areas. In May 1874, H Co. 6th Cavalry established camp on the Purgatoire River midway between that post and the Raton Mts. (Adjutant General's Office 2002). Indian troubles flared across the plains in July of 1874, and herders were attacked in Bent Canyon. Cavalry stationed at Fort Lyon were dispatched in pursuit (Taylor 1971:164; Adjutant General's Office 2002). Two 19th Infantry companies assigned to escort Cavalry horses to Trinidad left graffiti near Bent Canyon Stage station (National Archives 2002; Owens 2004). It is possible that other historic graffiti and sites within the PCMS will be attributed to these early military activities.

In the late 1860's, the Pinon Canyon region went from being a nearly uninhabited region to a viable ranching community. Hispanic pioneers came north from New Mexico with their sheep and goats to found plazas along the Purgatoire River and its drainages. As transportation to the area improved with the service from the stage line and railroad, Anglo settlers increased and cattle were introduced. In the 1880s large Anglo-owned cattle ranches began to challenge for control of the range, often buying up water sources and allowing their herds to roam across public and private land. By the early 1920s most of the public land had been claimed by homesteaders, though many soon found the area too dry to support their families and sold out to the larger ranches. It is the homestead and ranching activity from about 1870-1970 that accounts for most of the historic remains on the PCMS (Friedman 1989:4, 24, 64).

3.0 FIELD AND LABORATORY METHODS

The 2002 survey project could not have been completed without a highly talented group of archaeologists. Permanent NMSU employees included Dr. Lawrence L. Loendorf, Principal Investigator, Mark Owens, Field Coordinator, and Bonnie Newman, Laboratory Director. Ben Foerstner, Gary Jessop, Emily Pope, Steve Snyder, and Amanda Wintcher comprised the NMSU survey field crew. Caralee Maechtle joined the project as a volunteer at numerous times throughout the field season, and another volunteer, Pamela Rasfeld worked with the crew during the third field session. Kelli Barnes and Roche Lindsey served as the NMSU crew chiefs. Midwest Archaeological Center personnel included Project Coordinator Steve DeVore, Crew Chief Mike Chidley, and survey crewmembers Jason Jurgena, Missy Baier, and Megan Young. Throughout the season, Randy Korgel of DECAM aided in evaluating significant sites.

The field and analytical methods used to conduct this project followed the procedures established in Dean (1992). The intent of the survey was to locate and record all historic and prehistoric cultural remains found in the high priority survey areas, and to collect data in a manner that would supplement previous and future archaeological investigations on the PCMS.

Upon arriving in an area to be surveyed, a corner boundary was located for the specific study unit to be surveyed using a GPS. From this known reference point, parallel transects of 20 m were performed on cardinal compass bearings. In difficult terrain or in an area where topographic features may obscure small sites, crews sometimes left the transect path to inspect these areas. Usually after a short time a transect path was resumed.

When cultural material was identified, a pinflag was placed at the original find. The survey crew then inspected the proximate area for additional artifacts, structures, or features. When historic or prehistoric artifacts were noted a single flag was placed in the ground. Two pinflags were placed at structures, features, diagnostic artifacts, and formal chipped- or ground-stone tools. If a locality enclosed less than four artifacts or a single diagnostic artifact, it was recorded as an isolated find (IF). If a diagnostic artifact with one or more additional artifacts was observed, the location was recorded as a site. When features or structures were found, the location was recorded as a site regardless of the artifact density. Additional criteria used for determining prehistoric and historic sites, as well as IFs, are found in Dean (1992: IV 11-12). Once the size of the site boundary was established, by a 20 m break in artifacts, the recording procedures commenced.

On every site, data recovery begins with the establishment of a site datum to serve as a reference for all measurements. Datum's consisted of 45 cm lengths of ½ inch steel re-bar for this project and, for the most part, these were placed at the center of the site, on a prominent landform, or directly in front of rockshelters. Stamped site identification tags (military "dog" tags) are wired to the base of each datum for future reference.

Detailed location information for each datum was collected using a Trimble™ GeoExplorer GPS. A minimum of 180 point readings were collected for each datum using the GPS, and a file containing these readings was designated using the site number. Because the

signal recorded by this GPS is encrypted, data collected by this unit is only initially accurate to approximately ±100 m. The site number file was later differentially corrected, then grouped, in the laboratory using Pathfinder Office™ software and base station files obtained from Compasscom, Inc.® (a base station and mapping data supplier) from the internet. The result produced a single precise Universal Transverse Mercator (UTM) position for the site datum. In the field, GPS data is used to plot a site's location on USGS 7.5' topographic maps, to quickly locate the corners and boundaries of study units, or to determine field position in difficult terrain.

For each site a sketch map and feature planview maps were made, photographs were taken, the State of Colorado site forms were completed, and lithic and historical artifact analysis was performed. To facilitate the management and comparability of collected data, field specimen (FS) numbers and feature numbers were assigned when applicable. FS numbers were assigned to patterned or formal tools, unique lithic specimens, and diagnostic artifacts.

Every site and IF was plotted on a USGS 7.5' quadrangle map by a crew chief. Measurements for each site and feature map were made in the metric system. Elements incorporated into the maps include contour lines, site datum location and/or distance to datum from feature, site boundary, features (numerical designation), all tools (FS numbers), landmarks or natural features, roads and fences, previously surveyed or tested areas, all man-made disturbances, and a legend. The legend included scale, contour interval, site number, north arrow, mapper's initials, and date, as well as symbols used on the map.

For each IF a State of Colorado Isolated Find form was completed. Location information was taken from a GPS and was then plotted on the appropriate USGS quadrangle map. In every case, artifacts were collected by means of the same criteria used at sites.

3.1 Field Artifact Recording Procedures

Prehistoric artifacts, mainly in the form of debitage, comprised nearly all of the artifacts encountered in our survey units. All lithic materials were described within two major categories: chipped stone (debitage and patterned tools) and ground stone. Field analysis was performed on all artifacts using the coding formats found in Owens and Loendorf (2002, Appendices A, B, and C). The guidelines and definitions for this analysis were based on the standards set forth in Owens et al. (2000:17-22) and can be found again in Chapter VI. The attribute data was then logged into portable field computers in Excel database format. At the end of each field day, separate site files from the field computers were backed-up, then downloaded into the master project database.

Historic features and artifacts were recorded on State of Colorado Historic Archaeology Component forms, Record of Cans not Collected forms, Architectural Inventory forms, and/or Historic Architectural Component forms.

Collected artifacts were placed in specimen bags and labeled with project designation, site number, FS number, contents, date, and collector and crew chief initials. Collected artifacts include: patterned or formal lithic tools, unique or non-local lithic material, prehistoric ceramics, diagnostic artifacts (historic and prehistoric), cartridge cases, and datable historic items.

3.2 Laboratory Procedures

During the project, NMSU established a temporary laboratory facility at Red Rock Ranch on the PCMS. Here project personnel organized collected artifacts, reviewed project forms for omissions, post-processed GPS coordinates, and digitized maps and drawings. At the conclusion of fieldwork, laboratory operations were moved to Kent Hall, on the NMSU campus.

In the field, laboratory processing begins with a cross-inventory of forms, artifacts, photographs, maps, and databases. Errors or omissions are listed and the appropriate crew chief makes corrections where needed. At Kent Hall artifacts are cleaned, catalogued, and labeled. Then the artifacts are placed in a plastic specimen bag with site number, FS number, date, collector's name, and project designation written on the outside. An acid free label containing the same information is placed in the bag, which is then ready for curation.

Also at Kent Hall, detailed lithic analysis was performed on the collected chipped-stone tools and edge-ground cobbles. These were analyzed using the established criteria in Owens et al. (2000:241-245, 293-297), which created the coding formats found in Appendices D and E in Owens and Loendorf (2002). Analysis of chipped-stone tools included recording a piece's functional type, its dimensions, whether it is broken or complete, its material type, presence or absence of cortex, rotation for drills, its manufacturing stage, degree of use-wear, and utilized-edge assessments. Edge-ground cobble analysis includes observations regarding material type and grain characteristics, facet number, facet/bevel assessments, modification, and secondary mano usage.

Recovered ceramic items were sent to Richard Krause of the University of Alabama, for analysis and are discussed in Owens and Loendorf (2004:Appendix III). A sample of the obsidian specimens was sent to Richard E. Hughes, the Director of the Geochemical Research Laboratory. The results of his analysis are shown in Appendix V. The faunal remains from site 5LA10000 were sent to Erica Hill of Northern Technical Resources, her results appear in Appendix IV. Charcoal samples from 5LA9959 and 5LA10000 were sent to Geochron Laboratories for radiocarbon dating and results appear in Appendix VI. Elaine Nimmo of NMSU University photographed the classifiable projectile points and a sample of the patterned lithic tools.

4.0 ELIGIBLE SITES

During our 2002 field work, seventeen new sites and three revisited sites were determined to meet at least one of the four criteria considerations, thus they were deemed eligible for the NRHP. In general, all eligible sites encountered during this project fell under Criterion D (have yielded, or may be likely to yield, information important in prehistory or history). In the following section, each of these sites is briefly discussed with details regarding features, artifacts, temporal placement, research domain information potential, and management recommendation. In addition, six sites require testing to determine eligibility. These are also discussed in this section.

5LA2289

Both historic and prehistoric components have been found on this site. Crews from Larson-Tibesar recorded most of the historic material in 1983, and only noted a prehistoric component instead of recording it. To accurately record the additional cultural materials, archaeologists from NMSU updated the site map and performed historic artifact analysis on items from the trash scatter outside of the structures. The sparse prehistoric component was analyzed using our modern format and then added to the overall project inventory.

This site is located in TA 2, near the north PCMS boundary and on a ridge-like projection at the west edge of the Big Arroyo Hills. A rather deep drainage is noted along the eastern site boundary, and the western boundary exhibits several small erosional cuts (Figure 4.1). There is no naturally occurring permanent water source on the site; the closest water is Timpas Creek, 2.7 km to the northwest.

Juniper woodland is the plant community that dominates the site and the surrounding area, though most of the historic structures were found in an area of open grassland (Figure 4.2). In addition to juniper, pinon trees, cholla, threeawn, side-oats grama, and thick patches of ricegrass were seen. Residual sediment deposition is considerable in places, especially near the historic structures. Limestone and shale bedrock outcroppings form low erosional terraces at the east end of the site.

A total of six historic structures were recorded at 5LA2289 – a well (Feature 1), dugout (Feature 2), ash/charcoal dump (Feature 3), privy pit (Feature 4), building foundation remnant (Feature 5), and trash dump (Feature 6). All were found within 50 m of each other at the highest elevation on site. The site is located on land originally patented by Cassander H. Minor in 1924. In 1922, she was a 43-year old widow with 10 young children; her 42-year old husband had died locally in Model, Colorado that year.

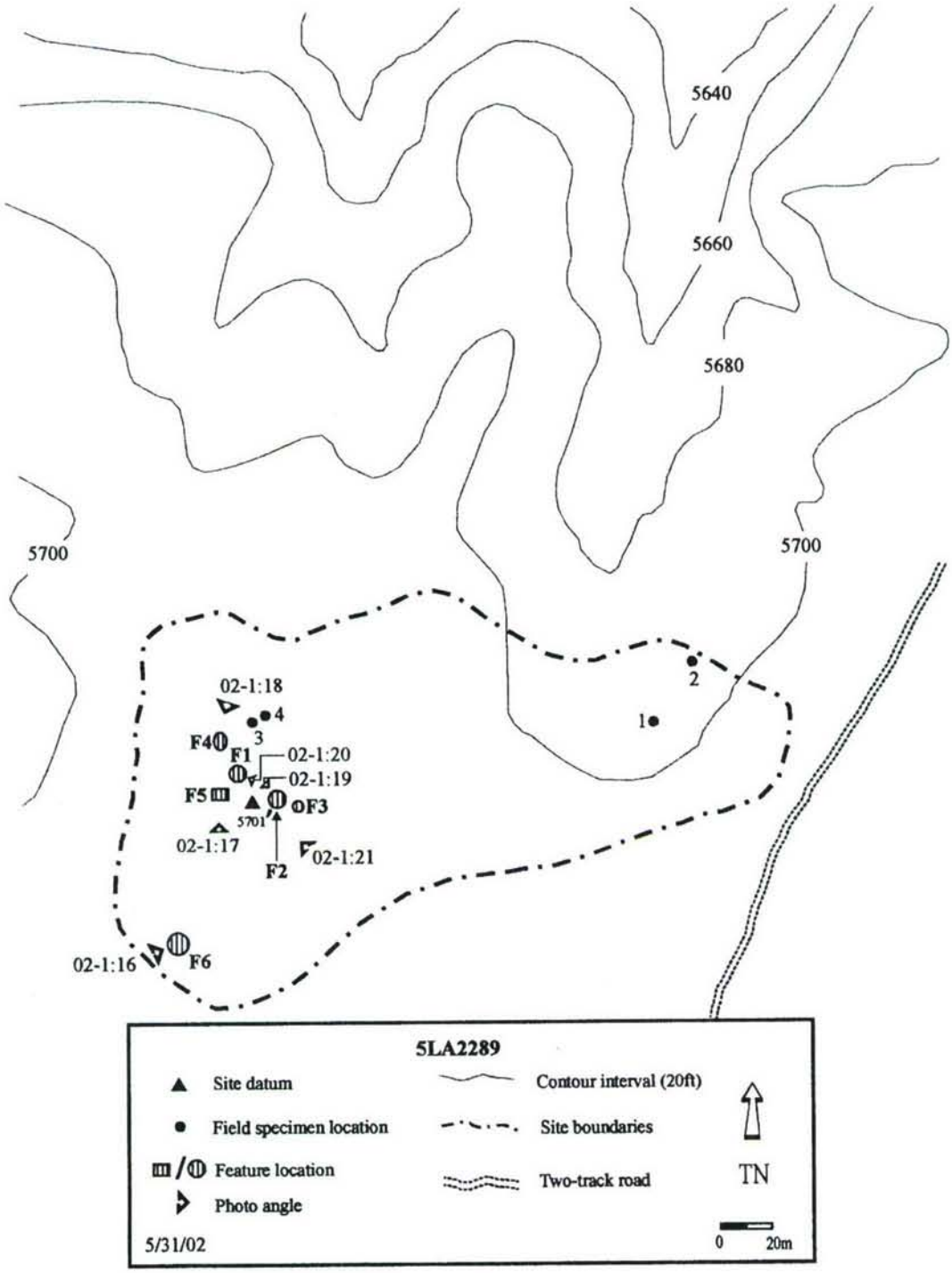


Figure 4.1: Site map, 5LA2289.

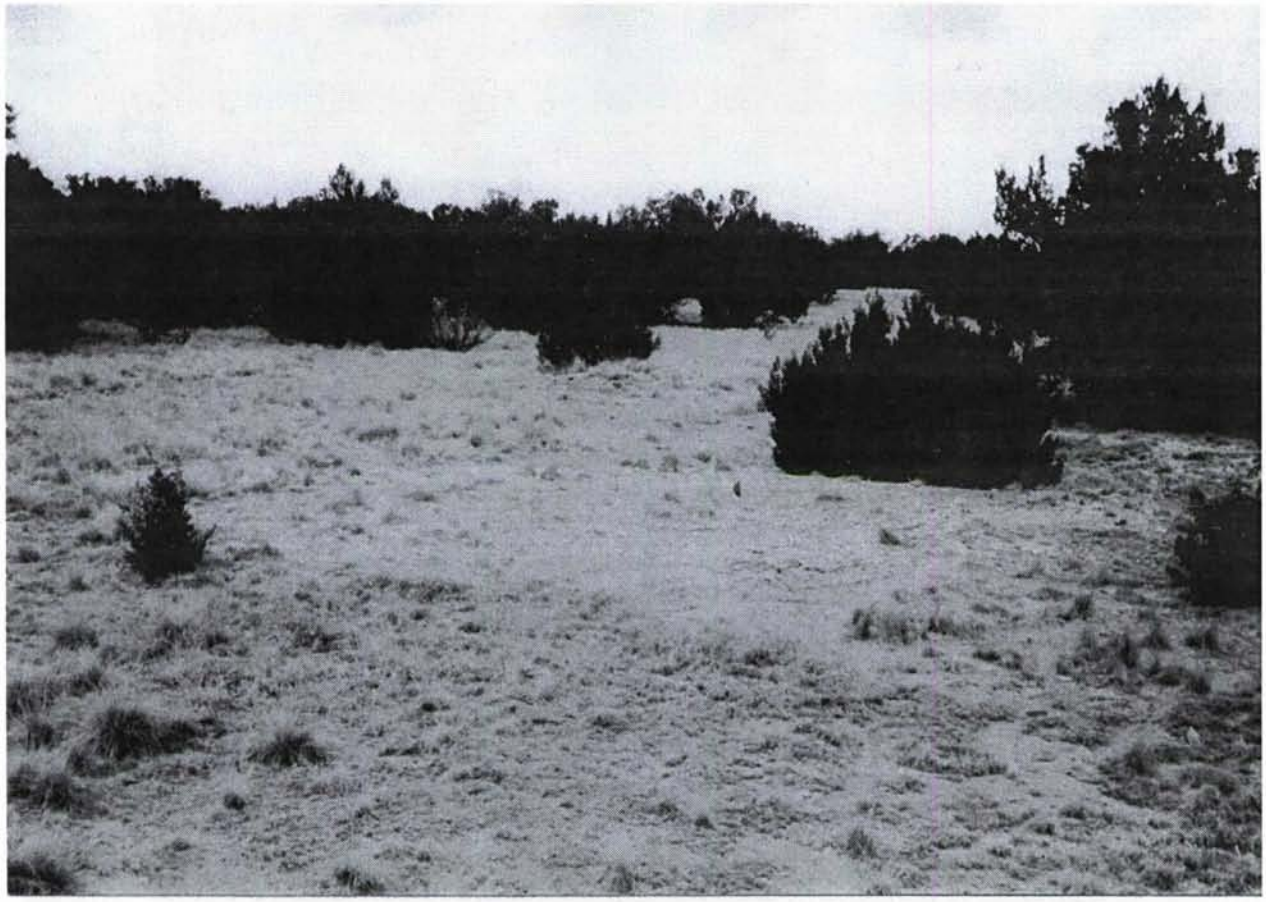


Figure 4.2: Site photo, 5LA2289 (02-1:21).

Feature 1 is a concrete-lined well; its collar rises slightly above the modern ground surface. This collar measures roughly seven ft in diameter and its walls are nearly nine and one-half in thick. One can only speculate as to its depth as it appears nearly completely filled with historic debris. Hundreds of cans, sherds of bottle glass and a large piece of sheet metal are visible within this fill. Local topography suggests the well may be over fifty ft deep. If so, then there may be over fifty ft of historic trash in the well.

Feature 2 is a dugout/root cellar hand excavated into limestone bedrock. The top of the post abandonment fill is roughly 1 m below the modern ground surface and there are no roof supports exposed within the depression. There seems to have been a ramped entry on its west side, but this too has filled in over the years. All of the building materials seem to have been scavenged for use elsewhere, but there is potential for finding diagnostic artifacts and intact floor features through excavation. A collar of waste rock is present around the depression, made up of the fill removed from the pit during original construction.

Feature 4 seems to be the remains of a privy pit. It is the northernmost of the features and measures four to six ft in diameter. No construction materials were noted in, or around, the feature; all that remains is the hand-dug pit and its associated waste rock pile.

Feature 5 is the sparse remains of a single course house foundation. Only the south wall of this feature remains intact, and all of the original construction materials appear to have been scavenged for use elsewhere. The only artifacts associated with this feature, suggesting it was a house, are wire nails and window glass sherds.

Feature 6 is a trash dump that was encountered outside of the 1983 site boundary. It is roughly 5 m in diameter and is 63 m south of the site datum.

A fairly diffuse trash scatter covers the rest of the site and includes hundreds of tin cans, machine and implement parts, fuel and oil cans, and slag from blacksmithing work. A wide span of time periods is represented by this trash. The earliest occupation seems to have occurred about 1890, and the last occupation would have been sometime in the 1940s or 1950s. This property was not patented until 1924, but other portions of Section 11 were filed on in the 1880s, and some of the artifacts could be trash from other settlers or from squatters who occupied the land before Minor filed on it. The Minors moved to Colorado between 1917 and 1921, and the family may have been living here since that time, fulfilling their 5-year residency requirement for land ownership.

The prehistoric component is sparse and consists of five simple flakes, four bifacial-thinning flakes, two utilized flake tools, a scraping tool, a complex flake, and a hammerstone. Of these, most are chert and were encountered at the crest of the ridge near the historic structures. All may have resulted from a single chert cobble reduction episode.

The site was not recommended eligible for the NRHP during the 1983 Larsen-Tibesar survey. However, there is excavation potential in the privy, well, and dugout. Site 5LA2289 is therefore recommended eligible for listing on the NRHP under Criterion D for its potential to yield information regarding the subsistence and economy among 1920s dryland farmers. Our management recommendation is that the site receives no further consideration until its future 5-year re-valuation, as it is not likely to be adversely impacted.

5LA3521

Like the previous site, 5LA3521 includes both historic and prehistoric components. The latter is a dense lithic scatter and an isolated architectural unit, while the former is a light early 20th century scatter of trash. On land patented by Charles Julian in 1926, the specific site location is in an open area south of the Hogback in TA 6. The landform is a gently northeast sloping plain with limestone outcroppings along its east edge (Figures 4.3 and 4.5). Grassland best describes the plant community; grama grasses are the dominant vegetation with sparse patches of galleta, tree cholla, and juniper. Accumulated sediment deposition is considerable, with depths of up to 50 cm recorded. The field crew noted no surface indications for thermal features.

This site was revisited by NMSU because a large number of tools (ground stone and chipped stone) and ceramics were located in our 2002 survey area designated SA 74. In defining

the extent of this cultural material scatter, the site boundary was extended east and north based on the surface distribution of the artifacts. Previously recorded sites 5LA3521 and 5LA3522, originally to the north and east of SA 74, were combined as no separation in the artifact distribution could be found.

The prehistoric feature (Feature 1) is a horse-shoe shaped, isolated structure measuring 2.4 x 1.8 x .5 m. Constructed of unmodified blocks of limestone at least four courses high, it would have offered concealment when being viewed from the east (Figure 4.4). There were no other features or artifacts in the area and it is unknown what function the feature might have served. Though it is a contiguous wall unit, it seems more like a hunting blind and was not assigned to one of Kalasz's (1989) architectural classifications.

The survey crew sampled the flaking debris; a total of 202 pieces of chipped-stone debitage were recorded (Table 4.1). Sixteen material types were noted, which is a relatively wide range for sites on the PCMS. Of the total, most was unspecified chert (41%), Smoky Hills jasper (12%), and argillite (11%), with smaller percentages of fine-grained quartzite (6%), coarse-grained quartzite (4%), sandstone (4%), obsidian (4%), Ralston Creek chert (4%), a material that appears visibly similar to Pedernal chert from New Mexico (3%), Black Forest silicified wood (3%), basalt (2%), unspecified dendritic chert (2%), chalcedony (1%), diorite (1%), siltstone (1%), and unspecified silicified wood (1%). Two obsidian samples, FS 8 and 31, were identified by Richard Hughes as from the Cerro del Medio, New Mexico source (Appendix V). Most (71%) debitage pieces fell into the small size-grade, while 29% were recorded as large, 10% had cortex and 90% were noncortical, and 26% were recorded as complex flakes, 3% as shatter, 27% as bifacial-thinning flakes, and 45% as simple flakes.

Overall, the debitage assemblage provides evidence that all phases of raw material reduction occurred at 5LA3521. This being said, most of the debris resulted from the manufacture of finished biface and uniface tools. Another interesting site aspect is the apparent reliance on non-local lithic materials by its occupants. Over 25% of the debitage resulted from the reduction of non-local lithic materials and this proportion is quite high for sites on the PCMS or even in southern Colorado. Two of the debitage items are patinated and likely relate to an early occupation.

The survey crew encountered six projectile point fragments, but only four could be classified within Anderson's (1989) projectile point classification system. All seem to suggest a site occupation date falling within the Late Prehistoric stage (1850 – 225 BP). The first of these specimens (FS 3) is a nearly complete chert point that most closely resembles Anderson's P41 type, which has associated dates ranging from AD 600 to 1200. The next specimen (FS 23) is a silicified wood preform that is missing its tip. It is most similar to Anderson's P49, a point style in use between AD 800 and 1750. A third point fragment (FS 32) was classified as P59. This medial point fragment of orthoquartzite would therefore date between AD 500 and 1200 according to Anderson. The remaining chert projectile point fragment (FS 1) most closely resembles P79, which has associated dates between AD 1000 and 1750.

Other tools encountered on the modern ground surface of the site included scraping tools, cores, bifaces, utilized/retouched flakes, a broken mano, an edge-ground cobble fragment, and a

slab metate fragment (Table 4.2). Of the cores, all are made of materials found at the Hogback (three argillite and one hornfels/basalt). It is the other flaked pieces that were more often made of non-local materials. Five of the seven scrapers are end/side scrapers and two are side scrapers. These are made of Hartville Uplift chert (3), Niobrara jasper (2), Jemez Mountain obsidian (1), and hornfels/basalt. The retouched/utilized pieces are argillite (3), Niobrara jasper (3), glass (1), hornfels/basalt (1), and Jemez Mountain obsidian (1). The bifaces are Alibates dolomite (1), Black Forest silicified wood (10), and orthoquartzite. Two of the three bifaces show polish wear on <45° working edges. Miscellaneous tools include a whetstone and polishing stone of baked clay.

Table 4.1: Summary Description of Chipped-Stone Debitage for 5LA3521.

	Arg.	B. Forest	Chal.	Chert	Diorite	H/Basalt	Obs.	Quartzite	Sand. S.	Wood	Silt.	Total
Total	23	5	3	120	2	6	9	22	9	1	2	202
Large	14	0	0	22	1	6	1	9	6	1	2	62
Small	9	5	3	98	1	0	8	13	3	0	0	140
Cortical	4	0	0	13	1	2	1	1	0	1	1	24
Noncortical	19	5	3	107	1	4	8	21	9	0	1	178
Complex	7	0	1	26	0	3	4	4	4	0	1	50
Shatter	1	0	0	3	0	2	1	0	0	0	0	7
Biface-Thinning	1	3	1	41	0	1	2	4	0	0	0	53
Simple	14	2	1	50	2	0	2	14	5	1	1	92

Table 4.2: Stone Tool Type by Material Group for 5LA3521.

	Type								
Material	Biface	Core	Projectile	Scraper	Flake Tool	Mano/Edge	Metate	Misc.	Total
Alibates	1	0	0	0	0	0	0	0	1
Argillite	0	3	0	0	3	0	0	0	6
Baked Clay	0	0	0	0	0	0	0	2	2
Black Forest	1	0	0	0	0	0	0	0	1
Chert	0	0	3	0	0	0	0	0	3
Glass	0	0	0	0	1	0	0	0	1
Granite	0	0	0	0	0	1	0	0	1
Hartville	0	0	0	3	0	0	0	0	3
Hornfels/Basalt	0	1	0	1	1	0	0	0	3
Niobrara	0	0	0	2	3	0	0	0	5
Obsidian	0	0	0	1	1	0	0	0	2
Orthoquartzite	1	0	1	0	0	0	0	0	2
Quartzite	0	0	0	0	0	1	1	0	2
Silicified Wood	0	0	2	0	0	0	0	0	2
Total	3	4	6	7	9	2	1	2	34

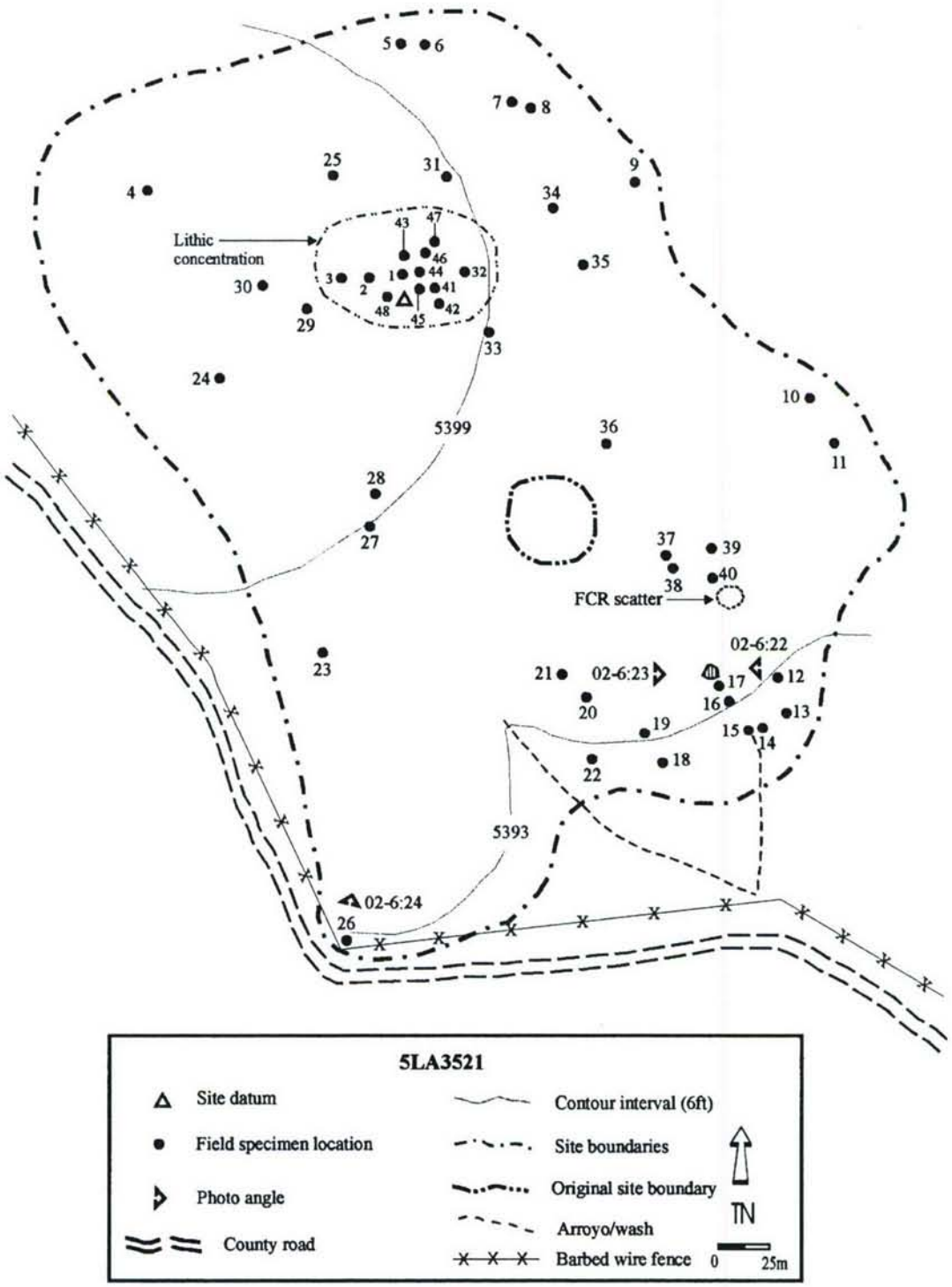
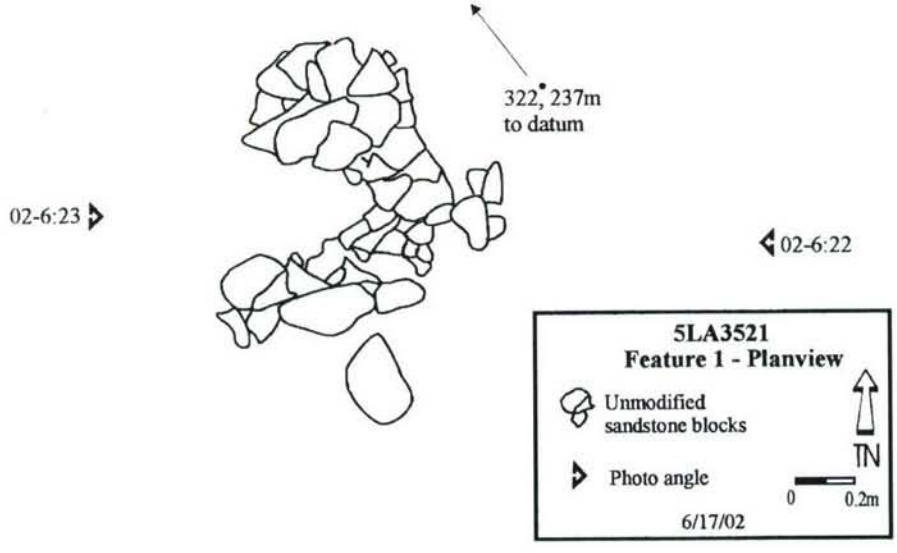


Figure 4.3: Site map, 5LA3521.



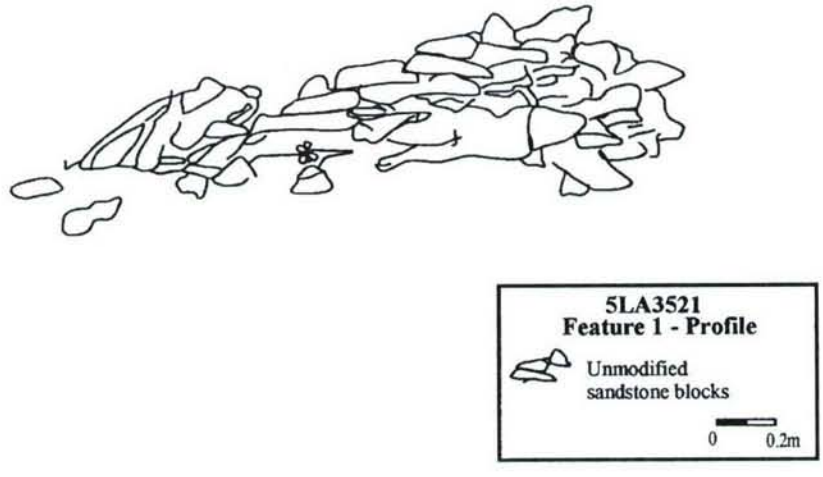


Figure 4.4: Feature 1 planview and profile maps, 5LA3521.

Figure 4.5: Overview photograph of 5LA3521 (02-6:24). View north at 1° from county road at south end of site.

We recommend that the site be determined eligible for the NRHP on the grounds that it is likely to yield information important to our understanding of prehistory (Criterion D). There are surface indications for buried and intact cultural deposits that have been capped by the large alluvial fan that has formed on the south side of the Hogback. The site is significant based on the Late Prehistoric component. Information, in the form of non-local material types, recovered from the "Barnes Site" (5LA9187) and the potential for data recovery from 5LA3521 could ultimately help to define trade and exchange relationships between High Plains populations and those from the American Southwest. In the future, the prehistoric structure may be tested to help determine its original function. This portion of the PCMS sees little maneuver impact so the site requires nothing but cyclic monitoring.

5LA4751

Larson-Tibesar Associates of Laramie, Wyoming originally recorded the site in 1987 and found a large lithic scatter, eleven features, a ceramic scatter, and rockshelters. Though the site was outside of our 2002 project area, NMSU revisited the location as an early Paleoindian point

was noted by a DECAM biologist working in the area. Paleoindian points are rare on the PCMS, so a survey crew went to the site in an attempt to determine the presence or absence of a Paleoindian component.

This lithic scatter, procurement, and rockshelter site is located along one of the several large drainages on the south side of Red Rocks Canyon. The site occupies a hill slope on the west side of the drainage, and in this area Dakota sandstone outcrops form several small cliffs and terraces (Figures 4.6 and 4.8). The artifact distribution here is fairly extensive; the site boundary measures approximately 570 x 280 m. Artifact density is highest in the erosional breaks on the west side of the site.

Juniper trees are dense along the canyon edge, and grassland dominates the vegetation on the west edge of the site. As well as juniper, mountain mahogany, sagebrush, yucca, skunkbrush, and grama grasses were common plants. Sediments are thin near the canyon rim and on top of the erosional terrace; relatively thick deposits were to be found along the western site margin.

A 50 m dog leash sample of the lithic debitage was taken from the immediate area of the projectile point (Figure 4.7). From this, 267 debitage items were recorded (Table 4.3). Locally available quartzite (52% fine- and 24% coarse-grained) and argillite (13%) were the dominant materials, with lesser amounts of unspecified chert (9%), basalt (1%), and Ralston Creek chert (<1%). All of these materials can be found within the PCMS; quartzite and the chert in Red Rock Canyon below the site, and argillite and basalt at the Hogback (approximately 27 km to the southwest).

The sample contains mainly simple flakes (69%), with a few complex flakes (24%), shatter specimens (1%), and bifacial-thinning flakes (6%) also seen. Seventy-five percent of the debitage specimens were noncortical, and 25% show some degree of dorsal cortex (15% large flakes and 11% small). The above percentages reflect an emphasis on early-stage raw material reduction with all other reduction stages disproportionately represented. It appears, for the most part, that many pieces of raw material were initially roughed out at the quarry then brought to the site in noncortical form. Once on site, these materials were manufactured into early-stage bifaces or used to produce flakes.

Of primary interest to us is the argillite because this material was used to manufacture the Paleoindian point. Also, we were trying to locate additional patinated items that might represent artifacts from the same occupation. As mentioned above, our debitage sample contained 13% argillite, which is fairly high for sites more than a few hundred meters away from the Hogback. From the overall assemblage, 11% of the debitage items show the same degree of patination as the point; among the argillite, nearly 63% of the items were patinated. There were also patinated pieces of quartzite and basalt, and just outside our sample location near the original site datum, there was an area where patinated gravels outcrop along the edge of a small erosional drainage. Based on the above information, the potential for a Paleoindian component in the area of the site where the point was found is high.

Table 4.3: Summary Description of Chipped-Stone Debitage for 5LA4751.

	Arg.	Chert	Hornfels/Basalt	Quartzite	Total
Total	39	24	3	201	267
Large	18	1	1	97	117
Small	21	23	2	104	150
Cortical	2	3	0	64	69
Noncortical	37	21	3	137	198
Complex	10	7	1	46	64
Shatter	0	0	0	2	2
Biface-Thinning	1	8	0	8	17
Simple	28	9	2	145	184

Table 4.4: Stone Tool Type by Material Group for 5LA4751.

	Type						
Material	Biface	Core	Projectile	Scraper	Drill	Flake Tool	Total
Argillite	0	2	1	0	0	0	3
Coarse Quartzite	0	1	0	0	0	0	1
Fine Quartzite	3	0	0	1	1	1	6
Orthoquartzite	0	0	0	1	0	1	2
Ralston Creek	0	0	0	0	0	2	2
Total	3	3	1	2	1	4	14

The projectile point appears similar to other points found on the PCMS, and was identified as Plainview (Hofman personal communications, 2001). This argillite point is a basal fragment with a deeply concave base, has an impact fracture at the haft, and its edges are ground (Figure 6.8).

Other tools collected from our sample area include seven utilized flakes (four chert, two argillite, and one coarse-grained quartzite), three cores (two argillite and one quartzite), a quartzite drill (Figure 6.3), an unfinished quartzite biface, and large bifacial cutting tools of chert and fine-grained quartzite (Table 4.4). Patination was noted on both of the argillite utilized flakes, and these were found at the same contour elevation as the point.

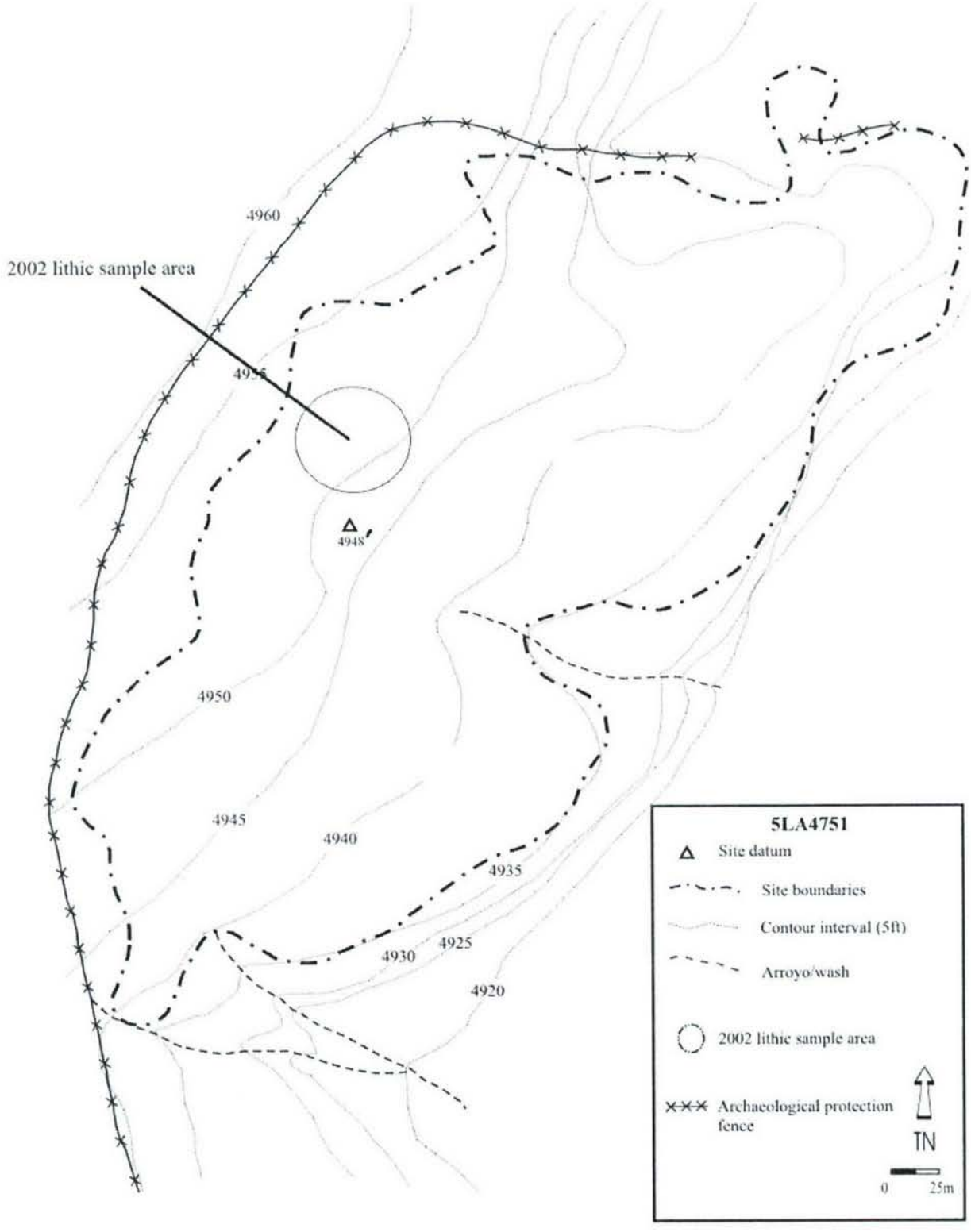


Figure 4.6: Site map, 5LA4751.

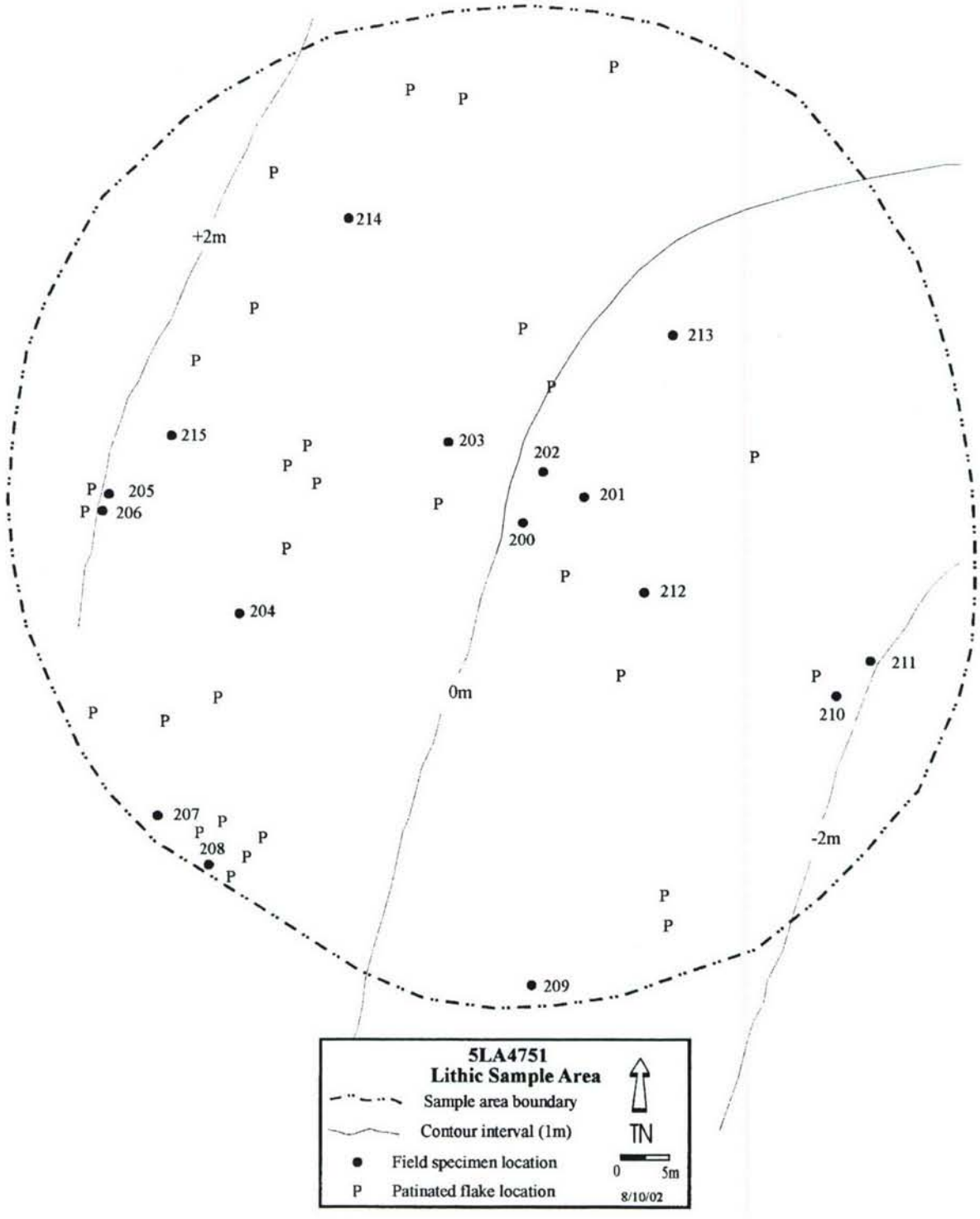


Figure 4.7: Field specimen and patinated artifact location within the sample area, 5LA4751.

Figure 4.8: Site photo, 5LA4751 (03-11:8).

Lithic analysis reveals that there are additional lithic materials on site that contain the same patination pattern as the point. All of these patinated artifacts are found at roughly the same contour elevation (or slightly higher). Because of this, the potential for a buried Paleoindian component seems excellent and information regarding early subsistence and settlement could be forthcoming. 5LA4751 is already inside an archaeological protection fence and eligible for the NRHP, so no further work needs to be performed at this time. Ultimately, the portion of the site with the patinated artifacts needs a trench, or Phase II testing, to determine the presence or absence of buried Paleoindian deposits.

5LA9939

This site is an historic mining camp on a hill slope along the west edge of the Big Arroyo Hills. From the site, Timpas Creek is 2.5 km northwest and State Highway 350 is 1.7 km west. The terrain dips steeply from east to west, and the mesa edge is 78 m southeast of the site.

Shrubland was the vegetative community on the site, and the mesa top above exhibited juniper woodland. Juniper, greasewood, *James frankenia*, and rabbitbrush grow sparsely on the loose soils around the historic features. Most of the soils are rather shallow, but there is some secondary deposition (up to 30 cm) in the area of the cultural remains.

The site contains two waste rock piles, an excavation pit, pile of coal, slag pile, and several other pits and features of unknown function. Feature 1 was a collapsed pile of unmodified sandstone and limestone blocks (Figure 4.9). Measuring 13 x 20 x 1 ft, it was circular in planview, and would have been composed of many courses of masonry. Its function is unknown as it has collapsed into itself, and there were no artifacts in association.

Feature 2 was a 26 x 13 ft level floor that has been excavated into a hillside. Though it may have been a platform for machinery or a tent, the only artifact found in association was a piece of wood with a nail in it.

Feature 3 was a 16 x 13 ft pile of slag eroding down the hillside. The feature contains burned coal, ash, soil, and rock. It was associated with Features 4 (20 x 7 ft depression with building blocks) and 5, which were to the east and slightly uphill. Feature 5 was a large (33 x 13 ft) oval mound with a small rock wall at the western end of its base. Associated artifacts were a brick-like material (possible adobe meld), a natural rock cairn, and coal.

An 8 x 1 ft alignment of unmodified limestone blocks was designated Feature 6. It was 3 m northwest of Feature 7, which is a 5 x 5 ft depression. The latter feature may have functioned as a privy. A large (13 x 10 ft) pile of coal (Feature 8) was found near the top of the ridge overlooking the site (Figure 4.10). It is flanked by Features 10 and 11, two large limestone tailing piles measuring 26 x 26 ft and 52 x 16 ft respectively.

The northernmost site feature was a mining pit (Feature 9) dug into the limestone/shale contact at the top of the hill. Measuring 36 x 26 ft, there are large, jumbled boulders and an excavated ledge at its opening.

This mining complex was on land patented by Daniel Ahern in 1922. There are other coal mining locales on the PCMS, but these exploit Dakota group strata in the area of Welsh Canyon and the Black Hills about 29 km to the east. A fairly diffuse trash scatter was associated with the features on 5LA9939. Household debris includes aqua, green, and brown bottle glass, various white glazed ceramic pieces, solder dot cans, a mattress and box spring, and a baby powder container. Bricks, sheet metal pieces, a variety of wire nails, and stone parts were artifacts associated with the mining activities. The trash deposit is tentatively dated to between 1912 and 1930 based on its artifact types. This period of time corresponds to the patent date.

We recommend this site for the NRHP because it is rather unique for the PCMS. In addition, there seems to be much excavation potential within the surface features. This site could yield information on coal mining practices in southeastern Colorado in the 1920s as well. This being said, all important features were on the side of a steep hill and not likely to be impacted by military plans. Therefore, the site should receive no further consideration other than periodic monitoring for adverse impacts.

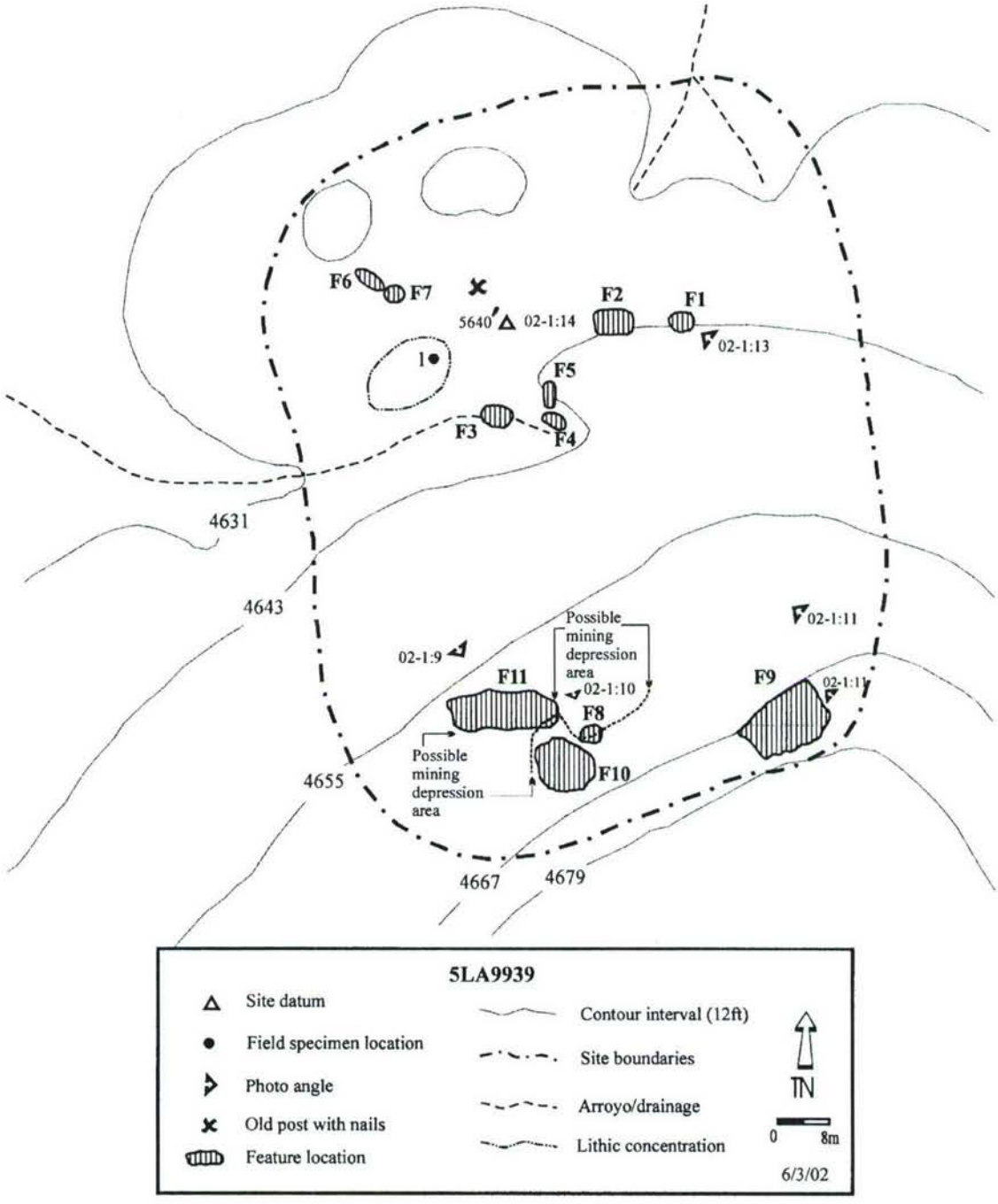


Figure 4.9: Site map, 5LA9939.

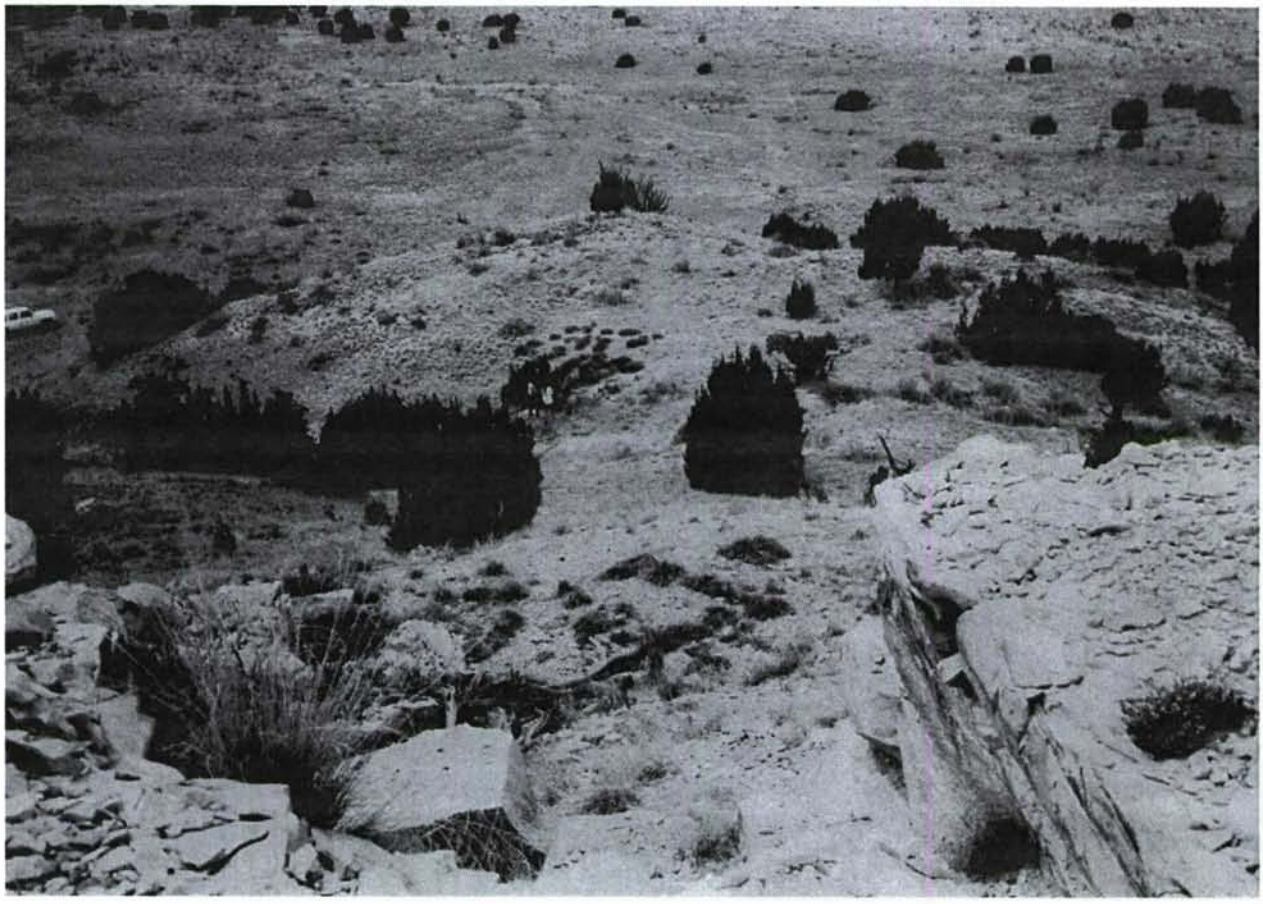


Figure 4.10: Site Photograph, 5LA9939 (02-1:11)

5LA9944

The site is located at the northern edge of Cedar Hill and just above the Bent Canyon Arroyo in TA 13. It contains two contiguous rock wall, isolated stone structures and a stacked wall alignment that very well may be a deflated architectural unit. Site terrain slopes northeast down into the drainage (Figures 4.11 and 4.12), and thick stands of juniper and skunkbrush cover the surface. Grama grasses, sagebrush, currant, mountain mahogany, soapweed, ricegrass, and prickly pear were also present. Sediments are very shallow, varying in depth to 10 cm. Exposed Dakota sandstone bedrock is present throughout the site, especially in the area of the structures. Other locations, especially in the western part of the site, have more visible deposition.

The presence of two structures is perhaps the most distinctive characteristic of the site. Feature 2 is located approximately 34 m northeast of the datum. This structure is a well preserved circular arrangement of sandstone slabs found at the crest of a small ridge. Its architecture measures approximately 4 x 3.5 m, and was originally constructed with upright sandstone blocks. Soils within the feature are ash stained and there is 20 cm of accumulated strata based on a pinflag probe. This evidence points to the presence of an intact occupation

surface and at least one internal thermal feature. Feature 3 is located approximately 22 m southeast of the datum. This structure is also a single room, but is missing its entire north wall. Measuring 4 x 3.5 m, the structure has two wall blocks in their original upright position.

Both of these structures are rock abutment, isolated units and because of this criterion, are typed as Class V, contiguous rock wall, isolated units (Kalasz 1989:102). According to Campbell (1969:373-376, 400), these structures are characteristic of Woodland and Apishapa focus structures. The structures from 5LA9944 would be classified as Category 15, with associated dates of 850 ± 60 BP and 920 ± 80 BP. These dates suggest the site had an occupation between the Developmental and Diversification periods.

The field crew identified two other features: Feature 1 is a bedrock metate and Feature 4 an irregularly shaped rock alignment. This alignment measures 3 x 3 m and was composed of unmodified and stacked sandstone blocks. Most of the feature lies on sandstone bedrock and erosion has modified its original form. It seems possible the feature was another habitation structure whose building materials were scavenged for use elsewhere. Two of the three ground-stone artifacts were found in the vicinity, so maybe it functioned as some kind of partitioned workstation.

A total of 84 chipped- and ground-stone artifacts were recorded (Table 4.5). Of the debitage (65 items), only simple flakes (36) and complex flakes (29) were encountered. These were made of fine-grained quartzite (31%), coarse-grained quartzite (26%), chert (24%), a material similar in appearance to Pedernal chert (6%), argillite (5%), chalcedony (3%), Ralston Creek chert (2%), silicified wood (2%), and sandstone (1%). Most of the debitage assemblage was comprised of small (54%) as well as noncortical (88%) items. It seems apparent that hard-hammer percussion generated both the quartzite and chert debitage. There were only 11 (17% of the entire assemblage) small complex flakes, so apparently the reduction strategy did not focus on the production of finished or nearly finished biface tools. The low percentage of cortical items indicates that raw materials were initially reduced at the quarry location (likely one of the deeper canyons in Cedar Hill), then brought to the site as cores or large flake blanks.

The flaked tool assemblage consists of 16 artifacts – seven utilized flakes, three bifaces, two side scrapers, two non-bipolar cores, a bipolar core, and a projectile point fragment (Table 4.6). The projectile point fragment (FS 4) is orthoquartzite, unclassifiable within the Anderson (1989) system, and only the blade fragment of a large tool. Of the utilized flakes, four specimens were fine-grained quartzite, two were unspecified chert, and one was locally available Ralston Creek chert. All exhibit at least one >45° scraping edge. All bifaces were broken early in manufacture (e.g., end shocked); two of these were coarse-grained quartzite and the other oolitic chert. Both of the scrapers were broken as well; FS 4 was orthoquartzite and FS 7 was chert. All of the cores were quartzite and exhibit multidirectional flake removal.

The ground-stone tools include a slab metate fragment, a bedrock metate (Feature 1), and a complete one-hand mano. All were made of sandstone and exhibit minimal modification of the parent piece. It is interesting to note that both metates (FS 14 and 15) were found in direct association with Feature 4, the rock alignment.

Table 4.5: Summary Description of Chipped-Stone Debitage for 5LA9944.

	Argillite	Chalcedony	Chert	Quartzite	Sandstone	Silicified Wood	Total
Total	3	2	21	37	1	1	65
Large	1	0	9	19	1	0	30
Small	2	2	12	18	0	1	35
Cortical	1	1	3	3	0	0	8
Noncortical	2	1	18	34	1	1	57
Complex	2	0	10	15	1	1	29
Shatter	0	0	0	0	0	0	0
Biface-Thinning	0	0	0	0	0	0	0
Simple	1	2	11	22	0	0	36

Table 4.6: Stone Tool Type by Material Group for 5LA9944.

	Type							
Material	Biface	Core	Projectile	Scraper	Flake Tool	Mano	Metate	Total
Chert	0	0	1	1	2	0	0	4
Course-grained Quartzite	2	3	0	0	0	0	0	5
Fine-grained Quartzite	0	0	0	0	4	0	0	4
Oolitic Chert	1	0	0	0	0	0	0	1
Orthoquartzite	0	0	0	1	0	0	0	1
Ralston Creek	0	0	0	0	1	0	0	1
Sandstone	0	0	0	0	0	1	2	3
Total	3	3	1	2	7	1	2	19

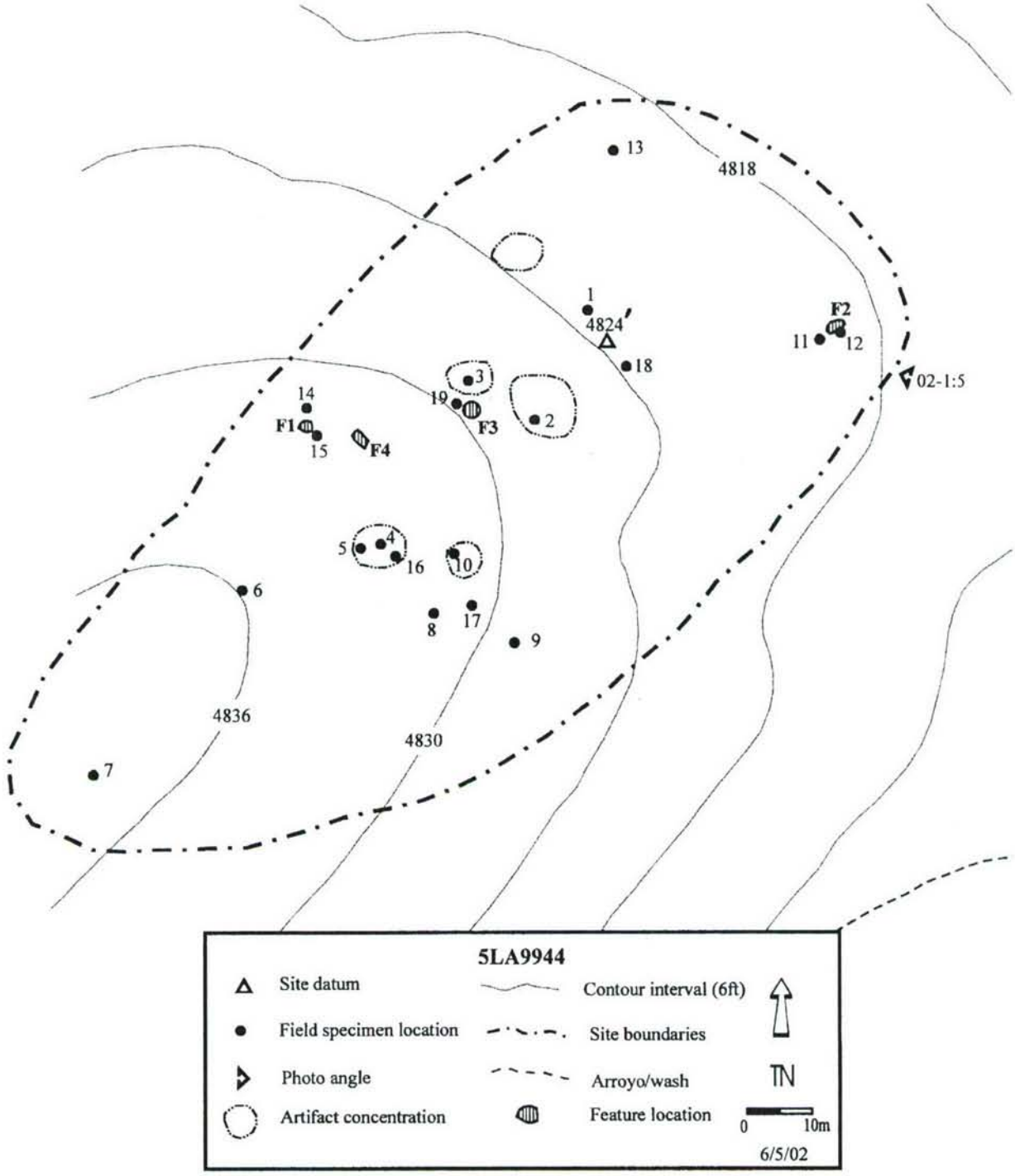


Figure 4.11: Site map, 5LA9944.

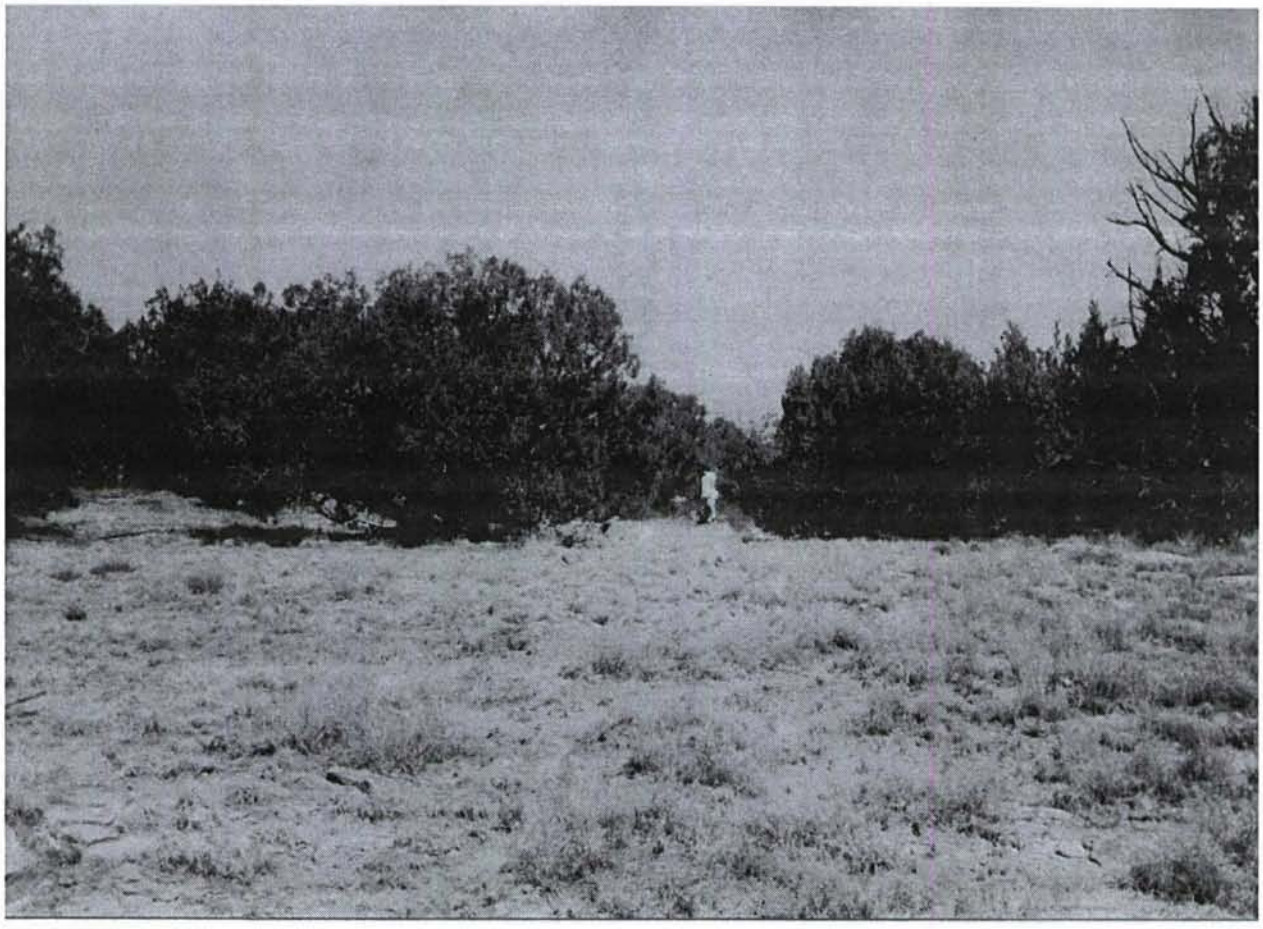


Figure 4.12: Site overview photograph, 5LA9944 (02-1:4)

We recommend the site eligible for listing on the NRHP on the grounds that it is likely to yield information important to our understanding of prehistory (Criterion D). Site 5LA9944 is a habitation site with distinct architecture, but it has relatively low artifact density. The presence of ground stone indicates that plant processing was an activity carried out at the site, and there is a good potential for recovering macrobotanical and/or pollen materials through excavation. This site has excellent potential for the recovery of buried materials, especially in Feature 2. If found, this information could be used to address research domains of subsistence and settlement. Though this potential is significant, the site is relatively stable and not in danger from military maneuvers. The site warrants no further archaeological investigations at this time, but it should be periodically monitored, however. If erosion or military activities begin to impact its significant remains, the management recommendations will need to be re-evaluated.

5LA9956

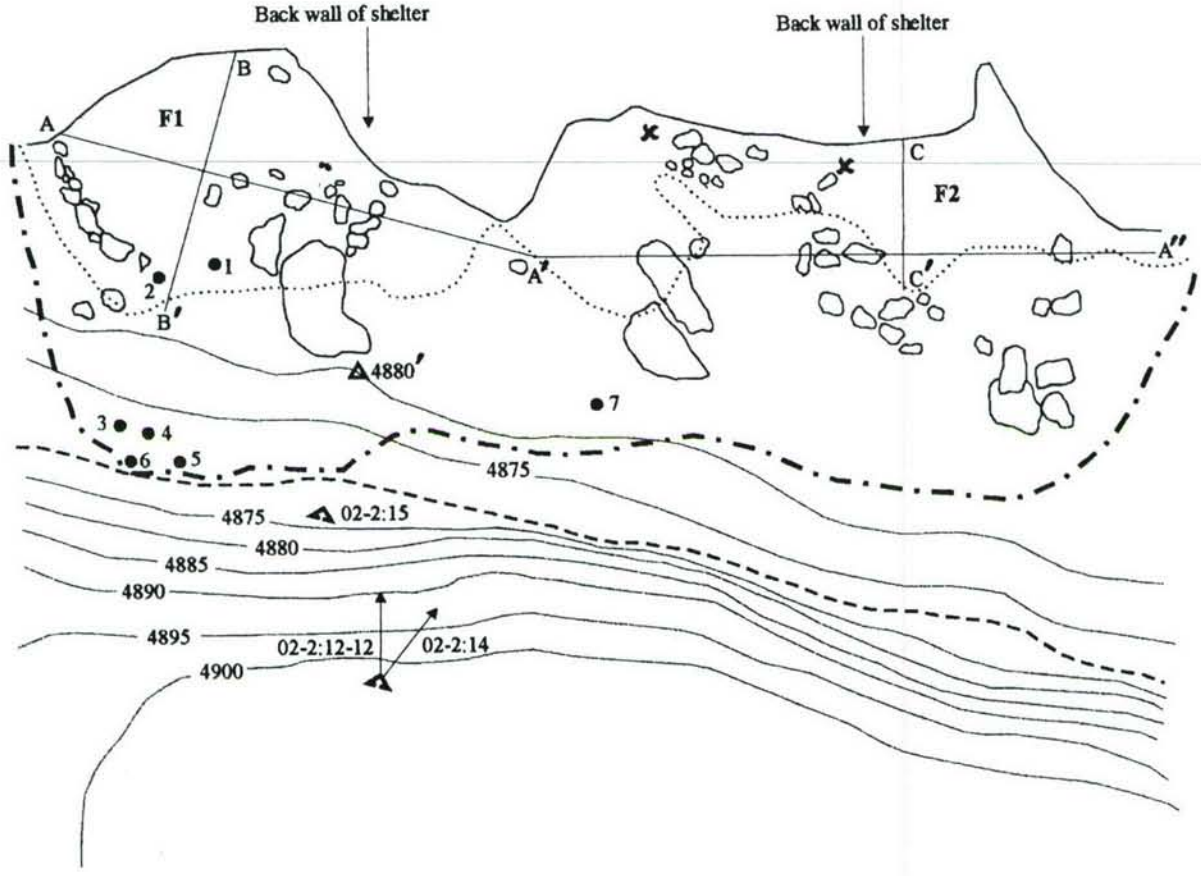
The site, two rockshelters and their accompanying lithic scatter, was located at the northeast corner of Cedar Hill. Small in size, 5LA9956 was found within a large southwest to northeast trending drainage. The habitation features were found on the east side of this

intermittent water course. Another small erosional cut exposes 1.5 m west of the shelters and a much larger arroyo was 10 m to the west. Located in the juniper woodland community typical of the Black and Cedar Hills landforms, the surface of the site was covered by juniper, prickly pear, cholla, grama grass, skunkbrush, and yucca plants. Surface sediments were relatively thin on the landform, with most under 10 cm thick. Deeper deposits, of up to 40 cm, were observed within the driplines of the shelters.

Both shelters were found along the base of the largest sandstone outcropping. The first (Feature 1) measures 7.5 x 4.2 x 2.6 m and has scattered lithic artifacts outside its opening. FSs 1-6 were recorded here in what is thought an activity area. A circular architectural unit can be found inside the shelter dripline and measures 5 x 4 m in size. It appears that this multiple-course wall was constructed of unmodified sandstone blocks, and a centrally located roof fall boulder may have been used as a fire deflector. A second connected shelter (Feature 2) can be found south of Feature 1 and within the same large outcropping. It is somewhat larger and has the remains of an indistinctly shaped structural unit inside of it.

Eleven pieces of debitage, five chipped-stone tools, and two hammerstones (FS 2 and 7) are associated with the shelters. Of the debitage, there were five items of quartzite, three of argillite, two of chert, and one of basalt. These materials were found in the form of complex flakes (5), simple flakes (4), and shatter (2). The chipped tools were a utilized flake of argillite (FS 1) and four quartzite cores (FS 3-6). No ground tools were identified.

We recommend that this site be determined eligible for nomination to the NRHP on the grounds that it is likely to yield information important to our understanding of prehistory (Criterion D). This judgment is based solely on the data recovery potential of both shelters. There was at least 40 cm of soil deposition in each, and there could be buried diagnostic artifacts or thermal features that could help date the site. An apparent activity area in front of the shelters indicates that technological, chronological, and paleoclimatic data will be recovered through testing the location. Even though the site is eligible for the NRHP, interior deposits are capped and there is there is no potential for military or erosional impact. Because of this, the site requires no additional archaeological work other than periodic monitoring.



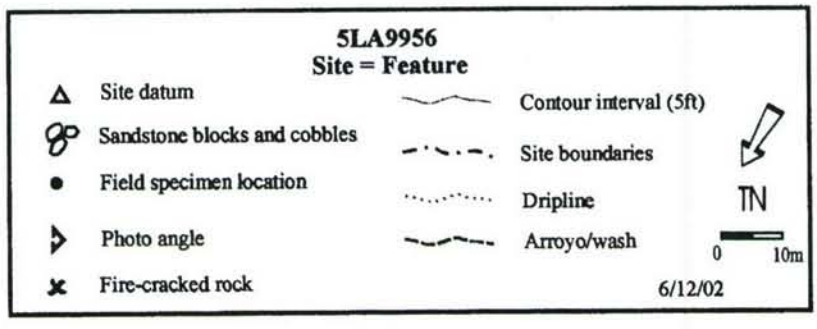


Figure 4.13: Site map, 5LA9956.

Figure 4.14: Site overview photograph, 5LA9956 (02-2:15)

5LA9957

The site is a sparse lithic scatter in an open plain (Figures 4.15 and 4.16). It was found on the west end of the Hogback and the north side of Van Bremer Arroyo. Brown Sheep Camp is 820 m to the east. Surface vegetation is that of a shrubland plant community, with saltbush becoming denser as one approaches the arroyo. Alkali sacaton, western wheatgrass, pale wolfberry, greasewood, winterfat, cholla, rabbitbrush, and broom snakeweed were identified. Because the site was located within an active floodplain, sediment depth could exceed 2 m. It is unknown how much of this depth may be cultural, based on the scant surface remains. At the surface, the soils are baked silt with intermixed basalt and limestone gravels. In many cases, these gravels were patinated, suggesting that paleosols are exposing on the landform.

Flaking debris has the following material type distribution -- chert (5), hornfels/basalt (4), and argillite (2). There were three bifacial-thinning flakes, three complex flakes, four simple flakes, and a piece of shatter. A single temporally diagnostic projectile point was encountered. This orthoquartzite specimen (FS 1) was the base of a Jimmy Allen Paleoindian point (Hofman personal communications, 2001).

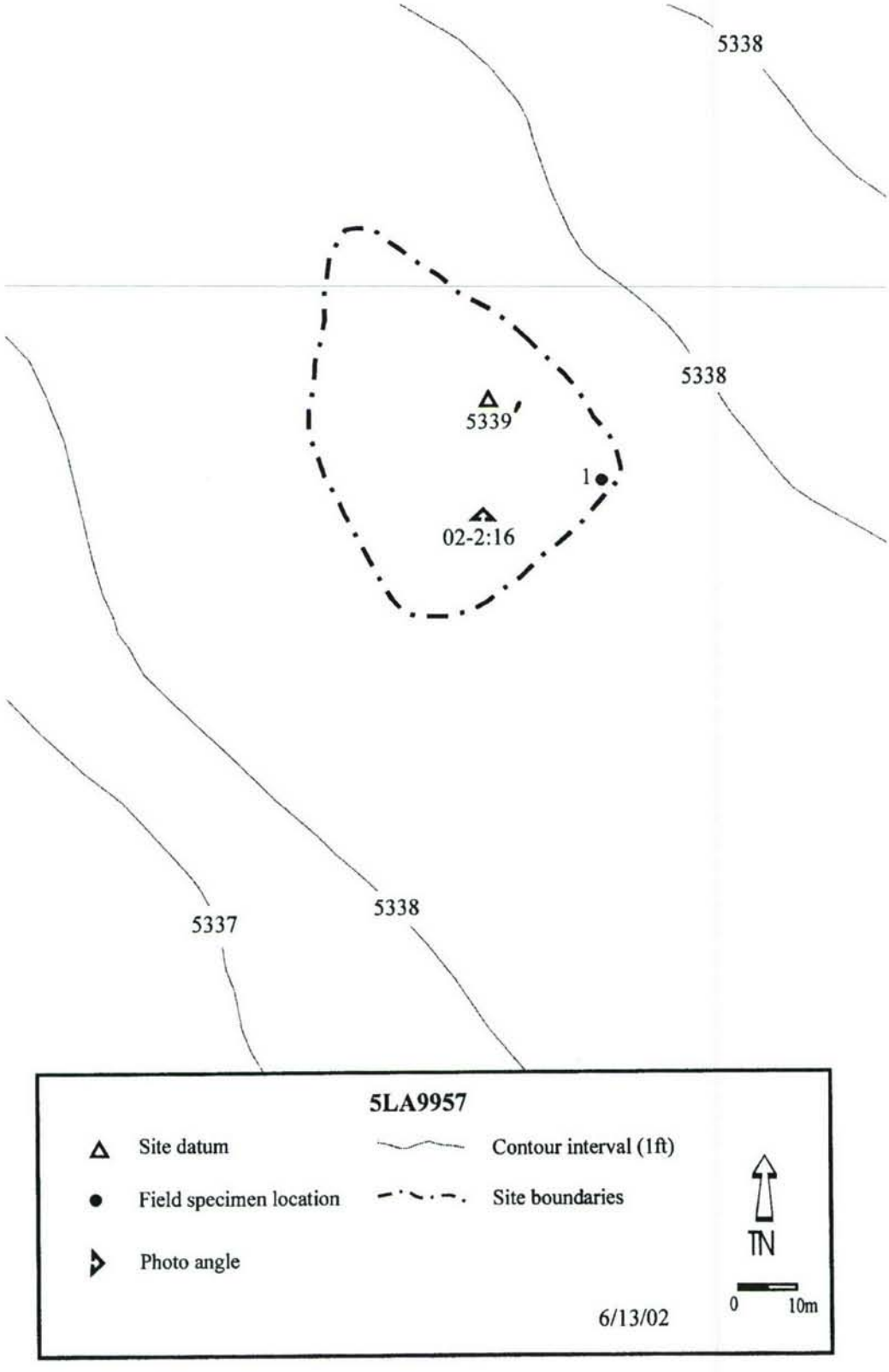


Figure 4.15: Site map, 5LA9957.

Figure 4.16: Site overview photograph, 5LA9957 (02-2:16)

We recommend this site be determined eligible for the NRHP on the grounds that it is likely to yield information important to our understanding of prehistory (Criterion D). Good areas for test excavation to search for intact cultural deposits are not immediately evident from a surface examination. This is unfortunate because Paleoindian artifacts are not common in the PCMS, and an intact site would be an important discovery. The site is considered worthy fro the NRHP simply on the strength of the surface discovery of the old artifact. The site needs to be tested to determine its eligibility status. It should be avoided until that process is complete.

5LA9958

The site is a dense scatter of prehistoric lithic debris. It was found in the Van Bremer Arroyo floodplain (Figures 4.17 and 4.18) 1.7 km west of Brown Sheep Camp. A large hill with good views to the west and east was 300 m north of the site. Four cores, four utilized flakes, and four projectile points were identified on the modern ground surface (Table 5.2). The cores were argillite (2), chert (1), and basalt (1). Materials recorded for the utilized flakes included argillite (2), chalcedony (1), and chert (1). Three of the four utilized flakes were broken; three of these were used as scrapers and one was a flake knife. Of the projectile points, two were unspecified type chert and two were Smoky Hill jasper. Only one point was complete enough to be placed within Anderson's (1989) system. It is nearly complete, with only the tip and tangs missing, and classified as P62 (AD 500 and 1400; Developmental to Diversification period). Three slab

metate fragments and a one-hand mano were also identified; all unmodified sandstone pieces exhibiting use-wear.

Flaking debris (Table 5.1) included items of hornfels/basalt (53), argillite (34), chert (29), coarse-grained quartzite (6), fine-grained quartzite (4), orthoquartzite (4), and silicified wood (1). These were classified as simple flakes (64), complex flakes (37), shatter (28), and bifacial-thinning flakes (2). The assemblage was 43% small noncortical flakes, 24% large noncortical flakes, 23% large cortical flakes, and 10% small cortical flakes indicating that the site occupants performed all stages of raw material reduction. For the most part, hard-hammer percussion was used to generate the debitage, but pressure flaking was also indicated by the smaller complex flakes and bifacial-thinning flakes.

Table 4.7: Summary Description of Chipped-Stone Debitage for 5LA9958.

	Argillite	Chert	Hornfels/Basalt	Orthoquartzite	Quartzite	Silicified Wood	Total
Total	34	29	53	4	10	1	131
Large	23	4	28	1	5	0	61
Small	11	25	25	3	5	1	70
Cortical	13	6	19	1	4	0	43
Noncortical	21	23	34	3	6	1	88
Complex	14	10	10	2	0	1	37
Shatter	6	4	14	0	4	0	28
Biface-Thinning	0	1	1	0	0	0	2
Simple	14	14	28	2	6	0	64

Table 5.2: Stone Tool Type by Material Group for 5LA9958.

	Type					
Material	Core	Projectile	Flake Tool	Mano	Metate	Total
Argillite	2	0	2	0	0	4
Chert	1	2	1	0	0	4
Hornfels/Basalt	1	0	0	0	0	1
Obsidian	0	1	0	0	0	1
Orthoquartzite	0	1	1	0	0	2
Sandstone	0	0	0	3	1	4
Total	4	4	4	3	1	16

The site is positioned at the interfingering contact of arroyo overbank deposits and at the terminal end of a large alluvial fan extending down to the site from the hills to the north. Though this combination suggests that cultural materials may have been capped, the surface remains appear to be in deflated context. There were surface indications of thermal features in the form of scattered FCR in many areas. Perhaps, the site functioned as a field camp. Natural formation processes have greatly impacted the surface materials, but buried cultural materials are possible. The site needs Phase II testing before the proper eligibility recommendation can be given. For now, our management recommendation is that the site be avoided and areas where there is potential for location subsurface deposits should be tested to determine their presence of absence.

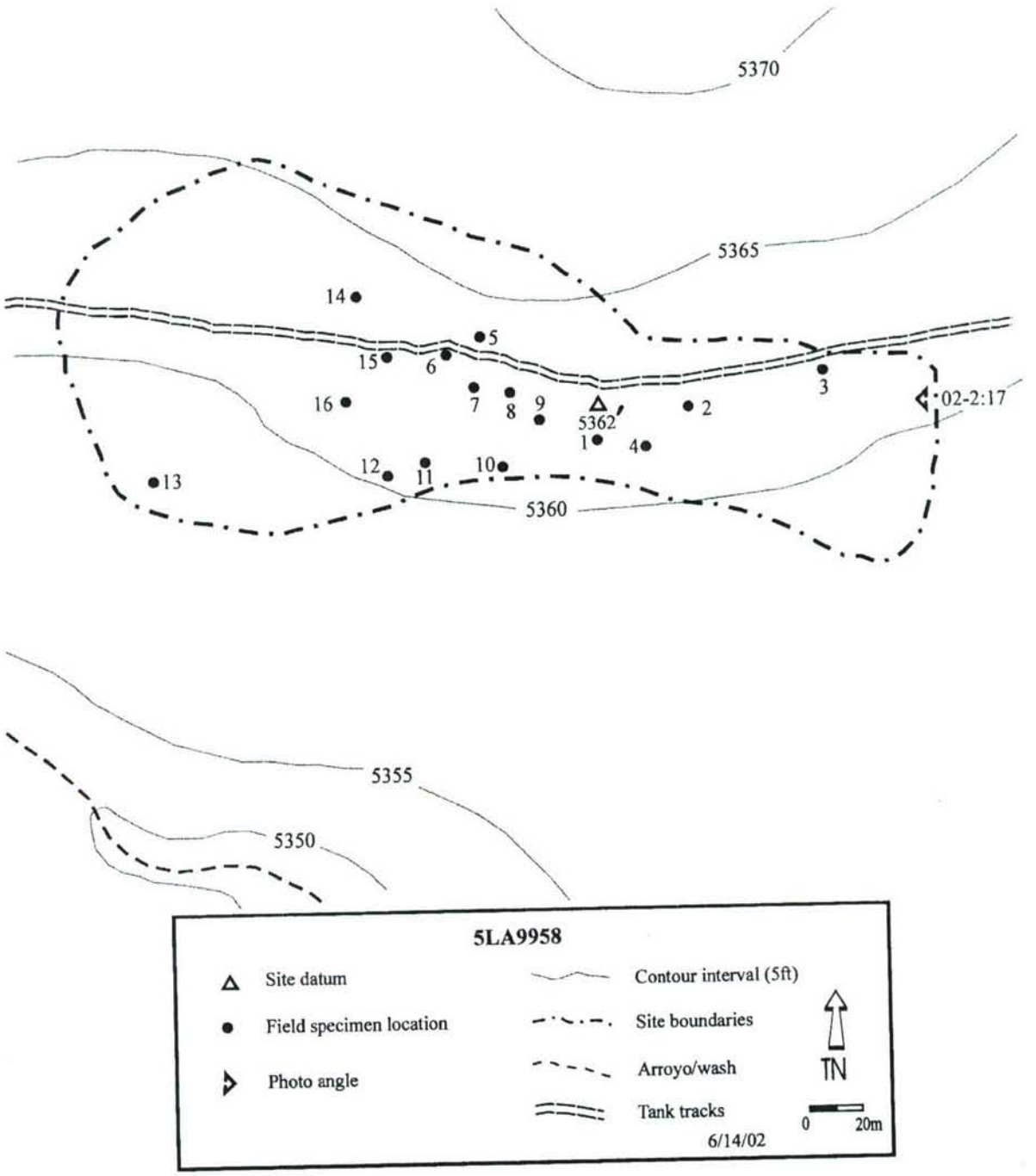


Figure 4.17: Site map, 5LA9958

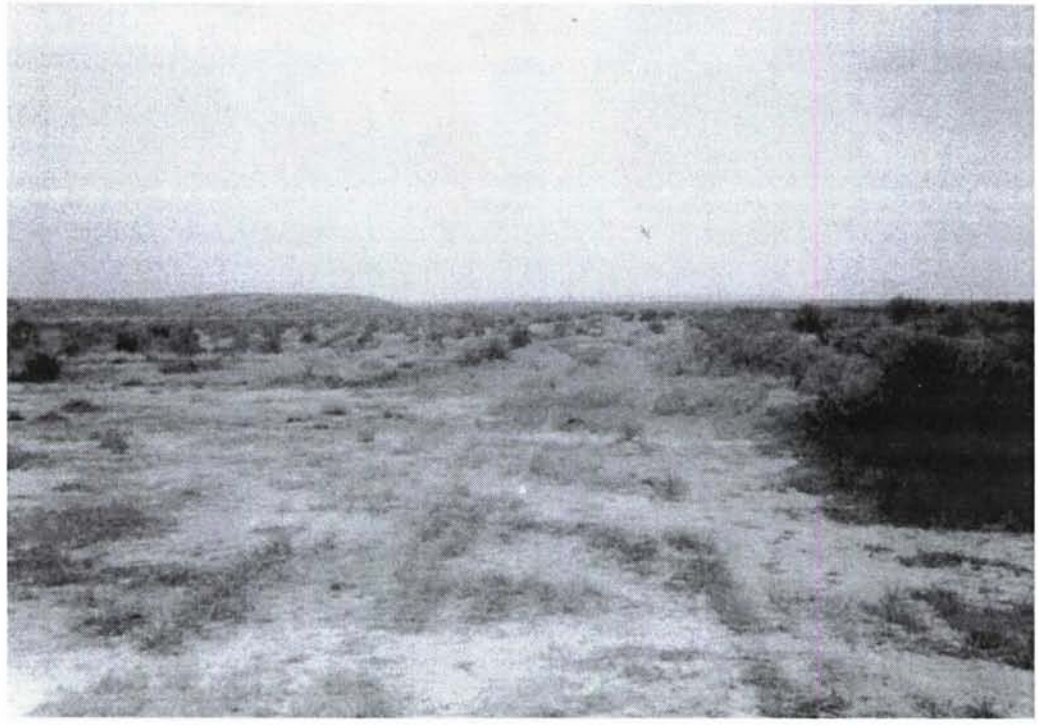


Figure 4.18: Site overview photograph, 5LA9958 (02-2:17).

5LA9959

This multi-component lithic scatter was found along the north end of the Big Arroyo Hills. Overall, the landform contains little sediment depth; however, in one small erosional basin, soil deposition exceeds 1.5 m. Here, among arroyo cuts, at least two distinct occupations were eroding out at the modern ground surface. The first is Late Prehistoric in age, based on a diagnostic projectile point. This component appears significant as it contains a hearth with visible charcoal. A second occupation, one vertical meter below the hearth (in stratigraphic profile), contains a nearly complete, and highly patinated Paleoindian projectile point, and two piles of fire-cracked rock (FCR).

Consisting primarily of a lithic scatter with a dense concentration of flaking debris and tools near its datum, the site was encountered in an area of small drainages near the northern border of the PCMS (Figures 4.19 and 4.20). Set in a woodland plant community, there is thick juniper and pinon cover around the boundary and sparse vegetation, comprised of ricegrass, mountain mahogany, cholla, threeawn, and prickly pear, elsewhere. Disregarding the site proper, sediments on the landform were shallow. Highly consolidated shales and limestones outcrop throughout this part of the military installation. Within the site boundary, sediment deposition is significant (up to 1.5 m). These soils were characterized as light-brown, silty clay.

A total of three features were recorded, all classified as hearths. Feature 1 is a 60 cm diameter hearth exposed in the sidewall of one of the small arroyo cuts. Its substrate, filled with

ash and charcoal, is likely Late Prehistoric in age. The other two thermal features (Features 2 and 3) were more like piles of FCR with no visible ash staining. If visible appearance is a reliable indicator, the three hearths represent two distinct cultural manifestations. Features 2 and 3 were found at the same elevation as the Paleoindian point, suggesting a possible vertical relationship.

Recorded artifact classes (Table 4.10) include debitage (76 pieces), patterned chipped-stone tools (15), and ground stone (9). Miscellaneous artifacts, in the form of four hammerstones, two charcoal specimens, an edge-ground cobble (FS 26), a large piece of FCR, and a steatite bowl fragment (FS 16), were also identified. Of the debitage, 34 items were argillite, 33 were basalt, five were chert, and four were quartzite (Table 4.9). The argillite and basalt materials seem to represent two distinct occupations as 22 pieces are highly patinated and 44 are not. Early-stage raw material reduction was the dominant reduction strategy as 63 items were classified as simple flakes. The remaining debitage included complex flakes (12) and shatter (1). Over 71% of the debitage items were large and 29% were small; 78% were noncortical and 22% exhibit varying degrees of dorsal cortex.

Table 4.9: Summary Description of Chipped-Stone Debitage for 5LA9959.

	Argillite	Chert	Hornfels/Basalt	Quartzite	Total
Total	34	5	33	4	76
Large	26	1	25	2	54
Small	8	4	8	2	22
Cortical	10	0	6	1	17
Noncortical	24	5	27	3	59
Complex	4	3	5	0	12
Shatter	0	1	0	0	1
Biface-Thinning	0	0	0	0	0
Simple	30	1	28	4	63

Table 4.10: Stone Tool Type by Material Group for 5LA9959.

	Type									
Material	Biface	Core	Projectile	Scraper	Flake Tool	Mano/Edge	Metate	Bowl	Hammerstone	Total
Argillite	0	4	0	0	0	0	0	0	1	5
Chert	1	0	1	0	0	0	0	0	0	2
Hornfels/Basalt	0	4	0	0	2	0	0	0	2	8
Orthoquartzite	0	0	0	1	0	0	0	0	0	1
Quartzite	0	0	1	0	0	1	0	0	0	2
Sandstone	0	0	0	0	0	5	4	0	1	10
Steatite	0	0	0	0	0	0	0	1	0	1
Total	1	8	2	1	2	6	4	1	4	29

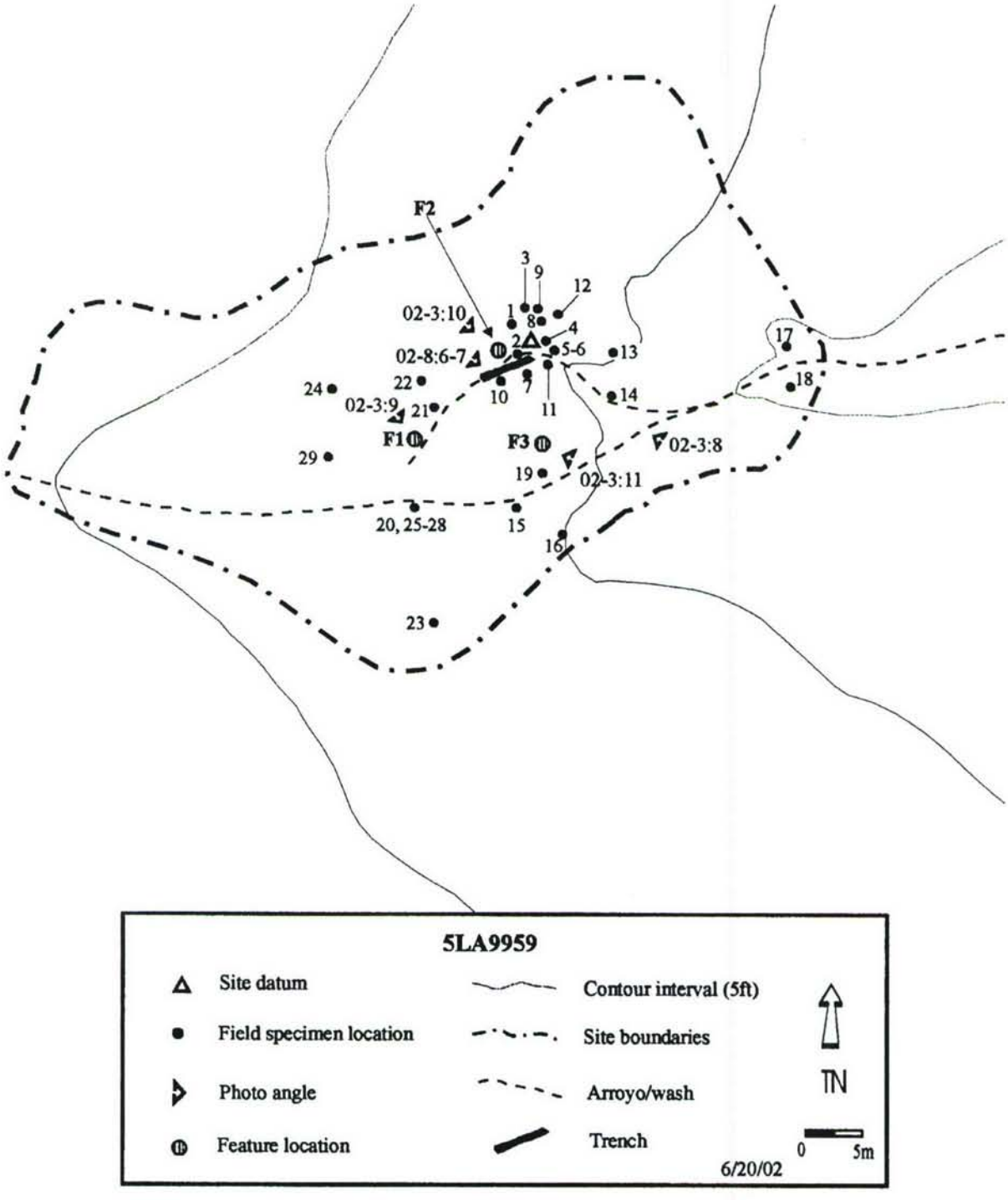


Figure 4.19: Site map, 5LA9959.

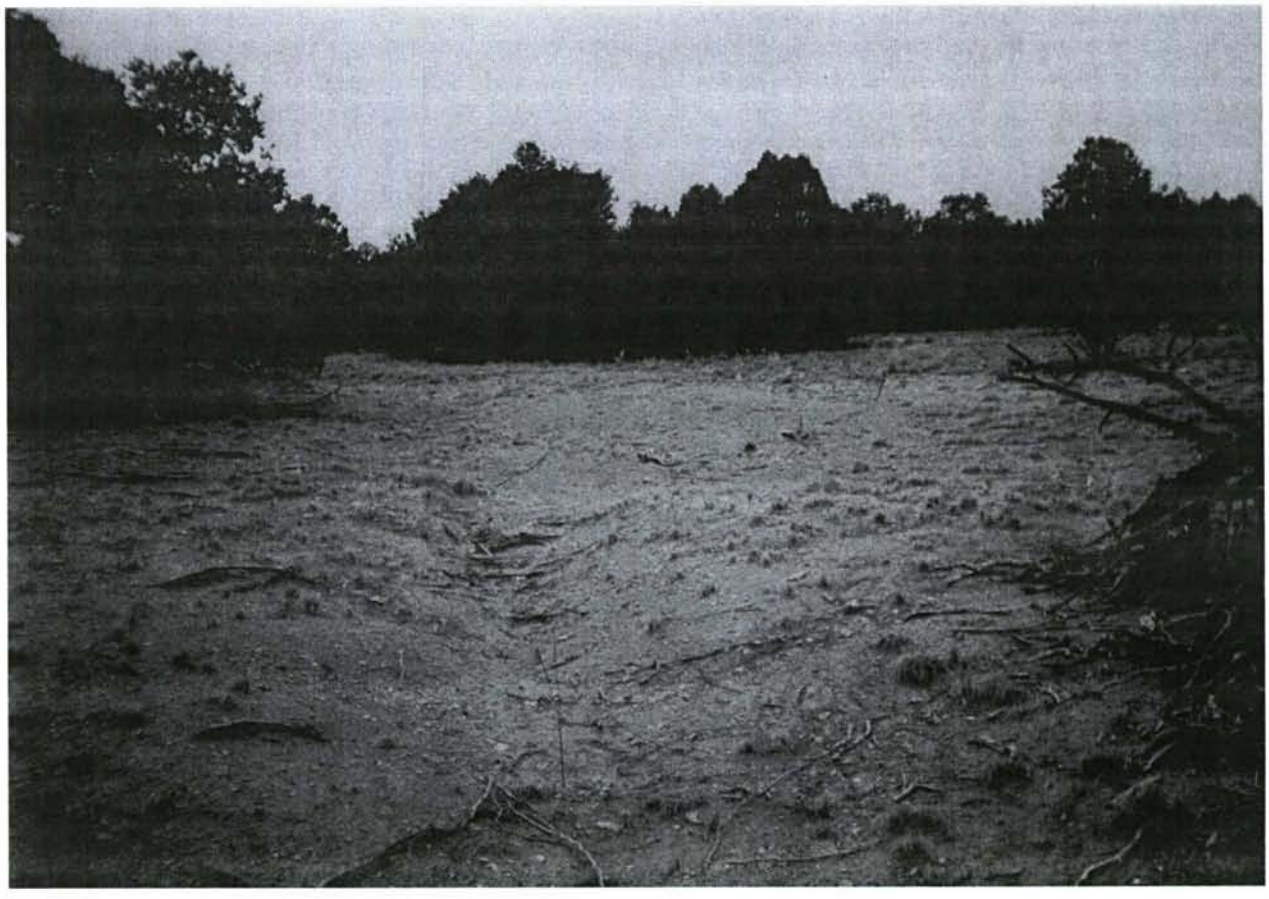


Figure 4.20: Site overview photograph, 5LA9959 (02-3:8).

Most chipped-stone tools were clustered in the vicinity of Feature 2 and include eight non-bipolar cores, three utilized flakes (two basalt, one argillite), two projectile points (fine-grained quartzite and argillite), and an orthoquartzite side scraper. Both projectile points were temporally diagnostic and support the site as being multi-component in composition. The large point fragment (FS 1) is argillite and a thick pink patina has developed over its surface (Figure 6.8). Its tip has broken off (in the not so distant past as this break has not patinated) and it exhibits edge grinding and a concave base. Hofman (personal communications, 2001) indicates it likely Plainview (8500-7700 BC). The small point (FS 23) most closely resembles Anderson's (1989) P59 type (AD 500 to AD 1200).

Ground-stone tools were recovered randomly from the surface, but FSs 20, 27, and 28, as well as the edge-ground cobble, were found in a looters pile at the west edge of the site. Ground-stone tools include four mano fragments, three slab metate fragments, a complete mano, and a whole slab metate.

Site 5LA9959 contains three hearths and a multi-component lithic debris scatter. Found among the detritus, and in the vicinity of Feature 2, was a patinated Paleoindian point made of locally available argillite. A test trench near Feature 2 showed intact buried deposits in this area of the site. A charcoal sample (from the floor of the trench) was sent to Geochron Labs and

furnished a date of 3680 +/- 40 years BP (Appendix VI). As such, it appears the site may have a Middle Archaic component and perhaps, the Paleoindian point was curated at this time. The two deflated hearths (Features 2 and 3) were found at nearly the same contour elevation and may be associated with the Paleoindian point. There was another hearth (Feature 1), higher in the stratigraphic sequence, which contained a thick layer of ash. This feature was encountered at roughly the same contour interval as the Late Prehistoric age point. Test excavations in this feature would likely lead to the recovery of pollen, faunal, and macrobotanical remains, these critical for addressing the research domains of subsistence, paleoenvironment, and chronology.

Based on the presence of intact buried deposits, and a rare Paleoindian projectile point, we recommend this site eligible for listing on the NRHP. Our management recommendation is to avoid the site and to continue Phase II testing of the deposits in an attempt to determine if a buried Paleoindian component exists.

5LA9964

This small site consists of rock art panels and a sparse scatter of lithic debris. It was encountered on the east side of a small drainage in the upper Bent Canyon system. The .18 ac site extends down the slope and into the arroyo (Figures 4.21 and 4.22). It was here that numerous large and small sandstone boulders were scattered across the surface, and these would have afforded prehistoric site occupants some degree of shelter from the elements.

Located in a plant community dominated by juniper, the vegetation also includes some grama grass and mountain mahogany. Soils were relatively shallow (up to ca 10 cm) and erosion has exposed Dakota sandstone bedrock in the drainage bottoms. However, there may be intact deposits in the area above the rock art panels.

Panel 1 is the main panel on the site, and was located on the cliff face east of the canyon bottom. The panel faces west at 270°, with an approximate inclination of 100°. The panel dimensions were 140 cm in height by 120 cm in width. The height of rock art elements above the present ground level, a sandstone ledge, varies from 255 cm to 110 cm. The solid pecked petroglyphs on the panel exhibit a shallow "u" shape cross-section with an approximate depth of 5 – 10 mm and a width of 1.5 - 2 cm.

The panel elements consist of six quadrupeds of varying sizes, and some have deteriorated to the point that the quadruped shape has become a bit difficult to distinguish (Figure 4.23). The focal point of the panel is a large quadruped, measuring 72 x 51 cm, which is located 64 cm from datum. Two smaller elements are to the right of the large quadruped: one is a small horned quadruped, measuring 23 x 17 cm, at 91 cm from the datum point, and just below this is a three-legged quadruped with horns, measuring 15.5 x 17.5 cm, at 78 cm from the datum. Just right of these two elements is a medium-sized four-horned quadruped with a possible spear imbedded in its side; the total composition measures 40 x 39 cm, at 96 cm from datum. Directly below this element is another medium-sized quadruped with a long neck and long ears, measuring 46.5 x 45 cm. The last highly eroded element is a small quadruped with horns, measuring 21 x 19 cm.

Overall, the panel condition is fair, as the natural colored surface background is darkly patinated with varnish. The rock surface color is dark grayish brown (Munsell # 10YR 4/2), and the design colors are light gray (Munsell # 10R 7/2) and light yellowish brown (Munsell # 10R 6/4). Weathering is causing some deterioration of the panel surface, and continues to further threaten the panel.

Figure 4.21: Site overview photograph, 5LA9964 (02-6:5).

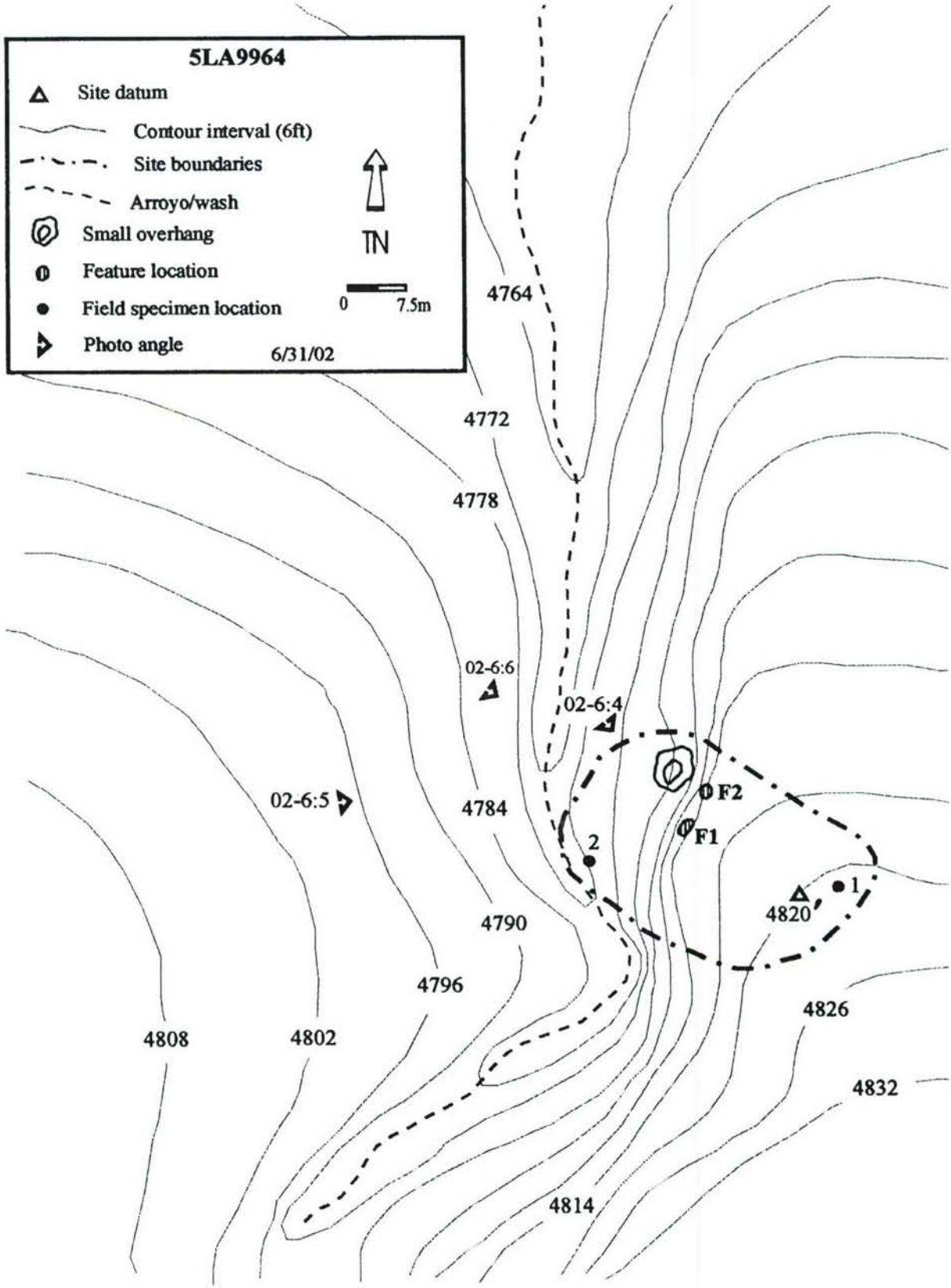


Figure 4.22: Site map, 5LA9964.

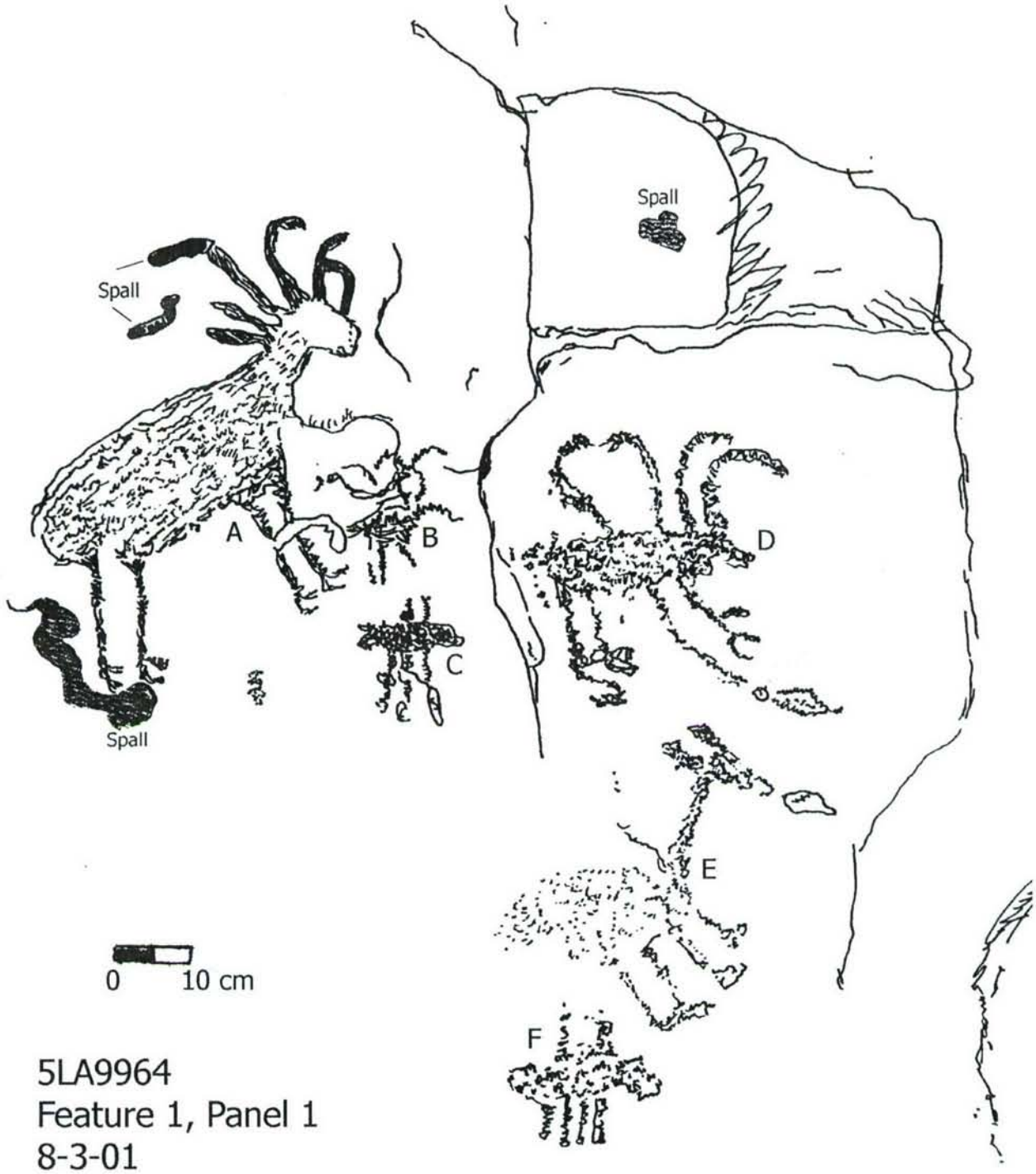


Figure 4.19: Profile map of Feature 1, rock art Panel 1, 5LA9964.

Panel 2 is directly below Panel 1 (the large deer panel), and is located on an upward facing ledge. The panel faces west at 270° east of magnetic North with an approximate inclination of 135°. Dimensions of the panel are 40 cm in length by 60 cm in width. The height of rock art elements from present ground level is highest at 90 cm, and lowest at 60 cm. The rock art elements are solid pecked petroglyphs with a trough shape cross-section measuring approximately 5 mm in depth and 1 to 1.5 cm in width.

There were six rock art elements on the panel. One, an eared quadruped, has a long tail with a blob on its end. It measures 9.5 x 14 cm, and is located 26 cm from the datum point. Another quadruped with short ears and no tail measures 7 x 9.5 cm, and is 35 cm from the datum. Below this quadruped is a "U" shape made from dots, measuring 6 x 4.25 cm overall. Directly below the "U" shape is a vertical line, measuring 10 x 0.5 cm. Below this is a series of intersecting lines of dots, measuring 8 x 11 cm. Three amorphic shapes were found to the right of the vertical line; they measure 3.5 x 21 cm and are 33.5 cm from the datum point.

Panel 1 was in fair condition, as its background surface is natural and darkly patinated with varnish. The color of the rock was very dark gray (Munsell # 10YR 3/1), and the design colors were grayish brown (Munsell # 10 YR 3/1) and pale gray (Munsell # 10 YR 6/3). Weathering will continue to cause deterioration of the elements on the panel.

Panel 3, to the left of the large deer panel, consists of modern pecking. The panel faces west at 270° east of magnetic north, with an approximate inclination of 105°. The panel measures 20 cm in height by 11 cm in width. Height of rock art elements from present ground level was highest at 141 cm and lowest at 130 cm. The single stippled petroglyph has a cross-section shape of shallow pits, with the approximate depth of 1 mm and 1 to 2 cm in width. The element is an oval with circles and a line at top (resembling a "Venus" figure), and measures 20 x 11 cm. Overall, the panel was in fair condition and its surface background natural and darkly patinated. Rock surface color was black (Munsell # 10YR 2/1), and design color was very pale brown (Munsell # 10YR 7/3). Weathering has caused some deterioration and the panel continues to be threatened by exposure to the elements.

Erosional processes have heavily impacted the surface of the site. Thus, only a few surface artifacts were encountered. The artifact assemblage includes three coarse-grained quartzite items – an end/side scraper, polishing stone, and simple flake. A single piece of argillite shatter was also recorded.

We recommend this site eligible for listing on the NRHP. The rock art elements embody the distinctive characteristics of the Purgatoire Petroglyph style (Criterion C), and ultimately, their distinctness of design may allow chronological placement within the regional system. Though the site was small with sparse artifact density, the rock art elements, especially those in Feature 1, are rather unique for the PCMS. This canyon area is not in danger from military maneuvers, and our management recommendation is that the site be monitored periodically for natural erosional impact.

5LA9965

The site is located at the east end of the Hogback near the confluence of Van Bremer Arroyo and its largest southern confluence. Permanent water, a spring and a deep sandstone water catchment, was found in Van Bremer Arroyo 450 m to the northwest. Situated on the southern canyon rim at the terminal end of a large alluvial fan, the site has small drainages along its east edge and several small erosional features crosscut the landform (Figures 4.24 and 4.25). Artifact density is variable, with some clustering at the base of the alluvial fan (the highest density occurs around the 5,146 ft contour interval). This large lithic scatter covers more than 12.7 ac.

The site was in a grassland vegetative community. Blue grama, galleta grass, tumble grass, sand dropseed, threeawn, cholla, and sparse juniper were observed growing on the surface. Deposits were deep within the alluvial fan, but the modern surface sediments (silt with intermixed basalt and shale gravel) appear shallow (10 and 20 cm). Areas of sandstone bedrock were visible at the scatters northern margin and near the cliff edge.

No structures or fire features were identified, though 5LA5372, a large spaced-stone circle habitation sites, is 350 m to the east. Site 5LA5379, a large lithic scatter with rockshelters is 400 m to the west.

The field crew recorded a 151-piece debitage sample (Table 4.11). Nine material types were noted, which is a relatively wide range for sites near the Hogback. Of the total, 83% is hornfels/basalt, 5% chert, 3% argillite, 3% orthoquartzite, 2% coarse-grained quartzite, 2% fine-grained quartzite, and the remaining 2% chalcedony, dendritic chert, and Ralston Creek chert. In this assemblage, 60% was the large size grade, while the remaining 40% small; only 7% of the debitage had cortex and 93% was noncortical; 46% was recorded as complex flakes, 38% as simple flakes, 7% as shatter, and 9% bifacial-thinning flakes. The bifacial-thinning flakes (13) and small complex flakes (18) were made out of six material types, so at least that many bifaces were manufactured within the current site boundaries. Several of the chert pieces appear to be Smoky Hills jasper and were the only non-local materials represented in the artifact assemblage.

Freehand percussion was the dominant technique for generating the debitage. The low percentage of cortical items indicated that materials were initially reduced at the quarry (on the Hogback for hornfels/basalt) and brought to the site as noncortical cores or large flake blanks.

A single diagnostic projectile point was recovered near the northern border. It was made of chert, its base broken, and classified in Anderson's (1989:165) system as a P43 (3000 BC to 500 BC). In addition, 40 utilized flakes, nine bifaces, five cores, an end scraper (fine-grained quartzite), and a uniface tool (argillite) were recorded (Table 4.12). Of the utilized flakes, 34 were argillite, two were coarse-grained quartzite, and there were single specimens of Black Forest silicified wood, unspecified chert, fine-grained quartzite, and baked claystone. This is the largest collection of utilized flakes on the western half of the PCMS. Observed edge angles indicate that 39 of the utilized flakes were used for scraping. The bifaces were argillite (6), fine-grained quartzite (2), and coarse-grained quartzite (1). Five of these were classified as unfinished (broken in the manufacturing process), three were nearly finished bifaces, and one

was a finished biface that broke while being used. FSs 11 and 56 were biface knives. FS 56 also has a distinct graver spur on one lateral edge. Four of the bifaces are heavily patinated suggesting the site was used for argillite and basalt procurement during the Archaic period. All of the cores were recorded in the field and not collected. These included specimens of hornfels/basalt (4) and coarse-grained quartzite (1).

Table 4.11: Summary Description of Chipped-Stone Debitage for 5LA9965.

	Argillite	Chalcedony	Chert	Hornfels/Basalt	Orthoquartzite	Quartzite	Total
Total	3	2	10	126	4	6	151
Large	3	1	4	79	1	3	91
Small	0	1	6	47	3	3	60
Cortical	0	0	1	9	1	0	11
Noncortical	3	2	9	117	3	6	140
Complex	2	2	4	58	1	2	69
Shatter	0	0	2	9	0	0	11
Biface-Thinning	0	0	0	10	2	1	13
Simple	1	0	4	49	1	3	58

Table 4.12: Stone Tool Type by Material Group for 5LA9965.

	Type							
Material	Biface	Core	Projectile	Scraper	Flake Tool	Mano	Metate	Total
Argillite	6	0	0	0	35	0	0	41
Black Forest	0	0	0	0	1	0	0	1
Chert	0	0	1	0	1	0	0	2
Course-grained Quartzite	1	2	0	0	2	0	0	5
Fine-grained Quaertzite	2	0	0	1	1	0	0	4
Baked Clay	0	0	0	0	1	0	0	1
Hornfels/Basalt	0	4	0	0	0	0	0	4
Sandstone	0	0	0	0	0	1	1	2
Total	9	6	1	1	41	1	1	60

Only two pieces of ground stone were encountered: a one-hand mano and a slab metate fragment. The chipped-stone tool to ground-stone tool ratio was 28:1 indicating that the camp subsistence activities more likely revolved around hunting.

We recommend this site be determined eligible for the NRHP on the grounds that it is likely to yield information important to our understanding of prehistory (Criterion D). Several artifacts hint at being Paleoindian or early Archaic in age (based on stylistic variables and heavy artifact patination). Scattered pieces of FCR also suggest thermal features in buried context. The areas containing the FCR should be tested to determine the presence or absence of intact buried deposits. Though this large site likely functioned for animal food procurement/processing, it also was a location where high-quality lithic materials could be obtained. There are many large spaced-stone circle sites within 1 km of 5LA9965 and perhaps

5LA9965 was the location where the large-scale subsistence activities were performed.

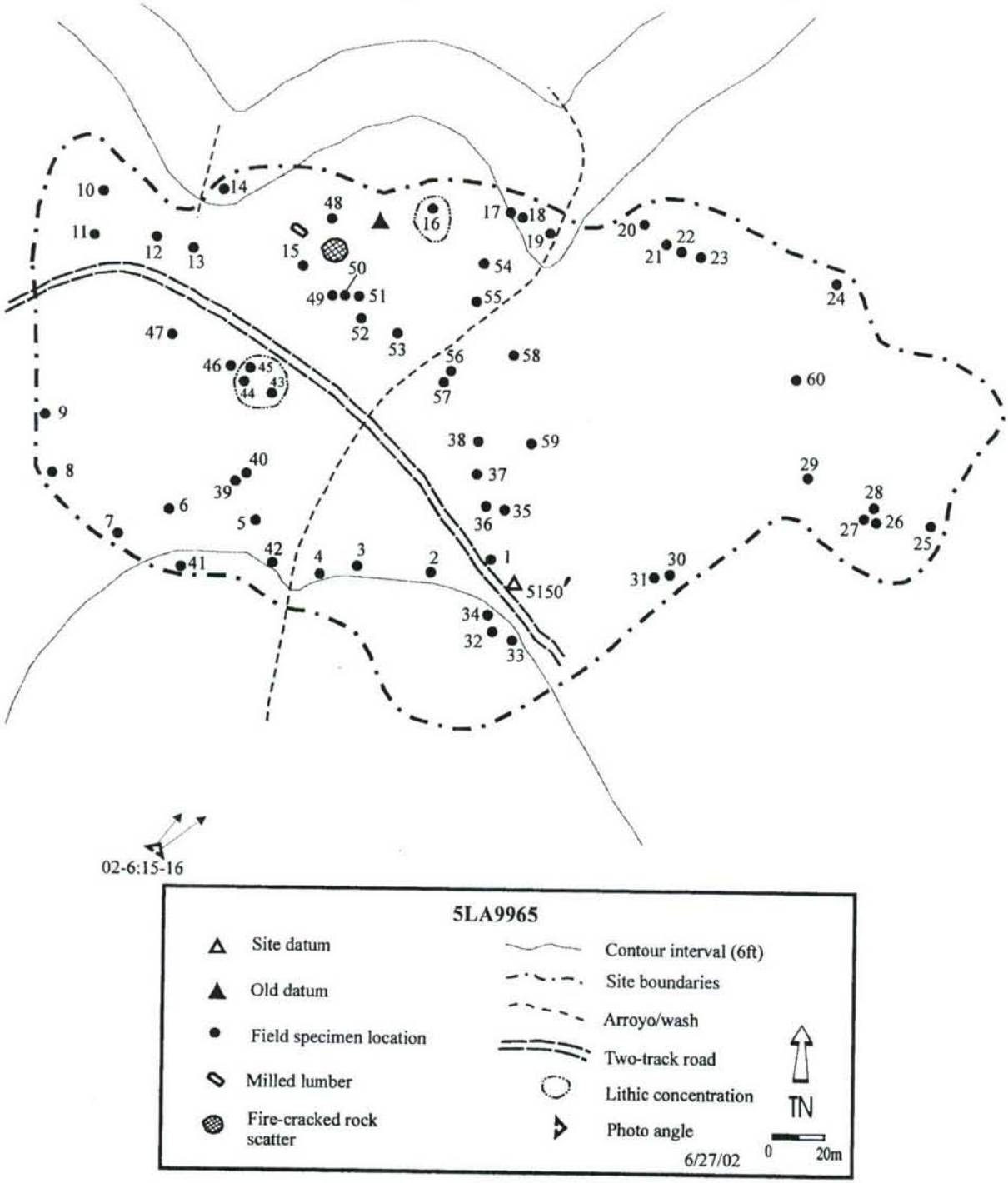


Figure 4.24: Site map, 5LA9965.

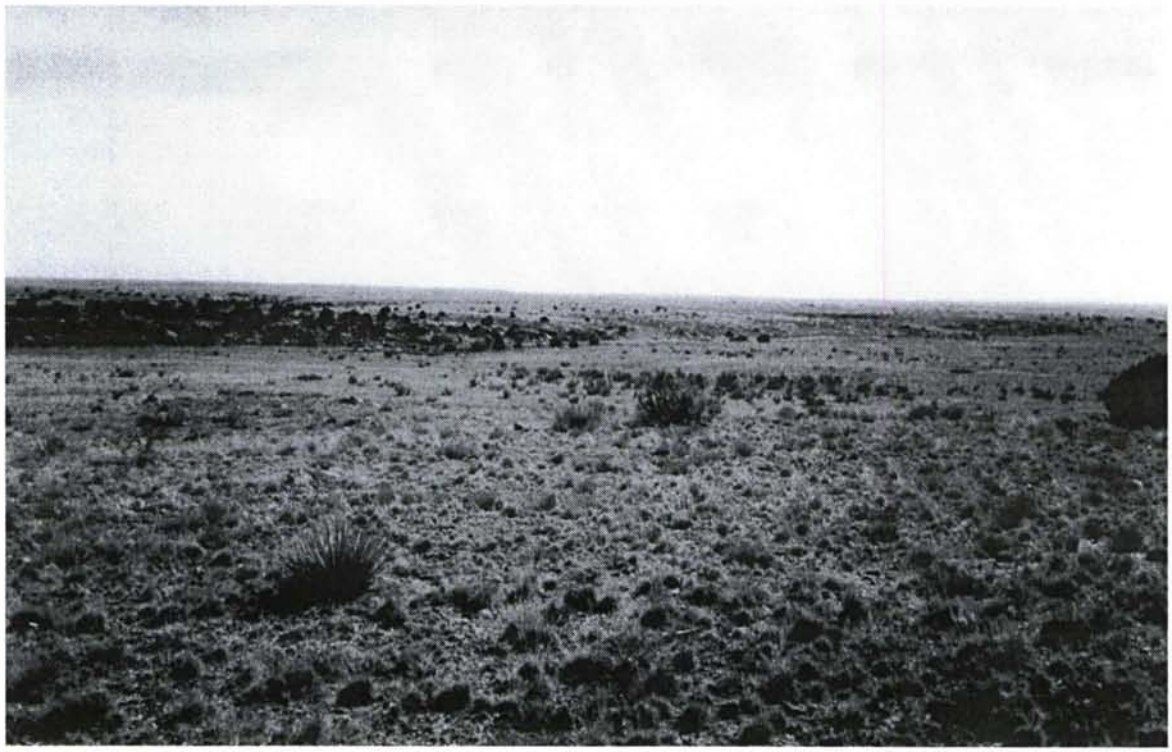


Figure 4.25: Site overview photograph, 5LA9965 (02-6:16).

5LA9990

This large lithic scatter was situated in the Van Bremer Arroyo floodplain 2.3 km west of Brown Sheep Camp. It lies parallel to a low east/west trending erosional terrace, and was 80 m north of the arroyo (Figures 4.26 and 4.27). An area of permanent springs and water catchments exists 170 m southwest along the arroyo drainage. The surface of the site dips from north to south at 1 to 10°. Many artifacts were identified in the western half of the site and were exposed on the top of the terrace. Like many of the other sites along Van Bremer Arroyo, some of the artifacts have deflated to their current position on the land.

The site datum was centrally placed in the surface scatter at an elevation of 1,636 m (5,367 ft). Shrubland vegetation covers the landform. Greasewood, saltbush, alkali sacaton, cholla, prickly pear, snakeweed, and rabbitbrush were the dominant plant types observed by the field crew. Most vegetation was found in small patches, and for the most part, the ground surface visibility was excellent. Soils were thick in this part of the floodplain (up to 2 m) and result from the accumulation of secondary deposits at the foot of an alluvial fan; the fan extends south from the hills north of the site.

A total of 143 artifacts were recorded, including 132 pieces of debitage, 10 chipped-stone tools, and a single slab metate fragment. As would be expected in this part of the PCMS, hornfels/basalt (26%) and argillite (24%) were the dominant material classes recorded for the

debitage. Remaining materials were chert (15%), coarse-grained quartzite (13%), fine-grained quartzite (11%), orthoquartzite (5%), silicified wood (2%), obsidian (2%), and chalcedony (1%). FS 4 was identified as obsidian from Canovas Canyon, NM (Appendix V), this is the first example of this material ever having been transported to the PCMS. The debitage was classified as complex flakes (44%), simple flakes (41%), shatter (14%), and bifacial-thinning flakes (1%). Most of the assemblage was noncortical (85%) and small in size (57%). It appears that earlier stages of lithic reduction were responsible for generating most of the surface flaking debris. The low percentage of cortical items, but overall large size of the pieces may indicate that the initial size of the raw material, once reduced on the site, was large. The presence of a single bifacial-thinning flake and numerous small complex flakes suggests that early- to late-stage biface manufacture also occurred within the site boundary. Various degrees of patination were observed in the debitage and suggest more than one prehistoric occupation is responsible for the assemblage.

Based on the age of the one temporally diagnostic point recovered on 5LA9990, at least one occupation dates to the Late Prehistoric period. FS 1 is a small fine-grained quartzite preform. In Anderson's (1989) point classification system it would be a P49 (AD 800 to 1750). Another point (FS 7) was hornfels/basalt, and large in size, but its fragmented nature makes it impossible to type. The remaining tools were non-bipolar cores (two argillite and one basalt), two fine-grained quartzite bifaces, and three utilized flakes (one chert, one fine-grained quartzite, and one siltstone). Both bifaces were broken late in manufacture. Patterned surficial flaking suggests that FS 8 may be of Paleoindian age, but its highly fragmented condition makes this determination tenuous.

Like other sites in this part of the PCMS, 5LA9990 seems rather plain when the artifact assemblage is considered. There is no evidence it ever functioned for habitation. A lack of vegetal processing tools suggests a reliance on hunting instead of gathering and the debitage assemblage data suggests that the site occupants, regardless of temporal affiliation, were relatively mobile.

This being said, NMSU archaeologists suspect that there are buried occupation surfaces at the terrace/alluvial fan contact at the north edge of the site. The southern site artifacts were capped by these deposits at one time, but now they have deflated down to their current position on the modern ground surface. This inference is supported by the fact that the recorded cultural materials were of mixed temporal affiliation. Numerous pieces of scattered FCR were also observed around the site in no apparent concentration. These were from thermal features that had been destroyed by natural formation processes in the past.

Though the integrity of the site is suspect, we recommend the site eligible for listing on the NRHP as it is likely to field information important to our understanding of prehistory (Criterion D). We suggest the site be revisited and the northern half tested to determine whether buried and intact cultural materials exist. Until testing can occur, the site needs avoided to prevent adverse impacts.

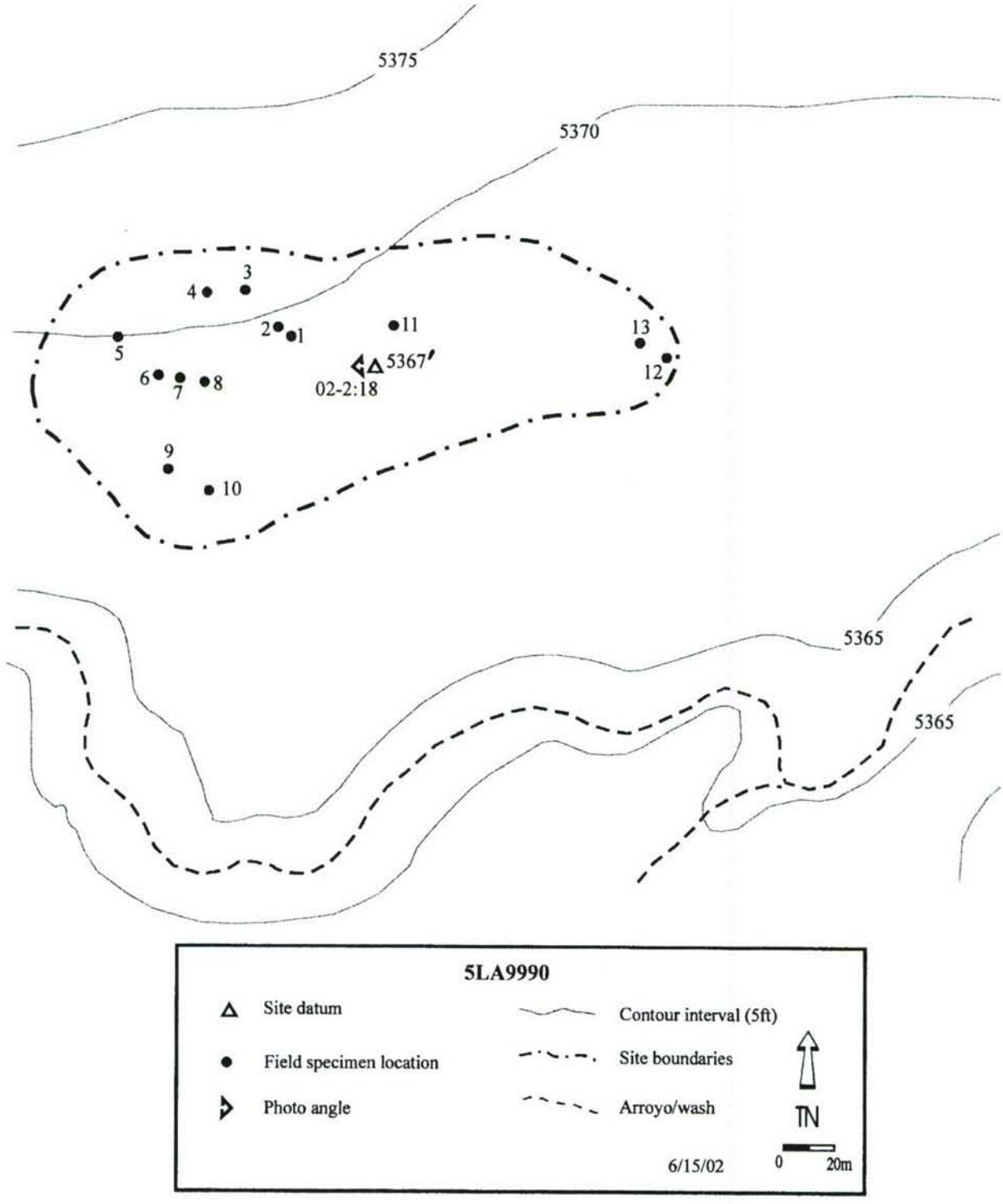


Figure 4.26: Site map, 5LA9990.

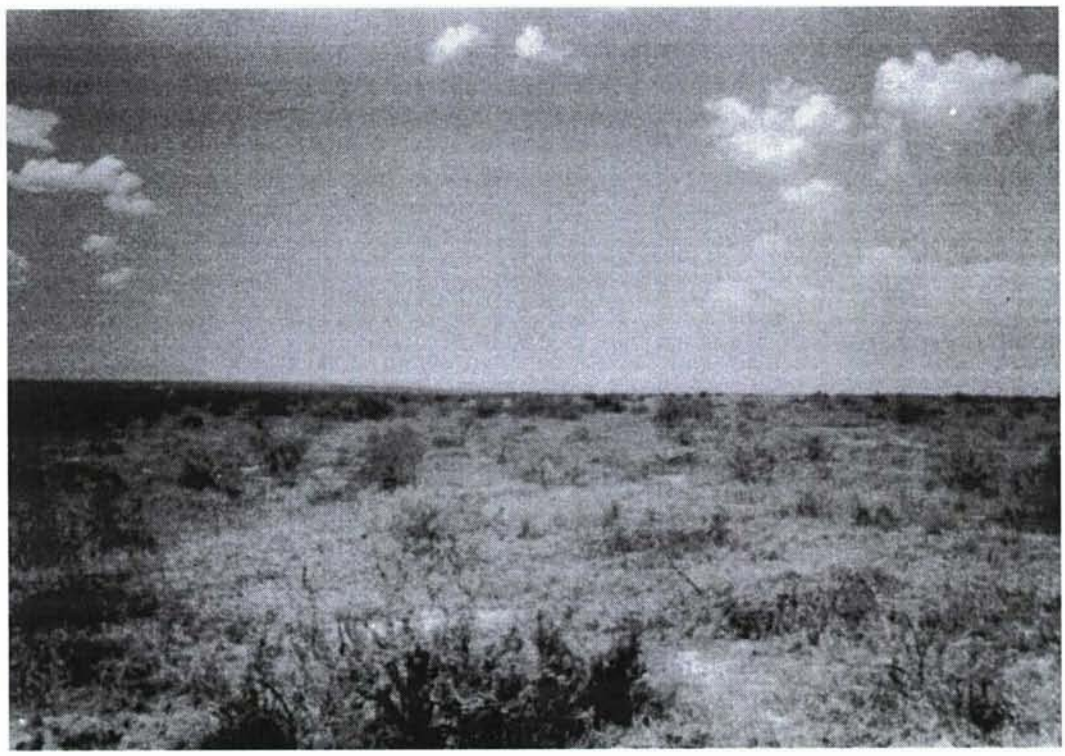


Figure 4.27: Site overview photograph, 5LA9990 (02-2:18).

5LA9991

The site includes sparsely scattered lithics with no definite cultural clustering (Figures 4.28 and 4.29). It covers 4 ac at the base of a slope on the north side of the Van Bremer Arroyo floodplain. The surrounding vegetation includes greasewood, saltbush, alkali sacaton, cholla, prickly pear, and rabbitbrush. All of the lithic materials were encountered in blowout areas between sparse patches of vegetation, suggesting they deflated down to their recorded positions. That being said, a natural terrace forms at the northern site boundary and it is here that most of the site artifacts were clustered. Buried cultural materials are evident along this terrace, but it is unknown whether a prehistoric occupation surface is beginning to expose or secondary soils with mixed artifacts are simply eroding out.

The 77 pieces of debitage were made of the following materials: argillite (34), hornfels/basalt (31), chert (10), quartzite (1), and silicified wood (1). Most of these were classified as simple flakes (44), and shatter (25), so early-stage raw material reduction was the obvious reduction strategy. Only eight complex flakes were recorded, and of these, only two were small in size. Found scattered in the surface detritus were three non-bipolar cores (argillite, coarse-grained quartzite, and basalt), a projectile point (chert), two slab metate fragments (sandstone and quartzite), and a quartzite mano fragment. The projectile point is P79, based on Anderson's (1989) classification system, and dates between AD 1000 and AD 1750.

5LA9991 is one of many surface lithic scatters along the Van Bremer floodplain that has been exposed by natural formation processes. However, the site is located on an active alluvial

fan that is continuously being downcut by flooding episodes in the Van Bremer Arroyo. The landform containing this site is likely preserving intact and very old soils as evidenced by the presence of patinated surface gravels eroding out of the floodplain, terrace contact. The site needs to be tested to determine its eligibility status and should be avoided until testing can be performed. For now it is eligible for listing on the NRHP. After testing, the management recommendation and eligibility determination can be reassessed.

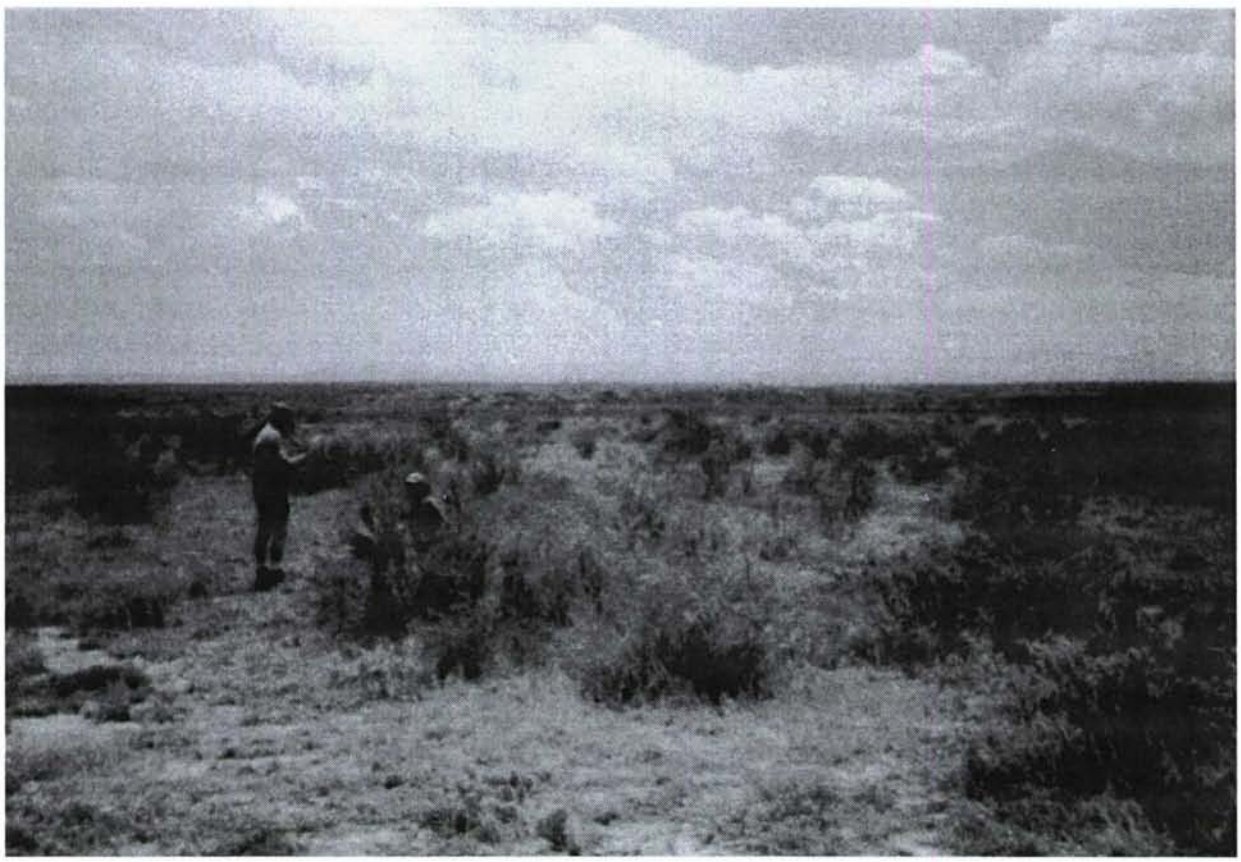


Figure 4.28: Site overview photograph, 5LA9991 (02-2:19).

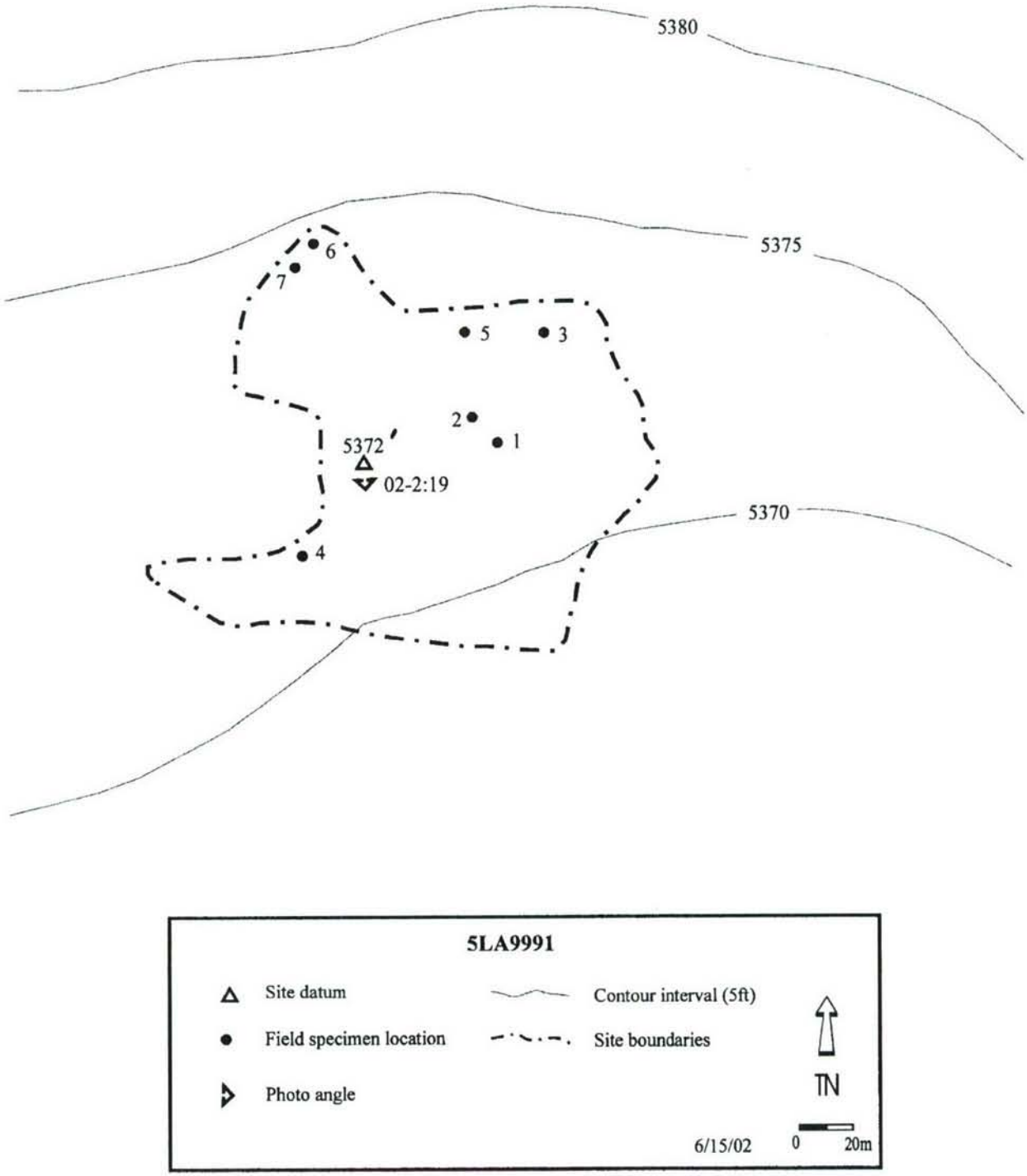


Figure 4.29: Site map, 5LA9991.

5LA9992

The site consists of widely scattered flakes within an area of nearly 2 ac. Several apparent lithic concentrations were noted within the scatter but this may be the result of natural formation processes as the artifacts have deflated into large erosional pockets among the surface vegetation. The site was situated on the north edge of the Van Bremer Arroyo floodplain 2 km upstream from Brown Sheep Camp. Hornfels/basalt dominates the flaking debris with nine pieces, compared to four pieces of chert and four pieces of argillite. A granite mano was recorded south of the site datum.

The site was located at the edge of an alluvial fan /Van Bremer floodplain contact (Figures 4.30 and 4.31). All of the artifacts have eroded out at this contact and suggest a buried prehistoric site is beginning to expose on the modern ground surface. The site requires Phase II testing to determine the nature of the eroding cultural materials. Surface remains suggest that 5LA9992 is a food procurement location. If intact deposits exist then test excavations will provide data for the reconstruction of subsistence patterns and/or paleoenvironment. As such, the site is eligible for listing on the NRHP as it is likely to yield information important to prehistory (Criterion D). It needs to be avoided until eligibility testing can be performed.

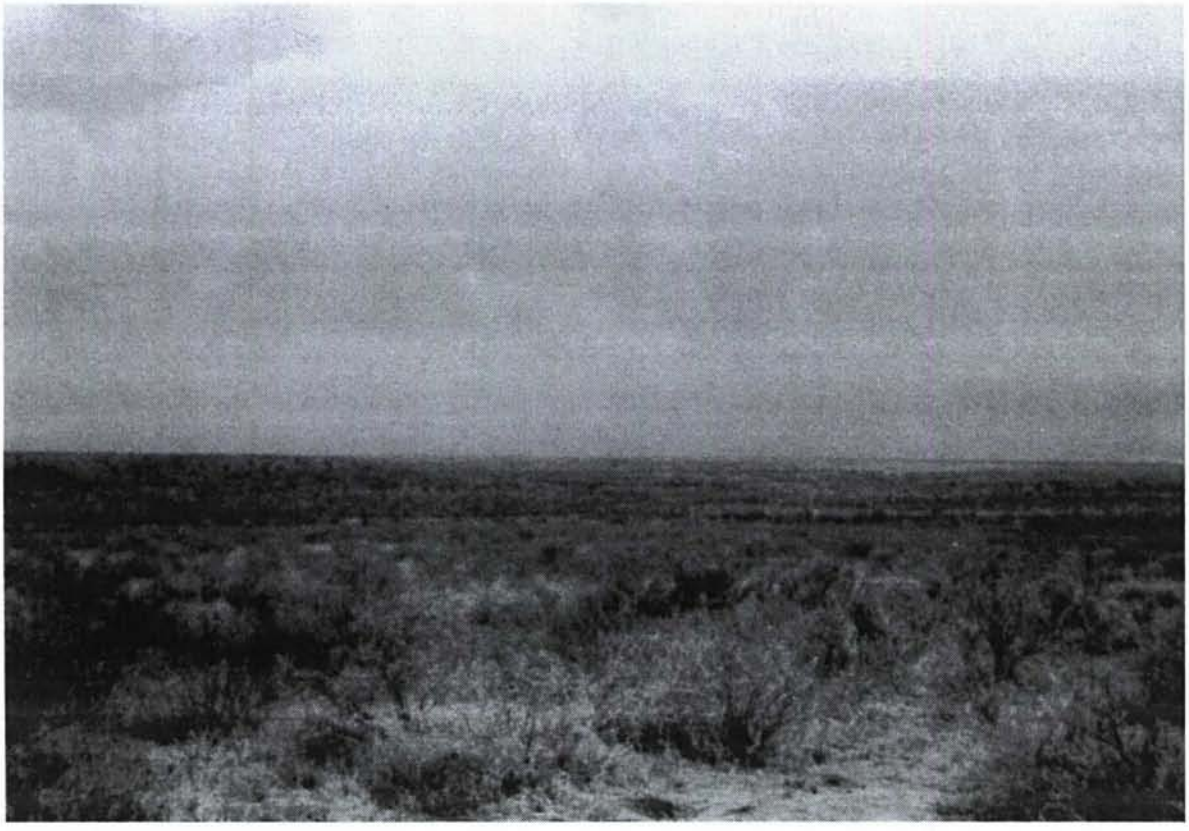


Figure 4.30: Site overview photograph, 5LA9992 (02-2:20).

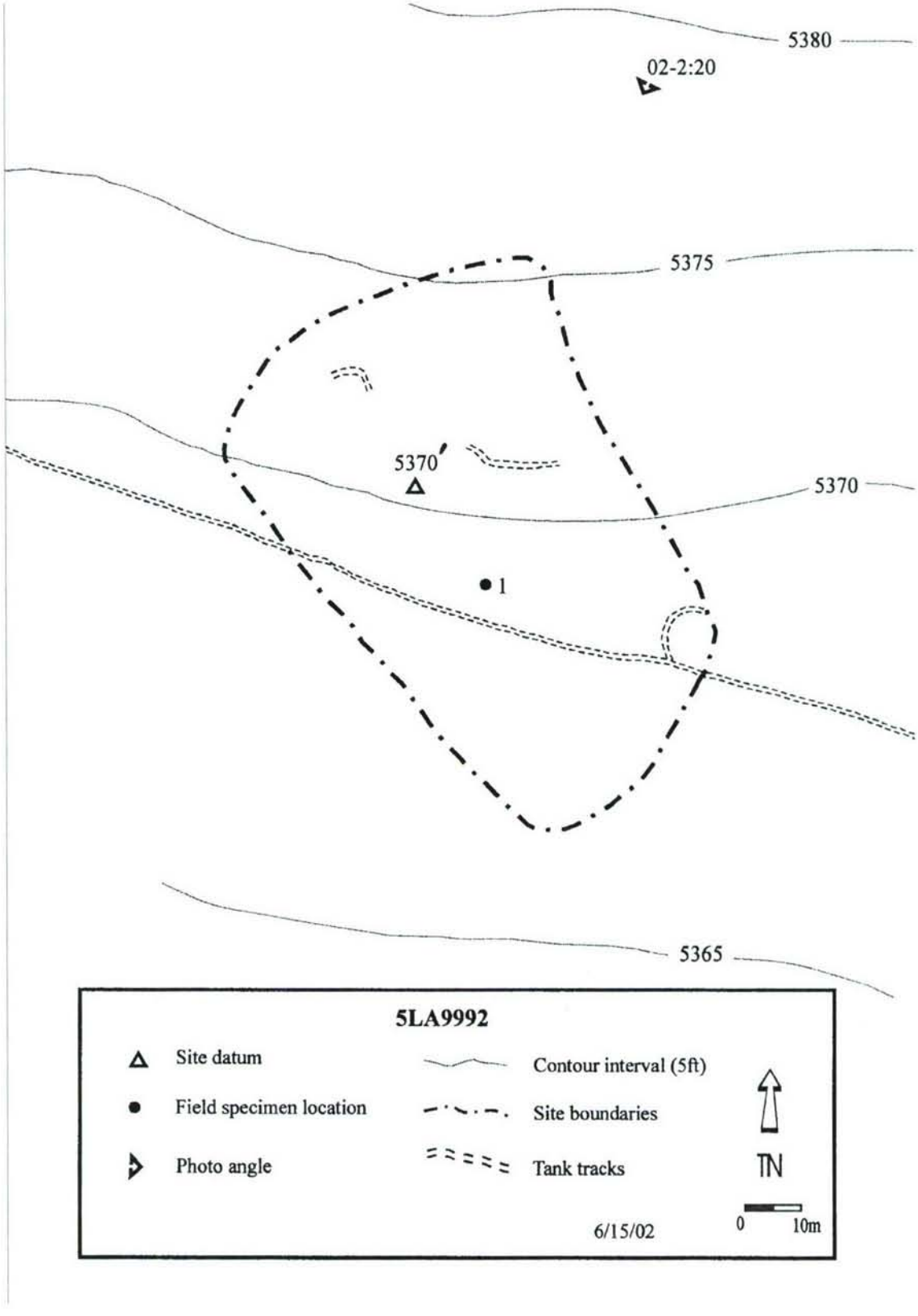


Figure 4.31: Site map, 5LA9992.

5LA10000

Located along the eastern side of Stage Canyon, the site was approximately 720 m southwest of Bent Canyon Arroyo. This large lithic scatter also contains 24 locations with rock art, eight spaced-stone circles, seven rockshelters, five bedrock metates, four hearths, two roasting pits, and two contiguous wall structures. The site was bordered on the east by the Stage Canyon Arroyo and on the west by the breaks of Cedar Hill (Figures 4.33 and 4.38). Many site features were encountered along a sandstone cliff face on the west edge of the Stage Canyon floodplain. Areas of sandstone bedrock outcrop on the ridge above the cliff, and it is here that most of the spaced-stone circles and thermal features were identified.

The site was located in the transition between open prairie and juniper woodland. A wide variety of vegetation was observed, including the grama grasses, wheat grass, cholla, juniper, sagebrush, currant, wolfberry, ricegrass, and skunkbrush. Alluvial wash from Cedar Hill has deposited up to 1 m of soil upon this ridge. Below, and in the floodplain, cultural deposits may exist up to 5 m below the modern ground surface; these were visible in Feature 2.

A historic component was identified in the form of rock art, a drift fence remnant, and axe-cut juniper trees. No historic structures were encountered within the site boundary, however.

Feature 1 (Figure 4.34) was a large (26 x 5.3 x 13.3 m) rockshelter, containing a hearth (Feature 44) and sandstone deflector. A prehistoric occupation surface, in the form of an extensive ash stain, was identified within the shelter and downslope. Rock art panels, Features 19 and 45, were found within the dripline and bedrock metates, manos, flaking debris, and chipped tools were visible on the shelter floor. Most of the surface sediments have been scoured out by erosion, but there were areas where buried cultural deposits remain.

Another large rockshelter at the north edge of the site was designated Feature 2. It measures 6.5 x 5.3 x 5.5 m in size, and because the Stage Canyon arroyo cross-cuts it from east to west, its many *insitu* buried occupation surfaces and abundant artifacts are visible. Cultural deposits extend from the modern ground surface down 2 m into the arroyo bottom. Of note, ceramics were observed in the side wall 130 cm below the modern ground surface, and tool grooves were visible in the back shelter wall, far below the uppermost visual cultural deposits. Following the geological principle of superposition, it seems that a large portion of the Late Prehistoric cultural sequence is contained here. A profile was drawn of the cultural deposits in the side-wall. In doing this, the wall was scraped off for profiling, and the fill removed was both dry screened through ¼ dry mesh, and taken back to the Red Rocks facility for waterscreening.

From the waterscreen sample, lithic materials include 89 pieces of lithic debris and seven tool fragments. The latter were projectile point fragments, utilized flakes of chert, a sandstone slab metate fragment, and a polishing stone of chert. Of the debitage, 49 pieces were simple flakes, 26 were minute-retouch flakes, seven were shatter, four were bifacial-thinning flakes, and three were complex flakes. This flaking debris was 64% chert, 30% quartzite, 2% argillite, 2% orthoquartzite, and 2% siltstone. Eighty-seven of these pieces show evidence of heat exposure, which is not surprising given the fact that thermal features were common in the wall cross-section.

Five ceramic artifacts from Feature 2 were submitted to Richard Krause of the University of Alabama for analysis (Appendix III, Owens and Loendorf 2004). They were made of non-mica bearing clay with grit temper and appear to be from one coiled and cord-roughened vessel.

The fill from Feature 2 also yielded 286 faunal specimens, which were examined by Dr. Erica Hill of Northern Technical Resources (Appendix IV). Fifty-eight bones were identified to species, and represented cottontail, jackrabbit, prairie dog, woodrat, canid, bird, reptile or amphibian, and other mammals not otherwise identified. A total of 90 specimens display evidence of burning. There were also three bone artifacts within the assemblage: a tube bead, possible awl, and flat incised rectangle, possibly a gaming tile.

Feature 2 has one of the most impressive stratigraphic cross-sections ever seen in a rockshelter on the PCMS. Layers of fire-reddened hearth collars and ash lenses were found in the wall profile, from top to bottom, for over 2 vertical meters. We collected a piece of charcoal from the lowest hearth and sent it to Geochron Labs. An AMS date of about 1110 years BP was returned (Appendix VI). Every time the Stage Canyon arroyo floods, large portions of the intact cultural deposits wash away. As such, Feature 2 requires immediate data recovery and/or stabilization.

Feature 21 was a small 4.5 x 1.45 m overhang at the northern edge of the site, and just south of Feature 2. A possible spaced-rock wall unit exists within its dripline. Sedimentary deposition is significant within the shelter (> 2m) and the feature will become larger in size with depth. Surface sediments were ashy and buried cultural materials are likely also to be found. A sandstone slab metate fragment was recorded inside the probable wall.

Approximately 10 m south, and down the cliff from Feature 21, was a large and expansive rockshelter designated Feature 22. It measures 9 x 6 x 3 m and has panels of prehistoric and historic rock art on its walls. The prehistoric pecked elements (Feature 24) were on the south wall just above the modern ground surface. Painted prehistoric elements and incised historic names (Feature 25) were found halfway up the north wall. A slab metate fragment was found on the modern ground surface at the back of the shelter. Other cultural materials include FCR and ashy soil, these exposed in a small arroyo channel during the last major precipitation event. Like Features 21 and 2 to the north, this shelter has much cultural depth and prehistoric occupation surfaces are likely to be encountered in subsurface context.

Feature 23 was found further up the cliff face and directly above Feature 2. It exhibits sandstone bedrock on the floor, and here three bedrock metates (FS 133, 134, and 135) were identified. This shelter measures 5 x 3.7 m and has a floor to ceiling height of 1.3 m.

Feature 36, another rockshelter, can be found to the north of the datum, and at the base of the sandstone cliff. It was long (7.1 m) and relatively narrow (4.5 m) with a substantial floor to roof measurement (5.5 m). A utilized flake of glass represents the cultural remains, and all sediments have been washed out through time.

The southernmost rockshelter, Feature 40, measures 21.5 x 19.5 x 3 m. On its floor, and

outside of the mouth, a large ash stain with FCR, burned artifacts, and ground tools exists. Prehistoric rock art panels (Features 38, 39, and 51) were found in close proximity.

Of the spaced-stone structures, all but one (Feature 9) were found singly, with no mixing of rocks or walls. They were found scattered on the upper terrace of the site in a rough semicircle following the 4838 ft contour. These architectural units have an average diameter of 5.7 mm, and none of the rings contain enough rocks to represent more than a single course of stones. In prehistoric times, there were likely many more rings on the site, but the erosional nature of the upper ridge makes this impossible to prove. The structures would be classified as Class IV units according to Kalasz (1989:100-102). He indicates that only two structures of this type have been dated in the area. One of these dated 600 ± 55 BP, and the other 1170 ± 120 BP. As it stands, we have no way of knowing how old the spaced-stone units on 5LA10000 really are. There were several thermal features in the vicinity (Features 8 and 10 were hearths, and Features 11 and 50 roasting pits), and testing these could provide datable carbon that could help to date the spaced-stone architecture, if used by the same people.

Both contiguous wall structures abut low sandstone ledges or boulders. They resemble Class V units, which according to Kalasz (1989) are contiguous wall, rock abutment, and fully enclosed, isolated units. Both have some excavation potential, and testing could provide data to help place them within the regional chronological scheme.

A recurring theme emerges after all of the prehistoric rock art panels are viewed (Figures 4.35, 4.36, 4.37. Numerous antlered quadrupeds and ungulate tracks appear on many panels (Features 17, 18, 19, 24, 26, 27, 31, 32, 37, 38, 39, 46, 47, 49). Most quadrupeds are similar in form to those of the Purgatoire Pecked style of rock art, with branched antlers and nondescript heads. Abstract elements appear on several panels across the site (Features 15, 16, 18, 24, 28, 33, 34, 35, 45, 51), some with thick patination suggesting an Archaic age. Several scattered elements appear to be atlatl forms, and on the face of Feature 31 there is a plant, possibly corn (element E). Of the quadrupeds, there seems to be a manufacturing preference for branch-antlered elk or deer. Other quadrupeds have curved horns indicating bighorn sheep. There is no mixing of these forms on any panel. In other words, Bighorn sheep were found with Bighorn sheep, and antlered forms (deer or elk) were found with other antlered forms. An interesting panel is Feature 18, Panel C. It contains pecked quadrupeds, red-painted ungulate tracks, and red-painted geometric designs.

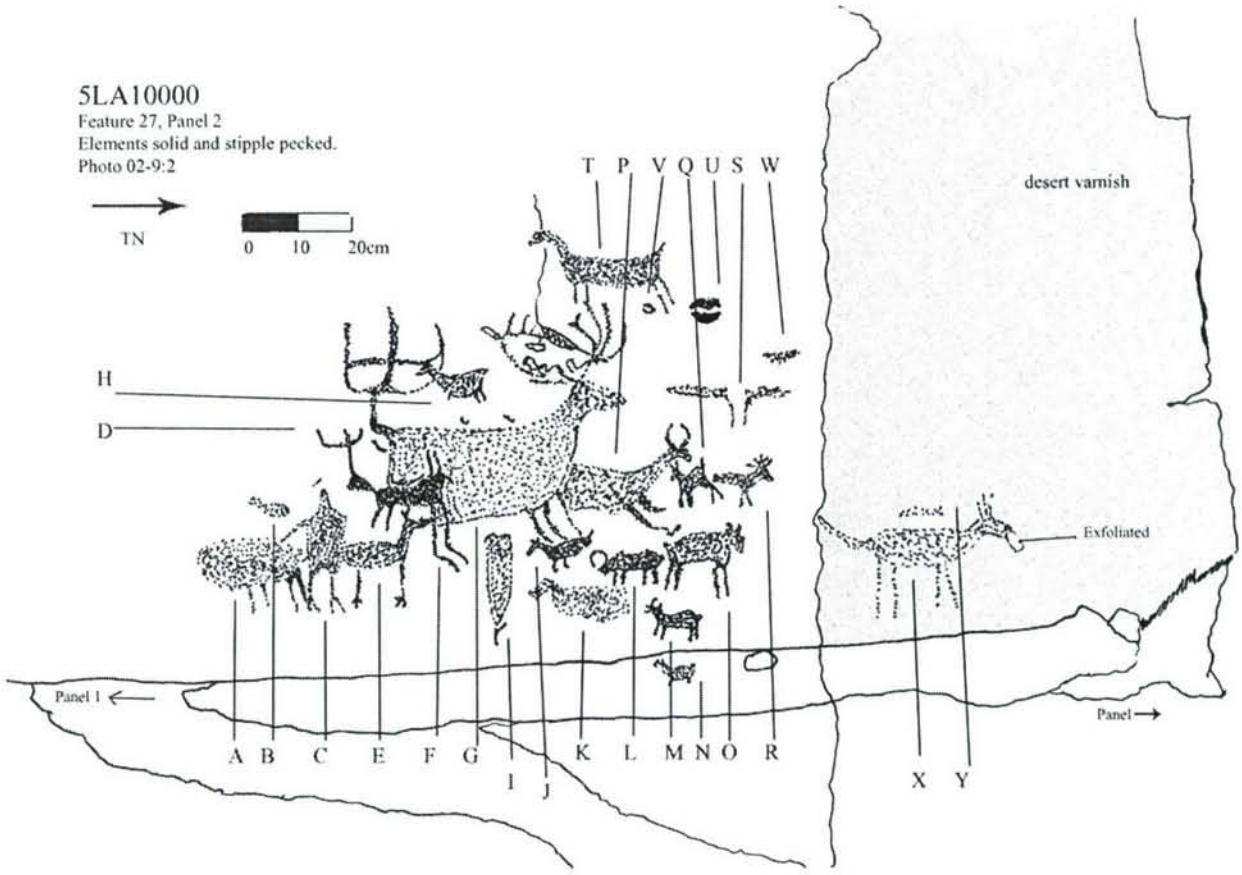


Figure 4.32: Feature 27, Panel 2, profile map, 5LA10000.

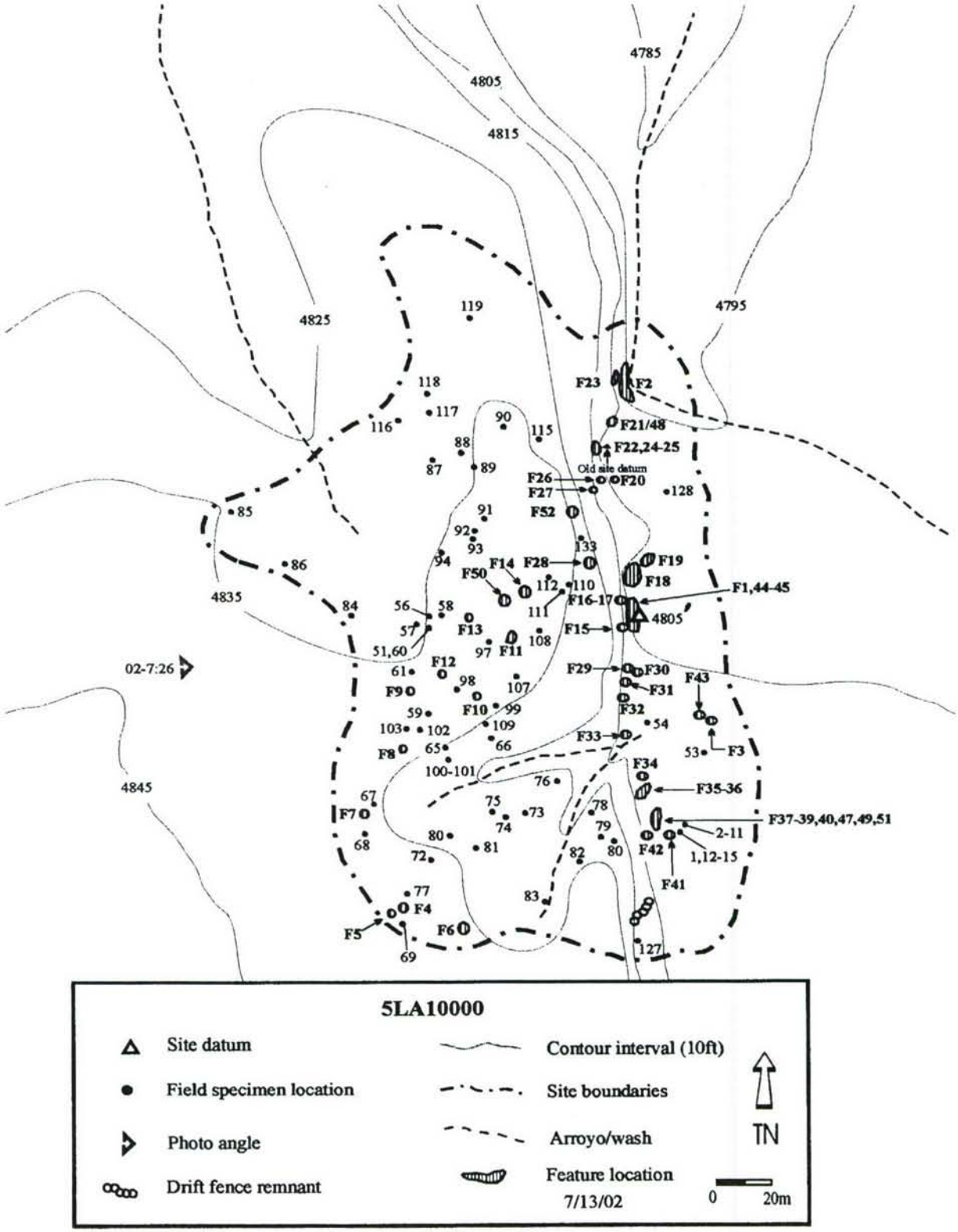


Figure 4.33: Site map, 5LA10000.

Figure 4.34: Planview map of Features 1, 18, 44, and 45, 5LA10000.

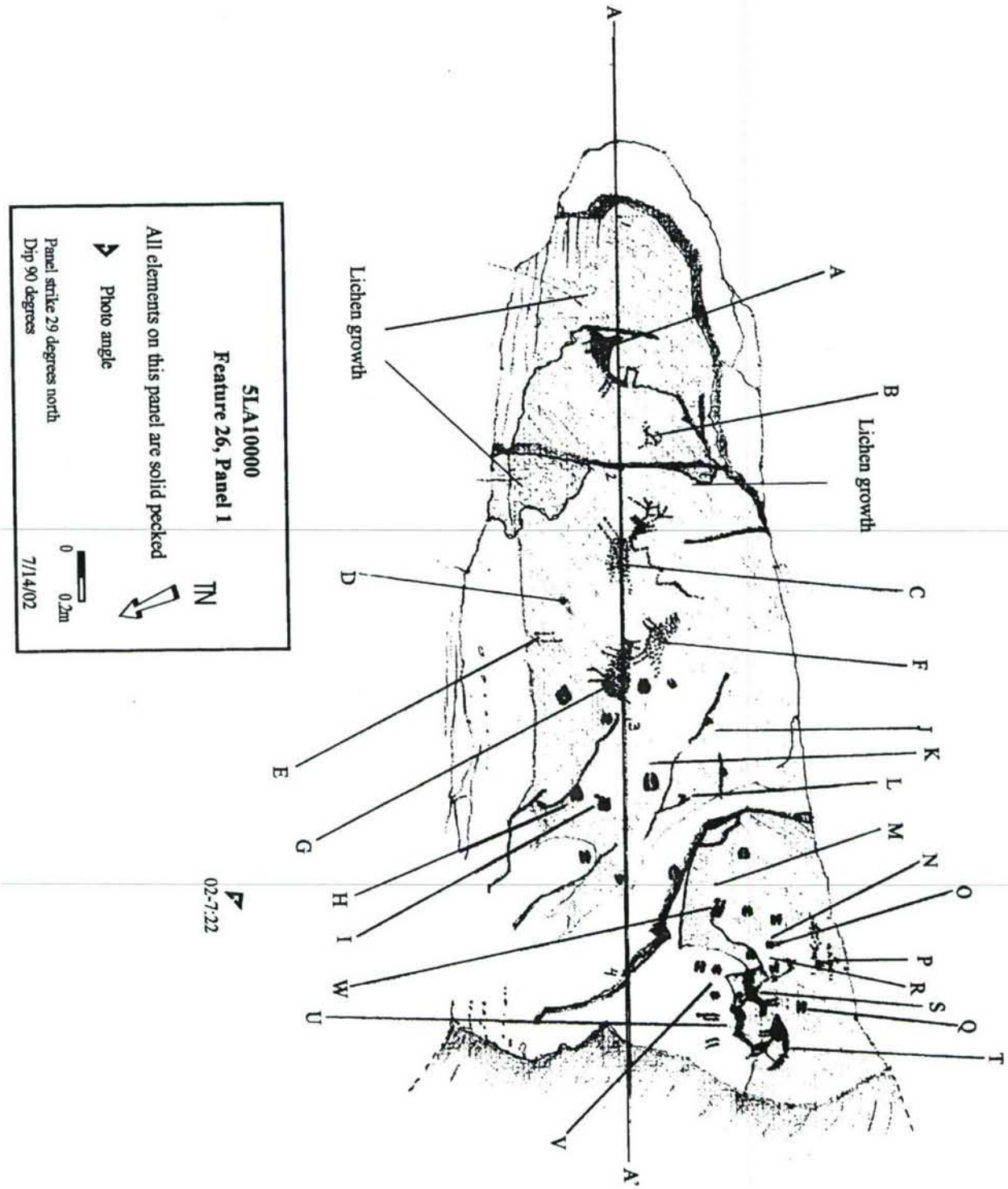


Figure 4.35: Profile map of Feature 26, rock art Panel 1, 5LA10000.

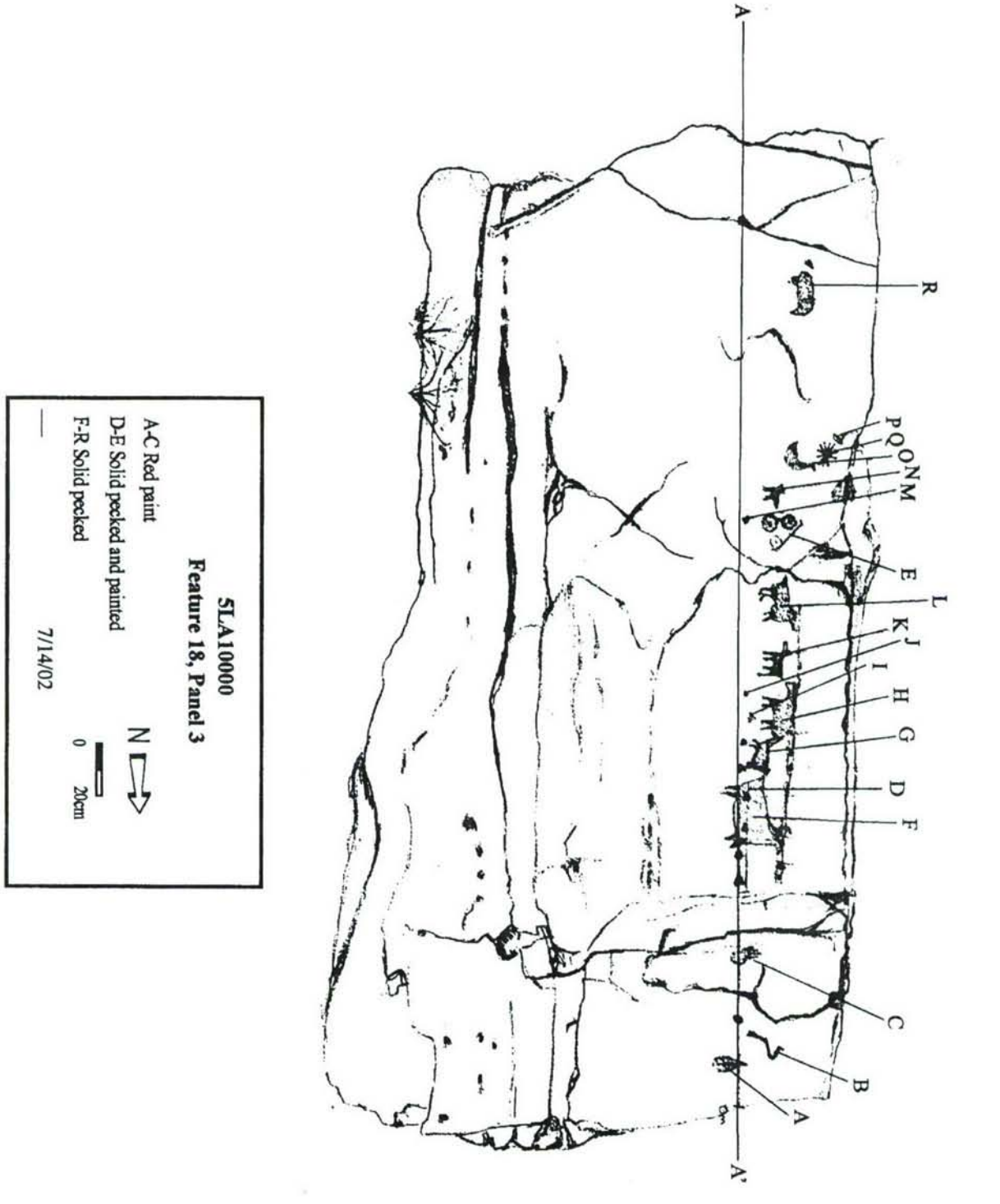


Figure 4.36: Profile map of Feature 18, rock art Panel 3, 5LA10000.

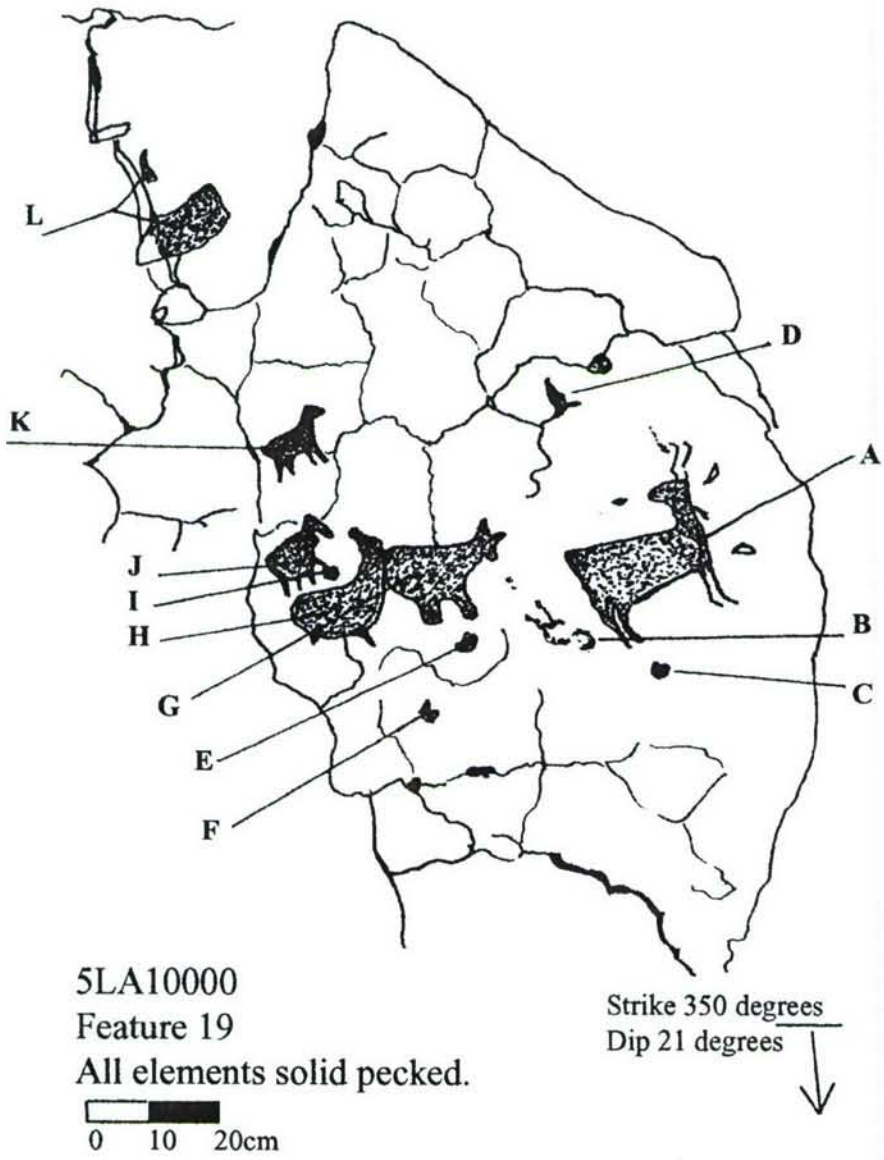


Figure 4.37: Profile map of Feature 19, a rock art panel, 5LA10000.

Figure 4.38: Site overview photograph, 5LA10000 (02-7:26).

A total of 453 lithic items were recorded from the surface, and include 320 pieces of debitage, 82 chipped-stone tools, 49 ground-stone artifacts, and two miscellaneous tools. Of the debitage (Table 4.13), 154 pieces were randomly sampled from general surface context and 166 pieces recorded from in and around rockshelters 1, 2, and 40. These were 173 complex flakes, 100 simple flakes, 27 pieces of shatter, 12 bipolar flakes, and eight bifacial-thinning flakes. Eight material types were identified from the assemblage. Fifty-seven percent was coarse-grained quartzite, 24% chert, 11% argillite, 3% hornfels basalt, 2% silicified wood, 1% chalcedony, 1% orthoquartzite, <1% Tiger-eye chert, and <1% obsidian. The Black Forest silicified wood, Tiger-eye chert, and obsidian specimens are non-local material. Silicified wood can be collected in south central Colorado, Tiger-eye chert in northwest Colorado, and obsidian (FS 58) in Malad, Idaho (Appendix V). Debitage materials were 40% macrocrystalline, 33% microcrystalline, and 27% cryptocrystalline. From the overall assemblage, 61% of the flaking debris is large, while 39% was recorded as small; 27% of the debitage had cortex and 73% was noncortical; and 20% was recorded as small complex flakes. Freehand percussion was used to generate the chipped-stone debitage, particularly in local materials. The relatively low number of cortical items suggests that materials were quarried some distance away from the site and carried here as prepared cores or early-stage bifaces. The high percentage of small, complex flakes and bifacial-thinning flakes indicate late-stage reduction for tool manufacture or maintenance. Of particular interest are the non-local lithic materials. These comprise 3% of the total debitage assemblage.

Two time diagnostic projectile points were encountered on the modern ground surface and one was found in the water-screened slump of Feature 2. From the surface collection, FS 69 was found in association with the spaced-stone circles. Classified as a P35 within the Anderson's system (1989:153-155), it is thought to date 1000 BC to AD 1200. The point removed from the Feature 2 fill is P83. Anderson (1989:220) suggests a date range of AD 750 to 1650, but in this poorly represented class (for the PCMS), we suspect it can be placed much later in the Late Prehistoric stage. The remaining diagnostic piece was a P48 preform. Anderson (1989:171) suggests an age range from AD 500 to AD 1400 for this type of artifact. The other five projectile points, found randomly across the site, were too fragmented for comparison to Anderson's specimens.

The remaining chipped tools (Table 4.14) were 26 utilized flakes, 26 non-bipolar cores, 17 bifaces, four scraping tools (two of chert, one of fine-grained quartzite, and one of Black Forest silicified wood), a Ralston Creek chert drill, and a diorite hammerstone. Of the cores, 23 were quartzite, two were chert, and one was argillite. The utilized flakes were quartzite (8), argillite (5), chert (3), Alibates dolomite (2), glass (2), Hartville Uplift chert (2), hornfels/basalt (1), obsidian (1), orthoquartzite (1), and Tiger-eye chert (1). Edge angle assessments and use wear patterns indicate 22 were likely used for scraping (edge angles of >45°) and four used for cutting (edge angles of <45°).

Most bifaces were quartzite (fine-grained 7 and coarse-grained 2) with fewer specimens of unspecified chert (3), Ralston Creek chert (2), argillite (1), hornfels/basalt (1), and silicified wood (1) identified. Fourteen of these were fragmentary, of which, nine were broken early in manufacture, four broke late in manufacture, and one apparently broke during heat treatment. Only five of the bifaces show evidence of use-wear; all have edge polish and a <45° utilized edge so they were likely used for a lateral action.

Ground-stone tools were 16 slab metate fragments, 12 one-hand mano fragments, 13 bedrock metates, seven whole slab metates, and a complete one-hand mano. All of these items were made on/of Dakota group sandstone, with the exception of granite and conglomerate manos. Of note, a sandstone polishing stone was also recorded.

This multi-component site contains three old site datum's from some unknown entity. These were encountered in front of Feature 1, outside of Feature 22, and on the upper slope of the northwest edge of the site. Most of the site falls within an 80 ac survey area that was supposed to have been finished in 1984, though there is no record of this site ever having been recorded according to the DECAM project records. This is unfortunate, because episodic sheet wash events have been adversely impacting several valuable site features, especially Feature 2. This site is a large, chipped-debris scatter and habitation locale with rockshelters, rock art panels, thermal features, and numerous pieces of non-portable ground stone. The site has several temporally diagnostic artifacts and structures, and areas with great soil depth provide a likelihood of encountering buried occupation surfaces. The chronological remains encountered suggest several Late Prehistoric occupations.

Table 4.13: Summary Description of Chipped-Stone Debitage for 5LA10000.

	Argillite	Chal.	Chert	H/Basalt	Obsidian	Orthoquartzite	Quartzite	S. Wood	Total
Total	34	4	80	11	1	3	182	5	320
Large	22	1	22	6	0	1	142	1	195
Small	12	3	58	5	1	2	40	4	125
Cortical	9	0	20	5	1	0	52	0	87
Noncortical	25	4	60	6	0	3	130	5	233
Complex	18	2	44	6	0	2	96	5	173
Shatter	3	0	11	0	0	0	13	0	27
Bipolar	0	0	11	0	0	0	1	0	12
Biface-Thinning	3	1	4	0	0	0	0	0	8
Simple	10	1	10	5	1	1	72	0	100

Table 4.14: Stone Tool Type by Material Group for 5LA10000.

	Type								
Material	Biface	Core	Projectile	Drill/Scraper	Flake Tool	Mano/Edge	Metate	Misc.	Total
Alibates	0	0	0	0	2	0	0	0	2
Argillite	1	1	1	0	5	0	0	0	8
Glass	0	0	0	0	2	0	0	0	2
Black Forest	0	0	0	1	0	0	0	0	1
Chert	3	2	4	2	3	0	0	0	14
Conglomerate	0	0	0	0	0	1	0	0	1
Diorite	0	0	0	0	0	0	0	1	1
Granite	0	0	0	0	0	1	0	0	1
Hartville	0	0	0	0	2	0	0	0	2
Hornfels/Basalt	1	0	0	0	1	0	0	0	2
Ralston Creek	2	0	0	1	0	0	0	0	3
Obsidian	0	0	1	0	1	0	0	0	2
Orthoquartzite	0	0	2	0	1	0	0	0	3
Quartzite	9	23	0	1	8	0	0	0	41
Sandstone	0	0	0	0	0	11	36	1	48
Silicified Wood	1	0	0	0	0	0	0	0	1
Tiger-eye	0	0	0	0	1	0	0	0	1
Total	17	26	8	5	26	13	36	2	133

We recommend the site eligible for NRHP listing on the grounds it is likely to yield information important to our understanding of prehistory (Criterion D). It is a large site (8.3 ac) with a high artifact density, differing prehistoric architectural features, and abundant rock art. The site exhibits cultural deposition, especially in the area of Feature 2. A stratigraphic cross-section in Feature 2 hints at a possible Archaic occupation given its depth. An Archaic component is also apparent given some rock art elements. The full extent of the buried deposits in Feature 2 has not been seen, and there is a possibility that buried Paleoindian deposits exist. Features 1, 2, 3, 8, 11, 22, 41, 44, and 50 are being destroyed by erosion. All have intact cultural deposits, and need data recovery before all available information is lost. Feature 2 is the most critical of these, as it continues to be scoured out by the Stage Canyon arroyo. Future flooding events will surely destroy the many prehistoric occupation surfaces and thermal features exposed here.

Lithic materials from outside the PCMS, including specimens from Idaho, Texas and New Mexico, were encountered suggesting the site has potential for answering questions regarding inter-regional contacts. The presence of thermal features, both inside and outside of structures, is significant. Not only could these provide datable carbon to help date the many site occupations, they should also produce pollen, faunal, and macrobotanical remains useful for reconstructing subsistence patterns and paleoenvironments. Finally, the presence of numerous rock art panels is data relevant to the study of ideology and cosmological issues.

The site has fenced protection, as both ends of Stage Canyon are closed to vehicle traffic. Therefore, our only management recommendation is related to the data recovery needs for the features being destroyed by erosion. We also suggest the site be revisited for more detailed mapping, and a more thorough surface collection. It should be noted that 5LA10000 is covered with looters' piles. Some of these have eroded into loose clusters, but some contain recently stacked artifacts. In addition, there were recently discarded cigarette butts in the vicinity of these looters' piles, so relic hunters appear to be actively using the site. We suspect this is why, on such an impressive site, there were very few finished patterned tools and diagnostic projectile points.

5LA10010

This is a small lithic scatter on the northern fringe of the Cedar Hill landform. Located between two small erosional drainages, the scatter follows the crest of a pointed ridge (Figures 4.39 and 4.40). Its site boundary covers approximately 2.4 ac and the site datum was set at 1,465 m (4805 ft). The south side of the site rises approximately 10 m above the datum, and the north side was at an elevation of approximately 1,462 m (4,798 ft).

Juniper woodland is the prevailing vegetation community, though grassland vegetation was observed 50 m to the north. Juniper trees, pinon, mountain mahogany, cholla, prickly pear, and the grama grasses were observed growing on the site. Overall, the site exhibits shallow sedimentation, but there were scattered pockets up to 40 cm at the base of sandstone outcrops.

Two areas with burned soils were noted. Feature 1, 45 m and 69° from the site datum, measured approximately 14 x 11 m. It was a large and irregular ash stain with intermixed pieces of FCR and burned lithic artifacts. Most of the feature remains intact and relatively stable. The north side of the feature has been impacted by episodic sheetwash events and appears to have little integrity. A second thermal feature (Feature 2) was classified as a hearth and is 62 m and 213° (uphill) from the site datum. It measures approximately 80 cm in diameter and has a metate (FS 10) and projectile point (FS 1) in direct association.

A total of 67 pieces of chipped-stone debitage were recorded from the surface (Table 4.15). Of the debitage, 60% was coarse-grained quartzite, 33% chert, 3% argillite, 1% fine-grained quartzite, 1% hornfels/basalt, and 1% orthoquartzite. Most debitage was small (52%) and noncortical (57%). Hard-hammer percussion generated most of the debris as the assemblage contained 62 simple flakes and only five complex flakes. Flakes were likely being produced for expedient use, though only one site artifact was found to have been utilized.

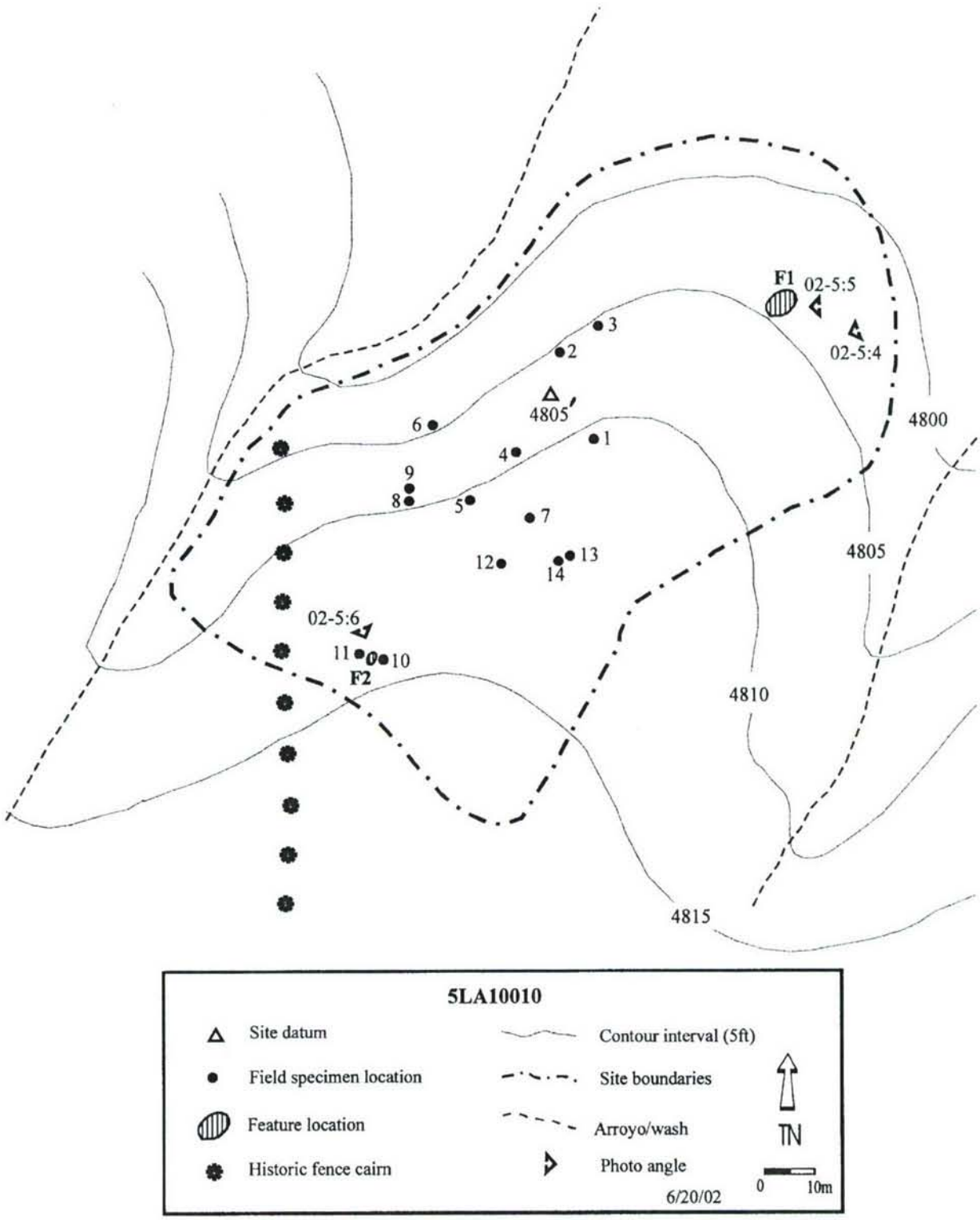


Figure 4.39: Site map, 5LA10010.

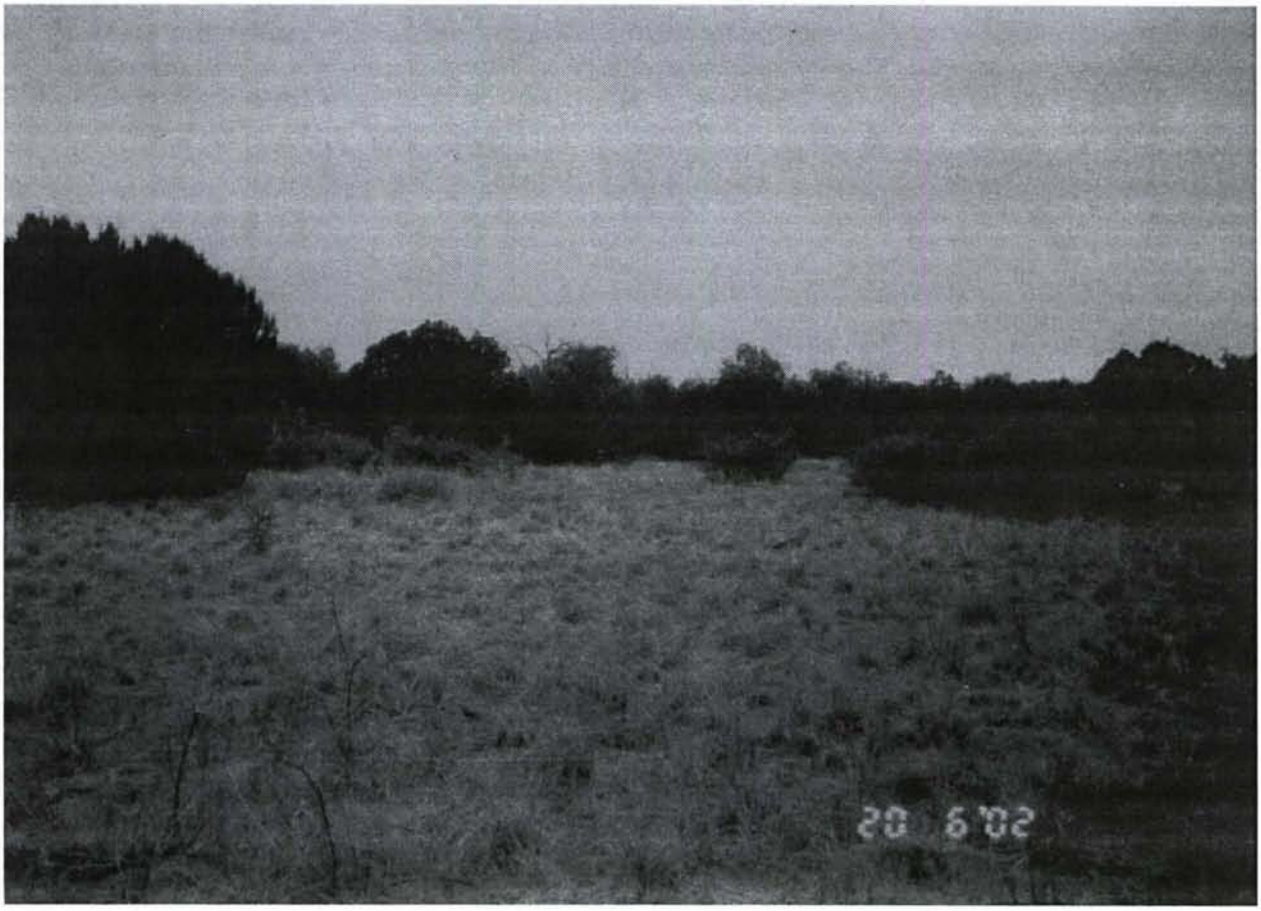


Figure 4.40: Site overview photograph, 5LA10010 (02-5:4).

The field crew encountered three large projectile point fragments (FS 1, 7, and 8). All were highly fragmented and only FS 1 was assigned to one of Anderson's (1989) projectile point categories. The points were chert (2) and fine-grained quartzite; FS 8 exhibits a thick patination rind. Using the Anderson (1989) system for comparison, FS 1 seems to fit best within P32. Points of this kind are thought to have been in use between 500 BC and AD 1000. The remaining tools were three sandstone mano fragments, three sandstone metate fragments, two non-bipolar cores (argillite and quartzite), an end/side scraper of orthoquartzite, a chert utilized flake, and an unfinished orthoquartzite biface (Table 4.16).

Table 4.15: Summary Description of Chipped-Stone Debitage for 5LA10010.

	Argillite	Chert	Hornfels/Basalt	Orthoquartzite	Quartzite	Total
Total	2	22	1	1	41	67
Large	0	4	0	0	28	32
Small	2	18	1	1	13	35
Cortical	0	7	0	0	22	29
Noncortical	2	15	1	1	19	38
Complex	0	1	0	1	3	5
Simple	2	21	1	0	38	62

Table 4.16: Stone Tool Type by Material Group for 5LA10010.

Material	Type							
	Biface	Core	Projectile	Scraper	Flake Tool	Mano	Metate	Total
Alibates	0	0	1	0	0	0	0	1
Argillite	0	1	0	0	0	0	0	1
Chalcedony	0	0	0	0	0	0	0	0
Chert	0	0	2	0	1	0	0	3
Orthoquartzite	1	0	0	1	0	0	0	2
Quartzite	0	1	0	0	0	1	1	3
Sandstone	0	0	0	0	0	2	2	4
Total	1	2	3	1	1	3	3	14

We recommend this site be determined eligible for the National Register on the grounds it is likely to yield information important to our understanding of prehistory (Criterion D). Though this was a small site with low artifact and tool density, it exhibits intact thermal features and deep soil deposition. There potential for buried and intact cultural deposits is therefore great. The presence of large projectile point fragments indicates that test excavations may yield some useful chronological information. The presence of ground stone and intact cultural deposits within the thermal features indicate potential for collecting pollen and macrobotanical data, as well as the recovery of datable charcoal. This type of information is useful for addressing the research domains of subsistence and chronology. We recommend data recovery for the thermal features as both are being destroyed by erosion. Military activities are not impacting the site and given its topographic location, they are not likely to occur in the future.

5LA10018

This is a lithic scatter and rockshelter site located along the west edge of a small intermittent drainage in the lower breaks of the Black Hills (Figures 4.41 and 4.43). A sparse debris scatter was found in front of the rockshelters, and a large thermal feature (Feature 2) was also exposed here. In addition, a solid-pecked rock art element was identified on a large boulder near the dripline of the northernmost shelter (Feature 4).

The site was found in the juniper woodland plant community typical of the Black Hills landform. Juniper, grama grasses, and skunkbrush were recorded by the field crew. Surface sediments were variable throughout the area; they tend to be deep in the shelters and also in from of them. Conversely, sediments were quite shallow around the site boundary.

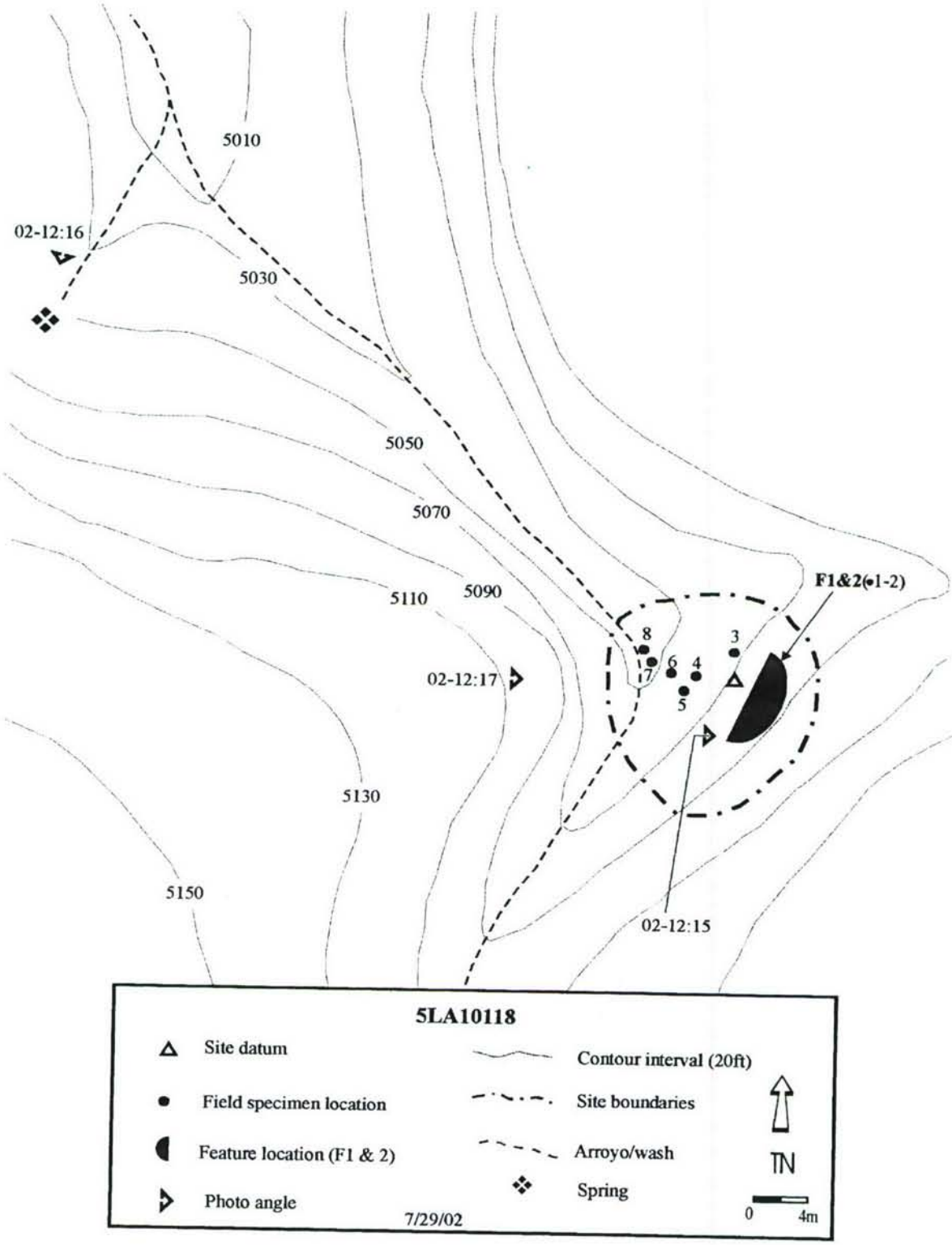


Figure 4.41: Site map, 5LA10018.

Figure 4.42: Planview map of Feature 1, a rockshelter, and 2, a thermal feature, 5LA10018.

Figure 4.43: Site overview photograph, 5LA10018 (02-6:1)

Rockshelter 1 (Feature 1) was located approximately 6 m west of the site datum (Figure 4.42). It was rather small, measuring 5 x 1.3 x 1.1 m, and comprised of a single overhang or chamber. Unlike other rockshelters on the PCMS, no architecture exists within the dripline. It is possible that overbank deposition from the arroyo to the east may have capped one or more occupation surfaces, or even a habitation feature, however. The thermal feature (Feature 2) was found just outside its opening and may be where a midden is beginning to expose on the modern ground surface. Another shelter, Feature 3, was located 4 m northeast of the datum. It measures 4 x 1.5 x .7 m, and no obvious cultural materials were identified on its floor. The site recorders feel that post-abandonment sedimentation has covered this type of evidence and now lies capped and protected from impact.

The surface lithic detritus was quartzite (3) and chert (1). Tools include a quartzite core, an unfinished chert biface fragment, three one-hand manos (sandstone, granite, and quartzite) and a sandstone metate fragment.

This site should be nominated eligible for the NRHP because it is likely to yield information important to our understanding of prehistory (Criterion D). The presence of rockshelters suggests the site will be useful for addressing questions regarding settlement patterns, and perhaps, population dynamics. There is good potential for the presence of buried

deposits in both shelters, and the presence of several pieces of ground stone indicate a high likelihood that pollen, faunal, and macrobotanical remains, useful for reconstructing subsistence patterns and paleoenvironment, will be recovered through the excavation of test units. The hearth has a good probability of yielding charcoal useful for dating the prehistoric materials. A rather large arroyo (intermittent, but very high energy) can be found 2 m east of the shelters. During significant flood events it likely erodes buried cultural deposits within the features. This natural formation process should be monitored, and if it adversely impacts the cultural materials, an immediate data recovery plan will need devised. For now, the site is topographically protected from military activity and our management recommendation is to avoid the location.

5LA10019

This small site was located along the bottom of a large canyon in the northern breaks of the Black Hills. Vegetation includes juniper, skunkbrush, and grama grass. Soils were relatively thin, with most between 5 and 10 cm deep. Large sandstone boulders cover the bottom of the intermittent waterway (Figures 4.45 and 4.46).

The site contains two rock art panels (Figures 4.44 and 4.47). The first, Panel A, was comprised of a solid pecked dot, a semi-circular solid pecked element (unknown form), two solid pecked straight lines, and two concentric solid pecked circles bisected by hooked lines. Panel B was highly weathered, cannot be assigned to any time period, and its element was indistinct. Panel A is stylistically unique to the PCMS as part of the Great Plains Abstract tradition (eligible for the National Register under criterion C) and heavily patinated, suggesting an older age. Though still in an experimental stage, cation ratio dating could date the materials and help to build the regional rock art chronology. The presence of previously unknown, and highly patinated, elements is contributing data for the study of ideology, as well. Based on the above information, the site is considered significant, and eligible for nomination to the NRHP. Though our management recommendation is that the location receives no further consideration, it should be periodically monitored for natural and cultural impacts.

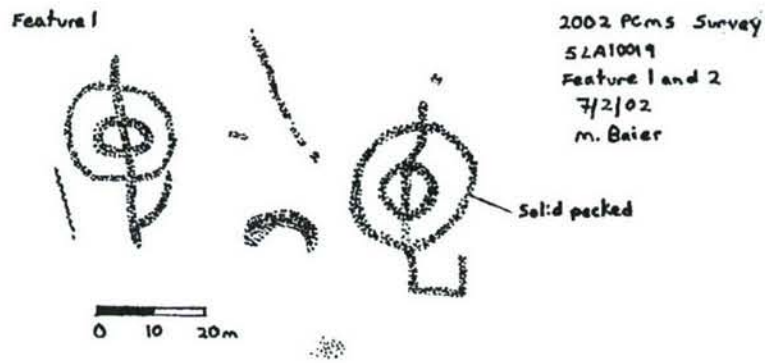


Figure 4.44: Planview map of Features 1 and 2, 5LA10019.

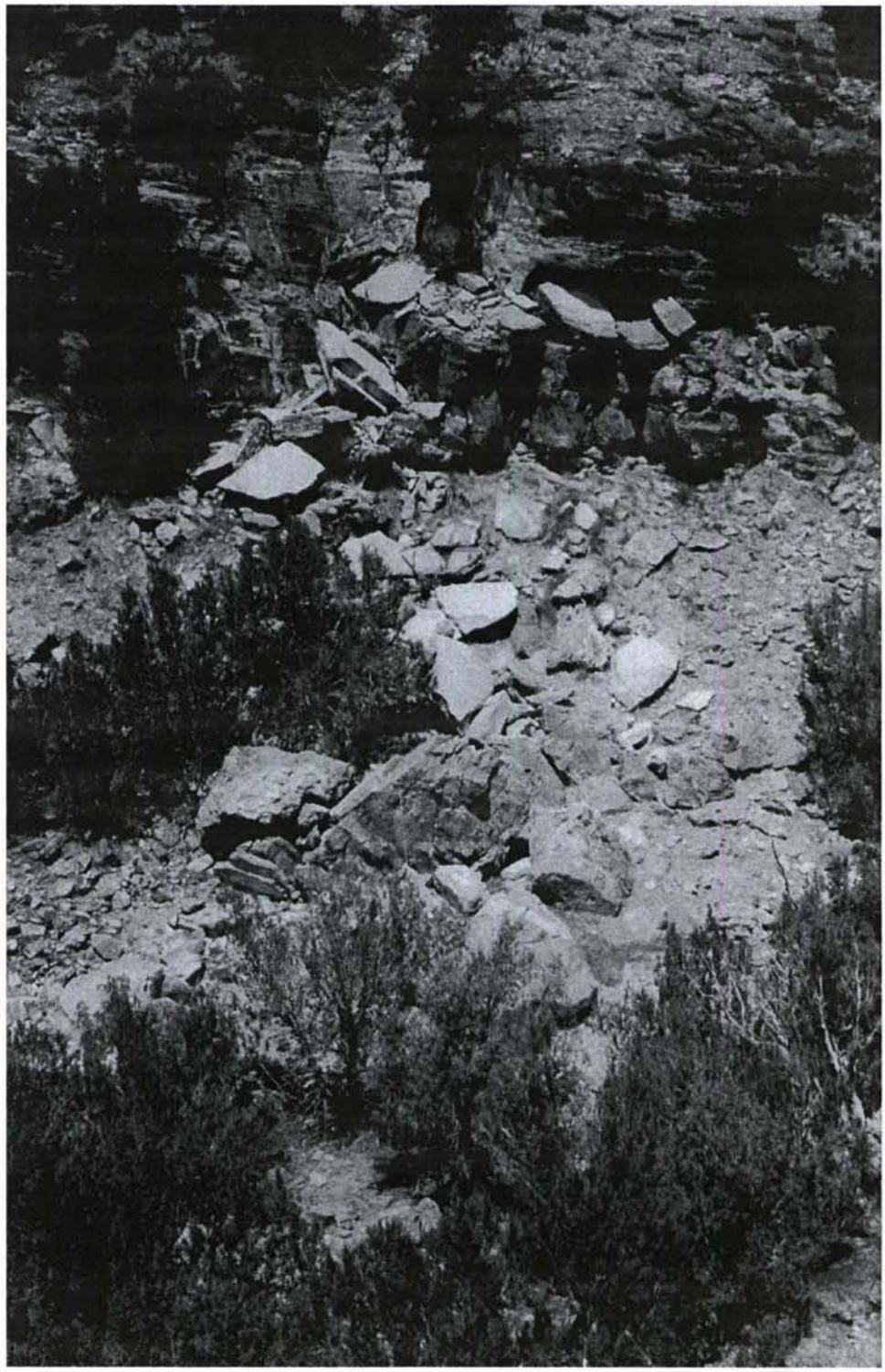


Figure 4.45: Site overview photograph, 5LA10019 (02-6:2)

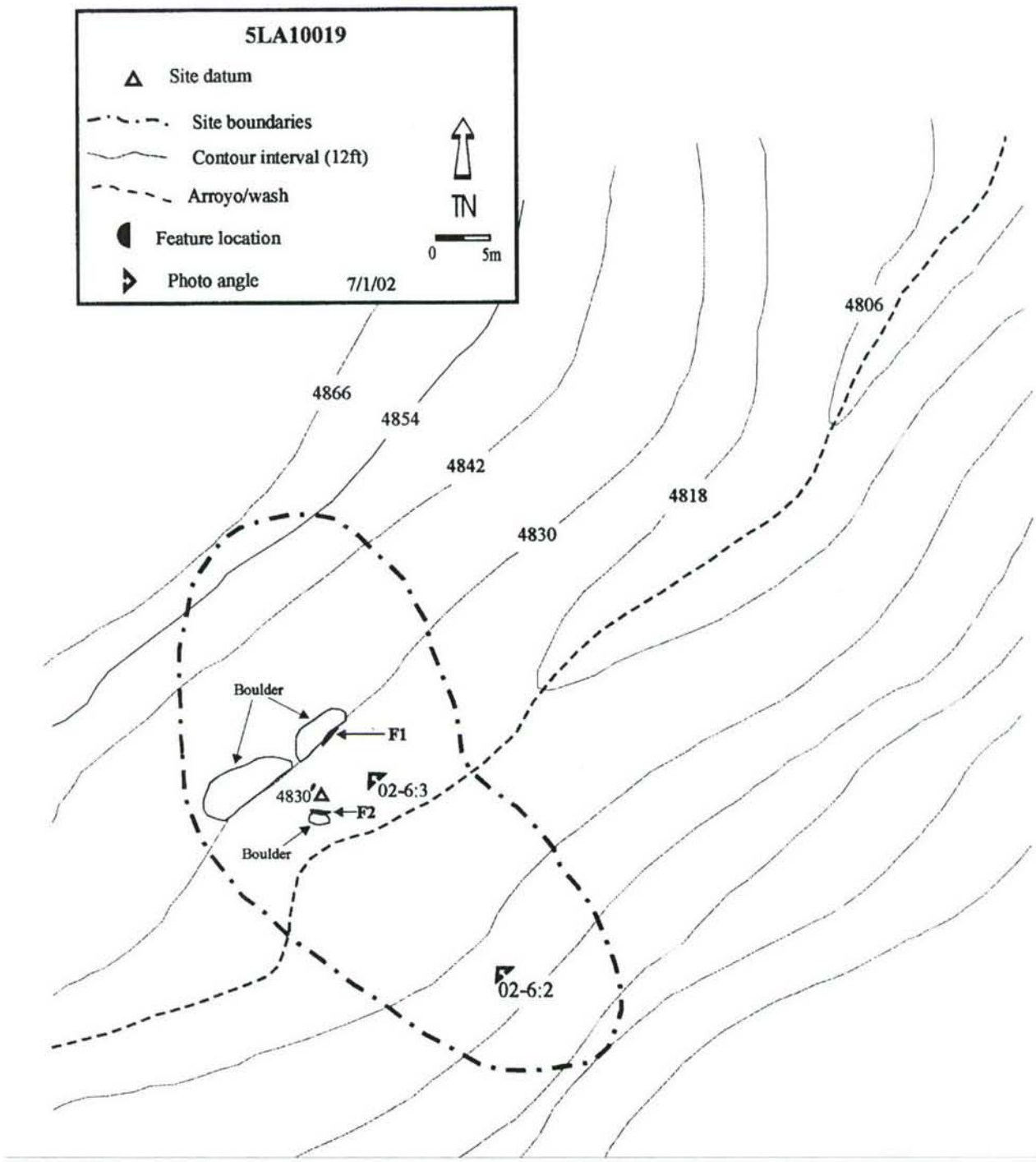


Figure 4.46: Site map, 5LA10019.

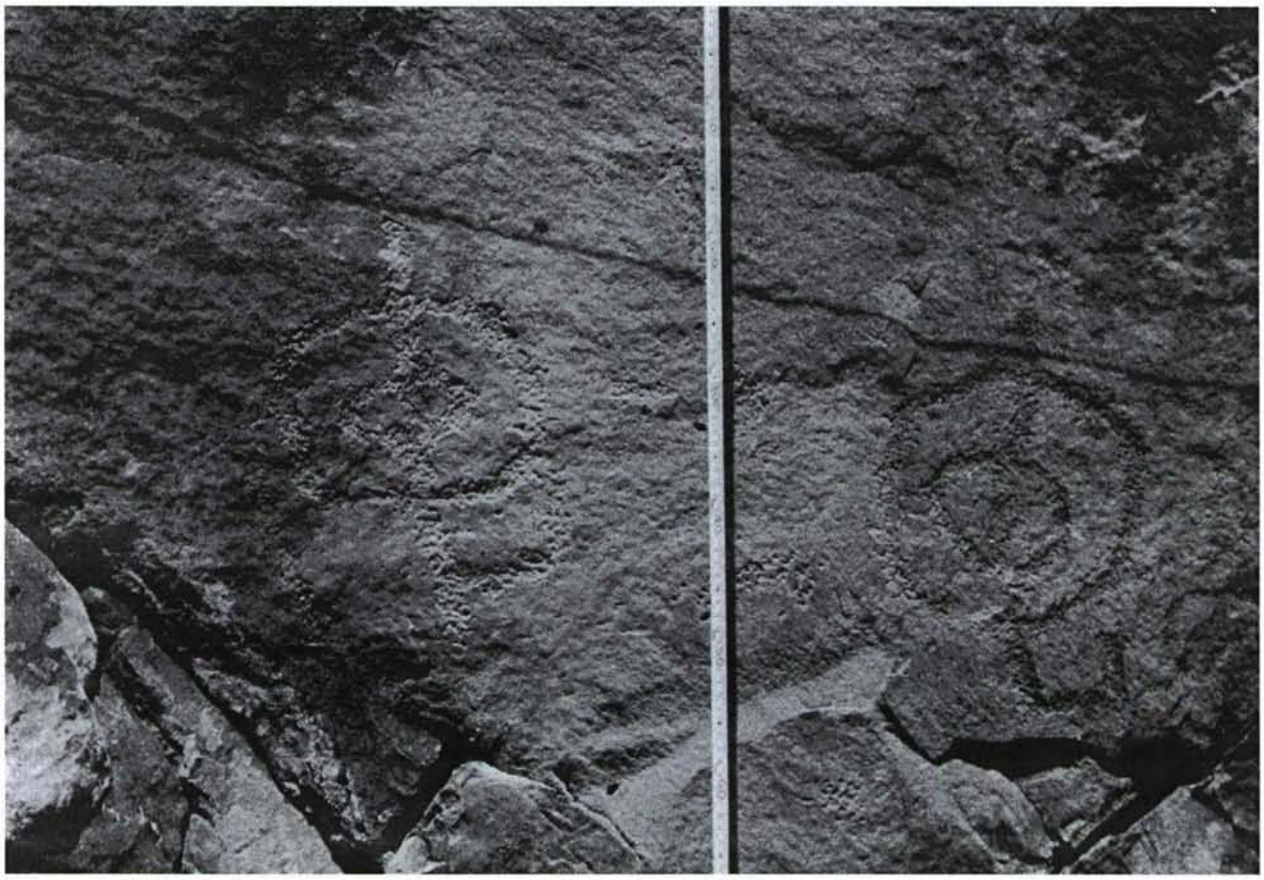


Figure 4.47: Photograph of rock art panel, Feature 1, Panel 1, 5LA10019.

5LA10059

The site is a sparse lithic scatter and prehistoric architecture set on a high ridge in the breaks between the Black Hills and the grassy steppes of TA 13. Visibility from this location is good to the north and the east, but the location seems a poor choice for habitation because of its open exposure to the elements and sloping rough terrain. The ridge trends north to south and there was a large sandstone outcrop that forms its uppermost surface (Figures 4.48 and 4.49). Only the central portion of the landform has artifacts and features. The site elevation at the datum is 1,502 m (4,930 ft) and slightly over 150 m in any direction the elevation is only 4,885 ft.

Juniper, skunkbrush, cholla, yucca, prickly pear, and grama grasses were growing on this 1.03 ac site. Sediment deposition ranges from a dusting on exposed bedrock, especially at the crest of the ridge, to around 20 cm in the area of the structures.

The site contains three oval structures with contiguous coursed rock walls and a spaced-stone circle. The spaced-stone circle was constructed at the narrowest fin of the ridge, and the wall blocks extend over the edge and down its slopes. This construction is intentional, as the circular form of the structure remains intact in planview. Kalasz (1989:109) presents two sets of

dates for spaced-stone circles; the early one 1220 BP and a later 650 BP. All of the architectural units are isolated; the three contiguous structures use a low rock ledge for a portion of the wall. These abutment structures closely resemble Kalasz' (1989) Class V, Categories 15 and 16, which are contiguous wall, rock abutment, fully enclosed, isolated units. Kalasz (1989:103) indicates that similar stone structures have associated radiocarbon dates of 850 ± 60 BP and 920 ± 80 BP for Category 15 and 695 ± 90 BP, 960 ± 60 BP, 3590 ± 90 BP, and 3370 ± 130 BP for Category 16. It is unknown where the 5LA10059 contiguous wall architectural units might fall within the above, diverse dates.

Artifact density was low, with an average spacing of 6 to 8 m between pieces. Flaking debris includes 16 pieces of quartzite and seven of chert, and there were ten complex flakes, nine simple flakes, and four pieces of shatter (Table 4.17). A mixed bag of reduction strategies was suggested because 15 of the 23 items were large and seven pieces were cortical. The tool inventory was composed of five items – a quartzite hammerstone, three one-hand mano fragments of sandstone, and a whole slab metate of sandstone. No chipped tools of any kind were identified, suggesting the location did not function as residence.

Site 5LA10059 has architecture, but an extremely low density of artifacts. This is interesting as PCMS architectural sites usually exhibit a high density of flaking debris. This information, coupled with the site's isolated position on a ridgeline, led the recorders to believe that it served a more ceremonial or defensive function. Although the landform and the fill within the features appear somewhat deflated, it is likely that buried occupation surfaces are present. There is a potential to study ritual or special use features and associated ideology. Test excavations in the architectural features will likely produce pollen, faunal, and macrobotanical remains, or datable carbon. This would allow researchers to make statements regarding the research domains of chronology, settlement and subsistence strategies, and geomorphology/paleoclimates. As such, the site is likely to yield information important to our understanding of prehistory (Criterion D), so it is eligible for listing on the NRHP. Our management recommendation: no further consideration other than cyclic monitoring for natural and cultural impacts.

Table 4.17: Summary Description of Chipped-Stone Debitage for 5LA10059.

	Argillite	Coarse Quartzite	Total
Total	7	16	23
Large	5	10	15
Small	2	6	8
Cortical	4	3	7
Noncortical	3	13	16
Complex	1	9	10
Shatter	2	2	4
Simple	4	5	9

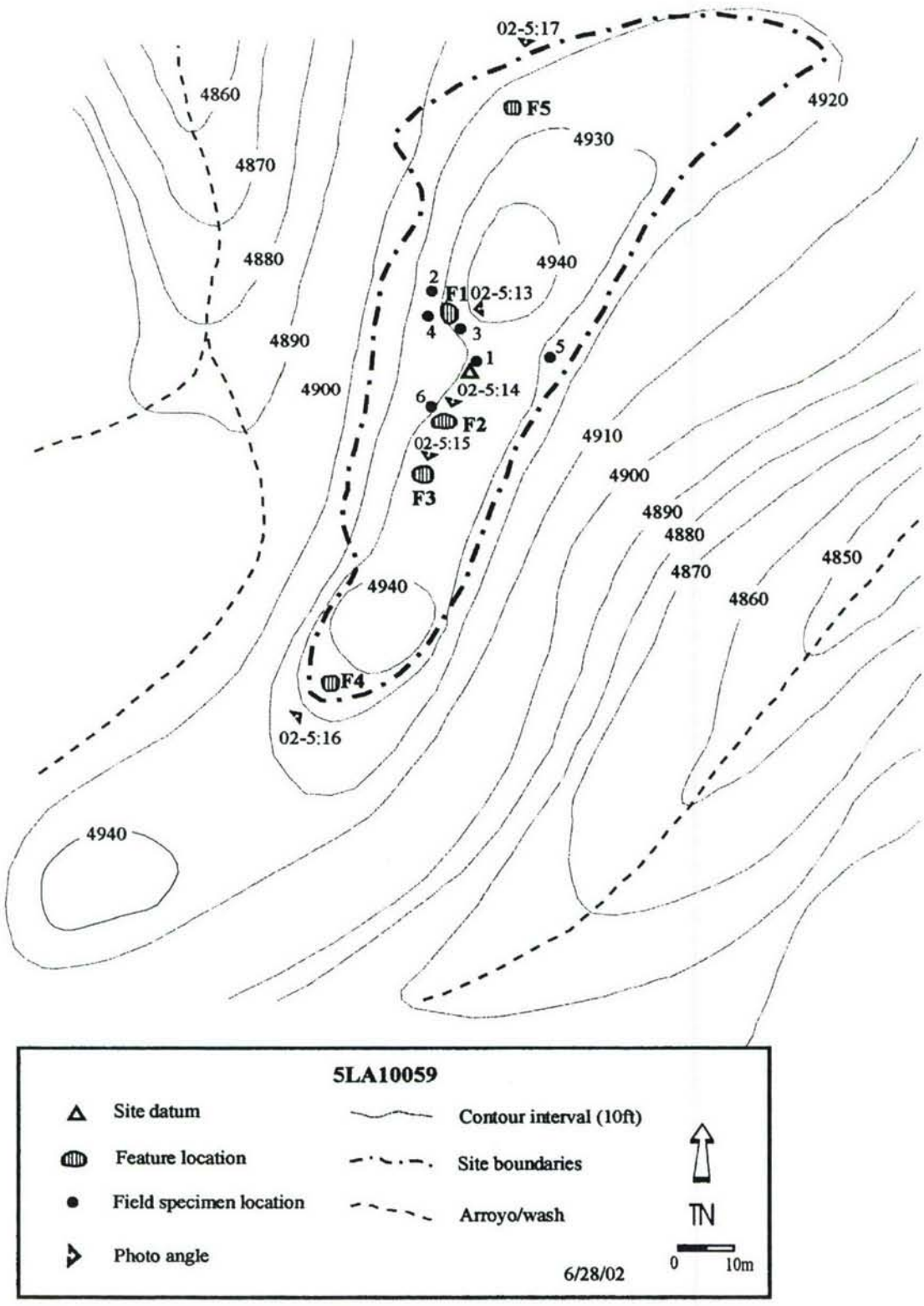


Figure 4.48: Site map, 5LA10059.

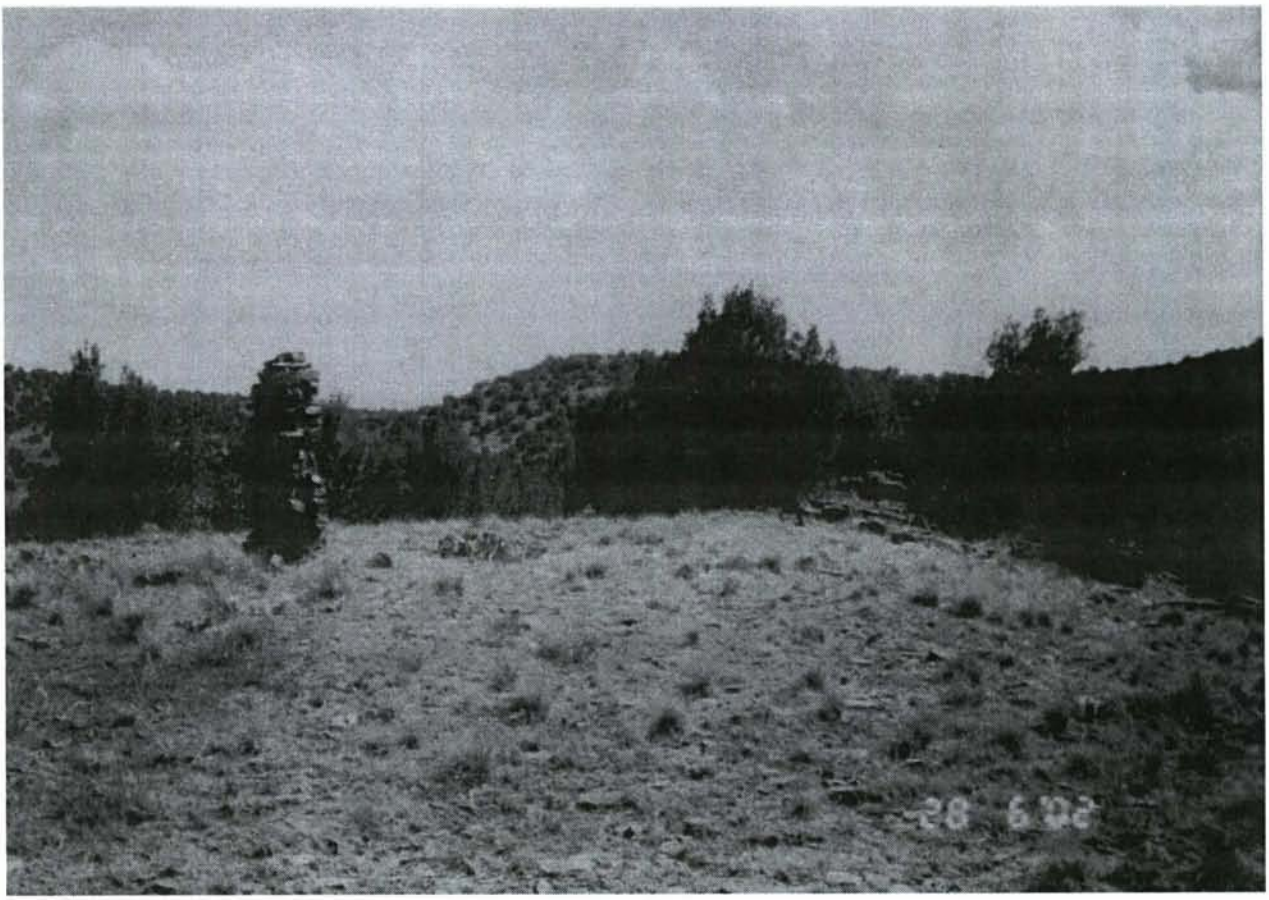


Figure 4.49: Site overview photograph, 5LA10059 (02-5:17)

5LA10060

5LA10060 contains rock art, two deflated contiguous wall structures, an intact hearth, and a spaced-stone structure. The site was found at the valley/canyon contact of a large southern tributary of Bent Canyon (Figures 4.50 and 4.553). Most features and artifacts were found above the small drainage at the northern edge of the site. Along the western boundary a series of sandstone ledges from the Lytle Formation contour at elevations from 4,880 to 4,925 ft. The drainage along the eastern site boundary, and another 80 m northwest of the datum, would have held seasonal pockets of water.

The site is located in a juniper woodland plant community. Its southern portion dominated by grassland (grama grass and buckwheat), with some ricegrass also identified. The northern portion is dotted with juniper trees and mountain mahogany. Sediments were variable across the site; the southern half nearly all sandstone bedrock and the northern half at least 100 cm of deposition.

The NMSU field crew identified seven features. All three habitation structures were isolated with no intermixing of wall elements. Two abut sandstone bedrock outcroppings and in Kalasz's (1989) system, they would be classified as Class V, contiguous wall, rock abutment,

fully enclosed, isolated units. Feature 2 (Figure 4.51) is similar to Kalasz's Category 16. Radiocarbon dates of 695 ± 90 BP, 960 ± 60 BP, 3370 ± 130 BP, and 3590 ± 90 BP were presented for this type of architectural unit (Kalasz 1989:103). Feature 4 is more like a Category 15 with associated dates of 850 ± 60 BP and 920 ± 80 BP (Kalasz 1989:103). The spaced-stone structure (Feature 6) is a Class IV unit, and has associated dates of 1200 and 650 BP. A hearth, exposed by a recent flood (June 12, 2002) clearly demonstrates the presence of buried cultural deposits in the northern end of the site. Overall, it measures 80 cm in diameter, and contains dark ash, FCR, and charcoal. This feature needs to be excavated or other large rain events will surely wash it away. Because several time periods are suggested for the site, a carbon date from this feature could help pinpoint one occupation for research purposes.

A total of three rock art locales were identified: Feature 3 (on the north end of the site, Figures 4.52 and 4.54), Feature 5 (centrally located), and Feature 7 (found at the southern end of the site, Figure 4.53). Feature 3 was a very large boulder of Dakota sandstone that fell from the cliffs above into the drainage. It measures approximately 4.9 x 3.5 x 2.5 m. Five rock art panels were identified: Panel 1 is on the west side of the boulder, Panel 2 the east side, and Panels 3-5 found on top. Panel 1 (4.4 x 2.5 m) includes 32 elements, ranging in form from pecked dots to tailed circles to Bighorn sheep. Many time periods are represented (Archaic and Late Prehistoric) based on style and element patination. Panel 2 (2.6 x 1.9 m) shows 14 elements, these also from more than one time period. Patination suggests an older age for these elements, but direct sun and weather exposure have taken a heavy toll, rendering many of the elements difficult to see. Panel 3 was a 110 x 33 cm face containing six solid-pecked abstract designs. Because these elements were on top of the boulder, they appear highly eroded. Another panel (designated 4) on top of the boulder measures 1.8 x 1.5 m. It contains seven distinct elements that have been solid-pecked into the rock varnished surface. Panel 5 consists of a single, solid-pecked tailed circle. It was found on an upright rock surface measuring 100 x 50 cm.

Feature 5 was a solid-pecked curvilinear meander enclosure. It was identified on top of a small sandstone boulder just to the northwest of Feature 6, a spaced-stone circle. The rock surface exhibiting the element measures 46 x 14 cm and faces south at an angle of 176°.

Feature 7 was identified on the south face of a large boulder of Lytle sandstone. Because this material is much more friable than other Dakota sandstones, panel elements were highly weathered and difficult to see (except when the panel is shaded). A combination of prehistoric and historic elements were found on this face including what appears to be a cowboy hat, a circle, a meandering line, a triangle or tipi, and connected circles. A hunting scene in the Plains Biographic Style depicts two anthropomorphs with bow-and-arrow; one mounted on a horse, stalking a large and small quadruped. All elements were stipple-pecked. Initials and names incised or abraded into the rock include the name "Halsey", the initials "F.G." and "L. B." and the letter "T." The name Halsey refers to Henry Halsey who had a 1921 land patent for the area containing the site.

The field crew recorded 182 pieces of debitage (Table 4.18): 92 general surface items, 53 from Feature 6, 31 from Feature 4, and six from Feature 2. Of the overall total, 33% was chert, 33% coarse-grained quartzite, 16% orthoquartzite, 7% argillite, 9% fine-grained quartzite, 1% limestone, and 1% basalt. These materials were 34% cryptocrystalline, 33% microcrystalline,

and 33% macrocrystalline. There seems to have been no selection preference for raw material though a high density of chert was found in the area of Feature 6, the tipi ring. All recorded lithic materials can be obtained less than 200 m from the site in the breaks of the Black Hills or down below in Bent Canyon.

Table 4.18: Summary Description of Chipped-Stone Debitage for 5LA10060.

	Argillite	Chert	Hornfels/Basalt	Limestone	Orthoquartzite	Quartzite	Total
Total	13	61	1	1	30	76	182
Large	6	16	1	0	9	49	81
Small	7	45	0	1	21	27	101
Cortical	7	22	0	0	14	51	94
Noncortical	6	39	1	1	16	25	88
Complex	5	15	0	0	8	13	41
Shatter	1	6	0	0	0	5	12
Biface-Thinning	0	13	0	0	3	0	16
Simple	7	27	1	1	19	58	113

Table 4.19: Stone Tool Type by Material Group for 5LA10060.

	Type							
Material	Biface	Core	Projectile	Scraper	Flake Tool	Mano	Metate	Total
Alibates	0	0	0	0	1	0	0	1
Chert	0	4	1	0	2	0	0	7
Coarse Quartzite	0	3	0	0	2	0	0	5
Fine Quartzite	2	0	0	0	0	0	0	2
Hornfels/Basalt	1	0	0	0	0	0	0	1
Ralston Creek	0	0	0	1	0	0	0	1
Sandstone	0	0	0	0	0	12	22	34
Total	3	7	1	1	5	12	22	51

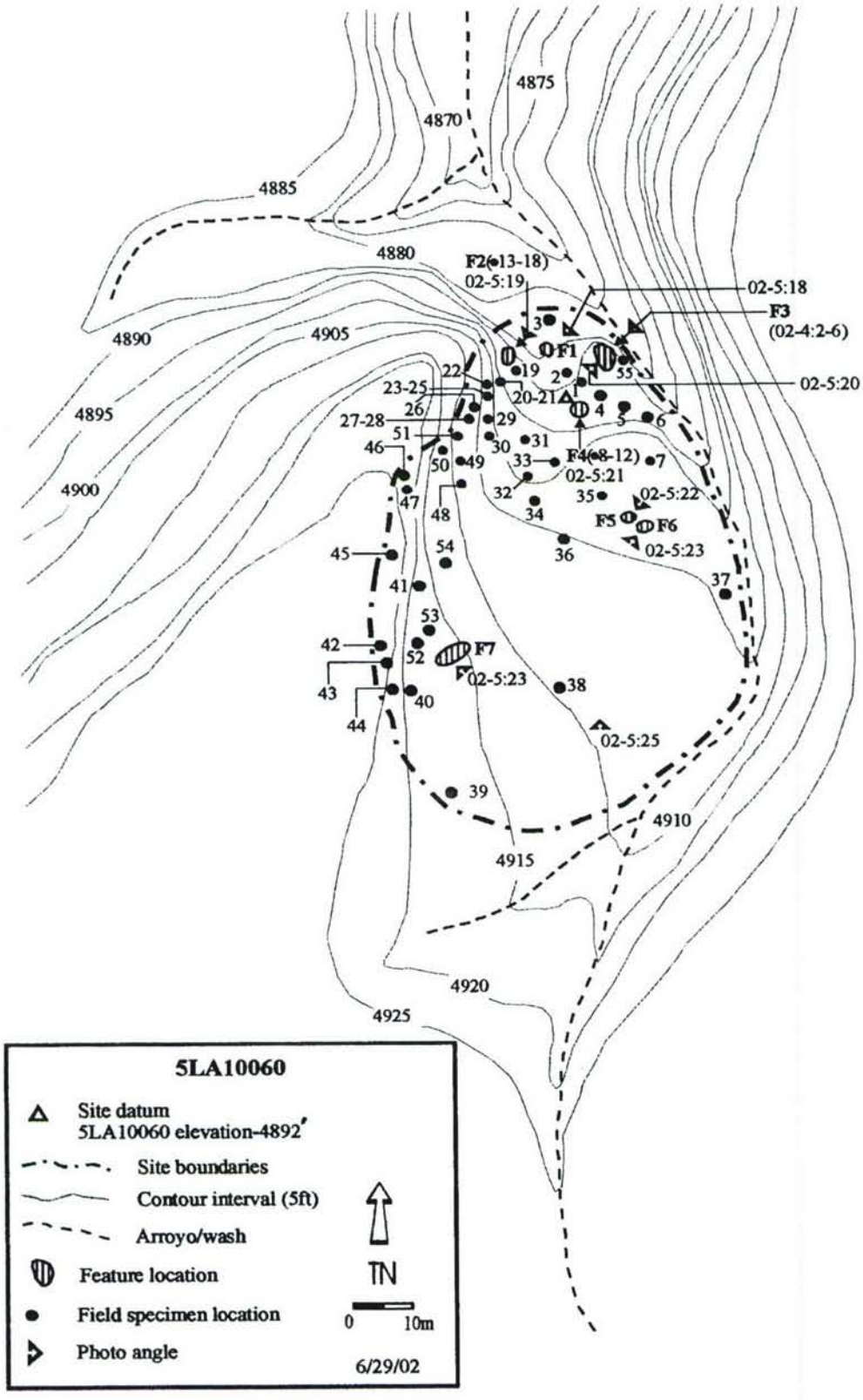


Figure 4.50: Site map, 5LA10060.

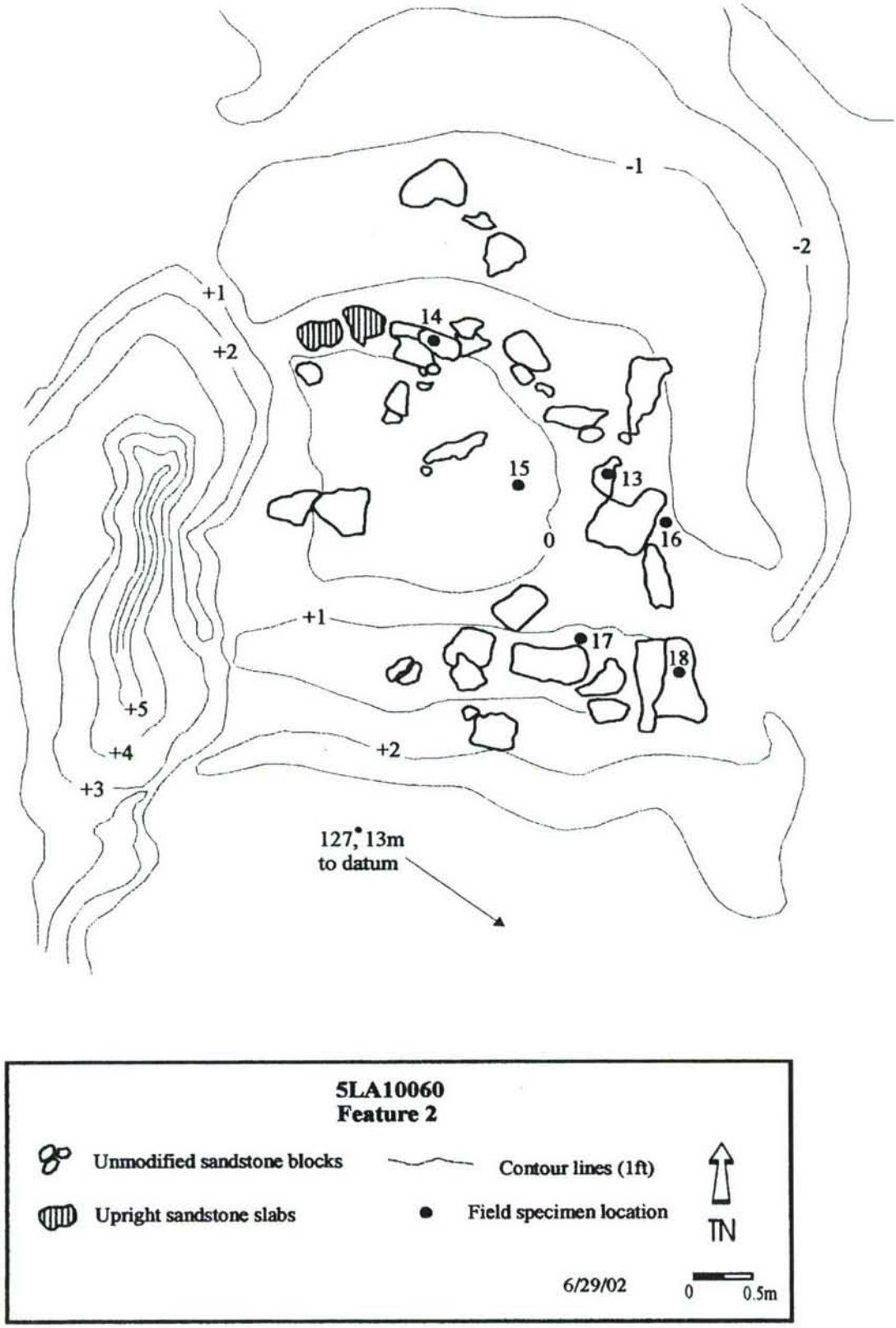


Figure 4.51: Planview map of Feature 2, architectural unit, 5LA10060.

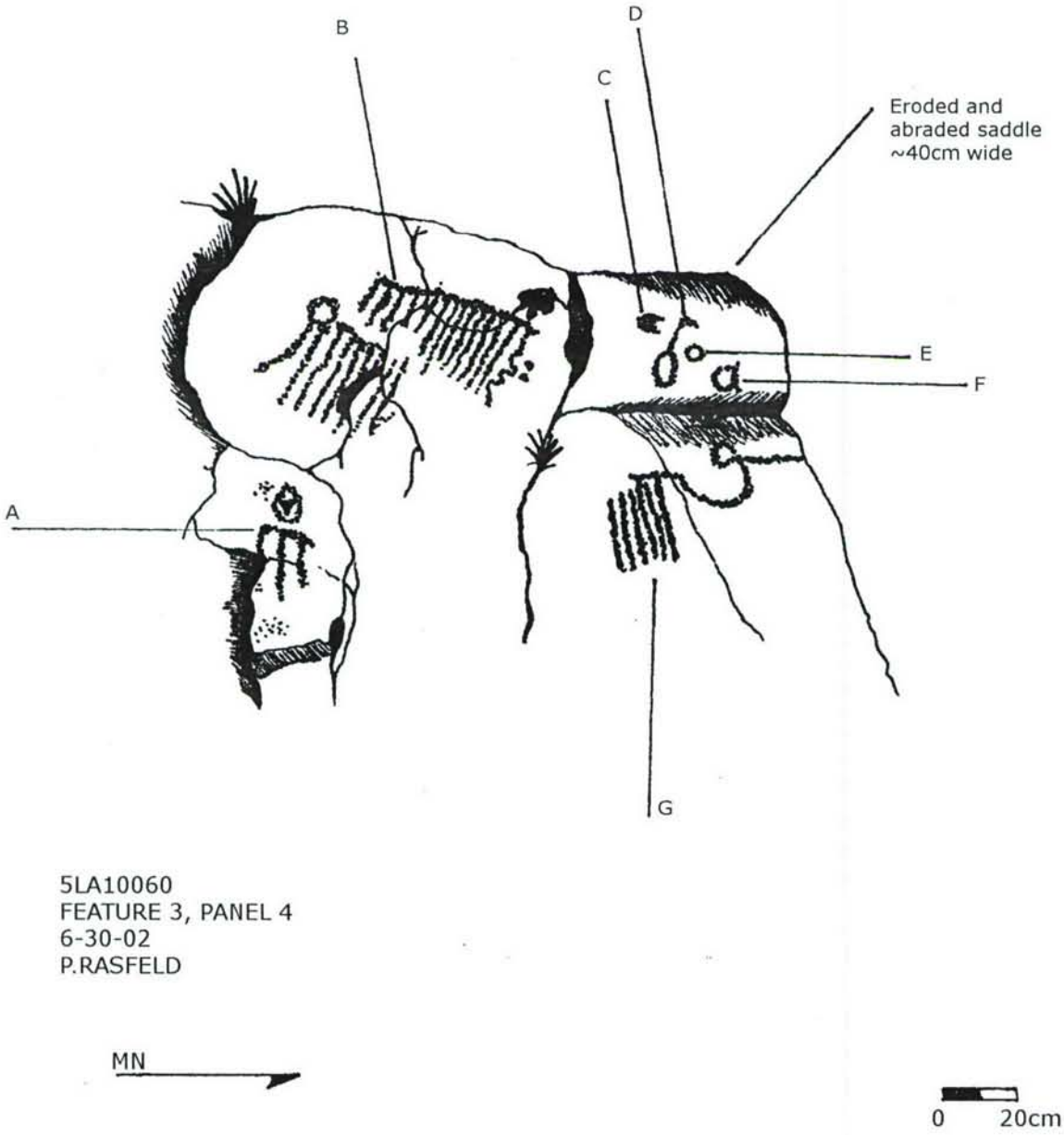


Figure 4.52: Feature 3, Panel 4, rock art, 5LA10060.

5LA10060
FEATURE 7
6-30-2002
P.RASFELD

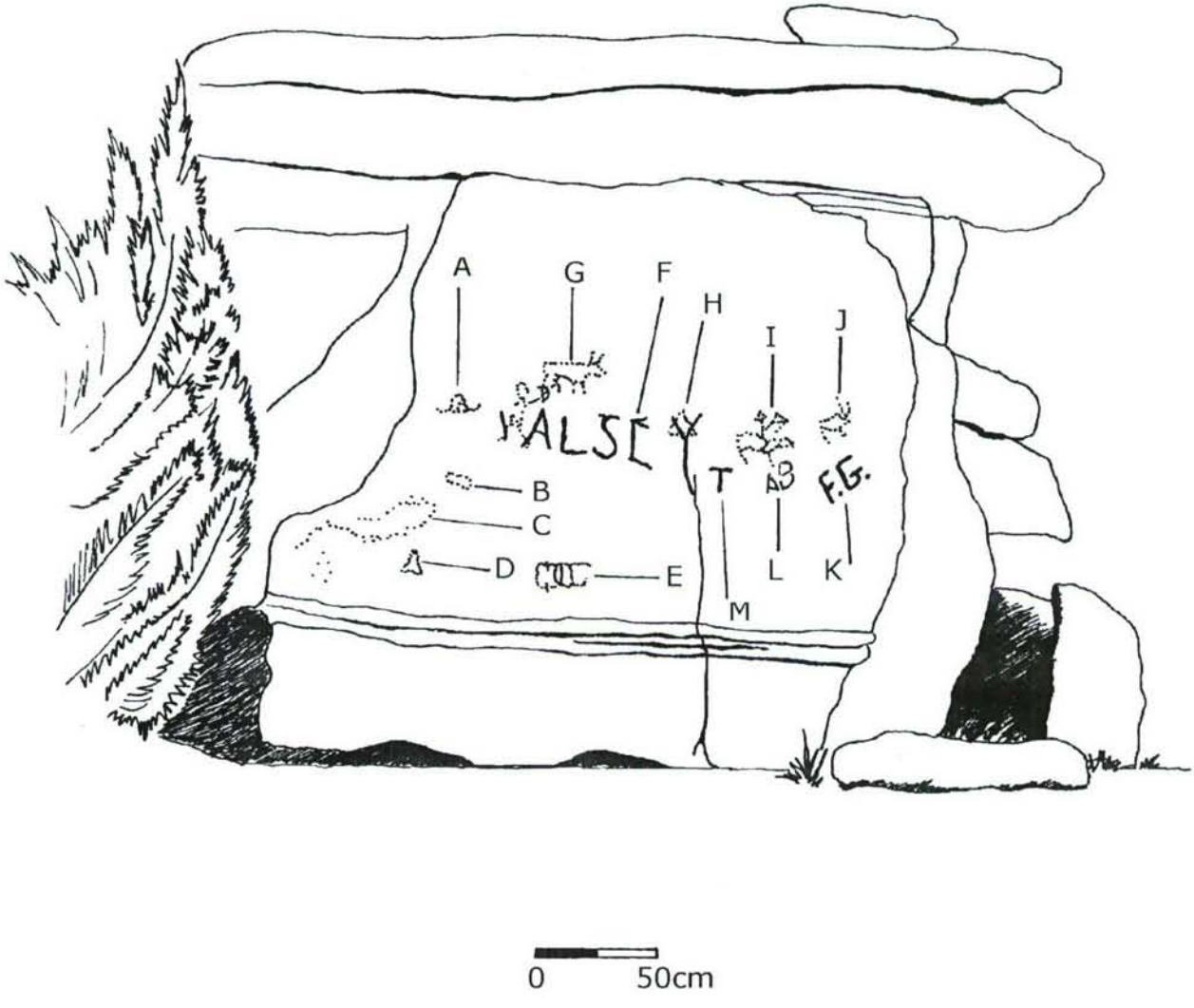


Figure 4.53: Feature 7, rock art panel, 5LA10060.

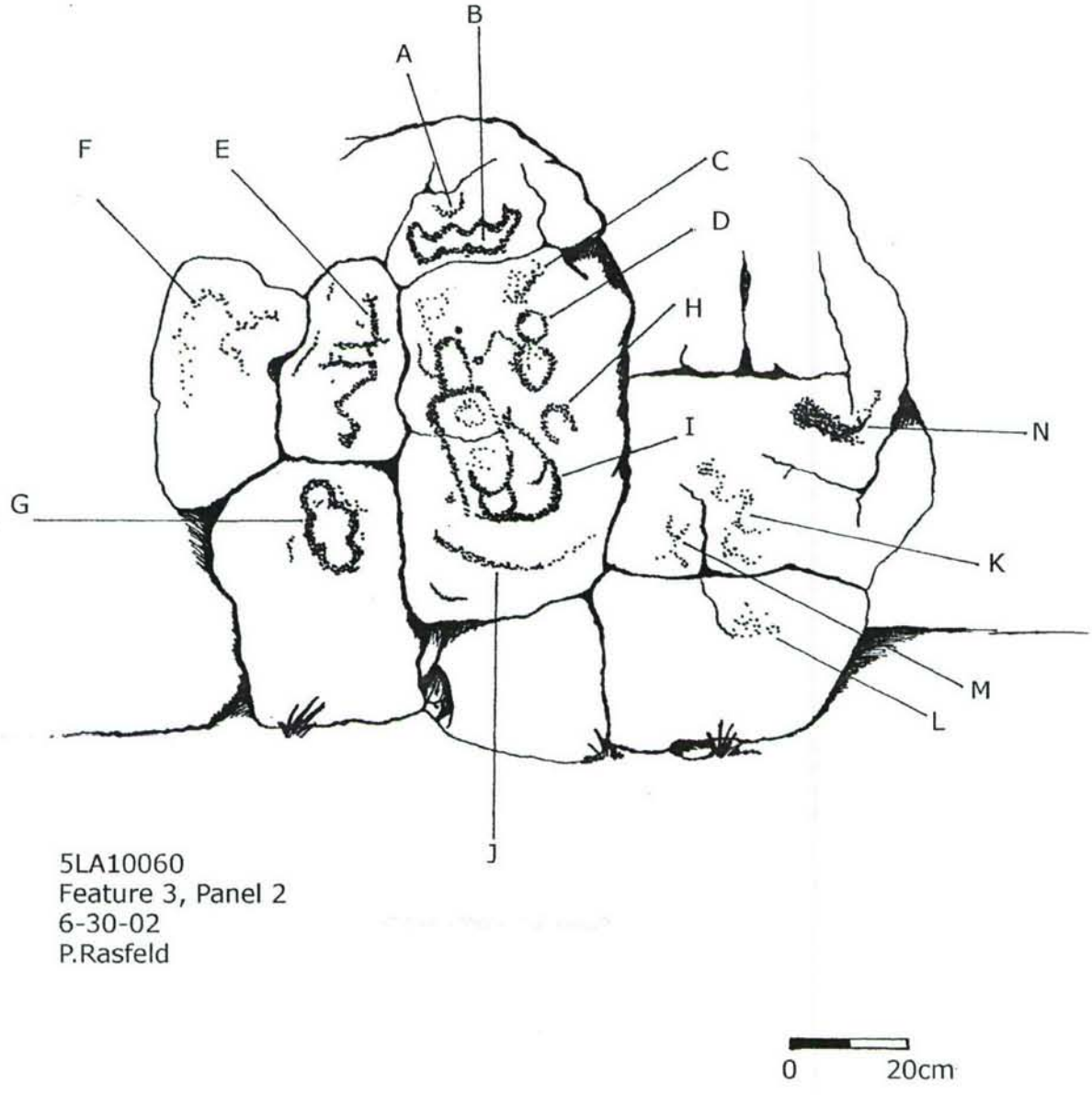


Figure 4.54: Feature 3, Panel 2, rock art, 5LA10060.

Figure 4.55: Site overview photograph, 5LA10060 (02-5:23)

All stages of core and cobble reduction were represented in the assemblage. Overall, 52% of the assemblage was cortical, while 48% was noncortical. These percentages were further broken down as 39% small noncortical items, 36% large cortical items, 16% small cortical items, and 9% large noncortical items. The type classifications were simple flakes (62%), complex flakes (23%), bifacial-thinning flakes (9%), and shatter (6%). Based on the proportionately low percentages of bifacial-thinning flakes and small complex flakes (6%), there appears to have been little emphasis on making finished uniface and biface tools. Large complex flakes (16%) suggest some early-stage bifaces were manufactured, however. The shatter specimens and most large cortical flakes were being produced as the by-product of quartzite and chert raw material reduction. All chert bifacial-thinning flakes were found in the area of Feature 6 and seem to indicate a single biface reduction episode.

Seventeen chipped-stone tools were encountered (Table 4.19): seven non-bipolar cores, five utilized flakes, three unfinished bifaces, a chert projectile point, and an end/side scraper of chert. The small projectile was broken and was classified as P80 within Anderson's (1989) analysis system. P80 points are thought to date between AD 1000 and 1750. The point was recovered at the base of Feature 3, Panel 2 when a crewmember kicked it lose from the soil while mapping rock art.

Ground-stone tools were the most remarkable of the lithic remains; 34 items were recorded including 22 slab metates and 12 one-hand manos. Nineteen of the metates and eight of the manos were broken. Nearly every mano was heavily used, and the metates were all very heavily used, in many cases having deeply pecked and ground milling surfaces. This level of wear has never been observed on PCMS ground-stone tools. Usually metates are simple slabs, with no concavity on the use surface. The 5LA10060 assemblage suggests a rare, but robust foodstuff processing event(s) (pinon nuts, acorns?), or these are curated artifacts that were left on site and reused over a long period of time.

The Feature 2 artifact collection included 13 items. Six were flaking debris, four were one-hand manos, one was the end fragment of a nearly finished biface (FS 16), one was a biface knife (FS 17), and there was a slab metate fragment (FS 18). Most ground-stone pieces were found stacked on the wall construction blocks. In other words, relic hunters have spent time on this site, and when ground-stone items were encountered, they were placed up on the wall and out of the way. This is not a unique occurrence as ground-stone artifacts were found stacked on sandstone ledges throughout the site area as well.

The Feature 4 assemblage contained 43 items: 19 simple flakes, 12 complex flakes, seven slab metates (four broken, three whole), two one-hand mano fragments, a chert core (FS 7), a chert scraper (FS 6), and an unfinished argillite biface (FS 4). Of the debitage, most was orthoquartzite (11), with fewer specimens of chert (2), coarse-grained quartzite (2), and fine-grained quartzite (6). Ten of these were large cortical items, ten were small noncortical items, eight were small cortical items, and three were large cortical items. Apparently, bifaces were not manufactured in or around Feature 4, and the reduction method involved the removal of flakes from both prepared and nodular cores.

Only debitage pieces were encountered in the area of Feature 6. Of the 53 items, 33 were simple flakes, five were complex flakes, and 15 were bifacial-thinning flakes. Materials included chert (29), orthoquartzite (11), coarse-grained quartzite (9), argillite (2), and fine-grained quartzite (2). Bifacial-thinning flakes included 12 items of chert and three orthoquartzite pieces, indicating at least two bifaces were reduced.

We recommend the site be eligible for listing on the NRHP on the grounds that it is likely to yield information important to our understanding of prehistory (Criterion D). This multi-component site was large, with a high artifact count and ground stone density. Although there was little deposition on the southern end of the site, substantial deposits can be found in the northern half, and in Features 1, 2 and 4. These features are being destroyed by erosion, and need data recovery before all information is lost. Only one diagnostic artifact was identified; however, more could be found in subsurface context, and would be helpful for addressing chronological issues. Rock art styles and architecture types suggest the site had more than one occupation. The various rock art elements seem to represent styles from the Archaic through the Protohistoric periods when compared with elements in Loendorf (1989). Pecking on Feature 7 represents high quality elements of the Plains Biographic style and includes anthropomorphs with bows-and-arrows, one of which is riding a horse.

5LA10063

The site contains lithic artifacts and multiple rockshelters. It was located in a large canyon in the breaks between the northern Black Hills and Bent Canyon. The .9 ac site was positioned on either side of the canyon bottom in a very narrow passage formed by the constriction of outcropping beds of sandstone (Figures 4.56 and 4.58). The main site features were along the canyon bottom though the site boundary incorporates the canyon walls on either side. The datum is at an elevation of approximately 1,495 m (4,905 ft). Site elevations range from a high of about 5,019 ft in the southern part of the site to a low of about 4900 ft along its northern edge.

Juniper, prickly pear, cholla, skunkbrush, side-oats grama, ricegrass, and buckwheat were growing on the site when it was recorded in June. The vegetative community surrounding the site is juniper woodland. Sediment deposits vary from sandstone bedrock with an aeolian duff covering, to alluvium at least 40 cm deep within the drainage.

Four rockshelters were recorded at the site (Features 1-4). Feature 1 was located about 12 m and 78° from the site datum. Facing west and overlooking the canyon bottom, this 6.5 x 4 m shelter had tabular and non-tabular sandstone blocks near its dripline suggesting a deflated architectural unit of some kind. No other cultural materials were identified in proximity to this feature. Feature 2 was a 14 x 2.5 m shelter with no evidence of internal architecture. It was identified at the base of a sandstone outcrop, 83 m southwest of the datum. Two metates were found in its interior (FS 1 and 2) but these appear to have been placed there in historic or modern times. Feature 3 was another small and shallow shelter located 21 m west of the datum. It measured 6 x 1.5 m and has been scoured out by erosion. A mano and metate (FS 6 and 7) were directly associated with this feature. Feature 4 (Figure 4.57) was a collapsed rockshelter with an associated thermal feature. Abundant lithic debris and ground stone suggest intensive occupation. Its location was 25 m west of the datum at a bearing of 323°. This shelter appears to have been substantial before its collapse (12 x 9 m) and it has been almost completely filled by post-abandonment sedimentation. The nature of the thermal feature is unknown; it was a large ash smear with FCR, and out in front of the shelter. It may be part of an activity area or midden, but it is equally plausible that it is eroded fill from within the shelter.

A total of 109 pieces of debitage were recorded at the site (Table 4.20). Like other sites in this part of the PCMS, quartzite (72%) was the most abundant material type. Also identified were pieces of chert (16%), hornfels/basalt (7%), orthoquartzite (5%), and argillite (<1%). Most debitage was cortical (69%) and large in size (66%). The debitage was composed of simple (62%) and complex flakes (37%), and only a single piece of shatter was identified. A lack of bifacial-thinning flakes and small complex flakes (only 9% of the overall assemblage) indicates that tool manufacturing activities played a minor role on 5LA10063. Hard-hammer percussion was the technique used to generate the majority of the debitage.

No time diagnostic pieces, such as projectile points or ceramics, were identified, and the sparse chipped-tool assemblage is comprised of only seven items (Table 4.21). Of these, five were non-bipolar cores (four of coarse-grained quartzite and one chert), one was an unfinished

argillite biface, and the other was a utilized flake of basalt. The ground-stone tool assemblage was more substantial. These artifacts were often found in direct association to the rockshelters, though they were stacked in large looter piles (this is likely why patterned tools are missing from the site surface). All ground-stone items were made of locally available Dakota sandstone. There were 15 slab metate fragments, three mano fragments, six complete slab metates, and a complete one-hand mano.

Table 4.20: Summary Description of Chipped-Stone Debitage for 5LA10063.

	Argillite	Chert	Hornfels/Basalt	Orthoquartzite	Quartzite	Total
Total	1	17	8	5	78	109
Large	1	8	4	1	58	72
Small	0	9	4	4	20	37
Cortical	1	9	5	3	57	75
Noncortical	0	8	3	2	21	34
Complex	1	9	2	2	26	40
Shatter	0	1	0	0	0	1
Simple	0	7	6	3	52	68

Table 4.21: Stone Tool Type by Material Group for 5LA10063.

	Type					
Material	Biface	Core	Flake Tool	Mano	Metate	Total
Argillite	1	0	0	0	0	1
Chert	0	1	0	0	0	1
Hornfels/Basalt	0	0	1	0	0	1
Quartzite	0	4	0	0	0	4
Sandstone	0	0	0	4	21	25
Total	1	5	1	4	21	32

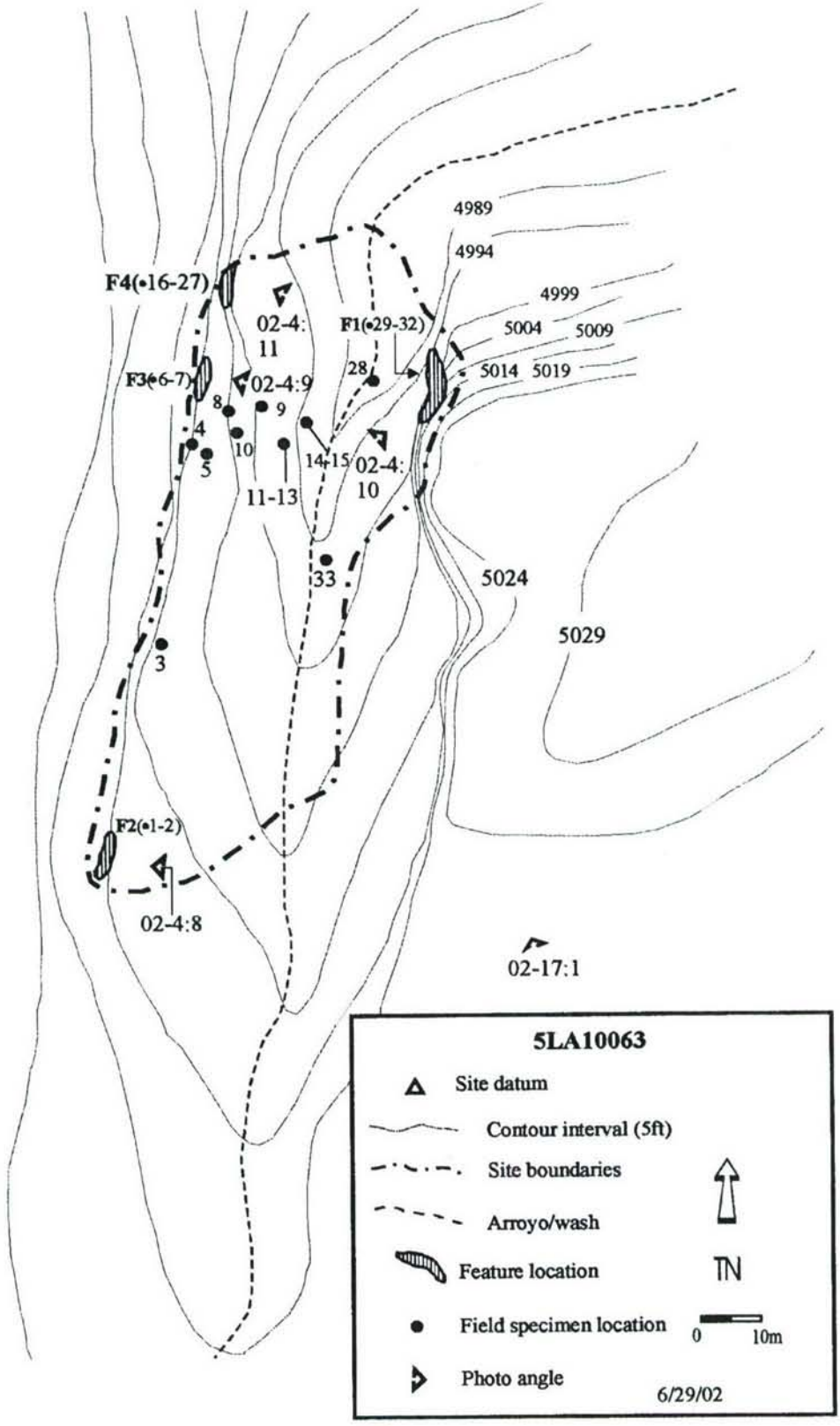


Figure 4.56: Site map 5LA10063.

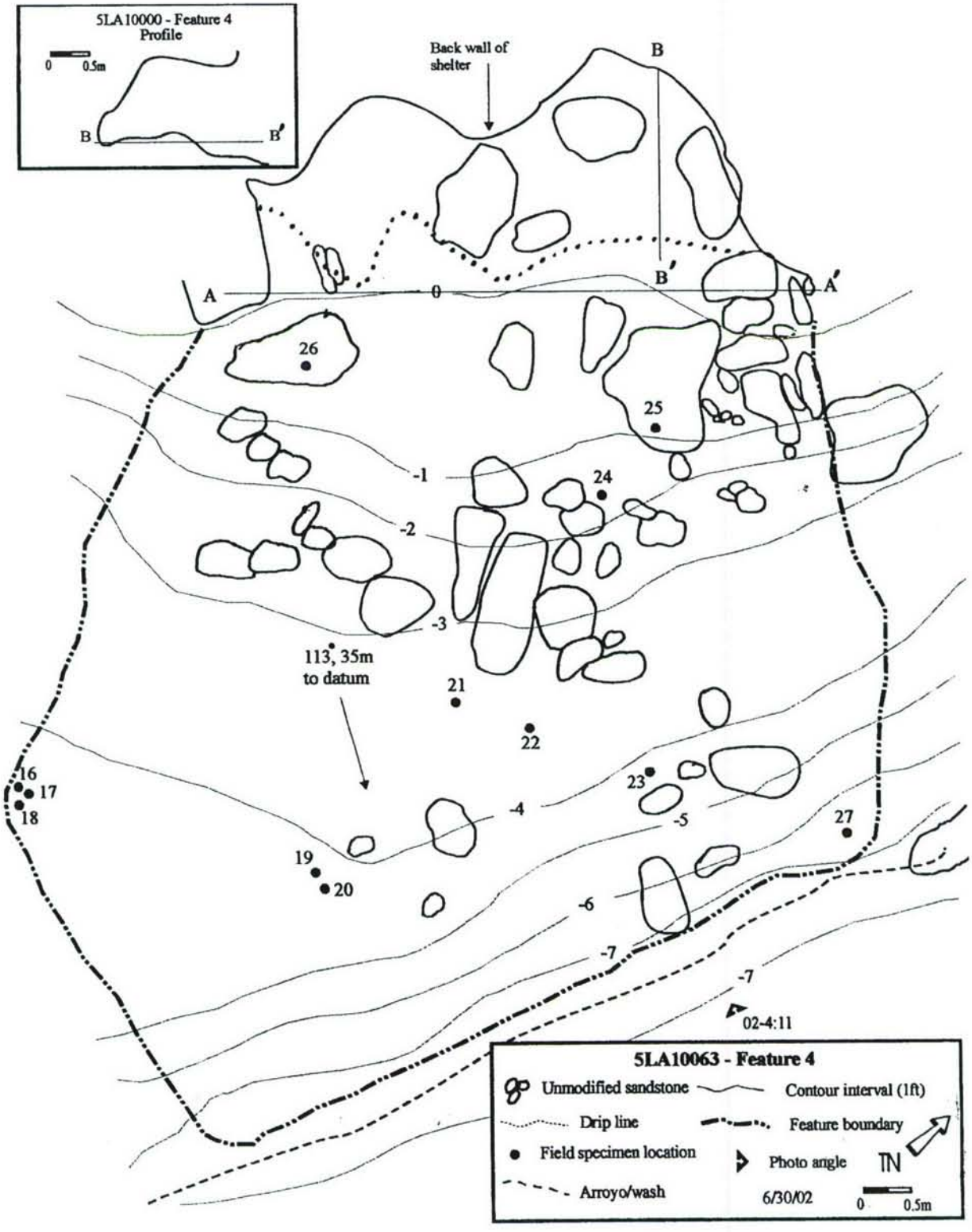


Figure 4.57: Planview map of Feature 4, 5LA10063.

Figure 4.58: Site overview photograph, 5LA10063 (02-17:1)

We recommend that 5LA10063 be nominated for listing on the NRHP as it is likely to yield information important to our understanding of prehistory (Criterion D). It is a habitation site with a relatively high artifact density. The presence of much ground stone indicates that plant processing was an important activity carried out at the site. As such, subsurface work should lead to the recovery of pollen and macrobotanical remains, useful for reconstructing prehistoric subsistence strategies and paleoclimates. Areas of burning should produce ^{14}C samples for establishing the site's placement within the regional chronology.

One of the shelters, Feature 4, had a large activity area outside its entrance, with one or more thermal features. The site gains its primary significance from this feature and its enormous research potential. Our management recommendation is data recovery. Water erosion and arroyo down cutting are destroying the shelter; it needs to be tested before all available data is lost.

5LA10100

Site 5LA10100 was located on the south side of TA 13, along the south bank of Bent Canyon near its confluence with Horse Canyon. This large multi-component site contains many

features including spaced-stone circles, thermal features, contiguous wall structures, rock art, bedrock metates, rockshelters, rock alignments, and a historic structure. The north end of the site occupies the floodplain and lower terrace of Bent Canyon Arroyo (Figures 4.59 and 4.58). The south end follows a large southwest to northeast trending ridge with numerous terraces formed by eroding beds of Dakota sandstone. Considerable sheetwash erosion has disturbed most of the site area, leaving gravelly to silty sediments. Along the northern edge of the site, and near a large sandstone cliff, the sediments were composed of aeolian sand. Sediment depths vary; maximum depths of up to 2 m were observed in an arroyo cutbank at the northwest edge and away from the floodplain, they were generally sparse among the numerous sandstone bedrock outcrops.

Open prairie and juniper woodland best describe the plant communities of the site. A wide variety of vegetation was observed, including ricegrass, currant, buffalo gourd, wheat grass, American plum, juniper, the grama grasses, and an occasional pinon tree. Various types of sedges and rushes were identified in the drainage. The site contains an historic component in the form of a structure built into a low sandstone ledge, and widely scattered surface artifacts throughout the site boundary. These could be related to the Bent Canyon Stage Stop (5LA3179), a large historic site with structures, located across the drainage to the north. The site is on land patented by Richard Surrant in 1891, according to GLO records. Richard Survant appears on the 1910 census in Trinidad. He was born in Tennessee in 1860 and, locally worked as a fireman for the railroad. He married in 1888 and had a 9 year old son.

The field crew recorded 77 features within the site boundary. These were found in relatively discrete areas with distinct spatial separation. For example, all rock art panels were encountered in the northwest part of the site at the base of a large Dakota sandstone cliff. In this area, the cliff is breaking up and several large boulders form alcoves, overhangs, and protected niches. It was among these hidden areas that several rock art panels were identified.

Feature 1, the largest and most intensely pecked grouping of rock art elements, was located just south of the datum. These elements were encountered in a small alcove formed by differential weathering on the north face of a large boulder. A grouping of eight panels was contained within the loci of Feature 1. Panel 1 occupied the east wall of the feature. It measured 90 x 50 cm and contained both modern vandalism and several sets of historic initials and names (Appendix III). Panel 2 exhibited both historic and prehistoric elements. This 2.1 x 1.4 m panel was found midway across the back wall of the shelter. A single, but rather large prehistoric element was designated Panel 3. It was encountered on the ceiling near the east side of shelter and was pecked into a thin ledge. Panel 4, measuring 1.3 x .8 m, contained historic names and dates and was found along the roof of the shelter. A series of connected meanders and other prehistoric elements were designated Panel 5. This impressive panel was encountered along the back wall of the shelter near its west edge and measures 2 x 1.7 m. Panel 6 occupies the western floor of the shelter. These elements are prehistoric in age and consist of quadrupeds, pecked circles, pecked dots, and connected lines. Another grouping of elements is found on the north face of the boulder, just outside and slightly lower than the alcove (Panel 7). All of these elements were highly weathered, and in several the form and pecking style was impossible to determine. Panel 8 was identified on the roof near the mouth of the shelter. It measured 26 x 18 cm and had incised connecting lines and a solid-pecked quadruped.

Feature 2 was a 160 x 75 cm panel of rock art containing eight stipple-pecked elements. The majority of the rock surface has eroded, and there were several areas of the face that have spalled off. Several elements (a, b, and h) seem to be incomplete as a result.

A third grouping of rock art elements (Feature 3) was found approximately 13 m east of the site datum. Two distinct panels were found on a freestanding boulder of sandstone. Panel 1 (115 x 72 cm) faces northwest and contains only prehistoric rock art in the form of rectilinear designs, curvilinear designs, a rake-like figure, and a simple quadruped. Panel 2 (152 x 110 cm) faces northeast and contains many petroglyphs as well as historic names. These were the names of soldiers from Ft. Lyon who were transporting horses to the Cavalry in New Mexico (Owens 2004). The inscriptions include: DUNNE "D" Co 19th INF July 31st 1874, HH, Lowery, and WE DERBY D CO US 19th INF (Figure 4.62). Both panels have been impacted by wind and water exposure, and as a result, the parent rock has started to crack and spall away.

Feature 4, a single rock art panel, was found on a large sandstone boulder at the northwest end of the cliff-like landform (17 m northwest of the datum). The panel surface was smooth, heavily patinated, and large areas of the face have spalled off. Some prehistoric elements remain, but most were heavily eroded or covered with bright green lichen. In viewing this panel, one senses that several elements have eroded away.

Two prehistoric panels, in close proximity to each other, were designated Feature 5. Panel 1 measured 1.7 x 1.7 m and was oriented to face west. Several elements have experienced erosion and appear indistinguishable. Identifiable elements were quadrupeds and solid-pecked meanders. Panel 2 was on the north (inside) face of a large crack in the cliff. It consisted of a single, highly patinated shield-like element. This feature was 47 m and 241° from the site datum.

Feature 6 was a single pecked element adjacent to Feature 7. The design appears to be Archaic in style, and it was highly patinated suggesting considerable age. Its orientation on the north side of a thin erosional feature was similar to that of Panel 2, Feature 5. There were also similarities in design style suggesting that both were produced during the same period or event.

Feature 7 was composed of prehistoric elements and found just south of Feature 6. Panel 2, a single rake-like element, was much higher on the face of the cliff than either Panel 1 or Feature 6. The rock face (45° angle facing up) of Panel 1 is mostly obscured by erosion and lichen growth. Two identifiable elements were recorded on this face. One was two sets of eight solid-pecked linear lines, the other was a single and rather long line bisected by at least 21 other lines. Erosion has nearly destroyed this panel, but we suspect that at one time both elements were connected to form one large image.

Feature 8 was a rock art panel on the north side of a small overhang formed on the face of a large boulder. There were eight elements and all had some degree of patination; the unidentifiable elements were the most patinated. The panel depicts a horizontal undulating line with squared curves, a solid-pecked circle, and several elements with pecked connected lines. The patination and the element design suggest an Archaic age.

Feature 10 was approximately 60 m southwest of the site datum. It was on the south side of a large sandstone boulder on a relatively flat surface (when compared to other faces on the rock). Six patinated elements were identified: a figure 8, upside down u-shapes, an upside down l-shape, a pecked meander, and a rectangular grid. There were several large cracks in the area of the elements, but none have specifically been impacted.

A solid-pecked tailed circle and a series of solid-pecked connected lines were designated as Feature 11. These were located in a secluded area formed between several large sandstone boulders 38 m and 228° from the datum. There were likely other elements here at one time, but wind and water exposure have destroyed part of the face of the panel.

A single upside down u-shaped element was encountered in a protected alcove 38 m and 232° from the datum. This was designated as Feature 12. There is a wall, likely historic in nature, just below this element that could be covering additional pecked designs.

Feature 13 was two rock art panels situated in a sandstone overhang near the Horse Canyon Arroyo. There was slight patination on the rock face, but none on the elements. All were solid pecked; Panel 1 contained a curvilinear meander, and Panel 2 a circle, an unidentifiable element, and two deeply abraded tool grooves.

Feature 14 was the southernmost of the rock art panels and 83 m and 215° from the datum. The Horse Creek Arroyo is approximately 15 m southwest of this boulder. Identifiable elements on this 70 x 56 cm panel include a pecked circle, several curved lines, connected lines, and a possible anthropomorph. The center of the panel exhibits a deep crack in the parent rock, and weathering has caused partial loss of some of the elements.

The remaining rock art panel identified by the field crew was designated Feature 15. Heavy wind and water erosion have made the elements indistinguishable, and all that remains is scattered areas of pecking.

A total of 17 spaced-stone circles were recorded on this site. The overall camp arrangement seems scattered when spatial analysis is applied. There was a grouping of circles along the upper terrace above Bent Canyon Arroyo. This cluster contained Features 65 through 72 and all were noted on a single shelf-like landform. Another grouping of rings (Features 16, 38, 42, 73, and 74) were encountered within the Bent Canyon Arroyo floodplain, just south (25 m) of the arroyo proper. Other circles were noted on the terrace above the rock art panels (Feature 61 and 75) and further up the ridge at what could be considered the central portion of the site (Features 76 and 77). In prehistoric times, we believe that there were more circles. The erosional nature of the entire ridge landform however makes positive identification of more rings impossible. All of the distinct habitation units conform to Kalasz's (1989) Class IV, and are freestanding, full-enclosure, spaced rock wall units. In southeastern Colorado, radiocarbon dates for these types of structures are 600 ± 55 BP and 1170 ± 120 BP (Kalasz 1989:109).

Of the contiguous wall structures (Features 19, 22 to 25, 29 to 34, 37, 40, 47, 63, 64), all were isolated; eleven of these rely on a low sandstone outcrop to form a wall (Figure 4.61), and

five were free standing (Figure 4.60). The abutment structures seem to resemble Kalasz's (1989) Class V, Categories 15 and 16, which are contiguous wall, rock abutment, and fully enclosed, isolated units. Similar structures have been dated to 930±225 BP and 630±50 BP (Kalasz 1989:103). Most of these architectural units, discounting Features 33 and 34, were found in the central portion of the site and within close proximity to one another. Without excavation or some sort of structural design/manufacture study, there is no way to determine if they represent a large contemporaneously used village, or are the remains of similar structures used many times throughout the past.

Seventeen thermal features were encountered within the site boundary. These range from small hearths to large roasting features. The most significant of the latter, Feature 52, was a large roasting pit measuring 38 x 16 m. It exhibited significant FCR, ash, charcoal, and burned lithic artifacts. Within the boundaries of this thermal episode was three structures: Feature 32 was a circular house structure, Feature 31 a smaller circular structure (possible a storage feature), and Feature 30 a linear wall. These seem to have been directly associated with the roasting activity because they were set in a topographic setting different from any of the other site structures. The linear wall feature had an animal burrow at its east end, which shows more than one course of buried building blocks. This burrow also shows ash and charcoal fill along its sidewalls for at least 40 cm in depth. Test units in this area would help to determine structure/loci function, and what kinds of materials were being cooked in the roasting feature.

Three of the four rockshelters were encountered on the east side of Horse Canyon (Feature 35, 56, and 59). The other shelter was found at the base of a low sandstone ledge on the east slope of the large ridge that accommodates most of the site materials. Structural units, or the remnants thereof, were noted in all of the shelters and Feature 36 is directly associated with another large thermal feature (Feature 54).

Lithic artifacts noted at the surface included debitage, patterned chipped-stone tools, ground stone, edge-ground cobbles, and miscellaneous items. There were many apparent activity areas on the site, and several of the features had distinct lithic assemblages. To get a feel for spatial relationships we recorded all items from each feature and recorded samples from the ridge (the area with the contiguous wall structures), the first terrace, the second terrace, and the hill slope area containing the spaced-stone circles. A total of 629 pieces of debitage were recorded, of which 177 pieces were attributed to the contiguous wall structures and 113 to the spaced-stone circles. A total of 12 separate material types were encountered in this large assemblage (Table 4.22). Coarse-grained quartzite (43%), chert (27%), fine-grained quartzite (12%), and argillite (11%) were the dominant materials. Much smaller percentages were seen of baked clay, chalcedony, hornfels/basalt, Ralston Creek chert, unspecified silicified wood, and siltstone. The non-local materials, Black Forest silicified wood and obsidian from the Jemez Mountains, comprised less than one percent of the overall total.

The total assemblage contained complex flakes (48%) and simple flakes (36%), with fewer bifacial-thinning flakes (9%), and pieces of shatter (7%) identified. Eighty-seven percent of all debitage was non-cortical. Cortex was observed on 10% of the large items and 3% of the small. These data reflect emphasis on the reduction of locally available materials, and all reduction stages were represented. The relatively high percentage of bifacial-thinning flakes and

small complex flakes (11% of the overall assemblage) indicate that many finished bifaces were manufactured. But for the most part, local materials were brought to the site in both cortical and non-cortical form, and once here, were used to manufacture early-stage bifaces, transportable cores, and flake blanks.

In the area of the contiguous wall units, 177 pieces of debitage were analyzed. Ten material types were noted (Table 4.23). Of the total, 95% of the materials were quartzite (51%), chert (34%), and argillite (10%). Found in much smaller proportions are baked clay, Black Forest silicified wood, chalcedony, hornfels/basalt, obsidian, silicified wood, and siltstone. Most (64%) of these debitage pieces were large in size, while fewer were small (36%); 15% of the assemblage had cortex and 85% was noncortical; and 44% were complex flakes, 33% simple flakes, 12% bifacial-thinning flakes, 10% shatter, and <1% were non-bipolar flakes.

Freehand percussion seems to have been the most important technique used in generating the quartzite and chert debitage in the area of the structures. This is not surprising considering the fact that quartzite outcrops within the site boundary and chert pebbles can be found relatively close by in Bent Canyon. The high percentage of noncortical flakes, bifacial-thinning flakes, and small, complex flakes (10%) indicates that tool manufacture and maintenance, in the form of soft-hammer percussion and pressure flaking, was also a dominant activity.

Table 4.22: Summary Description of Chipped-Stone Debitage for 5LA10100.

	Arg.	B. Clay	B. Forest	Chal.	Chert	H/Basalt	Obs.	Orth.	Quartzite	S. Wood	Silt.	Total
Total	70	2	2	2	194	3	5	1	344	1	5	629
Large	42	2	1	0	79	3	3	1	254	0	4	389
Small	28	0	1	2	105	0	2	0	90	1	1	230
Cortical	8	1	0	0	15	1	0	0	55	0	1	81
Noncortical	62	1	2	2	179	2	5	1	289	1	4	548
Complex	31	0	2	0	83	1	3	0	178	0	2	300
Shatter	3	2	0	0	30	1	0	0	8	0	1	45
Bipolar	1	0	0	0	0	0	0	0	0	0	0	1
Biface-Thinning	9	0	0	2	25	0	0	0	17	1	1	55
Simple	26	0	0	0	56	1	2	1	141	0	1	228

Table 4.23: Summary Description of Chipped-Stone Debitage from Contiguous Wall Features, 5LA10100.

	Arg.	B. Clay	B. Forest	Chal.	Chert	H/Basalt	Obs.	Quartzite	S. Wood	Silt.	Total
Total	17	1	2	1	60	1	2	91	1	1	177
Large	13	1	1	0	25	1	1	72	0	0	114
Small	4	0	1	1	35	0	1	19	1	1	63
Cortical	3	1	0	0	6	1	0	16	0	0	27
Noncortical	14	0	2	1	54	0	2	75	1	1	150
Complex	3	0	2	0	26	0	1	47	0	0	79
Shatter	2	1	0	0	10	1	0	3	0	1	18
Bipolar	1	0	0	0	0	0	0	0	0	0	1
Biface-Thinning	4	0	0	1	10	0	0	5	1	0	21
Simple	7	0	0	0	14	0	1	36	0	0	58

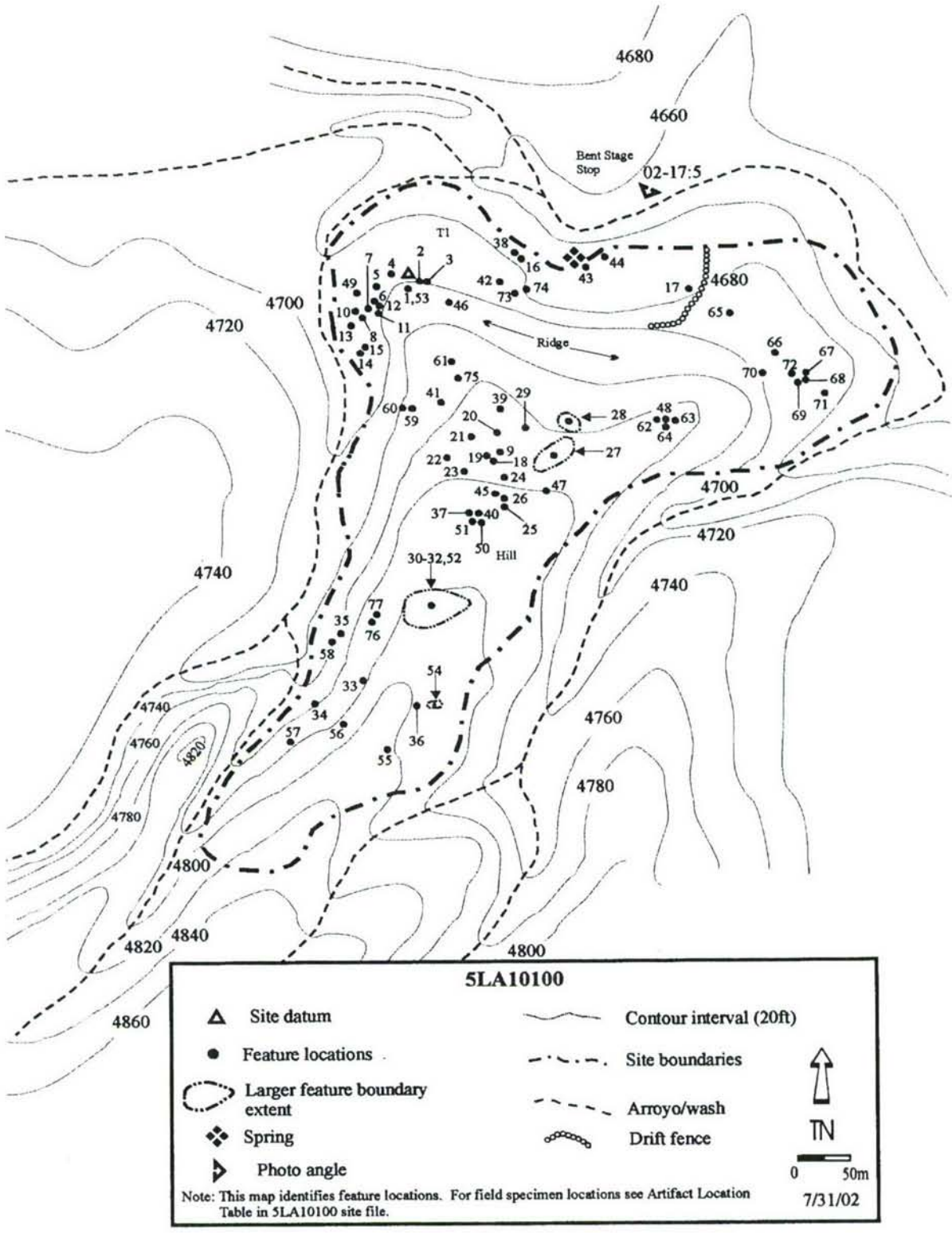


Figure 4.59: Site map 5LA10100.

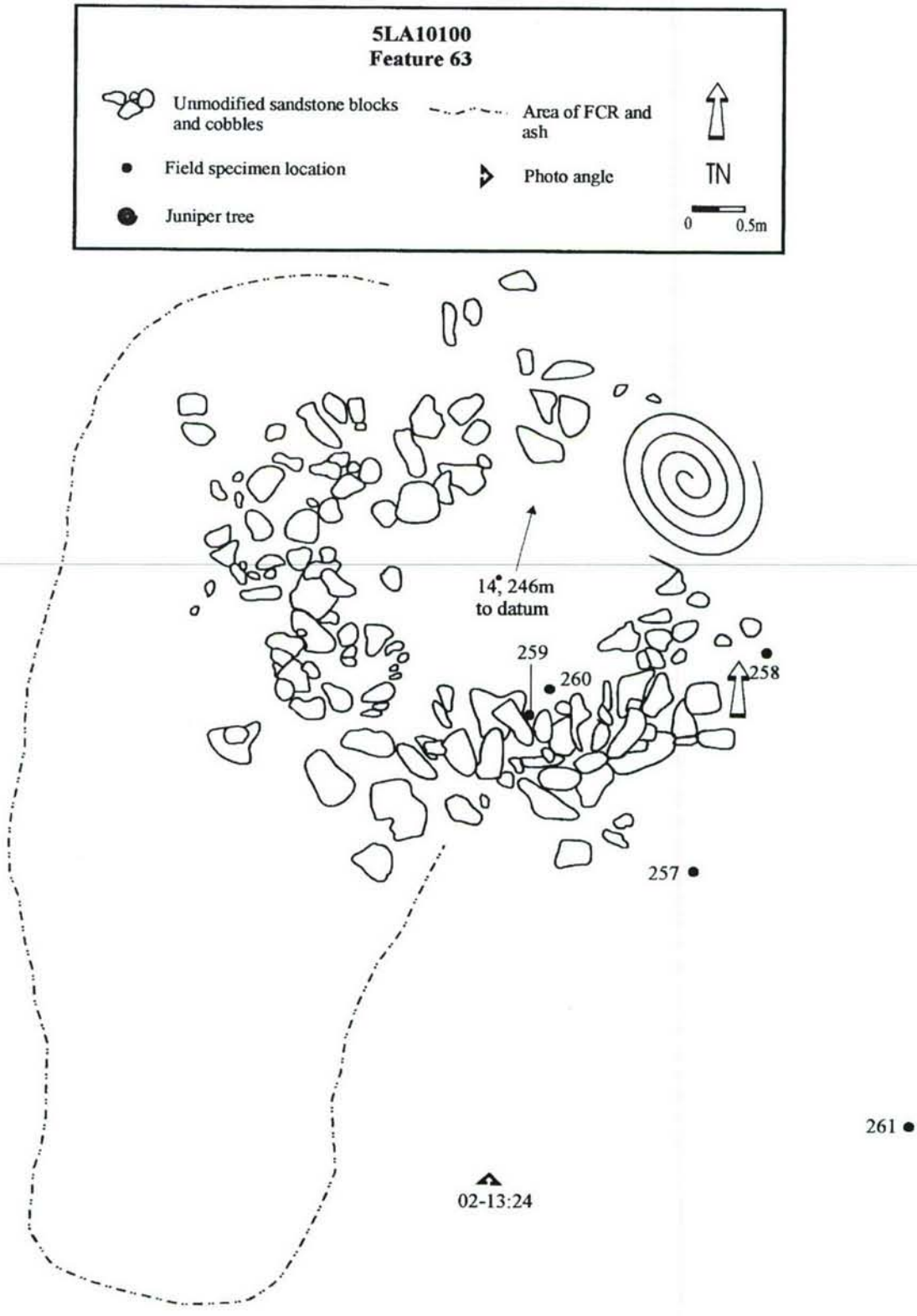


Figure 4.60: Planview map for Feature 63, 5LA10100.

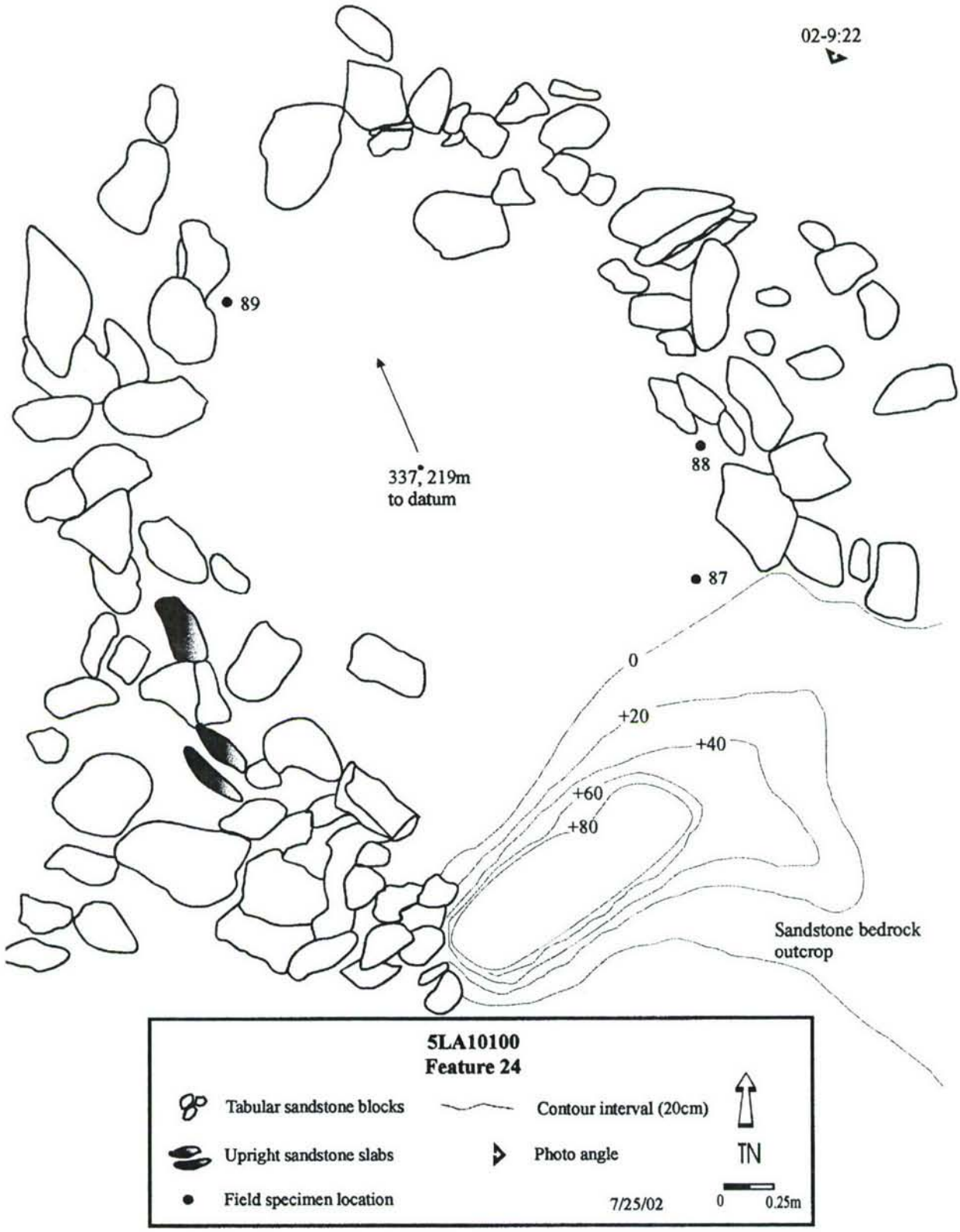


Figure 4.61: Planview map of Feature 24, 5LA10100.

Figure 4.62: Feature 3, Panel 2, relationship map, 5LA10100.

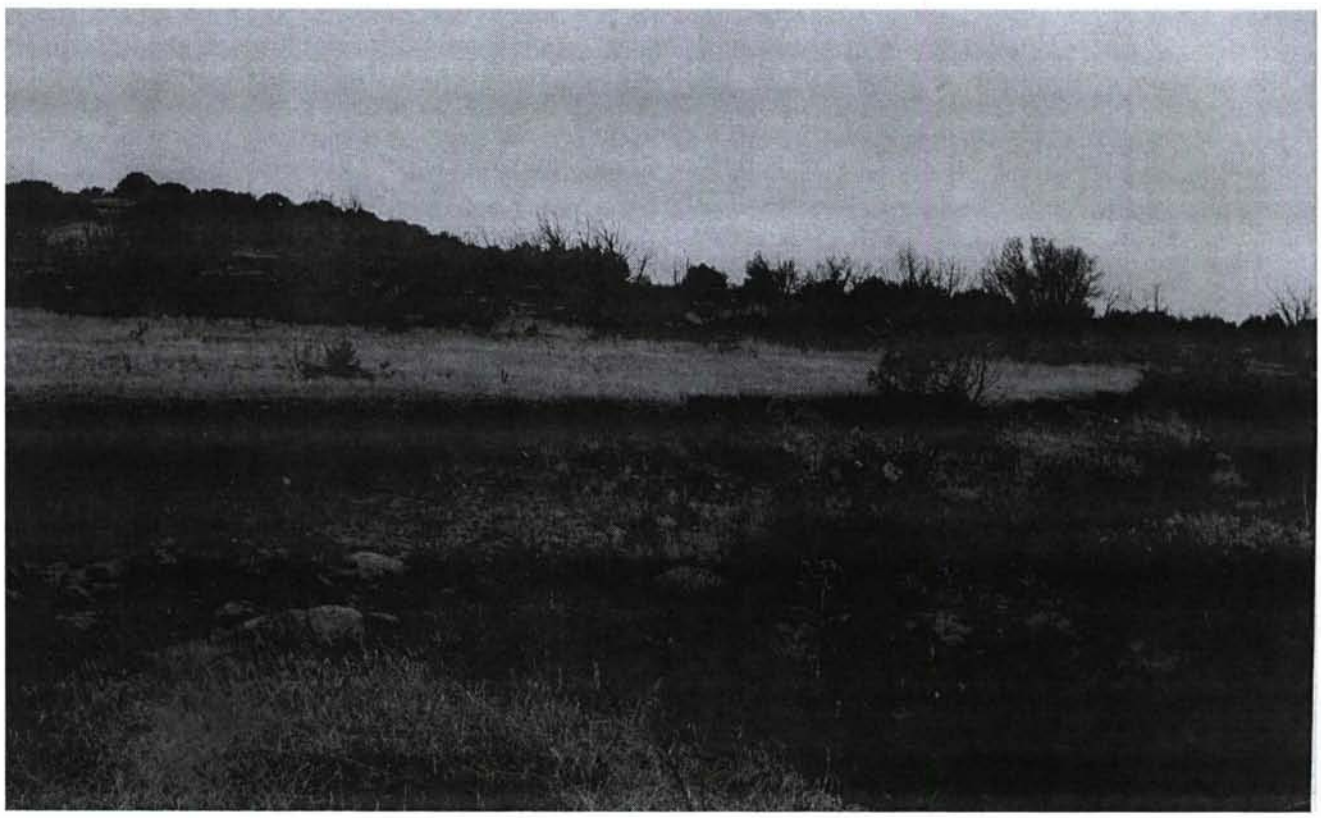


Figure 4.63: Site overview photograph, 5LA10100 (02-17:5).

For the most part, the spaced-stone architectural units were identified on the first major terrace above the floodplain, and at the northern edge of the site. A total of 113 pieces of lithic detritus were analyzed here. Only five material types were found (Table 4.24). Like the general and contiguous wall architecture assemblages, quartzite (50%), chert (36%), and argillite (12%) dominate. Found in much smaller percentages were chalcedony (1%) and siltstone (1%). The majority (65%) of the flaking debris was large, the remainder small (35%). Like the contiguous wall assemblage, 15% of the pieces had visible dorsal cortex, and 85% was noncortical. Debitage classifications were 52% simple flakes, 36% complex flakes, 6% bifacial-thinning flakes, and 5% shatter.

For the most part, there appears little difference between the spaced-stone and contiguous wall assemblages. Size-grade and cortex data were nearly the same and both show that all reduction stages were present within the samples. It is the debris classifications where subtle differences occur. There were fewer bifacial-thinning flakes and complex flakes in the spaced-stone circle assemblage. Coupled with the fact that there are also many more simple flakes, it seems reasonable to infer that initial raw material reduction, for the purpose of producing usable flakes, was the reduction strategy preferred by the spaced-stone circle inhabitants. This being said, the site is composed of many eroded landforms. As such, there are likely many occupations, covering most of the prehistoric culture sequence, mixed together with no possibility of establishing either horizontal or vertical spatial relationships.

Table 4.24: Summary Description of Chipped-Stone Debitage from Spaced-Stone Circles, 5LA10100.

	Argillite	Chalcedony	Chert	Quartzite	Siltstone	Total
Total	13	1	41	57	1	113
Large	7	0	24	41	1	73
Small	6	1	17	16	0	40
Cortical	2	0	4	11	0	17
Noncortical	11	1	37	46	1	96
Complex	8	0	21	29	1	59
Shatter	0	0	5	1	0	6
Bipolar	0	0	0	0	0	0
Biface-Thinning	0	1	5	1	0	7
Simple	5	0	10	26	0	41

The chipped-stone tools included 64 utilized/retouched flakes, 32 bifaces, 28 projectile points, 28 cores, four scraping tools, and three drills (Table 4.25). All cores were analyzed in the field and not collected, so only material data will be discussed in this report. Most cores were quartzite (20), with fewer chert (5), argillite (2) and silicified wood (1) items identified. The overwhelming selection preference for quartzite is not surprising as this material outcrops as part of Dakota group exposures in the area.

Of the bifaces, six material types were identified. Chert (13) and the quartzites (9 fine- and 1 coarse-grained) dominate the assemblage, though hornfels/basalt (4), orthoquartzite (3), and argillite (2) bifaces were also found. Twenty-one of the bifaces were broken and 11 were

complete; 26 were classified as unfinished, four were nearly finished, and two finished. Nearly all of the bifaces were broken during manufacture. Only two exhibit signs of use wear; both of these (FS 154 and 51) were broken biface knives.

Sixteen of the 28 projectile points recovered from the surface of this site appear temporally diagnostic. Three (FS 81, 141, and 180) were small leaf-shaped preforms and exactly like Anderson's (1989:173-175) P49. Preforms of this type are thought to have been manufactured between AD 800 and 1750. Two other preforms (FS 218 and 251) were classified as P50 (AD 1000 to 1750). Other diagnostic points classified within Anderson's (1989) typology include P19 (2000 BC to AD 1000), P35 (1000 BC to AD 1200), P48 (AD 500 to 1400), P53 (AD 700 to 1200), P62 (AD 500 to 1400), P79 (AD 1000 to 1750), P81 (100 BC to AD 900), and P83 (AD 750 to 1650). Also encountered was the base of a Hell Gap Paleoindian projectile. Frison (1974) offers a date range of 10,250 to 7800 for this type of point. Based on the projectile point data, all prehistoric stages appear represented... if the early points were not curated. Most occupations occurred during the Late Prehistoric stage (AD 100 to 1725), and this corresponds with the presence of Late Prehistoric architectural features.

A wide variety of material types were represented in the retouched and utilized flakes. Flakes of fine-grained quartzite (28), argillite (9), hornfels/basalt (6), and chert (5) comprise the majority. Other material types include baked clay (3), coarse-grained quartzite (3), glass (1), Morrison chert (1), obsidian (1), orthoquartzite (3), Ralston creek chert (2), silicified wood (1), and siltstone (1). Observed edge angles indicate that most (57) tools were used for scraping.

More formal scraping tools include end scrapers (fine-grained quartzite and orthoquartzite), an end/side scraper (fine-grained quartzite), and a side scraper (argillite). The drills were Alibates dolomite, chert, and fine-grained quartzite.

The ground-stone tool assemblage is quite impressive and totaled 74 items. This includes 43 slab metates, 19 one-hand manos, eight bedrock metates, and four edge-ground cobbles. As would be expected, all of the bedrock metates were complete. Only one edge-ground cobble was whole, as well as three one-hand manos and three slab metates. Material types for the manos – sandstone (11), granite (4), and quartzite (4), and the slab metates were sandstone (41) and quartzite (2). The edge-ground cobbles were sandstone (3) and conglomerate (1). It should be noted that all of the ground-stone tools were encountered randomly across the site in no apparent functional or temporal concentrations.

In addition, miscellaneous items included four hammerstones, three shaft abraders (FS 90, 97, and 221), a jewelry blank (FS 257), and two ceramics (FS 173 and 196). According to Krause (Appendix III, Owens and Loendorf 2004) these represent one cord-roughened vessel of non-mica bearing clay, though the shape of the vessel can not be determined based on the fragmented specimens.

Table 4.25: Stone Tool Type by Material Group for 5LA10100.

Material	Type								
	Biface	Core	Projectile	Scraper/Drill	Flake Tool	Mano/Edge	Metate	Misc.	Total
Alibates	0	0	0	1	0	0	0	0	1
Argillite	2	2	2	1	9	0	0	1	17
Baked Clay	0	0	0	0	3	0	0	0	3
Black Forest	0	0	2	0	0	0	0	0	2
Chert	13	5	15	1	5	0	0	0	39
Conglomerate	0	0	0	0	0	1	0	0	1
Course Quartzite	1	20	0	0	3	4	2	2	32
Fine Quartzite	9	0	6	3	28	0	0	0	46
Glass	0	0	0	0	1	0	0	0	1
Granite	0	0	0	0	0	4	0	1	5
Hornfels/Basalt	4	0	0	0	6	0	0	0	10
Morrison Chert	0	0	0	0	1	0	0	0	1
Obsidian	0	0	0	0	1	0	0	0	1
Orthoquartzite	3	0	2	1	3	0	0	0	9
Quartz	0	0	0	0	0	0	0	0	0
Ralston Creek	0	0	1	0	2	0	0	0	3
Sandstone	0	0	0	0	0	14	49	3	66
Silicified Wood	0	1	0	0	1	0	0	0	2
Siltstone	0	0	0	0	1	0	0	0	1
Total	32	28	28	7	64	23	51	7	240

We recommend this site eligible for listing on the NRHP as it will yield abundant information important to our understanding of prehistory (Criterion D). The presence of temporally distinct prehistoric architecture and associated thermal features suggests the site will be useful for addressing questions concerning settlement patterns, population dynamics, and technology. There is good potential for the presence of buried deposits in many features, and the presence of abundant ground stone indicates likelihood that pollen, faunal, and macrobotanical remains useful in reconstructing subsistence and paleoenvironment, will be recovered in subsurface context. The site exhibits tremendous sediment deposition and there were areas of up to 2 m in the Bent Canyon Arroyo. The ground- and chipped-stone tools indicate the primary site activities were raw material reduction, early-stage biface manufacture, and food processing. The presence of several large thermal features suggests the cooking or roasting of some vegetal resource. This site also served as a procurement location for baked clay/shale. Pieces of this same material have been found on other sites in the PCMS in the form of jewelry items, cloud blowers, or gorgets (Lintz 2000).

Most of the site is not in danger of military impact. Features, 24, 26, 27, 43, 48, 52, 54, and 59 are currently being destroyed by erosion, and surface evidence suggests that have significant information potential. A data recovery plan needs to be developed before all available information is lost. There is some modern vandalism within Feature 1, and both pedestrians and vehicles can easily access the northern edge of the site. To better protect 5LA10100, and also 5LA3179, a protection fence should be placed across the mouth of Bent Canyon. This would prevent mechanized vehicle access to the site.

5LA10101

This site is a lithic scatter with a rockshelter, thermal features, and historic rock art panels (Figure 4.64 and 4.66). It was found about halfway up in the breaks on the north side of the Black Hills (770 m southwest of the Bent Canyon Arroyo). The 4.5 ac site extends from a low bench on the north end to the top of large sandstone outcroppings at its south end. Two large and rather distinct drainages were fund along the east and west site boundaries. The site datum was placed at an elevation of 1,466 m (4,810 ft).

Located within a juniper woodland plant community, the landform exhibited sparse juniper, yucca, cholla, prickly pear, and ricegrass when the site was recorded. Sediments were thin, most between 5 and 10 cm deep, though deposits of up to approximately 40 cm were found on the bench and below the large sandstone exposure.

A rockshelter with historic rock art (Appendix III) and ash stain was identified near the site's center. This shelter, Feature 1, measured 4.9 x 1.9 m with a floor to ceiling height of 1.5 m. It faced east and had 35 cm of sandy sediment deposition that may be covering prehistoric occupation surfaces. The thermal feature (Feature 2) has been exposed in the sidewall of an animal burrow and it's amorphously shaped surface outline measures 3.4 x 1.4 m. The rock art (Feature 6) was found on a boulder on the north edge of the shelter floor. The initials "JG" and date "1832" were carved into the upper face of this boulder. If genuine, this is the oldest known historic date on the PCMS.

South of the rockshelter and on the south face of a large sandstone boulder was Feature 3 (Figure 4.65). This historic rock art panel contains solid-pecked initials "G.G", the date "1950", and a horse with a mountain backdrop. Another rock art panel (Feature 5) with highly eroded prehistoric elements was found in this area of boulders.

Feature 4 was an exceptionally eroded hearth located on the slope below and to the east of the large sandstone outcropping. It measures 2.2 x 1.6 m and was found under a sheltering rock that may have served as a deflector. There is much subsurface deposition and a test excavation unit would likely produce datable carbon.

The field crew recorded a total of 208 pieces of flaking debris (Table 4.26). Of the total debitage, 80% was coarse-grained quartzite, 17% chert, 2% argillite, and less than 1% fine-grained quartzite. Most (66%) debitage was the large size-grade, while 34% was small; 57% of the debitage was noncortical and 43% had cortex; and 77% was recorded as simple flakes, 22% as complex flakes, and less than 1 % as shatter and bifacial-thinning flakes. Freehand (hard-hammer) percussion appears to have generated most of the debitage. Though much of the site activity revolved around early-stage raw material reduction, the presence of five small complex flakes and a single bifacial-thinning flake suggest some biface manufacture, and this is supported by the fact that nine unfinished bifaces were recorded.

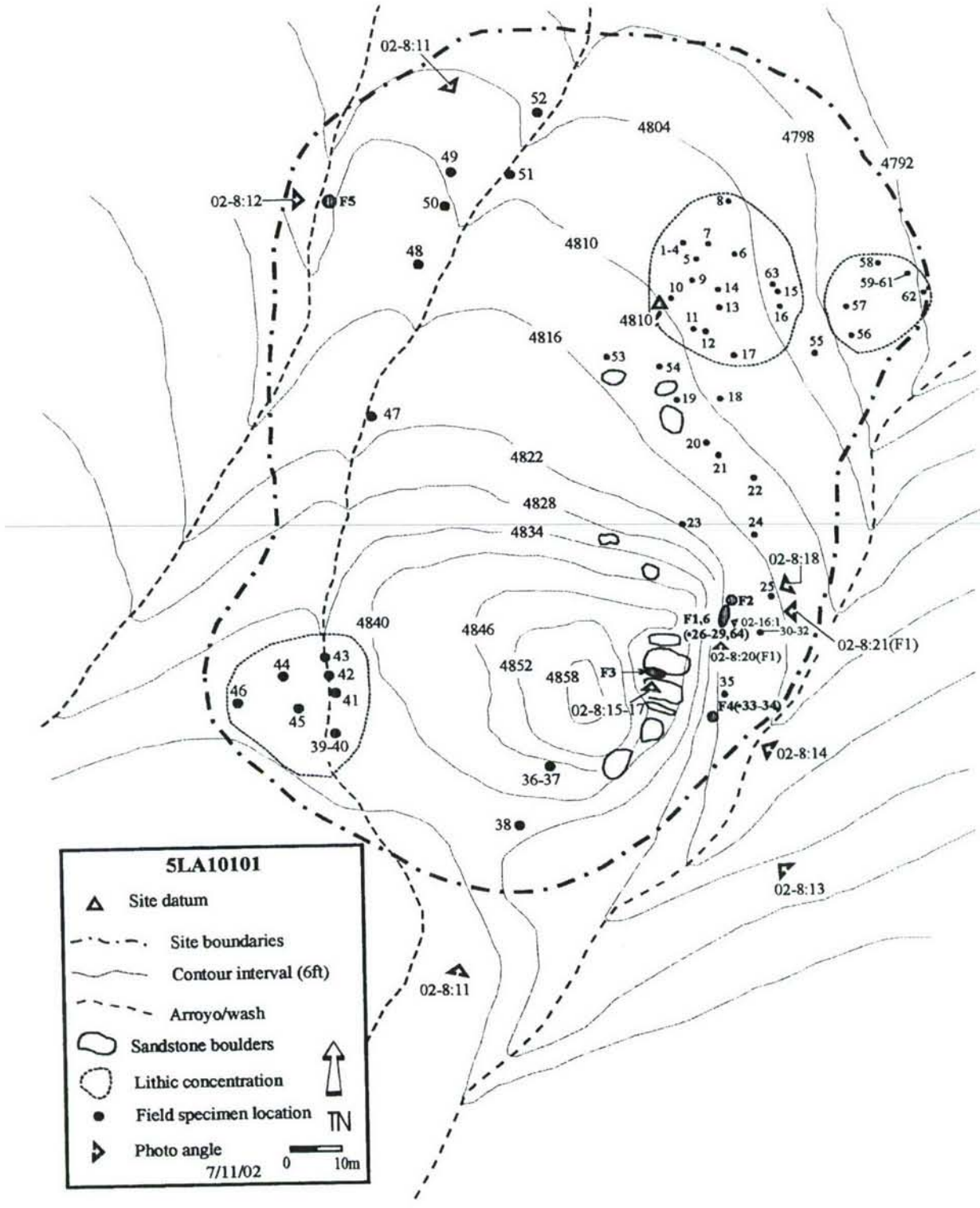


Figure 4.64: Site map, 5LA10101.

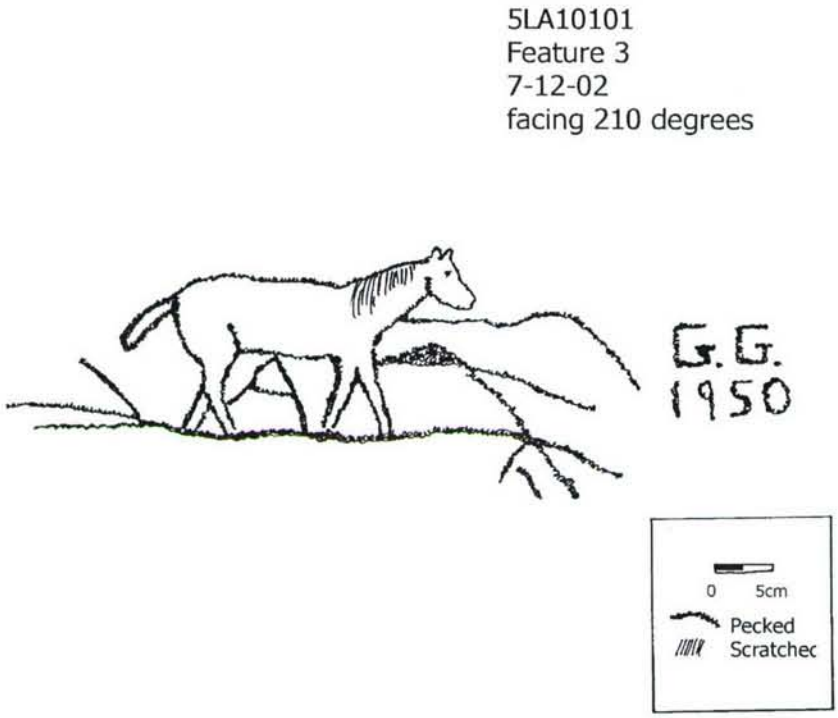


Figure 4.65: Feature 3 profile, 5LA10101.

Figure 4.66: Site overview photograph, 5LA10101 (02-8:11).

No time diagnostic materials such as projectile points or ceramics were found so little can be said about how the prehistoric component of the site fits into the regional chronology. Twenty-nine chipped-stone tools were recorded (Table 4.27), including seven retouched/utilized flakes, nine cores, nine bifaces, two scraping tools, and a graver. Of the cores, three were coarse-grained quartzite, three fine-grained quartzite, two chert, and one argillite. The retouched/utilized flakes were coarse-grained quartzite (1), chalcedony (1), fine-grained quartzite (3), hornfels/basalt (1), and orthoquartzite. Observed edge angles indicate that all were used for scraping. Seven of the nine bifaces were broken during the manufacturing process. These were chert (4), fine-grained quartzite (4), and orthoquartzite (1). Scraping tools include an end scraper of non-local Hartville Uplift chert and an end/side scraper of hornfels/basalt. The graving tool was fine-grained quartzite.

Table 4.26: Summary Description of Chipped-Stone Debitage for 5LA10101.

	Argillite	Chert	Hornfels/Basalt	Quartzite	Total
Total	5	35	1	167	208
Large	5	11	1	121	138
Small	0	24	0	46	70
Cortical	3	13	1	73	90
Noncortical	2	22	0	94	118
Complex	4	4	0	40	48
Shatter	0	1	0	0	1
Biface-Thinning	0	1	0	0	1
Simple	1	29	1	127	158

Table 4.27: Stone Tool Type by Material Group for 5LA10101.

	Type							
Material	Biface	Core	Scraper	Flake Tool	Mano	Metate	Hammer.	Total
Argillite	0	1	0	0	0	0	0	1
Chalcedony	0	0	0	1	0	0	0	1
Chert	4	2	1	0	0	0	0	7
C. Quartzite	0	3	0	1	2	0	1	7
F. Quartzite	4	3	0	4	0	0	0	11
Hornfels/Basalt	0	0	1	1	0	0	0	2
Granite	0	0	0	0	1	0	0	1
Orthoquartzite	1	0	0	1	0	0	0	2
Sandstone	0	0	0	0	13	14	0	27
Total	9	9	2	8	16	14	1	59

The ground-stone assemblage was 90% sandstone, 7% quartzite, and 3% granite. It included 12 slab metate fragments, nine mano fragments, seven complete one-hand manos, and two complete slab metates. A quartzite hammerstone represents the miscellaneous artifact category.

We recommend the site be eligible for listing on the NRHP. The early date for the historic component, if genuine, is significant because the Purgatoire River was used by Euro-American travelers as early as 1820. The site has a rockshelter with evidence for some human use and at least 35 cm of intact soil depth. Test excavations here, and in the area of the thermal features, may yield pollen, macrobotanical data, and faunal remains, all of which may contribute to our understanding of subsistence and paleoenvironment. Rock art panels, both historic and prehistoric, attest to the potential for the site to contribute to the understanding of the ideology and cosmology of early inhabitants of the PCMS. The site is not in danger from military maneuvers so it warrants no further consideration until its cyclic re-evaluation.

5LA10103

This lithic scatter and architecture site was found on a broad and rather steeply sloping ridge between two small drainages in the breaks between the Black Hills and Bent Canyon. The site was confined mostly to the ridge top, but does extend down into the flanking drainages (Figures 4.67 and 4.68). The datum was set at an elevation of 1,524 m (5,000 ft).

Situated within a juniper woodland plant community, prickly pear, yucca, cholla, and sagebrush were recorded, in addition to abundant juniper trees. Surface sediments were generally thin, with less than 5 cm of deposition along the ridge. Some pockets of approximately 40 cm were noted near the upper (southern) site boundary, especially in the area of the datum.

A single and isolated architectural unit was identified on a flat terrace at the southern edge of the site. This structure was constructed by stacking large unmodified blocks of sandstone horizontally into a circular shaped wall of one to three courses. It measures 5.5 m in diameter and is more like a robust tipi ring than the typical Apishapa phase structures usually found in this part of the PCMS. Secondary sediments appear to have capped the feature and certainly, a buried prehistoric occupation surface will be encountered if the structure is ever excavated. This structure is not amenable to Kalasz's (1989) classification in its current state, but should be "typed" if the feature ever happens to be excavated.

A total of 32 pieces of chipped-stone debitage (Table 4.28) were recorded from across the site surface, and in no apparent concentration. Most material was coarse-grained quartzite (17), with fewer specimens of chert (8), argillite (3), dendritic chert (3), and hornfels/basalt (1). These were simple flakes (27), complex flakes (3), shatter (1), and a bifacial-thinning flake. Twenty-three of the 32 specimens were noncortical and 19 items were classified as large. Based on these data, it appears that early-stage raw material reduction (freehand percussion) was the dominant reduction strategy. The tool assemblage consists of four utilized flakes, three cores, a mano and a polishing stone (Table 4.29).

Site 5LA10103 is a large but sparse lithic scatter and a single distinctive circular architectural unit. Although the deposition is shallow over much of the site, there are some areas that may have deposition covering intact cultural deposits, especially in the area of the structure. The presence of non-local dendritic chert suggests the possibility of addressing issues of trade and exchange. Based on the unique nature of Feature 1, and the potential for intact buried

deposits at the site's south end, we recommend 5LA10103 eligible for listing on the NRHP. Because the potential for natural and cultural impacts is low, the site should receive no further consideration. It should be periodically monitored, however, and if impacts start to occur, then a data recovery plan will need to be developed and implemented.

Table 4.28: Summary Description of Chipped-Stone Debitage for 5LA10103.

	Argillite	Chert	Hornfels/Basalt	Quartzite	Total
Total	3	11	1	17	32
Large	2	5	1	11	19
Small	1	6	0	6	13
Cortical	0	4	0	5	9
Noncortical	3	7	1	12	23
Complex	0	2	0	1	3
Shatter	0	0	0	1	1
Biface-Thinning	0	1	0	0	1
Simple	3	8	1	15	27

Figure 4.67: Site overview photograph, 5LA10103 (02-8:22).

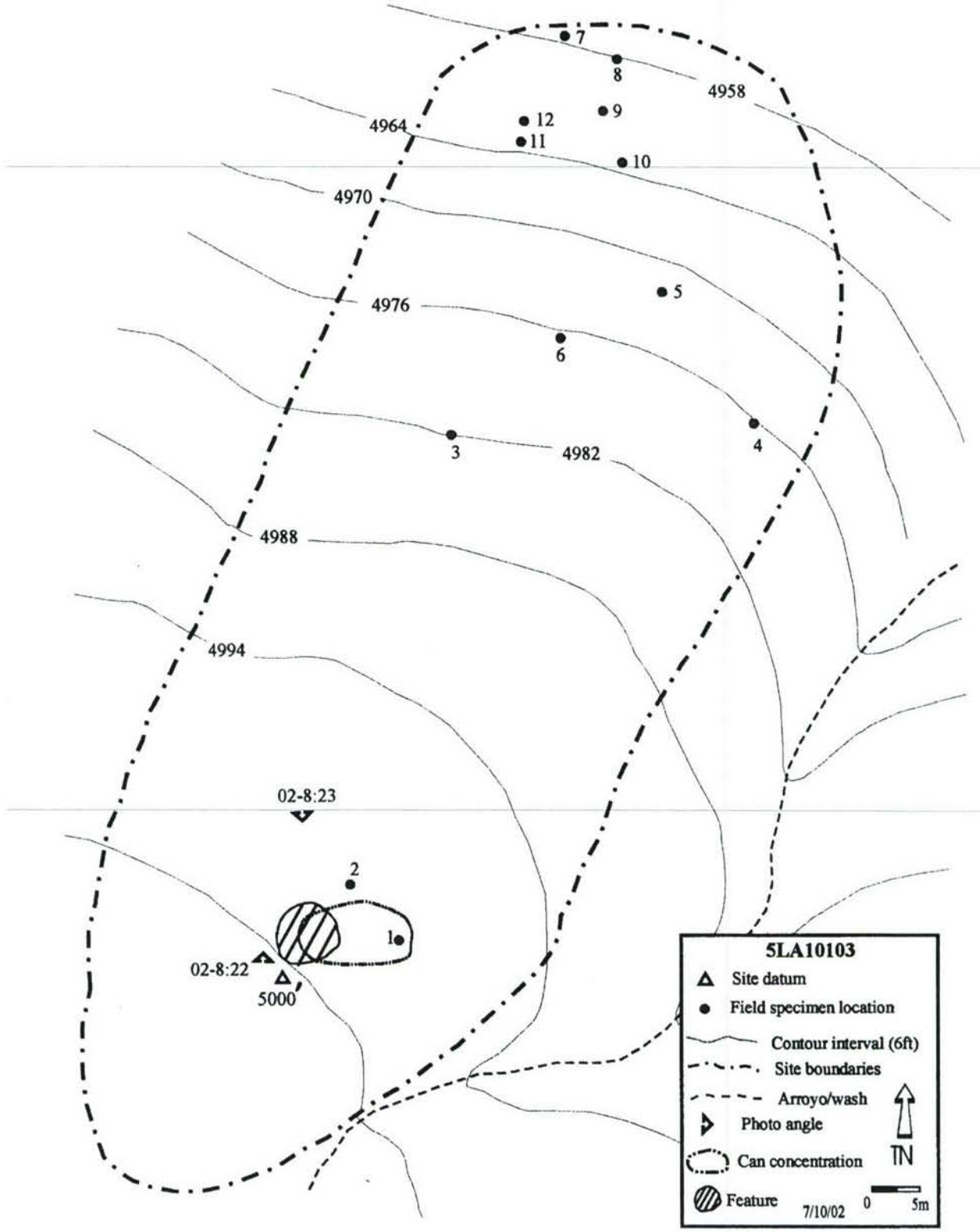


Figure 4.68: Site map, 5LA10103.

Table 4.29: Stone Tool Type by Material Group for 5LA10103.

Material	Type				
	Core	Flake Tool	Mano	Polishing Stone	Total
Chert	1	1	0	0	2
Chalcedony	0	0	0	1	1
Quartzite	2	3	0	0	5
Sandstone	0	0	1	0	1
Total	3	4	1	1	9

5LA10118

The site is located on the north side of the Black Hills, and at the head of a large feeder canyon on the south side of Stage Canyon. It occupies the canyon's east side and an intermittent arroyo crosses the western site boundary (Figures 4.69 and 4.71). The site datum was placed at the mouth of a rockshelter at an elevation of 1545 m (5070 ft). Area vegetation is primarily juniper, sagebrush, and skunkbush sumac, with an understory of black grama, soapweed, wolfberry, and yucca. Soils are poorly developed across the site, but sediments may be as much as 50 cm deep in areas not occupied by Dakota sandstone bedrock.

Culturally, the most important aspect of the site was the large rockshelter situated at the base of a sandstone outcrop (Figure 4.70). It measures 13 x 8 x 2.5 m and opens to the northwest. There were several roof fall blocks at the south end of the shelter that have covered ashy deposits (Feature 2). Roof fall blocks have acted as a cap, protecting and preserving as much as 3 m of deposition. Blackened soil and burned rock were also plainly visible on the western floor at the dripline. A few artifacts were found within the shelter and scattered on the talus slope below. These included simple quartzite flakes, three quartzite cores, manos of sandstone (2) and quartzite (1), and metate fragments of quartzite (1) and sandstone (1).

An active spring/seep was identified 80 m northwest of the shelter, so year round water was apparently available to the prehistoric occupants of the site. Deciduous trees, noted up the canyon to the south, suggest more water is available slightly below the surface and may have been readily available prehistorically. Though the artifact assemblage was sparse, there appears to be great potential for the recovery of intact cultural deposits within the shelter due to the protection offered by the roof fall. Excavation here should produce datable carbon or other organic remains, which could date the occupation(s) of the site. The presence of surface ground stone suggests that faunal, macrobotanical, and pollen remains will be encountered in subsurface context. As such, the major research domains of settlement and subsistence strategies, economy, and paleoclimates could be addressed. Though the shelter has outstanding excavation potential, it is unlikely to experience military or erosional impact. Because there are rockshelter sites on the PCMS in more dire need of data recovery at this time, NMSU's management recommendation for 5LA10118 is that it receives no further consideration. The site is eligible for inclusion to the National Register because of its information potential (Criterion D).

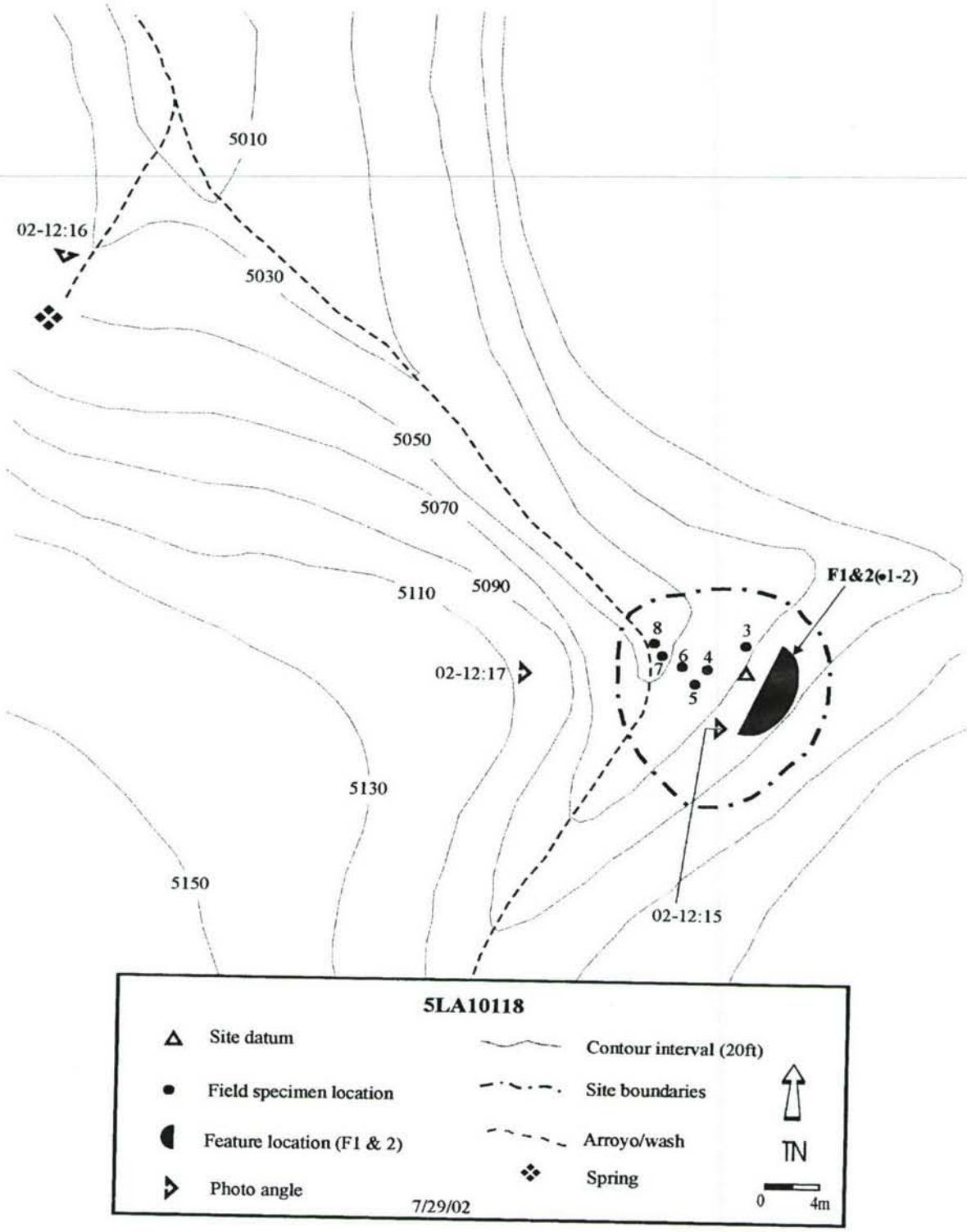


Figure 4.69: Site map, 5LA10118.

Figure 4.70: Planview map of Feature 1, a rockshelter, 5LA10118.

Figure 4.71: Site overview photograph, 5LA10118 (02-12:17).

5LA10135

The site contains two rockshelters, an associated lithic scatter, and a significant rock art panel (Figure 4.72 and 4.75). It was found on the east side of Horse Canyon, approximately 500 m south of its confluence with the Bent Canyon arroyo. The site is compact, measuring 31 m southwest to northeast, by 14 m northwest to southeast. It site occupies the lower portion of a Dakota sandstone capped ridge and continues downslope to the edge of the drainage. A datum was placed was placed in front of the shelter at approximately 1,440 m (4723 ft), and the eastern site boundary rises about 7 m above the datum.

The site was located in the juniper woodland typical of the Black Hills landform. Juniper, cholla, skunk brush, and grama grasses were growing on the site when it was recorded. Sediments may be as deep as 20 cm below the cliff, but the hill slope gradient has led to sediment slumping and would undoubtedly lead to mixed deposits.

Feature 1 was a large (15 x 5.5 x 5.5 m) rockshelter with substantial and relatively recently detached roof fall blocks and boulders inside of it (Figure 4.73). During one of these roof fall events, a large sandstone shelf with rock art (Feature 3) was knocked loose and is now

found among the debris on the floor of the shelter. Animal burrowing has brought up ash and charcoal from below the modern ground surface and it seems likely that one or more prehistoric occupation surfaces were capped by the roof fall. A mano (FS 1) was found among the blocks at the north end of the shelter.

Another 6 x 4.8 x 1.7 m rock overhang was designated Feature 2 (Figure 4.74). It is to the north of Feature 1 and has many artifacts in direct association. Approximately 4 m downslope is an area of dark colored soil that may be a thermal feature starting to expose.

Feature 3 (Figure 4.76) was a solid-pecked panel of rock art that is located on a roof fall boulder within Feature 1. This panel faces northeast at 48°, with an approximate inclination of 78°. Panel dimensions are 65 cm in height by 50 cm in width, and the height of rock art elements from modern ground surface is 86 cm. The petroglyphs on the panel have a shallow "u" shape cross-section with an approximate depth of 5-10 mm and a width of 1.5-2 cm.

Panel elements consist of ten quadrupeds of varying sizes, and some have deteriorated to the point that their shape is a bit difficult to distinguish, especially elements D and C. The focal point of the panel is an anthropomorph with a buffalo horn headdress. It appears to be carrying a standard and riding a small quadruped. Other elements include a pecked meander and an amorphous figure. Of the quadrupeds, all have distinct ears, but only element K has headgear.

The lithic assemblage at 5LA10135 is sparse, and most items were encountered around Feature 2. Fourteen pieces of debitage were recorded including specimens of argillite (3), chert (5), and quartzite (6). These were classified as 11 complex, and three simple flakes. The tools were two sandstone slab metate fragments, a complete quartzite metate, a one-hand mano fragment, an unfinished quartzite biface, and a small preform. The preform closely resembles a P48 type (Anderson 1989:170-172), which has associated dates from AD 500 and AD 1400.

We recommend that the site be eligible for listing on the NRHP because capped cultural deposits within the rockshelters are likely to yield information important to our understanding of prehistory (Criterion D). The rock art panel, Feature 3, is very distinctive in style and substance and possesses high artistic values so it is also eligible under Criterion C. The presence of rockshelters suggests the site could be useful for addressing questions concerning settlement strategies. Animal burrows demonstrate that buried cultural deposits can be found in the rockshelters and pollen, faunal, and macrobotanical data recovered here will provide useful information for addressing the research domains of subsistence and paleoenvironment. Temporally diagnostic artifacts and datable organic materials recovered for inside the shelters will allow the site's chronology to be determined. Finally, the presence of a rock art panel is data relevant to the study of ideology and cosmological issues.

The site is on the side of a steep canyon and not likely to be impacted by mechanized military maneuvers. Because the significant deposits are capped and not likely to erode away, 5LA10135 needs no additional work other than periodic monitoring. It should be noted that H. H. Robb (1942) excavated an archaeologically rich rockshelter in Horse Canyon called "Rocky Ford Cave." Given his limited data, 5LA10135 is a candidate, though he makes no mention of rock art. If this truly is the site, then its roof has collapsed within the last 65 years.

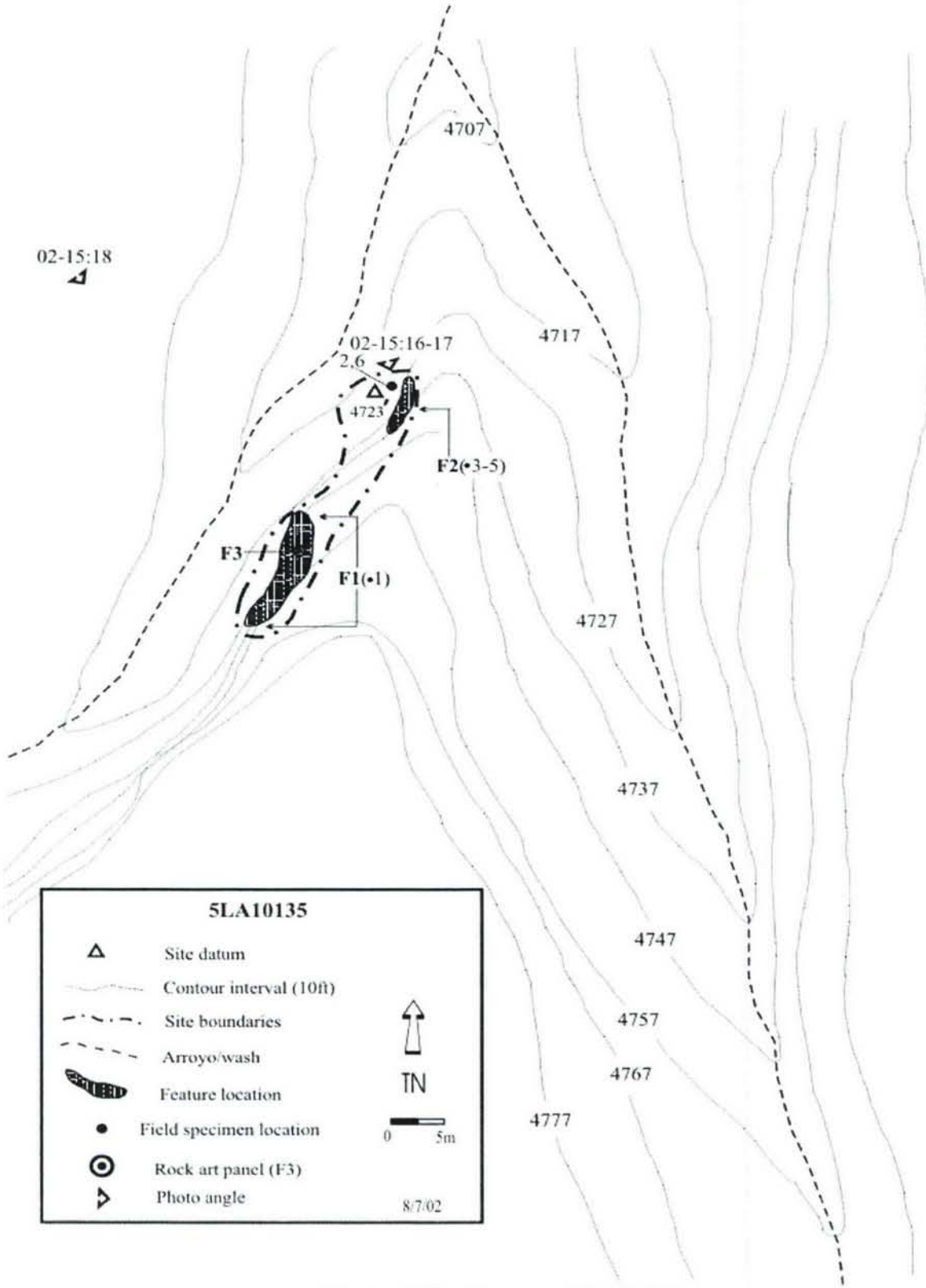


Figure 4.72: Site map, 5LA10135.

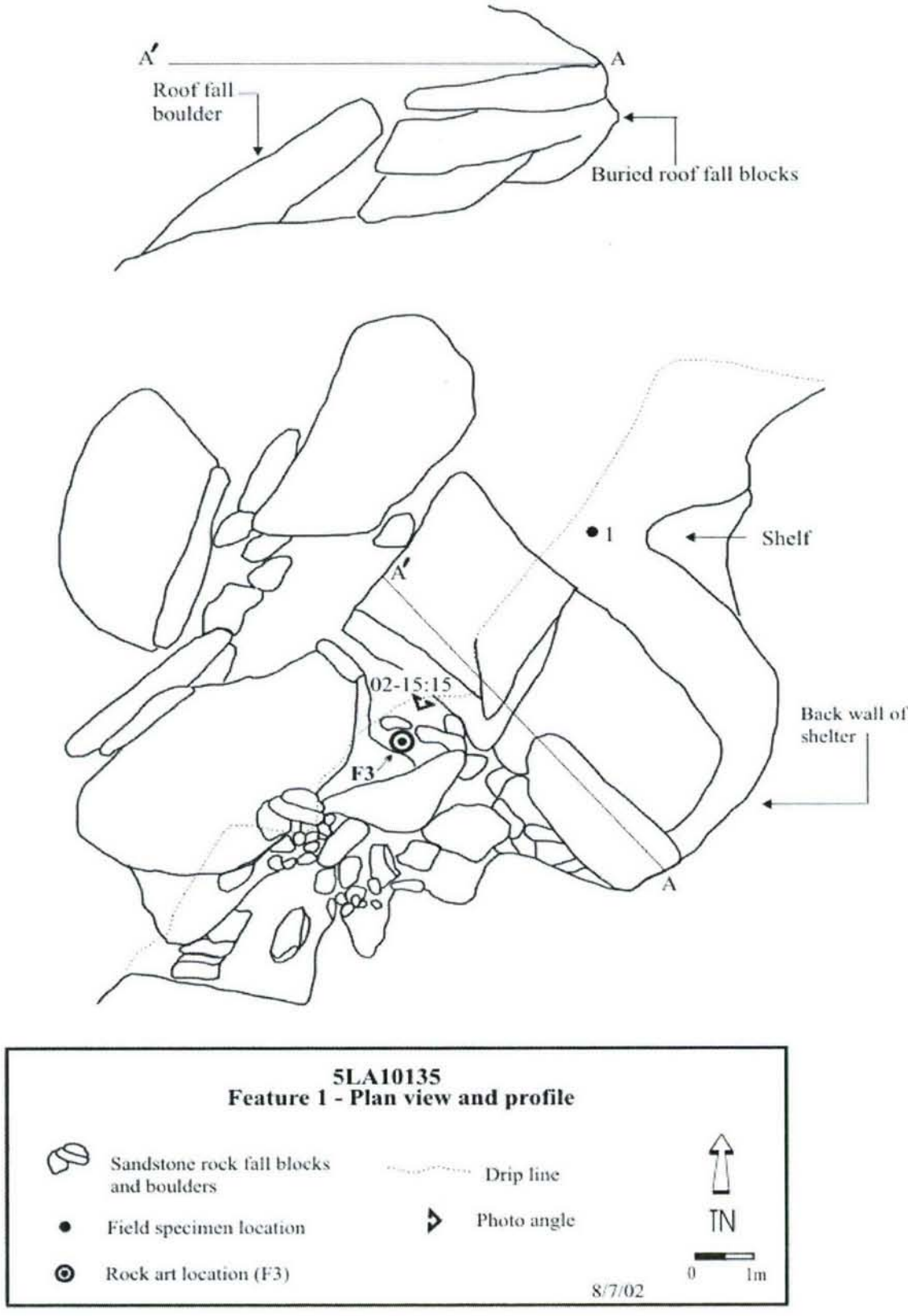


Figure 4.73: Planview map of Feature 1, a rockshelter, 5LA10135.

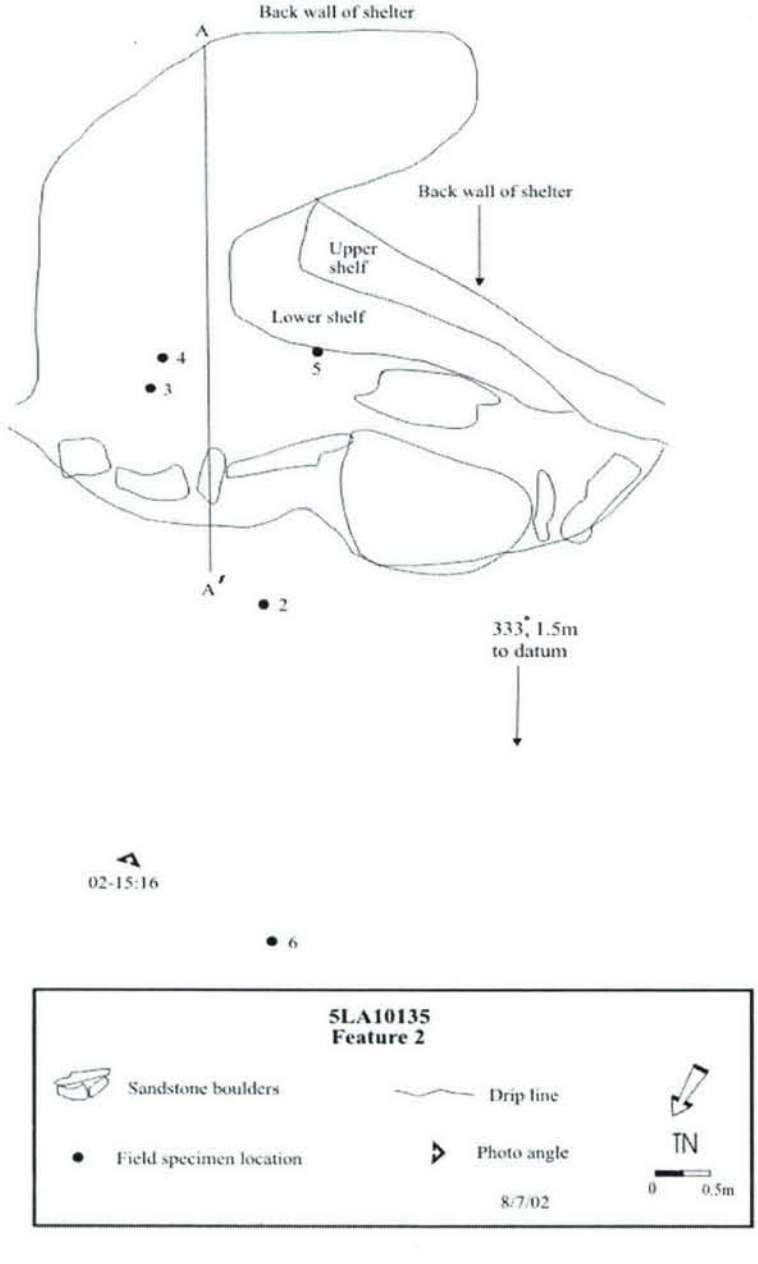


Figure 4.74: Planview map of Feature 2, a rockshelter, 5LA10135.

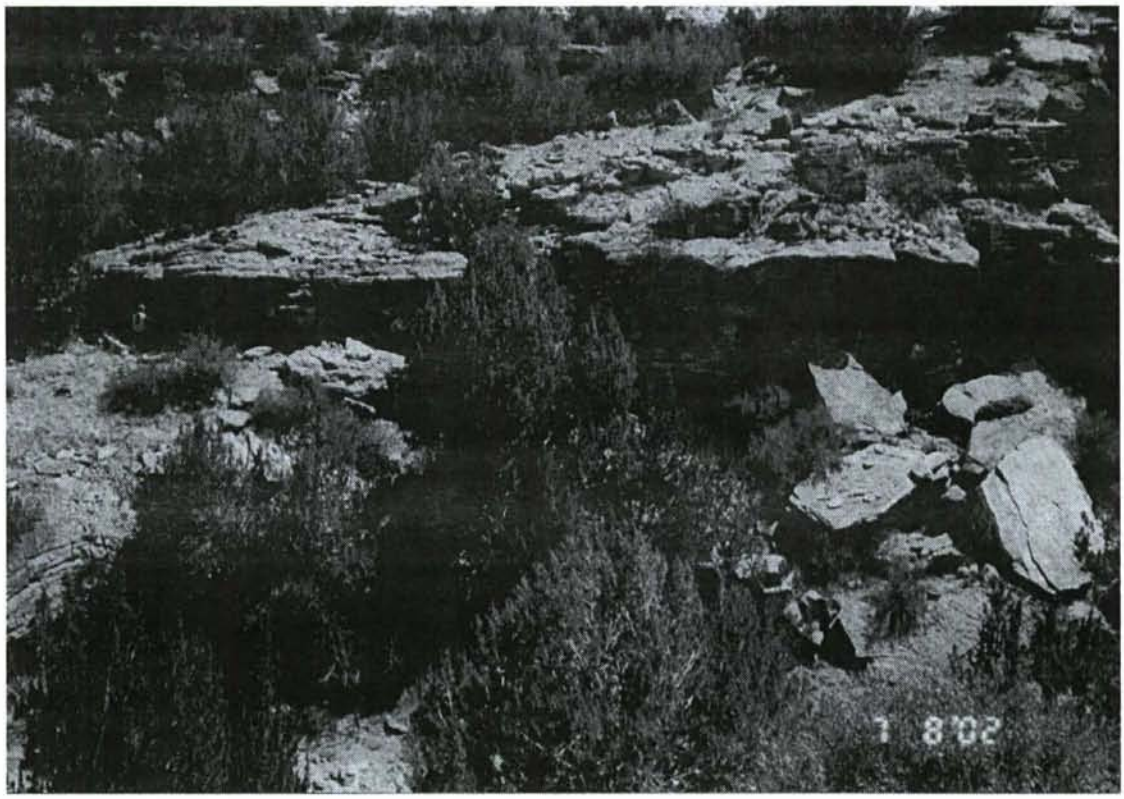


Figure 4.75: Site overview photograph, 5LA10135 (02-15:18).

Figure 4.76: Feature 3, rock art panel.

5.0 NON-ELIGIBLE SITES

A total of 86 sites were determined to be not eligible for the National Register and require no further work. Because we recorded data and collected artifacts from them, it is important that they be discussed, albeit briefly, in this report.

5LA3551

This site was originally recorded by the University of Denver in 1984 (Hurt et al. 1984). They determined it a relatively large lithic scatter with five distinct hearths. During NMSU's visit in 2002, the features originally recorded as hearths were examined and it was determined either the features were natural piles of basalt (in 1984) or they had eroded away in the past 20 years. Lithic artifacts were still abundant so they were recorded using our modern analysis system. Seventy-six pieces of debitage were identified – argillite (31), chert (19), hornfels/basalt (14), and quartzite (12). Four argillite items were highly patinated.

A total of 16 tools were identified, which is a very high number for this part of the PCMS. Four of these were projectile point fragments, and all were classified within Anderson's (1989) system. The first point was chert and similar to Anderson's P26, though only the base and blade remain. This type has been associated with dates between 1000 BC and AD 500. An argillite basal fragment was classified P35. Points of this kind were in use between 1000 BC and AD 1200. The last two diagnostic pieces were preforms. The orthoquartzite specimen a P48 (AD 500 to 1400) and the Black Forest silicified wood preform a P51 (AD 1200 to 1725). Based on the projectile points, the site likely had at least two occupations, one occurring sometime between the Late Archaic and Diversification periods (1000 BC to AD 1450), and the other between the Diversification and Protohistoric periods. There is some overlap in the estimated point dates at around AD 1200 so it is possible, though unlikely, that the points represent only one occupation.

Other tools include an argillite core, three sandstone manos, four slab metates (three hornfels/basalt and one sandstone), end/side scrapers of Black Forest silicified wood and argillite, and utilized/retouched flakes of Black Forest silicified wood and argillite.

This site has been subjected to heavy erosion and the original thermal features have either washed away, or were misidentified in 1984. The hard-pan surface appears deflated, with thick basalt gravels, though areas supporting saltbush, prickly pear, and cholla preserve some intact sediments. Overbank deposition could be capping buried cultural deposits, but this is unlikely based on the surface evidence. As such, the site is not eligible for the NRHP and requires no further work.

5LA5497

The site was recorded by the University of Denver in 1983 and found to be a large lithic scatter with a rockshelter exhibiting red pictographs along its back wall. Originally the site boundary measured 25 x 17 m, but after nearly 20 years of natural and cultural impact, the lithic scatter now measures 206 x 116 m. This site was located at the edge of the Hogback alluvial fan

and is positioned on the west side of a tributary of Van Bremer Arroyo, which enters the area from the southwest. Grassland vegetation covers the landform and the silty soil was an estimated 80 cm in depth. In should be noted that the original site datum could not be relocated, so we placed a new one near the northern edge.

During the 2002 project, a spaced-stone circle of basalt was noted. In addition, prehistoric artifacts covered the entire landform. Eighty-two pieces of debitage of eight material types were identified. Material types were dominated by hornfels/basalt (48) and chert (18), though items of obsidian (6), course-grained quartzite (4), Ralston Creek chert (3), fine-grained quartzite (1), chalcedony (1), and argillite (1) were also recorded. No ground-stone tools were identified, but identified chipped-stone tools were a hornfels/basalt core, nine utilized flakes (seven argillite, one chert, and one obsidian), an unfinished basalt biface, and the medial portion of a large, but unclassifiable, argillite projectile point.

The rock art panel measured 230 x 120 cm and elements were of the Purgatoire Red Painted Style. Elements include zoomorphs and abstract forms that remain colored in a variety intensities. The University of Denver crew did an adequate job of recording these features so no further work was done by the NMSU crews.

Though sedimentary depth was noted within the shelter and above it in the grassy flats, a lack of visible features and mixed subsurface deposits make the site unlikely to yield additional information. In addition, the rock art represents a common style here at the PCMS and has been recorded as thoroughly as possible. No further work is needed on the site as all available data has been collected.

5LA9931

This small (100 x 48 m) lithic scatter was encountered on an east to west trending ridge along the west edge of the Big Arroyo Hills. Recorded artifacts include 13 pieces of debitage, six utilized flakes, a whole sandstone slab metate, and the medial portion of a large chert projectile point. Debitage items include eight simple flakes, four complex flakes, and a piece of shatter. Material types recorded for the flaking debris were argillite (5), hornfels/basalt (3), quartzite (3), and chert (2). Argillite (2), obsidian (2), orthoquartzite (1), and chert (1) materials were identified in the utilized flakes. Visual comparison shows the obsidian as being of the Polvadera Peak and Cerro del Medio varieties. Surface sediments were shallow (< 10 cm) and have been mixed by cultural and natural processes. No further work is necessary at this location because the recording of the site has exhausted its research potential.

5LA9934

Prehistoric remains recorded on the site include a complex flake of chert, a large chert projectile point fragment (Type P22, 1500 BC to AD 500) according to Anderson's system [1989:139-140]), and a diorite mano fragment. These items were found on a northeast sloping terrace at the west edge of the PCMS, approximately 340 m from Timpas Creek. Exposed shale caps the landform, eliminating any possibility for encountering buried cultural deposits. As such, 5LA9934 is not worthy of NRHP listing and requires no further work.

5LA9938

The site is a scatter of historic 19th and 20th century trash. It was found in the shale-covered breaks below the west edge of the Big Arroyo Hills. Artifacts include bottle and other glass, vent-hole can and tobacco tins, ceramic sherds, miscellaneous metal fragments, and a battery core. For the most part, artifact density was sparse, but there was a fairly concentrated area to the northeast and it is likely the location of the original dumping episode. Because the terrain slopes rather steeply to the south, artifacts continue to wash downhill during high energy events.

No historic features were identified, and there is no potential for buried cultural deposits. The site is on land patented by Julian Herrera in 1882, but he likely did not dump the trash. Though some of the artifacts are old, the site is not significant as it is a one-time dumping episode where domestic trash was discarded.

5LA9940

The site was a thin scatter of prehistoric lithic materials and historic trash. It was identified on the northwest corner of the mesa-like Big Arroyo Hills. Lithic artifacts included a sandstone slab metate fragment, and flaking debris of hornfels/basalt (5), chert (3), argillite (2), Black Forest silicified wood (1), orthoquartzite (1), and unspecified silicified wood (1). A few bottle glass fragments and sanitary cans comprise the historic component; they were on land patented by Julian Herrera in 1882. This site is not eligible for the NRHP and requires no further work.

5LA9945

The site is a light concentration of debitage, a sandstone mano fragment, and a broken sandstone metate. These artifacts were found on a low bench at the northwest corner of the Big Arroyo Hills, and within thin juniper cover. Debitage was classified as four simple and four complex flakes; these made of quartzite (3), hornfels/basalt (2), obsidian (1), orthoquartzite (1), and argillite (1). Positioned on an alluvial fan, the landform is subject to erosion and the site maintains little integrity. Coupled with the fact no features were recognized, additional research is not warranted.

5LA9948

The site is a small, but dense lithic scatter on a northeast trending ridge in the central portion of the Cedar Hill landform. Prehistoric cultural remains include 50 complex flakes, 20 simple flakes, 12 pieces of shatter, three cores (argillite, chert, and quartzite), a utilized flake of quartzite, a chert end/side scraper, the lateral edge of a chert biface, and a slab metate fragment of sandstone. The assemblage infers lithic reduction and plant processing activities, but without thermal features or evidence of habitation, site function is largely unknown. Surface sediments have eroded away because a recent forest fire stripped the land of anchoring vegetation. As all

available information has been recorded, the site is not eligible for the NRHP and merits no further work.

5LA9949

This site consists of a prehistoric artifact scatter with two distinct concentrations, as well as other, more isolated chipped-stone pieces. It was identified on the northern fringe of Cedar Hill, just south of the Bent Canyon Arroyo. Eighty-seven pieces of lithic detritus were identified – 49 simple flakes, 34 complex flakes, and four pieces of shatter. Material types were primarily coarse-grained quartzite (66), with fewer items of argillite (8), chert (6), hornfels/basalt (4), fine-grained quartzite (2), and obsidian (1). Three tools were recognized among the flaking debris. These include an end/side scraper of chert, a utilized argillite flake, and a small projectile point preform of orthoquartzite. This specimen is similar to Anderson's (1989:173-175) P49, which has associated dates ranging between AD 800 and 1750.

Though there were two concentrations of artifacts, suggesting discrete activity areas, surface sediments were shallow (<2 cm) and have been secondarily deposited. No further work is needed on this insignificant surface scatter.

5LA9950

The site artifacts included a sandstone mano and two pieces of chert shatter. Juniper, yucca, cholla, prickly pear, and other grasses were growing on the site, which encompasses 17 m^2. Located on an exposed ridge in the middle portion of the Cedar Hill landform, surface sediments have been secondarily deposited and are shallow (<10 cm). There is no potential for buried features or cultural deposits, so the site is not significant. Our management recommendation is that no further work is needed.

5LA9951

The site was located on a southwest to northeast trending ridge in Cedar Hill. Four prehistoric artifacts were identified – a complex argillite flake, a utilized flake of chert, a fine-grained quartzite simple flake, and the medial portion of a large obsidian projectile point that was broken and recycled into a scraping tool. Surface sediments were shallow and classified as silt with heavy gravel. Recent wildland fire damage, coupled with natural sheetwash erosion, have resulted in 5LA9951 losing its integrity. No additional work is recommended for this site.

5LA9952

This small site covers less than one-quarter acre. Artifacts were primarily of flaking debris, these classified as complex flakes (11), simple flakes (4), and shatter (2). A high number of chipped- and ground-stone tools were also recorded. Ground stone includes three complete sandstone slab metates, two sandstone metate fragments, a complete sandstone mano, and a broken quartzite mano. An argillite core, an unfinished biface of Ralston Creek chert, two utilized flakes (one glass, one argillite), and a nearly complete argillite projectile point with thick

patination were found. The projectile point resembles Anderson's (1989:153-155) P35; a type thought to have been produced between 1000 BC and AD 1200.

Located on the south side of the Bent Canyon arroyo, and within the floodplain, sediments depths were quite significant. This being said, surface deflation was considerable and has destroyed the integrity of the site. There may be spaced-stone circles here, but distinct outlines cannot be determined. 5LA9952 is not worthy of additional work, and should not be nominated for listing on the NRHP.

5LA9953

The site is on the south side of Bent Canyon arroyo, 450 m west of the Bent Canyon Stage Stop site (5LA3179). Grassland plant species grow in the area, though along the arroyo, erosion leaves the ground surface exposed. A deflated hearth (Feature 1) was found; it measured 50 cm in diameter and nothing remains but a loose pile of fire-cracked rock. The 11 pieces of debitage included five complex flakes (obsidian, hornfels/ basalt and three of coarse-grained quartzite), two pieces of chert shatter and four simple flakes (argillite, hornfels/ basalt, chert and fine-grained quartzite). The obsidian flake was sourced to Malad, Idaho (Appendix V). Recorded tools included a large slab metate (36 x 26 x 10 cm) of sandstone, a basalt hammerstone, a patinated chert side scraper, a flattop chalcedony utilized flake, a quartzite utilized flake, and two chert non-bipolar cores. The site is not a good candidate for additional research because the thermal feature has no integrity and does not contain fill.

5LA9954

Located at the confluence of Bent and Horse Canyons, 5LA9954 is a lithic scatter associated with large multi-component habitation sites of 5LA10100 and 5LA9781. One hundred and forty items were recorded – 125 pieces of debitage, 10 chipped-stone tools, four sandstone slab metate fragments, and a hammerstone of quartzite. The debitage consists of a wide variety of materials including quartzite (71), chert (29), argillite (16), baked clay (3), Alibates dolomite (2), hornfels/basalt (2), orthoquartzite (1), and Black Forest silicified wood (1). Simple flakes (60), complex flakes (44), and shatter specimens (21) comprise the debitage classes. Chipped-stone tools include five cores (2 chert, 2 quartzite, and 1 argillite), an argillite end scraper, a chert spokeshave, a quartzite uniface, and two utilized flakes (chert and orthoquartzite).

Sediment deposition was significant (over 50 cm) on this terrace, but cultural materials seem to be confined to the surface. In addition, no thermal features or evidence of habitation structures were identified. This site gains its primary significance from its tenuous relationship to sites 5LA10100 and 5LA9781, and, therefore, requires no further work.

5LA9955

The site is a short-term activity area located in the breaks at the northern edge of Cedar Hill. Prehistoric artifacts include five flakes: three quartzite, one chert, and one obsidian,

identified as from Cerro del Medio, NM (Appendix V). Sandstone outcrops over most of the site and vegetation is sparse. No features were identified and the site needs no further work.

5LA9960

The site is a sparse lithic scatter located on an alluvial terrace adjacent to Van Bremer Arroyo and Brown Sheep Camp. No features were identified, and many of the artifacts were encountered on deflated hardpan areas suggesting subsurface cultural deposition is nonexistent. Across most of the site, the greasewood, grass, and prickly pear plants were thick. This limited ground visibility and most of the artifacts were found in the open blowouts between the plants.

One hundred and four lithic artifacts were identified – 92 pieces of debitage, six chipped stone tools, and six ground-stone items. Debitage classes were simple flakes (68), complex flakes (14), shatter (8), and bifacial-thinning flake (2). Material types for these items were argillite (34), chert (26), hornfels/basalt (18), coarse-grained quartzite (12), and fine-grained quartzite (2). Of the ground stone, three items were whole hornfels/basalt slab metates, one was a broken sandstone slab metate, and one a broken quartzite mano. Chipped-stone tools include utilized flakes (two argillite, one chert, and one quartzite), the base of a large chert projectile point, and a Black Forest silicified wood preform (Anderson's Type P50, AD 1000 to 1750).

In recording this site we have exhausted its research potential as the cultural remains were found in deflated context. As such, the site is not recommended for the NRHP and no further work is needed.

5LA9961

The site, located in the juniper covered fringes of Cedar Hill, was a sparse lithic scatter and collapsed cairn (Feature 1) of unknown temporal affiliation. Widely dispersed lithic detritus of quartzite (11), chert (8), Ralston Creek chert (3), hornfels/basalt (1), and argillite (1), suggests early-stage raw material reduction. Tools found on site included a quartzite core/hammerstone, sandstone mano, slab metate fragment, and four retouched/utilized flakes of quartzite. A small corner-notched point fragment of rock quartz was also identified. Following Anderson's (1989) point classification system, it would be a P66 (AD 800 and 1450). Sediments were thin at this location and there does not appear to be much opportunity for finding intact buried remains. No further work is required on 5LA9961.

5LA9963

The site is comprised of what could be fairly recent artifacts. Varied tin can fragments, a funnel, a metal button, and stoneware were identified. On land originally platted as a state owned section, the site occupies an erosional terrace east of the Hogback in an area where limestone outcroppings form small ridges. This is a sparse and isolated trash dumping episode that requires no additional archaeological scrutiny.

5LA9966

This lithic scatter is located on the north side of Cedar Hill, at a location where the juniper trees transition into the open grasslands of Bent Canyon arroyo. It is one of many small short-term use locations in the area related to either lithic or food procurement pursuits. Debitage includes nine complex flakes, seven simple flakes, two bifacial-thinning flakes, and a piece of shatter. Material types were chert (9), quartzite (9), and argillite (1). Tools included utilized flakes (one quartzite and one chert), a large and unfinished chert biface, and the base and medial portion of a small chert point. This point most closely resembles Anderson's P79, which has associated dates between AD 1000 and 1750. Neither ground stone or thermal features were found nor was there evidence for buried deposits. No additional work is needed on this small site.

5LA9967

The site was comprised of three simple argillite flakes, two retouched/utilized flakes (one argillite, one hornfels/basalt), a quartzite metate fragment, and a siltstone mano fragment. These items were found on top of a small northwest to southeast trending ridge in the steppes south of the Hogback. Resistant outcropping clay forms the landform which is covered by juniper trees and mixed grasses. No features were encountered and the site is not a good candidate for additional research.

5LA9968

The site was identified within the grassy plains north of the east edge of the Hogback. A core and utilized flake of hornfels/basalt, complex and bifacial-thinning flake of obsidian, and simple and complex flakes of chert were recorded. No features were evident on the deflated modern ground surface, so the site is not a good candidate for future work.

5LA9969

This site was a sparse lithic scatter and an apparent architectural feature of unknown age and function. The feature was a conical stone circle and linear rock alignment of limestone. A single course of unmodified field stones was all that remains of the construction materials. Flakes of argillite and sandstone represent the associated cultural materials. Sediments were substantial in depth (30+ cm) as the site was found at the foot of an alluvial fan. These deposits appear mixed and even if buried cultural materials exist within the matrix, they do not have the integrity required for a NRHP nomination. As such, no further work is needed on this insignificant site.

5LA9970

The site consists of a sparse scatter of lithic debris that occurs on a hilltop above an unnamed tributary of Luning Arroyo. Four chert artifacts were identified, including two utilized/retouched flakes, a simple flake, and a complex flake. Grama and galleta grass covers portions of the site, but the soil development appeared poor. Likely all artifacts were utilized,

but macroscopic examination showed nothing on two items. Regardless, it is safe to say that the site functioned as a food procurement location with an unknown economic target. Shallow surface sediments exist and most of the landform was comprised of bedrock. Buried remains are unlikely, so the site warrants no further work.

5LA9993

This site is a sparse lithic scatter on the north side of the Van Bremer floodplain. Prehistoric artifacts were encountered among the patches of vegetation on hardpan erosional surfaces with thickly accumulated basalt and limestone gravels intermixed. Overall the terrain was flat, but at the site's north end, limestone caprock forms a hill 15 m higher than the datum. The site is one of the many open PCMS lithic scatters with no evidence for fire features or habitation structures.

Lithic reduction activities seem to have revolved around the production of flakes from prepared chert and quartzite cores. Recorded artifacts included 23 simple flakes, ten complex flakes, and five pieces of shatter. These were made of quartzite (16), chert (11), Black Forest silicified wood (4), argillite (3), hornfels/basalt (3), and orthoquartzite (1). Chipped-stone tools included five utilized flakes; four of these chert and one argillite.

Being in the floodplain, overbank deposits appear significant (over 2 m). It is possible that buried deposits may be found below the surficial remains on 5LA9993, but these are of a different temporal date and would have to be capped at significant depth. The utilized flakes suggest that the site functioned for food procurement, but without detailed edge assessments, it is unknown whether the economic focus was related to plants or animals. The sparseness of the prehistoric remains, coupled with little subsurface archaeological potential, render the site ineligible. No further archaeological work is required as all available data has been recorded.

5LA9994

The site is a single historic trash dumping episode. Artifacts were found along the south side of Van Bremer Arroyo, and in an area of dense saltbush and greasewood. It seems a load of trash was dumped into a small arroyo early in the 20th century, and through time, water erosion has washed some of the artifacts further down the arroyo. Trash consists of household refuse and items used in a dairy or milking operation.

The site was on land purchased by Charles Conkle in 1913. He appears on the 1910 census in El Paso County working on a stock farm. It is also possible that the trash was dumped by the inhabitants of Brown Sheep Camp (5LA5824); this site 2.5 km to the east. All available data has been recorded on this insignificant and relatively recent site, so no additional work is recommended.

5LA9995

This site was located on a terrace north of a small spring fed arroyo. Artifacts included secondary reduction basalt and argillite flakes, as well as a few chert flakes, a silicified wood

flake, and an Alibates dolomite flake. Basalt and argillite cores were also present, as well as mano and metate fragments.

These lithic materials were found on the northern terrace of upper Van Bremer arroyo, with water-filled springs along the southern site boundary. Black greasewood, cholla, and grama grass grow on the site which was contained in an area of 2.7 ac. No thermal features or habitation structures were found so the site likely functioned for vegetal resource procurement. This point is interesting because the close proximity of water would make this a likely habitation site. Perhaps, the vegetal target was riparian and was seasonally exploitable at this locale.

The landform is highly eroded because of its placement between two watercourses. High energy floods do not have to be of the 100-year variety to impact the cultural materials as the landform is slightly lower than its surrounding terrain. The cultural materials have deflated to their position on the modern ground surface so the site is not eligible for listing on the NRHP.

5LA9997

The site is an inconsequential can dump with a few milk glass shards and a metal strap. These were identified on the south side of a large arroyo in the Big Arroyo Hills. The artifacts lie on bedrock and no sediment deposition is present. This one-time dumping episode is on land patented by Clyde Hawkins in 1925. No additional work is warranted as all artifacts have been documented.

5LA9998

The site was located on an east facing slope at the northern edge of the Big Arroyo Hills. It lies within pinon/juniper woodland on a shale and gravel talus covered ridge top. One sandstone metate fragment, two unfinished chert bifaces, and an argillite core were identified, as well as simple flakes of chert and hornfels/basalt. Because there were no areas likely to contain buried deposits, the site is not eligible for the NRHP and no further work is needed.

5LA9999

This small scatter of historic trash was found at the northern edge of the Big Arroyo Hills. Artifacts rest on natural shale deposits and include green bottle glass, solder-dot cans, tobacco tins, an enamel tea pot, and a baking powder lid. The site is on land patented by Lydia Blackmore in 1923. The site is a single and insignificant trash dumping episode and further work is not needed.

5LA10005

This small lithic scatter was found on a grass-covered terrace and was surrounded by the hills of the western Hogback. Flaking debris, in the form of simple flakes (10), complex flakes (3), and shatter (2), was primarily argillite (11), with pieces of hornfels/basalt (3), and chert (1) identified. Tools include a stemmed point of quartzite (Type P9, 3300 BC to 2800 BC in Anderson's 1989 point classification system) and five utilized flakes: two argillite, two Black

Forest silicified wood, and one chert. Many lithic materials were heavily burned suggesting they were thrown in a fire upon discard. No thermal features were identified during our recording operation, and coupled with the poor sediment deposition in the area (< 10 cm), the site does not appear to have potential for additional research.

5LA10006

The site is an isolated historic rock art panel. It was found on a basalt boulder at the foot of the western edge of the Hogback. There were many patinated basalt boulders further upslope but none exhibited cultural modification. Hispanic affiliation is inferred by the Spanish surname etched on the boulder: OCT 16 1921 TRUJILLO. Census records from this time period list several Trujillo's in the area of the PCMS, but it is unknown which one may have created this panel.

5LA10007

Sixteen pieces of debitage, sandstone mano and metate fragments, a basalt hammerstone, a broken quartzite biface, and two utilized flakes (argillite and Alibates dolomite) comprise this site. Of the debitage pieces, most were simple flakes (10), with complex flakes (3), and shatter (3) identified. These were made of argillite (7), quartzite (5), hornfels/basalt (3), and chert (1). These cultural materials were identified along a minor side drainage in the Van Bremer Arroyo system, near the southwest corner of the PCMS. The landform is an exposed limestone terrace with shallow sediments formed by its erosion. No evidence for former fires was found, so this small food procurement location was believed to be a poor candidate for additional work.

5LA10008

This site was found on a gentle plain that dips east towards Van Bremer Arroyo. Debitage, utilized flakes, and a projectile point were identified with a heavier concentration of artifacts near the datum. A 150-piece debitage sample was taken out of the estimated 200-300 flakes. Materials were primarily argillite (145), with fewer specimens of chert (3), quartzite (1), and hornfels/basalt (1). These items were classified as simple flakes (78), complex flakes (67), bifacial-thinning flakes (4), and shatter (1). The nearly complete projectile point was argillite and assigned to P10 (5500 BC and 3000 BC) in the Anderson (1989) system. Surface sediments are less than 10 cm, so the site recording has exhausted its research potential.

5LA10009

This small lithic scatter was found above Van Bremer Arroyo near the east end of the Hogback. Seven flakes of argillite and quartzite, and an argillite utilized flake were identified. A lack of features and low artifact count make the site insignificant.

5LA10011

The site was a sparse lithic scatter located on the north slope of Cedar Hill. Found on the first topographic rise above the Bent Canyon Arroyo, it appears to be a short-term activity

location, likely related to nearby sites (5LA9961, 5LA9966, 5LA10011). Lithic artifacts include a slab metate fragment, quartzite flakes (two complex and three simple) chert complex flakes, and an argillite complex flake. Vegetation on the site includes juniper trees, prickly pear, currant, and yucca. There were areas with sediments as much as 15 cm deep, but without evidence for fire features, the site merits no additional work.

5LA10012

The site is a thin lithic scatter on the first topographic rise above Bent Canyon Arroyo. One sandstone slab metate fragment was encountered, as well as flakes of basalt, argillite, quartzite, and chert. No chipped tools or features were found among the surface detritus, indicating no additional archaeological work is needed at the location.

5LA10013

This moderately dense lithic scatter was found on the flat plain above and south of Van Bremer Arroyo. Tools included a sandstone mano fragment, seven retouched/utilized flakes (four argillite, one hornfels/basalt, one orthoquartzite, one Ralston Creek chert), two side scrapers (Black Forest silicified wood and fine-grained quartzite), an end/side scraper of argillite, and two biface fragments (Hartville Uplift chert and argillite). Forty-five pieces of debitage were recorded – simple flakes (23), complex flakes (14), shatter (7), and a bifacial-thinning flake (1). These pieces were argillite (28), chert (12), hornfels/basalt (3), and quartzite (2).

An historic component also was identified. Recorded artifacts were a broken amethyst bottle, side-seam can, and metal strap; these found on land patented by Edward L. Hollingsworth in 1923. Neither the historic or prehistoric components were considered significant. Surface sediments in the area appeared shallow and mixed, and no features or time diagnostic artifacts were identified. No further work is needed and the site is not eligible for the NRHP.

5LA10014

The site is a lithic scatter within 116 m of the largest southern tributary on Van Bremer Arroyo. Found in the grassy steppes, the west edge of the site exhibits exposed Dakota sandstone bedrock, while the eastern portion has sedimentary deposits of only 10 cm in depth.

Chipped-stone debris consists of 107 pieces; these were 70 simple flakes, 24 complex flakes, 11 shatter, and two bifacial-thinning flakes. Surprisingly, 44 items were orthoquartzite; argillite generally dominates assemblages in this area of the PCMS. Other materials include chert (31), argillite (15), quartzite (9), chalcedony (7), and obsidian (1). Five tools were found among the detritus. These were two argillite cores, a conglomerate mano fragment, and utilized flakes of silicified wood and argillite.

The diversity of the debitage pieces suggests multiple activities may have taken place on this large (3.3 ac) site, but poor soil deposits and little chance of finding buried cultural materials renders the site insignificant.

5LA10015

This is a large and dense lithic scatter with two distinct spaced-stone circles and two other possible circles that may be either naturally arranged or culturally "robbed" circles. These cultural materials were found on a gently sloping plain between the Hogback and Van Bremer Arroyo. Vegetation includes short grasses, yucca, and cacti with sparse stands of juniper nearby. Although sediment depth to a carbonate horizon was 20 cm, cultural depth is less than that, and likely related only to the depth of the habitation features.

The Hogback, about 100 m away, was the source for argillite, the dominant material in the artifact assemblage. Of the debitage, 138 pieces were argillite, 14 were chert, two pieces were non-local obsidian, one was hornfels/basalt, one was orthoquartzite, and one was silicified wood. Regarding the obsidian, FS 19 was identified as Polvadera Peak from New Mexico and FS 35 was obsidian from Malad, Idaho (Appendix V). The tool assemblage size and diversity was significant when compared with other sites in this part of the PCMS. Thirty-nine tools were identified – 28 utilized/retouched flakes, seven bifaces, three cores, and an undiagnostic projectile point of unspecified obsidian.

This site is directly related to other tipi ring sites in the area, like 5LA5372 and 5LA5254; both of these sites are less than 100 m away. This is its only significance as no thermal features were identified and sediment deposits are shallow. Recording this site has exhausted its research potential, so no further work is needed.

5LA10016

The site was located on the south side of Van Bremer Arroyo, with the Hogback to the west. This landform, comprised of sediments up to 40 cm thick, was covered by yucca, cholla, juniper and sage. Characterized as a large lithic scatter with a single spaced-stone circle, this site is one of many in the area with visible rings.

One hundred and sixty-three prehistoric artifacts were encountered. This includes a 150-piece sample of the debitage, five bifaces, five utilized flakes, a graver, a metate fragment, and a side scraper. Chipped tools were primarily argillite (10), though two chert items were identified. Of the debitage, argillite (143) was the dominant material type, though pieces of Black Forest silicified wood (4), chert (2), and orthoquartzite (1) were found. Debitage classes were simple flakes (85), complex flakes (61), bifacial-thinning flakes (3), and shatter (1), so multiple reduction strategies were employed by the site inhabitants.

Although the site contains a habitation feature, the cultural depth within it is not likely to be significant, and there is no observable ash staining. A rodent burrow nearby reveals 40 cm of deposition above bedrock, but well developed carbonates were found only 15 cm below the modern ground surface. As there is little potential for significant sub-surface deposition, no further work is needed.

5LA10017

5LA10017 is a moderate density lithic scatter that includes a diagnostic projectile point (P21, when compared to Anderson's 1989:138 specimens). The site was found in the gently sloping steppes near the base of the Hogback at its southeast corner. There were small drainages to the north and south, these eventually drain into Van Bremer Arroyo. Sediment depth in the area was 10 cm, but carbonates appeared on the surface so all of the prehistoric materials are assumed to be in deflated context.

The artifact assemblage consisted mainly of argillite (93%), with smaller amounts of chert, fine-grained quartzite, hornfels/basalt, and orthoquartzite. Simple flakes made up 46% of the debitage, complex flakes 46%, shatter 5%, and 3% bifacial-thinning flakes were also observed. Tools, aside from the projectile mentioned above, were an unfinished argillite biface, an argillite retouched/utilized flake, and a complete sandstone metate.

No further work is required for this large (185 x 105 m) site as it contains no thermal features or habitation structures. A lack of cultural depth buttresses the argument as well.

5LA10020

This site was found on a west to east trending ridge on the east side of the Black Hills, and above upper Horse Canyon. Surface lithics included a quartz manuport, chert core, six retouched/utilized flakes of quartzite, and a dense scatter of chert and quartzite debitage (eighty-eight pieces). The potential for finding buried cultural deposits is minor as only 5 cm of sediment was recorded. No fire features were noted, and no architectural features were apparent. The site does not warrant further research as it is one of many small lithic scatters in the Black Hills.

5LA10029

This sparse lithic scatter was found on a flat plain covered by short-grass prairie vegetation. It is 350 m south of Van Bremer Arroyo, and approximately 900 m east of the Hogback. Cultural materials include a chert P29 point (associated dates between 500 BC to AD 600; Anderson 1989), and pieces of chert (8), Alibates dolomite (1), argillite (1), and silicified wood (1) debitage. No further work is needed at this small site as recording has exhausted its research potential.

5LA10030

The site was a sparse lithic scatter at the south PCMS boundary and near the east end of the Hogback. Only prehistoric flaking debris was identified – argillite (11), chert (7), hornfels/basalt (4), and single items of fine-grained quartzite, coarse-grained quartzite, obsidian, and silicified wood. There was no indication of buried cultural deposits, and the insignificant site was not recommended eligible for NRHP listing.

5LA10058

This fairly disperse lithic scatter was found within a generally flat plain between two unnamed drainages, and 700 m south of the eastern end of the Hogback. Surface visibility was poor here as grassland vegetation (wheat grass, grama grass) covered about 75% of the modern ground surface. The artifact assemblage was comprised of two projectile points, a utilized obsidian flake, and end-stage resharpening/reduction flakes of various cherts. The obsidian was of the Malad, Idaho source (Appendix V). The points relate to two distinct occupations for the site. The first chert point was classified as P62 in the Anderson (1989:195) system. This type of point is thought to date between AD 500 and AD 1400. The other point was also chert. Classified as P30, large points like this one were in use between 1000 BC and AD 1000 (Anderson 1989:148)

The site represents a short-term use area but the cultural remains clearly represent those of a biface technology. Biface technologies are portable technologies, so the site occupants must have exhibited high residential mobility. The lack of features, sparseness of the scatter, and little likelihood of buried deposits renders this site ineligible. No further work is needed here.

5LA10061

This is a small scatter of lithic debris. The site was found on a gently sloping plain, adjacent to a small tributary drainage of Van Bremer Arroyo. Ground visibility was good, vegetation included only sparse grama grass and cacti, and the soils were loose with intermixed gravel. Artifacts consisted of lithic reduction detritus, and all were made of argillite. These were five simple flakes, a complex flake, and a piece of shatter. No features were identified among the debitage, and the site does not require additional archaeological work.

5LA10062

Six flakes of chert, argillite, and quartzite, as well as a single argillite retouch flake comprised the site. It was found near the top of the Black Hills on a narrow ridge overlooking Stage Canyon to the west. Juniper was the over story species at this location, with grama grasses, prickly pear, and yucca also present. Dakota sandstone bedrock outcrops throughout the area and scattered pockets of sedimentary fill (< 5cm) were observed at the base of trees. A lack of features and diagnostic artifacts renders this site ineligible. As such, no further work is needed.

5LA10064

The site is a sparse scatter of lithic debris on a gently sloping ridge in the northern breaks of the Black Hills. A large southern tributary of the Bent Canyon system was found 100 m to the east. Most of the prehistoric artifacts were clustered along the eastern edge of the site in an area scoured by water erosion. Surface sediments were shallow (<10 cm) and found in pockets between the many areas of exposed Dakota sandstone bedrock. Thirty-three artifacts were recorded by the survey crew: 26 pieces of debitage, three cores (1 chert and 2 quartzite), a chert utilized flake, and chert biface tip. Vegetal material processing was indicated by the presence of

two sandstone mano fragments. This light surface scatter lacked thermal features, and shallow sediments cause it to be ineligible. No further work is required at this location.

5LA10065

This site is a sparse lithic scatter located on a hill slope in the northern Black Hills. A series of outcropping Dakota sandstone beds form terraces that trend east to west across the site, and thin sediment deposits (<10 cm) were identified at the base of these. Artifacts were found to be randomly distributed with no apparent concentrations. These were a large chalcedony projectile point (P9 in the Anderson [1989] system; 3300 BC to 2800 BC), two cores (chert and quartzite), a sandstone slab metate fragment, and 20 pieces of debitage. Of the flaking debris, 13 items were quartzite, three items were chert, three pieces were argillite, and one was hornfels/basalt. No structures or features were encountered, and with poor sediment depth at this location, all available data has been recorded. Our management recommendation: no further work.

5LA10068

The site occupies a ridge in the northern portion of the Black Hills, and overlooks Bent Canyon to the north. The modern ground surface was predominantly deflated rocks and gravel, with some exposed sandstone bedrock. The terrain dips gently downward to the north. Juniper trees dominate the vegetation, with a few small cacti and patches of grama grass present. Artifacts included 20 pieces of debitage (17 quartzite and three chert), non-bipolar cores of chert and quartzite, a utilized flake of orthoquartzite, and quartzite mano and metate fragments. The recordation of this site has exhausted its research potential, so no further work is needed.

5LA10069

This simple habitation site contained a workshop/activity area in front of two rockshelters. The site was found on the upper slope of a large drainage in the northern portion of the Black Hills. Rockshelter 1 measured 4.5 x 3.5 x 1 m and has wing wall remnants along its north and south walls. This architecture has collapsed and it is unknown what the construction technique might have been. There appeared to be about 10 cm of fill within the feature, but there does not seem to be any potential for buried features. Near the dripline two mano fragments and a metate fragment were identified and in the northern wing wall section, a complete slab metate was used as a construction block. Rockshelter 2 was much smaller (2.7 x 2.2 x 1.1 m) and abuts Feature 1 on its south side. The former feature has been scoured out by runoff and has no remaining deposition. A mano was found inside of it.

The remaining artifacts were found downslope between the shelters and around several large sandstone boulders. These included 15 pieces of debitage (13 quartzite, 1 chert, 1 orthoquartzite), two manos, and a slab metate fragment. Within the site boundary a steel cable spans the bottom of the canyon to near the top. Its function is unknown, but it likely relates to the historic occupation of 5LA6108. Both sites were on land patented by Henry Barnes in 1922.

Because the site is positioned along the canyon wall, water erosion has washed the cultural deposits out of the shelter and onto the slope below. As such, recording the site has exhausted its research potential and no further work is needed.

5LA10070

This small site measured 28 x 35 m, and was comprised of 100 pieces of flaking debris, three quartzite cores, and an end/side scraper of chert. These cultural materials were identified near the bottom of a south to north trending drainage at the north end of the Black Hills. The terrain dips steeply and averages between 15 and 20°. Juniper trees, cholla, prickly pear, and grama grass grow across the site, though very little sediment remains (<10 cm). This seems to be a single-use raw material procurement location, and without potential for buried cultural deposits, no further work is required.

5LA10071

The site is a rockshelter with tool grooves on its back wall and a complete slab metate of sandstone. These prehistoric cultural materials were found at the base of an outcropping Dakota sandstone ledge on the north side of the Mary Doyle arm of Welsh Canyon. The Mary Doyle homestead is 300 m northeast. Many roof fall boulders were found on the floor of the shelter, and it is impossible to determine if prehistoric architecture exists. No evidence for thermal features exists either and there is no activity area near the mouth of the shelter as is often seen on PCMS rockshelter sites. Sediments within the shelter may reach as much as 40 cm deep, but given the paucity of artifacts and lack of features, additional work at the site is not warranted.

5LA10072

This large lithic scatter was found on the northern terrace of Welsh Canyon, directly above the Mary Doyle homestead. Artifacts were encountered randomly across the site's surface, though tools were found in two concentrations: one at the south site boundary and the other at the north. Surface sediments were shallow (<7 cm) and classified as sandy silt with intermixed sandstone gravel. Dakota sandstone bedrock outcrops near the terrace edge and the artifacts found here have deflated to their current position on the modern ground surface. The site vegetation was relatively thick when compared to other parts of the PCMS, and is comprised of juniper, mountain mahogany, prickly pear, sagebrush, cholla, and grama grass.

Recorded artifacts included 66 pieces of flaking detritus, two sandstone manos, two slab metates, a chert end/side scraper, a quartzite core, and a chert utilized flake. Of the debitage, 39 items were quartzite, 13 pieces were argillite, ten were chert, and there were single specimens of hornfels/basalt, orthoquartzite, baked clay, and chalcedony.

The site has experienced moderate disturbance from both natural and cultural impacts. Early-stage lithic reduction seems to have been the primary site function, though the tools suggest food items were being processed on a limited basis. No thermal features or architecture was identified, so the site likely does not represent a residential base or long-term use field camp.

Because there is no potential for buried cultural materials, the site is not eligible for NRHP inclusion and it requires no additional work.

5LA10073

This dense scatter of lithic debris was found within a sloping basin on the west side of a southern Bent Canyon tributary. Dakota sandstone outcrops over most of the modern ground surface, and forms two ledges on the south and north ends of the site. The terrain dips steeply to the northwest, and past rains have washed away most of the surface sediments. Recorded artifacts included a quartzite core, sandstone edge-ground cobble, sandstone mano, and 88 pieces of debitage. The majority of the debitage was quartzite (83%), with smaller amounts of chert (10%), argillite (5%), and hornfels/basalt (2%). Debitage classifications were simple flakes (59%), complex flakes (39%), shatter (1%), and bifacial-thinning flakes (1%). The dominant reduction strategy was simple raw material reduction, though at least one biface was manufactured. Most of the debitage pieces were found in a 20 x 20 m area and represent a single reduction episode. No features or diagnostic artifacts were identified and there is no potential for buried cultural materials. The site is therefore not eligible for the NRHP and needs no additional work.

5LA10074

This sparse scatter of lithic debitage was found on the top and north side of a low ridge. On a larger scale, it occupied the breaks on the north side of the Black Hills near Stage Canyon. Dakota sandstone outcrops everywhere, and the shallow sediments (<20 cm) were residual in nature. There was a low sandstone block wall at the eastern edge of the site, but its function and age remain unknown. Further down the ridge, there was an old road with rock blocks along its edges (on the Henry Halsey land plot), so the wall on 5LA10074 may represent a continuation of the road. Prehistoric artifacts included ten pieces of debitage, two utilized flakes (one chert, one quartzite), a large patterned biface fragment of chert, and a sandstone one-hand mano. This site may represent a single, limited use occupation, but without a diagnostic artifact there is no way to tell when it was used. The site merits no further work as all available data has been recorded.

5LA10075

This is one of many small and discrete lithic scatters at the north edge of the Black Hills. Flakeable quartzite outcrops near the site, so it is not surprising that most of the lithics recorded here were quartzite (133 pieces of debitage and five chipped-stone tools). The remaining debitage specimens were chert (9), argillite (5), limestone (2), and obsidian (2). When compared to other sites in the area, the tool assemblage was large. It included nine slab metates (only one whole), a mano fragment, four cores (three quartzite and one chert), a end/side scraper of chert, a utilized flake of hornfels/basalt, and a complete, fine-grained quartzite projectile point. This specimen has characteristics, like basal grinding, a contracting stem, and collateral flaking that appear similar to Hell Gap points from other areas of the Great Plains (Frison 1974, 1978). Within the site boundary, sediments are shallow (<20 cm) and bedrock outcrops everywhere. As such, no further work is required at this location.

5LA10082

This sparse lithic scatter was found at the eastern edge of Stage Canyon. Prehistoric habitation sites 5LA10000 and 5LA10117 were identified nearby, and a large lithic scatter (5LA4781) is down slope and 30 m to the north. Cultural remains include 18 pieces of quartzite debitage, six pieces of chert debitage, one orthoquartzite flake, a quartzite core/hammerstone, an end/side scraper of chert, a slab metate fragment, and two unfinished quartzite bifaces. As the site was positioned on an alluvial fan, the surface sediments are deep. This being said, the cultural materials were only surface remains and there is little potential for buried cultural deposits. The site gains its primary significance from its association with the other sites mentioned above. It does not stand on its own, and additional research is not warranted.

5LA10083

The site is a sparse lithic scatter located about midway up a north trending ridge in the northern Black Hills. Vegetation includes moderately dense juniper, grama grasses, yucca, and cacti. The site's location on a very steep slope and its exposure to the elements has led to heavy erosion. Bedrock has been exposed over most of the landform as a result. Among the debitage specimens, eight material types were identified – fine quartzite (23), course quartzite (14), hornfels/basalt (6), chert (5), argillite (2), Morrison chert (1), orthoquartzite (1), and Ralston Creek chert (1). Recorded tools were a quartzite hammerstone, two unflaked basalt cobbles, a chert end scraper, a sandstone slab metate fragment, and two unfinished bifaces (fine-grained quartzite and Morrison chert). There is no soil depth in the area, and no features were identified by the field crew. Because of this, additional work is not justified.

5LA10084

The site is a historic trash dump with a light scatter of prehistoric debris intermixed. It was found at the north edge of the Big Arroyo Hills in dense juniper tree cover. The historic component consisted of three dozen sanitary and solder-dot cans, clear and brown bottle glass fragments, an enamel double boiler, a porcelain tea cup with a maker's mark, and a "Coca-Cola" bottle opener. There was also one feature in the form of a collapsed cairn that likely signified a property marker. In addition, there were many axe-cut junipers in the vicinity. Land records show that this section was patented by Lydia E. Blackmore in 1921.

The sparse prehistoric component included a utilized argillite flake, sandstone mano fragment, unfinished biface of argillite, and nine pieces of debitage: three baked clay, three hornfels/basalt, two argillite, and one fine-grained quartzite.

Limestone bedrock outcrops over the site's surface and there was no sedimentary depth. Coupled with a lack of features, this site is not considered to be significant and needs no further work.

5LA10085

The site was located on a flat to gently dipping limestone ridge. Pinon pine and juniper dominate the vegetation, with downed wood and isolated clumps of grama and threeawn grass, cholla, and prickly pear present. Recorded artifacts included multiple early-stage pieces of hornfels/basalt and fine-grained quartzite. An orthoquartzite point, type P59 within the Anderson (1989:189) system, dated the occupation between AD 500 and 1200. Four manos (two quartzite and two sandstone), a sandstone slab metate fragment, three cores (two argillite and one hornfels/basalt), and a utilized flake of argillite were also identified.

A deflated thermal feature was found at the northern site boundary. Defined by discolored limestone, a light ash smear, and a few pieces of burned rock, it was oval in shape and set on limestone bedrock. Sediments may reach 5 cm at the base of trees, but otherwise, there was no depth within the site boundary. This site requires no additional work as all available data was recorded during our visit.

5LA10086

The site was composed of sparse lithics, a historic trash scatter, and a historic well. The site was located in the Big Arroyo Hills on a fairly flat plateau, and was incised on the east side by a small drainage. Scattered prehistoric artifacts included a utilized chert flake, a piece of argillite shatter, and three slab metate fragments.

The historic component includes a well, sections of fence line, a 1940s car, a 1942 Colorado license plate, and household trash. There were more than 60 cans, many glass fragments, a barrel and buckets. The well was constructed of unmodified limestone blocks and measured approx. 6.5 x 8 ft. Its opening has filled in with post abandonment sediments and is covered by a box spring. A few pieces of wood, sheet metal, and some loose cut nails were found on the modern ground surface, but no structures were located. A homestead is probably in close proximity, however. This section of land was patented by Lydia Blackmore in 1923, but the artifacts are likely associated with later land use. The lack of unique architectural elements or significant prehistoric features makes further work on this site unnecessary.

5LA10087

This small site was found on a south slope near the bottom of the Stage Canyon drainage. It is on the opposite side of the canyon from a permanent spring. Based on the surface remains, the site was an extraction location for local quartzite, which outcrops in the canyon wall. No diagnostic artifacts or features were observed; only 16 white quartzite flakes recorded. One middle-stage gray, fine-grained quartzite flake was found. Cobbles were probably reduced to blanks at this site and transported off to other locations. The site has little integrity as its northern portion is eroding into canyon drainage. Coupled with the lack of features, no additional research is warranted.

5LA10088

This 5 ac site was located on a bench and terraced slope on the south side of Stage Canyon. It served as a quarry; white quartzite, Morrison chert, and unidentified chert outcrop in the canyon wall nearby. Of the debitage, 82% was early-stage flakes, mostly of the local quartzite and chert, with a few pieces of argillite, basalt, fine-grained quartzite, orthoquartzite, and silicified wood. Eleven cores were recovered along with a quartzite end scraper, four utilized chert flakes, and an edge-ground mano. A linear arrangement of stacked rocks was identified and it was positioned at a right angle to a boulder. No other structures or features were noted. The site has been moderately disturbed by water erosion and further work is not likely to yield significant information.

5LA10089

This small site consisted of a 16.5 x 5.6 x 2.5 m rockshelter and its associated lithic artifacts. It was found near the head of an unnamed canyon that drains north to Stage Canyon. Two slab metates with light use wear suggest some seasonal food processing occurred. Five flakes were recovered, but no time or cultural diagnostic items. The shallow sediments within the shelter were mixed and being impacted by erosional processes. As such, the site is ineligible and requires no additional archaeological work.

5LA10091

This lithic scatter covers 3 ac. It was found atop the plains between Welsh Canyon and the Mary Doyle arm of Welsh. Collected tools included a chert biface fragment, and utilized flakes of fine-grained quartzite and Polvadera Peak obsidian (Appendix V). Middle- to late-stage lithic reduction and expedient tool use were the predominant activities based on the 63 item artifact assemblage. The site has been moderately disturbed by natural and cultural impacts. A lack of features and diagnostics makes it ineligible and further work is not recommended.

5LA10092

This small but dense lithic scatter was located in the plains between Welsh Canyon proper and the Mary Doyle arm of Welsh Canyon. The reduction of fine-grained quartzite into portable cores appears to have been the main activity, though one mano and a metate fragment were recorded. There were no visible features and sediment deposition was very shallow, giving little chance for buried cultural deposits to be located. This site is not considered significant.

5LA10093

This lithic scatter was located on an upper terrace in the Stage Canyon drainage system. A Black Forest silicified wood projectile point fragment was identified; it is much like Anderson's (1989:175-176) P50, associated dates ranging between AD 1000 and 1750. Fourteen metate fragments and two manos support vegetal processing as a primary site activity. Cores and debitage of locally available quartzite point to primary and secondary reduction of local materials. Although there was significant sediment deposition and some apparent buried cultural

materials. The deposits are naturally mixed with no cultural integrity. A lack of surface features and temporally diagnostic artifacts suggest excavation would not yield significant information as well. Though not connected by artifacts, this site may be related to NRHP eligible site 5LA10000, which is 100 m to the west.

5LA10094

This lithic scatter was located in Stage Canyon and along the base of its northern wall. Lithic reduction of locally available quartzite probably produced most of the artifacts. One chert core and a bedrock metate were noted, as well as a base portion of a large biface preform. Sheetwash erosion and a two-track road have slightly impacted the landform, but the cultural materials have not been disturbed. This part of Stage Canyon exhibits deep sediments, but the cultural materials were deflated surficial remains. Coupled with the lack of features, the site is insignificant and not eligible for NRHP listing.

5LA10095

This sparse lithic scatter was found on a sandstone outcrop near the steep the side slop of Stage Canyon. Fifteen artifacts were found, including a quartzite core, a mano, three metates, and ten flakes. Heavy erosion on this 40° slope has mixed cultural materials and natural strata. The site has no integrity and no potential for buried cultural deposits.

5LA10096

This site is on a hill occupying the base of a ridge that overlooks eastern Stage Canyon. The terrain dips dramatically to the north, though intermittent drainages to the north and south of the ridge allow water to flow to the east as well. The datum was set at the highest point on the hill at an elevation of 1,472 m (4830 ft). Dakota bedrock outcrops on either side of the hill and shallow sediments were only noted in a few locations. Juniper trees are thick throughout the site, though a few open patches with cholla, soapweed, prickly pear, and the grama grasses recorded.

A Paleoindian projectile point, a stone habitation feature, a ceramic pot drop, and lithic artifacts were identified. More than one temporal component was represented, though the artifacts have deflated to their current position on the modern ground surface. A nearly complete Hell Gap point (Figure 6.8) was found near the southern site boundary and the deflated stone structure at its west edge.

The pot drop consisted of 27 ceramic fragments from a single polished ware vessel. Fragments vary in thickness, and appear to be from a molded rather than coiled piece. These elements, along with a mano and three slab metates, suggest that the location was used for food processing, but it is not known whether it was Paleoindian or Late Prehistoric hunter gatherers. In recording the site, its information potential has been exhausted.

5LA10099

Comprised of two cores and six flakes, the site occupies a limestone capped ridge in the Big Arroyo Hills. Surface sediments were thin and artifacts were all found on bedrock. Additional work is not required for this limited use food or lithic procurement location.

5LA10102

This lithic scatter was found on a north-facing slope in the Cedar Hills. Sediments depths were less than 5 cm, and these were of mixed composition. A total of 42 artifacts were recorded – 26 simple flakes, eight complex flakes, three utilized flakes, two bifaces, an end/side scraper, a non-bipolar core, and a uniface. All artifacts were of local material suggesting the site occupants were not mobile. A lack of soil deposition, diagnostics, and features render this site ineligible.

5LA10104

This small site was located on a mesa in the Black Hills. Horse Canyon is to the north and west of the location. A chert complex flake and utilized flake of quartzite were recorded. These were found on exposed sandstone bedrock. No further work is required on this insignificant surface scatter.

5LA10105

This 2 ac site was found on a sloping tabletop in the Black Hills. The head of Horse Canyon is nearby. Recorded artifacts included nine utilized flakes, a chopping tool, and 18 flakes of quartzite and argillite. A chert projectile point and lightly used mano were also identified. The point is nearly complete, and most like Anderson's (1989) P62 (AD 500 to AD 1400). This small food procurement location lacks features and all cultural materials were found on bedrock. It is not eligible for listing on the NRHP and needs no additional work.

5LA10113

This prehistoric tool-stone quarry occupied a sandstone terrace on the south side of Stage Canyon. Artifacts included a slab metate fragment, chert and quartzite cores, 37 quartzite flakes, and 11 chert flakes. Sediment deposition on the terrace may be as much as 20 cm, but it has been mixed by natural processes. There is little chance for additional data recovery, so the site requires no further work.

5LA10114

This site contains two boulders with historic etching. Located on high on the western slope of a terminal ridge, the site is south of the east end of Stage Canyon. Panel 1 shows letters and numbers -- "JSJ 1871" and "G," along with three arrows. Panel 2 exhibits "JC 1877". The site was on land patented by Vernon B. Rice in 1923 and GLO records do not show any landowners in T28S-R27W with these initials. There were no associated artifacts; the field

crews could not identify the etching instruments on the ground bedside the boulders. The site has been well documented and requires no additional archaeological work.

5LA10115

This lithic scatter was found on a bench above the Stage Canyon arroyo. It is on the other side of the canyon from a permanent water source. Because the landform has a slope of 10°, erosional disturbance is moderate, and the mixed sediments are less than 5 cm in depth. Chert and quartzite outcrop close by in the canyon wall, and these materials were well represented in the surface assemblage. Prehistoric artifacts included a chert bipolar core, five chert flakes, 26 quartzite flakes, a utilized quartzite flake, two metates, and a mano. Though the site functioned as a lithic procurement location, the presence of ground stone suggests vegetal food processing as well. The site is one of many small procurement locations in the area that are not eligible for inclusion to the NRHP.

5LA10116

The site was found on a terrace above Stage Canyon, approximately one-third of the way up the south slope. Artifacts were scattered across this steeply sloping landform and surface sediments were of mixed composition because of the grade. This was a secondary lithic reduction location; cherts and quartzite outcrop within a few meters of the site boundary, but away from the artifact scatter. All debitage pieces were quartzite or chert and no exhausted or broken tools were found in association. Three non-bipolar cores of quartzite and a utilized fine-grained quartzite flake were identified among the flaking debris. No features or time diagnostic artifacts were found. Because the slope is actively eroding, the possibility of discovering intact buried cultural deposits is remote. Further work is not warranted.

5LA10117

This small (7 x 2 x 2.75 m) rockshelter was found under a small sandstone outcrop on the east side of Stage Canyon. Two bedrock milling surfaces were found within the shelter, and a Black Forest silicified wood flake tool was identified on the slope nearby. Natural erosion has scoured out the shelter so it has no research potential.

5LA10119

The site was found on a low saddle near the east edge of Stage Canyon. At this location, an erosional point has separated from the canyon wall and forms a well defined pinnacle. Dakota quartzite outcrops within 100m of the site and it is no surprise that most of the artifacts were made from this material. Tools include a biface, battered core-tools, non-bipolar cores, slab metate fragments, utilized flakes, and a uniface. Fifty-nine pieces of debitage were identified. Clearly, the site functioned as something more than a quarry as food processing tools were identified. There are better food resources in the valley below, so the sites location remains curious. The best explanation is defense. Other defensive sites (5LA7307, 5LA7365) are to be found within 1 km and along the south side of Stage Canyon. The cultural materials were found

on a 5–20° slope, and what sediment deposition remains is mixed. No research potential exists, so the site is not eligible for the NRHP.

5LA10131

This lithic scatter site was found on the east side of Welsh Canyon. The landform is rocky, with little sediment cover. This insignificant food procurement location contains a quartz core-tool, sandstone mano, chert utilized flake, and quartz flake.

5LA10132

This large multi-component site was found in the Cedar Hills north of Stage Canyon. It was comprised of a lithic scatter, deflated thermal feature, bedrock metate, debitage, and projectile point fragments. The landform has been scoured by erosion and all artifacts were observed lying on bedrock. Projectile points include a chert P49 (Anderson 1989:175; AD 800 to 1750), a chert P82 (Anderson 1989:216; AD750 to 1725), a silicified wood P19 (Anderson 1989:134; 2000 BC to AD 1000), and an undiagnostic fine-grained quartzite fragment. Associated debitage pieces were argillite (9), chert (40), quartzite (63), basalt (1), obsidian (2), Ralston Creek chert (1), sandstone (7) and silicified wood (1). One of the obsidian items was sourced to Obsidian Ridge, New Mexico (Appendix V). Lithic reduction and food procurement/processing appear to have been site activities. No further work is needed as all the available information has been recorded.

5LA10133

This small site contains a single spaced-stone circle and its associated artifacts. These cultural materials were identified on a small erosional terrace at the south edge of the Bent Canyon arroyo floodplain. The circle, 4 m in diameter, is of unknown cultural affiliation and was constructed of a single course of unmodified sandstone blocks.

Debitage was comprised of quartzite, argillite, and Black Forest silicified wood. Recorded tools included a sandstone mano and sandstone slab metate fragment. Landform and feature deposition is minimal and it is unlikely that buried occupation surfaces exist. Further work is not needed as the sites research potential has been exhausted by this recording.

5LA10134

This sparse scatter of lithic debris was found on a gently sloping ridge in the northern breaks of the Black Hills. Sandstone bedrock outcrops over most of the area, but there were shallow pockets of aeolian sand (< 5 cm in depth) in between these. The reduction of locally available quartzite was commonplace with many large simple flakes (both cortical and noncortical), recorded. Slab metate fragments were identified so vegetal material processing also occurred. No significant features were encountered so the site warrants no further work.

5LA10136

This lithic scatter was located on the west bank of Horse Canyon at its confluence with Bent Canyon arroyo. Artifacts included a large quartzite utilized flake, two metates, six chert flakes, and three quartzite flakes. Naturally mixed sediments may be as much as 100 cm deep, but there is no potential for buried cultural materials.

5LA10137

This large site contains scattered lithics, 33 spaced-stone circles, a thermal feature, and a lithic concentration. It was found on the northeast slope of the Black Hills; this area overlooks Bent Canyon to the north and Horse Canyon on the east. Located within a woodland plant community, the landform exhibits sediments of variable depth (0- 20 cm) with outcroppings of Dakota sandstone forming widely-spaced terraces. Natural impacts include wind and water erosion, and cultural impacts were observed in the form of looters piles.

Spaced-stone circles were in four apparent concentrations. It is unknown whether these represent separate occupations or just the dispersal of a single group to the best camping locations. Circles were constructed of single discontinuous courses of rock, and 24 considered complete. Construction appeared more robust on the north or west sides of 21 structures, suggesting they were built to withstand prevailing winds. Four circles had evidence for deflectors and/or internal stone features.

The artifact assemblage included 251 pieces of debitage, 38 chipped-stone tools, 35 ground-stone tools, and 4 hammerstones. Debitage consisted of 71% simple flakes, 14% bifacial-thinning flakes, 13% complex flakes and 3% shatter. Unlike most sites in this area of the PCMS, the proportion of unspecified chert was quite high (34%). Exotic materials in the debitage sample include Black Forest silicified wood simple flakes and Hartville Uplift bifacial-thinning, complex, and simple flakes.

Broken down by type, the tools were 31 slab metate fragments, 22 utilized flakes, ten patterned bifaces, four cores, three scrapers, two edge-ground cobbles, a core tool, mano fragment, and polishing stone. Of the bifaces, four are temporally diagnostic items when compared to points in Anderson's (1989) typology. The first is a chert perform (FS 14), type P49 (AD 800 to 1750). FS 16 was the base of a small Washita chert point (P79, AD 1000 to 1750). Another Washita of hornfels/basalt (FS 17) was P83 (AD 750 to 1650). The remaining point is stylistically different, suggesting multiple site occupations. It is a nearly complete corner-notched point of orthoquartzite (P35, 1000 BC to AD 1200).

The thermal feature measured 83 x 76 cm and had two metate fragments in direct association. Natural formation processes have eroded its fill, leaving little to offer researchers.

5LA10137 is a large habitation site, but its numerous domiciles and thermal feature lack the depth to contain cultural deposits. In addition, diagnostic artifacts have likely been removed by historic residents so there remains nothing to learn chronologically. The site is a poor candidate for the NRHP and no additional work is required.

6.0 ARTIFACT ANALYSIS

6.1 Introduction

A total of 7,780 prehistoric and historic lithic specimens were recorded during the 2002 PCMS survey project. This assemblage consists mainly of portable items, but also includes a few bedrock and large slab metates. Of the total assemblage, 6,363 items were debitage, 893 pieces were chipped-stone tools, 450 specimens were ground stone, and 73 items were considered miscellaneous items. Table 6.1 summarizes functional group and artifact class for the 2002 lithic artifacts.

Our analysis, performed both in the field and laboratory, was concerned with describing all lithic artifacts, differentiating the general variability of the raw materials which were utilized, and assessing site chronological affiliation as it relates to the Chapters 4 and 5 write-ups. Applying the lithic analysis criteria identified in Owens et al. (2000:17-22) we were able to make statements regarding differing reduction strategies and decision-making processes associated with the production and use of the artifacts. In sum, the research domains of chronology, technology, and subsistence strategy were addressed, though often briefly, in our information.

The first portion of the chapter describes the various raw materials identified in the assemblage, as well as local and non-local material sources. Next, the debitage analysis procedures and results are discussed. The chipped-stone tool analysis is then described and types discussed by material type and morphological attribute. Following this, we address the type and nature of the ground-stone tools. The last portion of the chapter presents artifact temporal and functional interpretations.

6.2 Raw Materials

Material type selections are often made on the basis of raw material availability or the physical properties of the stone. Regarding the latter, size, shape, fracture toughness, and resiliency of chipped-stone raw materials restrict both the various reduction techniques used by a prehistoric toolmaker and the morphology of the resulting artifact (Andrefsky 1994). In short, materials best suited for knapping are isotropic solids having the physical properties of elasticity and homogeneity. Elasticity allows stone to return to its former state after being depressed by an application of force. Homogenous materials may be easily worked because they lack cleavage planes and often have no inclusions to impede the conchoidal fracture upon initial impact (Crabtree et al. 1985).

Table 6.1: Project Artifact Classes Present.

FLAKED LITHIC GROUP			GROUNDSTONE/MISCELLANEOUS GROUP		
Artifact Classes	Count	Percentage	Artifact Classes	Count	Percentage
Biface-Thinning Flake	268	3.44%	Hammerstone	26	0.33%
Bipolar Flake	20	0.26%	Edge-Ground Cobble	7	0.09%
Complex Flake	2067	26.57%	Mano	139	1.79%
Shatter	425	5.46%	Bedrock Metate	23	0.30%
Simple Flake	3583	46.05%	Slab Metate	281	3.61%
Non-Bipolar Cores	220	2.83%	Jewelry Item	1	0.01%
Core-Tools	9	0.12%	Manuport	4	0.05%
Bipolar Cores	11	0.14%	Whetstone	1	0.01%
Biface	139	1.79%	Polishing Stone	5	0.06%
Chopper	1	0.01%	Abrader	3	0.04%
Drill	5	0.06%	Bone	23	0.30%
End Scraper	10	0.13%	Bead	1	0.01%
End/Side Scraper	26	0.33%	Ceramic Sherd	8	0.10%
Graver	2	0.03%	Steatite Bowl Piece	1	0.01%
Spokeshave	1	0.01%	TOTAL	523	6.72%
Side Scraper	23	0.30%	Note: Thirteen historic pieces also collected		
Uniface	10	0.13%			
Utilized/Retouched Flak	339	4.36%			
Projectile Point	98	1.26%			
TOTAL	7257	93.28%	TOTAL ARTIFACTS	7780	

Fracture toughness is the stress-intensity factor necessary to begin the propagation of a crack in the stone (Cotterell and Kamminga 1987:678). It is a fundamental characteristic of chipped-stone raw materials, and although oversimplified, a meaningful dichotomy may be drawn between fine- and coarse-grained materials. Coarse-grained materials generally have much higher fracture toughness than do fine-grained materials (Andrefsky 1994). Not surprisingly, prehistoric flintknappers generally appear to have employed fine-grained and coarse-grained materials for different tasks.

Because of their lower fracture toughness, fine-grained materials are well suited for thinning and shaping into patterned tool. In contrast, the high fracture toughness of most coarse-grained materials makes them extremely difficult (if not impossible) to retouch by pressure flaking. However, high fracture toughness materials would have been advantageous for their use as expedient tools because the working edges would have become dull much more slowly. Consequently, fine-grained materials are closely associated with the production of patterned tools like bifaces and scrapers, whereas course-grained materials appear to have been more commonly used in the production of expedient flake tools.

Although grain structure varies somewhat within any material, it can generally be defined as either fine- or coarse-grained. Materials that generally have a finer grain, identified in PCMS assemblages, include various cherts, chalcedony, limestone, orthoquartzite, silicified wood, siltstone, fine-grained quartzite, quartz, and obsidian. Coarse-grained materials would include

hornfels/basalt, quartzite, conglomerate, diorite, sandstone, schist, welded tuff, granite, and argillite.

Most raw materials used by the prehistoric inhabitants of the project areas are found within the PCMS boundary, but several material types have been identified that are from sources outside southeastern Colorado. Obsidian rocks source from two primary locations. Those from New Mexico include the Jemez Mountain, Canovas Canyon, Cerro del Medio and Polvadera Peak varieties. Obsidians from near Malad, Idaho have also been found. Alibates dolomite, Hartville Uplift chert, Flattop chalcedony, Knife River flint, Plate chalcedony, Niobrara jasper, Tiger-eye chert, and Black Forest silicified wood have all been transported into the PCMS from fairly substantial distances away. Other materials, such as some nondescript quartzite and chert, were probably transported much shorter distances from the uplifted beds along the Front Range of Colorado. For the most part, however, the lithic materials identified in the 2002 assemblage outcropped within 100 m of the sites on which they were found.

In the western portion of the PCMS, and in the area of the TA 3-6 sites, the surface geology is attributed to Quaternary alluvium, pediment sediments, and colluvium. Unmodified nodules and cobbles of chert, basalt, argillite, and quartzite can be found exposed on erosional terraces or in the beds of intermittent streams. Olivine basalt and argillite, found in substantial amounts on sites throughout the PCMS, can be collected at the southwestern corner of the PCMS along the northern side of a large intrusive basalt dike.

The ground-stone assemblage reflects the use of a relatively narrow range of raw material types that are all available in the immediate area. Identifiable sources of sandstone include the sedimentary rocks from the Dakota Group, Morrison Formation, Bell Ranch Formation, and Entrada Sandstone. These are exposed in the side canyons and floors of Taylor Arroyo, Red Rock Canyon, Welsh Canyon and other drainages that feed the Purgatoire River system.

6.3 Debitage

6.3.1 Debitage Analysis Procedures

The 2002 debitage assemblage was analyzed in the field using a system developed for PCMS fieldwork by Dr. Stanley Ahler. Definitions and codes for this format can be found in Owens et al. (2000). In the field, a single lithic analyst performed the collection of lithic data on each field crew by logging attribute data into "palm sized" computers in Excel database format. This section provides a description of the recorded data, and the field procedures for the collection of these data.

Macroscopically unmodified chipped-stone artifacts were classified in a system based on Ahler's (1989) approach to chipped-stone mass analysis. This type of analysis focuses on size-grade distributions of different raw material types represented in any given context. The analysis was based on the assumption that, in proportional terms, more small flakes were generated during the later stages of lithic reduction, and larger flakes would predominate during the earlier stages of lithic reduction strategies.

Two size-grades (large and small) were used to classify flaking debris size. In the field, small wire mesh screens with ½ sq in openings were used for the rapid assessment of this attribute. Large size-grade materials will not pass in any orientation though a ½ sq in screen. This includes debitage with a minimum dimension greater than 0.71 in, the diagonal measurement of ½ sq in. Small size items will pass through our ½ sq in screen.

Raw material type is an important element recorded in the system. As noted above, a number of raw materials outcrop on the PCMS. During an early field project, Andrefsky (1990) classified most of these materials. More recently, Ahler (1996) collected a number of material samples to redefine the typology and provide laboratory reference materials. Ahler, in Schiavitti et al. (2001:286-288), describes some of the more common varieties. In 2002, non-local materials (e.g., Black Forest silicified wood, Alibates dolomite, or Flattop chalcedony) were collected when found in the field and brought back to the laboratory for comparative analysis. They were then classified as to "source" by comparison with known lithic material specimens, through outside specialist analysis, or by using ultraviolet fluorescence identification like that described by Hofman et al. (1991).

Also recorded was the presence or absence of cortex (i.e., the weathered rind or natural exterior surface of the raw material). In some cases, cortex may appear as discoloration caused by chemical processes or as a smooth, polished surface in the case of water tumbled terrace cobbles. In each specimen, cortex is recorded as "absent" if no surface rind is present on the dorsal flake surface or platform. Cortex is recorded as "present" if a weathered coating is present in any amount on the dorsal flake surface or platform.

In addition to the aforementioned size and material information, flaking debris items were classified according to debitage category. Categories include chunk/shatter, simple and complex flakes, bifacial-thinning flakes, and bipolar flakes. These will be described later in this chapter.

6.3.2 Debitage Analysis Results

A total of 6,363 pieces of debitage were analyzed from project sites and IFs; these represent over 82% of the total artifact assemblage. Twenty-one material types were identified in the debitage assemblage (Table 6.2). Not surprisingly, locally available materials dominate (98.15% of the total). Coarse-grained quartzite (35%) was the primary material, while unspecified chert (22%), argillite (19%), fine-grained quartzite 10%), and hornfels/basalt (8%) also demonstrated relatively high percentages. The remaining 6% of the local materials were baked clay, chalcedony, diorite, limestone, orthoquartzite, quartz, rhyolite, Ralston Creek chert, sandstone, silicified wood, and siltstone. These materials are 44% macrocrystalline, 31% microcrystalline, and 25% cryptocrystalline. The high proportion of macrocrystalline and microcrystalline materials can be attributed to the abundance of locally available coarse-grained quartzite, argillite and hornfels/basalt in relation to the position of the 2002 survey areas, and was not likely the result of any selection preference on the part of the prehistoric inhabitants. Non-local materials (1.87% of the debitage assemblage, 119 items) were Alibates dolomite (5),

Black Forest silicified wood (15), Hartville Uplift chert (35), obsidian (40), Smoky Hills jasper (23), and Tiger-eye chert (1). Table 6.5 presents the summary data for non-local lithic materials recorded during the 2002 project. These were, for the most part, the same non-local materials identified on other PCMS projects (Loendorf and Loendorf 1999:91-92; Owens and Loendorf 2002:127; Owens and Loendorf 2004:567; Owens et al. 2000:242; Schiavitti et al. 2001); interpreted as evidence for a north-south oriented trade and exchange system, or migration route.

Simple (56%) and complex flakes (32%) dominate the debitage assemblage, with substantially smaller amounts of shatter (7%), bifacial-thinning flakes (4%), and bipolar flakes (<1%) identified (Table 6.3). This information clearly shows that all stages of lithic reduction are represented, and is supported by the fact that 56% of the assemblage was classified as large in size and 25% cortical.

Simple flakes comprise the largest debitage class (3583). A simple flake is a freehand percussion or pressure flake that exhibits parts of two or fewer previous flake scars on the dorsal surface (Owens et al 2000:19). Small platform-trimming flakes, signifying platform preparation, were not considered dorsal flake scars. A flake may or may not retain the platform, so this category often includes incomplete flakes that lack platforms. Like the overall debitage assemblage, many material classes represent the simple flakes, and a distinct selection preference for quartzite (55%) and chert (19%) is seen (see Table 6.4). Alibates dolomite, Black Forest silicified wood, obsidian, and Smoky Hills jasper comprised the simple flake non-local materials (< 1% of the assemblage).

Seventy-one percent of the simple flakes were noncortical and 29% showed some degree of dorsal cortex. Of these, 40% were noncortical small flakes, 31% were noncortical large flakes, 22% were cortical large flakes, and 7% were cortical small flakes. Regarding simple flake size, 52% of the assemblage was large and 48% small. A higher proportion of large pieces and increased frequency of noncortical pieces indicate that most simple flakes were produced by hard-hammer raw material reduction activities, with most of the materials reduced some distance away from the quarry locale. Noncortical small flakes perhaps resulted from some early-stage biface/uniface tool manufacturing. Only 12 simple flakes were thought to have been heat exposed and 119 were patinated to some degree.

Table 6.2: Debitage Class by Material Type.

Material	Debitage Class					
	Biface-Thinning	Bipolar	Complex	Shatter	Simple	Total
Alibates Dolomite	0	0	2	0	3	5
Argillite	28	1	442	84	633	1188
Baked Clay	0	0	2	2	5	9
Black Forest Sil. Wood	3	0	4	0	8	15
Chalcedony	4	0	9	2	10	25
Chert	131	18	428	161	641	1379
Coarse Quartzite	17	1	670	82	1478	2248
Hartville Uplift Chert	7	0	4	1	23	35
Diorite	0	0	0	0	2	2
Fine Quartzite	30	0	240	9	361	640
Hornfels/ Basalt	15	0	162	65	288	530
Limestone	0	0	0	0	3	3
Obsidian	5	0	20	2	13	40
Orthoquartzite	8	0	41	2	72	123
Quartz	0	0	0	2	0	2
Ralston Creek Chert	8	0	19	6	17	50
Sandstone	0	0	5	0	6	11
Silicified Wood	1	0	13	5	8	27
Siltstone	1	0	3	1	2	7
Smoky Hills Jasper	10	0	2	1	10	23
Tiger-Eye Chert	0	0	1	0	0	1
Total	268	20	2067	425	3583	6363

Table 6.3: Summary Data for Debitage Type.

	Biface thin.	Bipolar	Complex	Shatter	Simple	Total
Total	268	20	2067	425	3583	6363
Large	45	15	1392	260	1869	3581
Small	223	5	675	165	1714	2782
Cortical	5	19	387	142	1054	1607
Noncortical	263	1	1680	283	2529	4756
Large/Cortical	2	14	335	115	774	1240
Small/Cortical	3	5	53	27	280	368
Large/Noncortical	43	1	1057	145	1095	2341
Small/Noncortical	220	0	622	138	1434	2414

Table 6.4: Summary Data for Material Group.

	Total	Large	Small	Cortical	Noncortical	Lrg/Cortical	Sml/Cortical	Lrg/Non	Sml/Non
Argillite	1188	660	528	265	932	197	68	463	460
Chalcedony	25	3	22	2	23	1	1	2	21
Chert	1493	1012	481	292	1201	172	120	308	893
Claystone	9	8	1	3	6	3	0	5	1
Diorite	2	1	1	1	1	1	0	0	1
Hornfels/Basalt	530	341	189	114	416	99	15	242	174
Limestone	3	0	3	0	3	0	0	0	3
Obsidian	40	11	29	7	33	2	5	9	24
Orthoquartzite	123	28	95	23	100	9	14	19	81
Quartz	2	2	0	1	1	1	0	1	0
Quartzite	2888	2019	869	880	2008	739	141	1280	728
Sandstone	11	8	3	1	10	1	0	7	3
Silicified Wood	42	14	28	5	37	5	0	9	28
Siltstone	7	6	1	2	5	2	0	4	1

Table 6.5: Summary Data for Non-local Materials.

	Total	Large	Small	Cortical	Noncortical	Lrg/Cortical	Sml/Cortical	Lrg/Non	Sml/Non
Alibates Dolomite	5	2	3	0	5	0	0	2	3
Black Forest Sil Wd	15	4	11	2	13	2	0	2	11
Hartville Uplift Chert	35	4	31	1	34	0	1	4	30
Obsidian	40	11	29	7	33	2	5	9	24
Smoky Hills Jasper	23	1	22	0	23	0	0	1	22
Tiger-Eye Chert	1	1	0	0	1	0	0	1	0

Complex flakes are freehand percussion, or occasionally, pressure flakes that lack the more specialized features of a bifacial-thinning flake, but which do clearly exhibit all or parts of three or more previous flake scars on the dorsal surface (Owens et al 2000:18-19). Again, small platform preparation flakes were not considered. Complex flakes may be recorded whether they do, or do not, retain the proximal end/platform. In the 2002 artifact assemblage, 2,067 items were classified as complex flakes. Quartzite (44%), chert (22%), and argillite (21%) were by far the dominant materials. Those remaining total 13% and include Alibates dolomite, baked clay, Black Forest silicified wood, Hartville Uplift chert, hornfels/basalt, Morrison chert, obsidian, orthoquartzite, Ralston Creek chert, sandstone, silicified wood, siltstone, Smoky Hills jasper, and Tiger-eye chert.

When the complex flakes are further scrutinized, 51% were large noncortical flakes, 30% were small noncortical flakes, 16% were large cortical flakes, and <3% were cortical small flakes. In this group these were 67% large flakes and 19% cortical flakes, so the chief reduction strategy was related to the hard-hammer percussion of large and noncortical pieces of lithic raw material. The presence of small noncortical flakes suggests some later-stage biface manufacturing activities. Nearly 2% of the complex flakes were made of non-local material – Alibates dolomite (2), Black Forest silicified wood (4), Hartville Uplift chert (4), obsidian (20), Smoky Hills jasper (2), and Tiger-eye chert (1). Of the complex flakes, 97 items were patinated and there were ten either colored or cracked by heat exposure.

Four hundred and twenty-five pieces of debitage were classified as shatter. Shatter is defined in Owens et al. (2000:18-19) as an angular piece of knappable stone that lacks features which allow determination of the dorsal or ventral surfaces or the direction of force application (i.e., it is not possible to identify a bulb of percussion or platform). Experimental studies indicate that hard-hammer cobble testing customarily generates shatter (Ahler and Christensen 1983:187). Therefore, a high proportion of shatter in the chipped-stone debitage assemblage is used as an indicator of cobble testing and early-stage lithic reduction.

The following material type distribution was observed in the shatter class—argillite (20%), baked clay (<1%), chalcedony (<1%), chert (40%), hornfels/basalt (15%), obsidian (<1%), orthoquartzite (<1%), quartz (<1%), quartzite (21%), silicified wood (1%), and siltstone (<1%). Non-local materials included Hartville Uplift chert (1), obsidian (2), and Smoky Hills jasper (1). These data indicate that some non-local materials were being brought to the PCMS as unfinished chunks or cobbles, not always in the form of a finished tool. Most of the shatter pieces were large (61%) and noncortical (67%). This indicates that specific outcrops for these materials were very close to the project survey areas. Eleven items show evidence for heat exposure and six items were patinated.

Bifacial-thinning flakes represent technologically specialized flakes removed from a biface during mid-to-late stages of thinning. Researchers identify bifacial-thinning flakes as having:

> A thin flattened transverse cross-section; a thin, curved longitudinal cross-section; very acute lateral and distal edge angles associated with feather terminations, including opposite that of the subject flake; a narrow, faceted and prepared platform representing a small segment of a prepared and dull bifacial tool edge; a lipped platform; little or no cortex on the dorsal flake face; an expanding flake shape; and a diminutive, flattened or subdued positive bulb of force. (Ahler and Christensen 1983:189)

The debitage assemblage contains 268 bifacial-thinning flakes and these were made from ten different materials including argillite (10%), Black Forest silicified wood (1%), chalcedony (1%), chert (58%), hornfels/basalt (6%), obsidian (2%), orthoquartzite (3%), quartzite (18%), silicified wood (<1%), and siltstone (<1%). Size and cortex data show that 82% of the bifacial-thinning flake assemblage was noncortical small flakes, 16% was noncortical large flakes, 1% was cortical large flakes, and 1% was cortical small flakes. The high proportion of noncortical small flakes suggests that most bifacial-thinning flakes were attributed to late-stage biface manufacturing or resharpening activities. With small amounts of cortex present on some specimens, early-stage biface manufacture was also evident. Because only 17% of the flakes were large, most bifaces manufactured on sites recorded during the 2002 project were presumably small to medium in size. Bifacial-thinning flakes include 25 pieces of non-local lithic material – three Black Forest silicified wood, seven Hartville Uplift chert, five obsidian, and ten Smoky Hills jasper. None of the bifacial-thinning flakes were thought to have been exposed to fire and only two pieces were recorded as patinated.

Twenty bipolar flakes were recorded during the 2002 survey project and include pieces of argillite (1), chert (18), and coarse-grained quartzite. According to Kooyman (2000:170), bipolar flakes result from a percussion blow on a worked piece of raw material that was placed on an anvil stone. The force of the blow is reflected back into the worked piece by the solid anvil resulting in shattered or crushed points of force application, dorsal and ventral faces that are difficult to determine, and flakes with angular, transverse cross-sections and a high frequency of pronounced ripple marks on flake surfaces.

6.3.3 Debitage Analysis Summary

During the 2002 fieldwork, an on-site analysis of all surface flaking debris was completed, or a 150-item sample was analyzed on large sites. On extremely large or artifactually dense sites, a 150-item sample was recorded, and additional samples of up to 50 items was taken from individual features in an attempt to determine feature or loci function. As has been discussed in Owens and Loendorf (2002:130) there appears to be some bias regarding this sampling strategy because small pieces of lithic debris have the possibility of being missed in the field. Though this is a very real problem, there are still some worthwhile points to be made regarding the information gleaned from the 2002 lithic debitage assemblage.

Raw material availability explains the dominance of quartzite and chert in the site assemblage. Both materials were found on erosional terraces, or exposed in the side walls of the many large and small canyons of the PCMS. The sites in, and near, TAs 3-6 have high proportions of argillite and basalt which outcrop in bed form along the Hogback. These materials were also abundant as cobbles or nodules in Van Bremer Arroyo. Both argillite and hornfels basalt are considered locally available materials on the PCMS, but some sites in TA 13 are 45 km away from the Hogback. In sum, the high proportion of locally available materials suggests the local lithic resources met the technological and quantitative needs of the prehistoric inhabitants of the PCMS. This use of materials was seen as an *embedded* tactic (Binford 1977, 1979; Binford and Stone 1985) which involves the collection of raw materials incidentally while everyday subsistence activities are occurring. Because very little time and energy was used to collect suitable lithic material, time could be spent on other activities.

In the overall debitage assemblage, non-local materials included obsidian from New Mexico and Idaho, Alibates dolomite, Black Forest silicified wood, Hartville Uplift chert, diorite, Smoky Hills jasper, and Tiger-eye chert. These items represent only 1.87% of the overall debitage assemblage. Though this is a very small percentage, some general comments can be made regarding material form and group mobility.

The non-local debitage items were 59 simple flakes, 25 bifacial-thinning flakes, 33 complex flakes, and 4 pieces of shatter. Three of the complex flakes, seven of the simple flakes, and a single piece of shatter show some degree of dorsal cortex; these materials were Black Forest silicified wood, Hartville Uplift chert, and obsidian. The presence of cortex, especially on specimens of obsidian and Black Forest silicified wood, indicated these materials were brought to the PCMS as unmodified cobbles or chunks. Non-local materials also entered the area as

large, unpatterned bifaces or prepared cores based on the flake tool types, but more on this later in the report.

What were the non-local materials being used for once they arrived in the area of the PCMS? From the debitage, it appears that formal tools, flake tools, and flake blanks were being produced. It is likely that tool resharpening produced some of the small bifacial-thinning flakes (24) and small complex flakes (20).

It is unknown at this time whether the procurement tactic for non-local materials involves seasonal movement or trade and exchange. Either way the transport routes appear to be aligned north-south. The latter notion corresponds well with the obsidian exchange information presented in Baugh and Nelson (1987). While analyzing obsidian specimens from Oklahoma and New Mexico, they were able to show that Jemez Mountain obsidians were a desired exchange item after AD 1450. If this is the case, the high proportion of Jemez obsidian in our debitage assemblage may provide some clue as to the relative age of some of the sites.

Simple and complex flakes dominate the debitage assemblage, although shatter, bifacial-thinning flakes, and even a few bipolar flakes were seen. Both expedient flake and biface technologies were methods of production used by the prehistoric inhabitants of the 2002 site areas. High percentages of simple flakes and the presence of abundant shatter is strong evidence for expedient core reduction and/or raw material procurement activities along the fringes of the Hogback and on the upper and lower terraces of the major canyons and drainages of the PCMS. This notion is supported by the fact that access to high quality lithic materials was good in these areas. There was also a strong emphasis on all stages of tool manufacturing (the production of retouched flakes, unifaces, bifaces, etc.) based on the high number of small, complex flakes and bifacial-thinning flakes.

6.4 Chipped-stone tools

This section of the report presents a description of the chipped-stone tools collected during the 2002 survey project. Cores and core-tools, items not collected for laboratory analysis, are also described in this section. A total of 892 chipped-stone tools were analyzed during our work including projectile points, drills, scrapers, large bifaces, cores and core-tools, and expedient flake tools. A descriptive summary of our analysis techniques, as well as observations regarding the patterns observed in the assemblage, is included in the chapter.

6.4.1 Stone Tool Analysis Procedures

The collected tools were subjected to an analysis that followed the format described in Owens et al. (2000:19-20). In the field, all artifacts were recorded as one of three size grades – large, medium, or small. Sizes were determined by using hand held wire mesh screens with ½ in and 1 in openings. Large stone tools did not pass in any orientation through 1 sq in openings (diagonal of 1.41 in), medium tools did pass through the 1 in opening, but not ½ sq in opening (diagonal of 0.71 in), and small tools passed through both the 1 and ½ in openings.

In addition to the size information, material types were coded using the same format as the debitage. The presence or absence of cortex was also a variable recorded in the field.

During the field analysis, chipped stone tools were classified as one of eight categories; only the first five collected and subsequently analyzed in greater detail in the laboratory. The categories are as follows: small thin patterned biface (arrow point or knife), large thin patterned biface (dart point or knife), other unfinished biface, patterned flake tool, retouched/utilized flake, large crude bifacial core/tool, non-bipolar core, and bipolar core.

Small thin patterned bifaces (Category 1) have been heavily shaped by intentional secondary flaking (i.e., patterned), are small and thin in size and form (i.e., arrow point size), and exhibit only pressure flaking. This type includes both technologically finished and unfinished forms so both preforms and completed projectiles were included in this category (Owens et al. 2000:20).

Large thin patterned bifaces (Category 2) are defined as bifaces heavily shaped by intentional secondary flaking (i.e., patterned), are medium to large in size and form (i.e., dart point size), and shaped by pressure flaking and/or percussion techniques with highly regularized bifacial margins (Owens et al. 2000:20). This type also included both technologically finished and unfinished forms (i.e., both preforms and completed projectiles).

Other large patterned bifaces (Category 3, sometimes unfinished bifaces) included any other large biface that lacked hafting elements. Some of these have been used as handheld cutting implements; however, macroscopic evidence of use-wear is not necessary for incorporation in this classification. These items may be either technologically finished or unfinished (Owens et al. 2000:20).

Patterned flake tools (Category 4) are defined as flake tools with secondary flakes removed to produce a form or outline intended by the knapper (e.g., scraping tool or perforator) (Owens et al. 2000.20). This category was further divided into several types during ensuing laboratory analysis, including end scraper, side scraper, or drill.

Other retouched and/or utilized flakes (Category 5) consisted of unpatterned flake tools with one or more edges macroscopically modified by intentional retouch and/or heavy utilization wear (Owens et al. 2000:20). The outline, in planview, of these tools was largely a product of flake blank shape rather than intentional retouch. In our analysis, flakes with unpatterned retouch and utilized pieces were included in a single all encompassing category as it is often difficult to recognize differences between them. There are two reasons for this. First, retouch and use both involve the purposeful application of force to the artifact margin. In the case of a retouched artifact, it is held stationary and force is applied by another implement. During utilization an artifact is pressured against a stationary object. The point to be made is that for both of the above instances, the two processes often produce macroscopically identical results. Second, most retouched artifacts were also utilized, making it functionally awkward to completely separate these categories.

Large crude bifacial core/tools consist of thick cores modified by bifacially directed percussion flaking, this results in a sinuous or irregular edge. These artifacts may or may not exhibit macroscopic evidence for use-wear (i.e. ring fractures or micro step-flake scars). This category includes cores or early-stage bifacially-reduced artifacts used as tools (Owens et al. 2000:20-21).

Non-bipolar cores consist of any core or core-like tool produced by freehand, or non-bipolar percussion flaking. Non-bipolar cores are any piece of lithic material from which another piece of lithic material has been detached for the purpose of use as a tool or to manufacture into a tool (Kooyman 2000:170). Bipolar cores were pieces of raw material fashioned by application of opposing forces. Areas of force application appear shattered or crushed, rings of force remain plainly visible on both ends.

Further laboratory analysis (at Red Rock ranch and NMSU) was completed for stone tool Categories 1 through 5, which were collected, and this information is presented below. These artifacts were collected because their greater degree of culturally-induced patterning allows the use of more meaningful analytical procedures (i.e., chronological age estimates can be researched in the case of projectile points, and true functional determinations made through use wear analysis). Metric attributes for recording these tools can be found in Dean (1992).

6.4.2 Patterned Tool Analysis Results

The patterned tool assemblage, for the moment not counting the projectile points, included 555 artifacts. This section of the report provides more information regarding these tools, in a way consistent with other recent artifact analysis projects performed on the PCMS (Owens and Loendorf 2002; Owens and Loendorf 2004; Owens et al. 2000; Schiavitti et al. 2001). For the past several years, Mark Owens of NMSU has performed the laboratory lithic analysis for all PCMS projects. This has allowed NMSU to avoid inter-observer error, and reduce the overall subjectivity of the analyses. The collected tools were of nine formal types – biface, drill, end scraper, end/side scraper, graver, spokeshave, side scraper, uniface, and retouched/utilized flake.

Table 6.6 presents a cross-tabulation of formal tool type and material type. Argillite (29%), fine-grained quartzite (23%), chert (16%), orthoquartzite (6%), hornfels/basalt (5%), and coarse-grained quartzite (5%) were the most common materials encountered in the assemblage. Found in smaller percentages, but totaling the remaining 16%, were Alibates dolomite, baked clay, Black Forest silicified wood, chalcedony, clastic chert, glass, Hartville Uplift chert, Morrison chert, Niobrara jasper, obsidian, oolitic chert, Ralston Creek chert, silicified wood, siltstone, and Tiger-eye chert. Most of the materials were from PCMS sources (91%), but a large number of pieces (9%) were of distinct non-local varieties. Raw materials were 59% microcrystalline, 31% cryptocrystalline, and 10% were macrocrystalline.

Table 6.6: Patterned Tool Class by Material Type.

Material	Tool Class									
	Biface	Drill	End Scraper	End/Side Scraper	Graver	Side Scraper	Spokeshave	Uniface	Util/Ret Flake	Total
Alibates Dolomite	2	1	0	0	0	1	0	0	5	9
Argillite	23	0	2	2	1	4	0	2	126	160
Baked Clay	0	0	0	0	0	0	0	1	3	4
Black Forest Sil Wd	1	0	0	2	0	2	0	0	4	9
Chalcedony	0	0	0	0	0	0	0	0	2	2
Unspecified Chert	38	1	4	6	0	4	1	1	36	91
Clastic Chert	1	0	0	2	0	0	0	0	1	4
Coarse Quartzite	8	0	0	1	0	1	0	1	17	28
Fine Quartzite	42	2	2	2	1	7	0	3	70	129
Glass	0	0	0	0	0	0	0	0	6	6
Hartville Uplift Chert	2	0	0	6	0	1	0	0	3	12
Hornfels/ Basalt	9	0	0	0	0	1	0	1	18	29
Morrison Chert	0	0	0	0	0	0	0	0	2	2
Niobrara Jasper	0	0	0	2	0	0	0	0	3	5
Obsidian	0	0	0	1	0	0	0	0	11	12
Oolitic Chert	1	0	0	0	0	0	0	0	0	1
Orthoquartzite	7	0	2	1	0	2	0	0	20	32
Ralston Creek Chert	3	1	0	1	0	0	0	1	8	14
Silicified Wood	1	0	0	0	0	0	0	0	2	3
Siltstone	1	0	0	0	0	0	0	0	1	2
Tiger-Eye Chert	0	0	0	0	0	0	0	0	1	1
Total	139	5	10	26	2	23	1	10	339	555

Bifaces (Figures 6.1 and 6.2) are artifacts with generally shallow angle retouch on both faces and one or more margins (Owens et al. 2000:244). Unfortunately this brief definition also holds true for projectile point preforms, a class of artifact detailed elsewhere in the report. The biface tools described here are disassociated from projectile point preforms on the basis of size, use wear pattern, or reduction stage (finished, unfinished, or nearly finished tools).

A total of 139 biface tools were subjected to laboratory analysis. Of these, most (96, 69%) were classified as unfinished. Among the finished (23, 17%) and nearly finished (20, 14%) bifaces, 21 specimens exhibited macroscopically observable use wear. Sixteen had an edge angle of less than 45°, indicative of cutting use, while the other five had angles of >45°, these seem to have been used for scraping. Most (103) of the bifaces were broken. Among the complete biface tools, length ranges from 21 to 94 mm (average 56.29 mm), width from 14 to 69 mm (average 34.72), thickness from 3 to 31 mm (average 10.17), and the weight 3 to 124 g (average 16.14 g) (Table 6.7). The majority of the bifaces were fine-grained quartzite (42, 30%), chert (40, 29%), and argillite (23, 17%); smaller amounts of Alibates dolomite (1%), Black Forest silicified wood (<1%), coarse-grained quartzite (6%), Hartville Uplift chert (1%), hornfels/basalt (6%), orthoquartzite (5%), Ralston Creek chert (2%), unspecified silicified wood

(<1%), and siltstone (<1%) were recorded. These materials were 53% microcrystalline, 35% cryptocrystalline, and 12 % macrocrystalline.

Drills (Figure 6.3) are defined as flakes with steep angle retouch on opposing margins forming a narrow neck (Owens et al 2000:244). These tools are used in rotary fashion to create a hole in a worked material (Kooyman 2000:171). Only five drills were identified in the 2002 assemblage; these were two microcrystalline pieces and three cryptocrystalline pieces. Four of the five drills were made of locally available material (chert 2, quartzite 2); the non-local item identified as Alibates dolomite. The direction of primary rotation was able to be identified in four drills, but in one highly weathered specimen the rotation direction could not be determined. In three cases rotation was counter clockwise when viewed from the tip down, while the remaining piece shows counterclockwise rotation. Two of the drills were complete; the broken pieces were bit fragments only.

End scrapers (Figure 6.4) are defined as tools with steep angle retouch on the proximal or distal end of the flake blank it was produced on (Owens et al 2002:242). These tools were commonly made on a rather thick flake or piece of shatter that was attached to a handle, then used for a scraping activity like removing flesh from an animal hide. Ten end scrapers were recorded on 2002 field season sites and included four material types – chert (4), argillite (2), fine-grained quartzite (2), and orthoquartzite (2). As has been observed in other PCMS end scraper assemblages (Owens and Loendorf 2002:135; Owens and Loendorf 2005:577), there were more microcrystalline materials than either cryptocrystalline or macrocrystalline. End scraper length ranged from 16 to 38 mm (average 28.20 mm), widths from 18 to 47 mm (average 31.57 mm), and thickness from 4 to 18 mm (average 9.30 mm). Data shows a minimum weight of .8 g, a maximum weight of 34.3 g, and an average weight of 9.26 g (Table 6.8).

End/side scrapers (Figures 6.4 and 6.5) are artifacts with steep angle retouch on the distal and lateral flake margins (Owens et al. 2000:244). A total of 26 items were classified as end/side scrapers. Unlike the end scrapers, most end/side scrapers were made of cryptocrystalline materials, and many of these were of non-local origin. Unspecified chert (23%) and Hartville Uplift chert (23%) were the dominant materials, though specimens of argillite (8%), Black Forest silicified wood (8%), clastic chert (8%), coarse-grained quartzite (4%), fine-grained quartzite (8%), Niobrara jasper (8%), obsidian (4%), orthoquartzite (4%), and Ralston Creek chert (4%) were also noted. Seventeen end/side scrapers were complete and nine broken. These tools range from 19 to 78 mm in length (average 44.88 mm), 14 to 48 mm in width (average 31.75 mm), and 4 to 21 mm in thickness (average 12.07 mm). Weight varied from 0.9 to 75.7 g with an average of 18.71 g. Table 6.9 shows the metric data for the end/side scrapers.

Graving tools have one or more pointed projections used to incise a worked material (Kooyman 2000:173). Two gravers were identified in the 2002 patterned tool assemblage. The first is the distal and medial portion of an argillite flake with a single lateral spur. The other is a fine-grained quartzite flake with a distal lateral spur (Figure 6.7).

Side scrapers (Figure 6.6) are tools with steep angle retouch on one or more lateral margins (Owens et al. 2000:244). These artifacts may have been used in a hand held fashion or hafted and used for scraping activities. Side scrapers occurred at almost the same incidence as

end scrapers, but these artifacts may have been used for a greater variety of tasks. There were four tools made from non-local material: one each of Alibates dolomite and Hartville Uplift chert, and two of Black Forest silicified wood. Those remaining side scrapers were quartzite (8), argillite (4), chert (4), hornfels/basalt (1), and orthoquartzite (2). Fourteen side scrapers were broken in some way. Of those complete, length ranges from 16 to 124 mm (average 62.18 mm), width 11 to 61 mm (average 37.87 mm), and thickness 4 to 41 mm (average 11.86 mm). Weight varies from 0.5 to 107.1 g with an average of 27.11 g (Table 6.10).

Table 6.7: Summary Metric Data for Complete Biface Tools.

Bifaces						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	37	21	94	56.29	18.46	341.10
Width	70	14	69	34.72	12.17	148.20
Thickness	125	3	31	10.17	5.27	27.83
Weight	139	0.3	124	16.14	22.18	492.13

Table 6.8: Summary Metric Data for Complete End Scrapers.

End Scrapers						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	5	16	38	28.20	8.13	66.20
Width	7	18	47	31.57	11.87	140.95
Thickness	10	4	18	9.30	4.83	23.78
Weight	10	0.8	34.3	9.26	10.61	112.76

Table 6.9: Summary Metric Data for End/Side Scrapers.

End/Side Scrapers						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	17	19	78	44.88	15.68	246.11
Width	24	14	48	31.75	9.70	94.28
Thickness	26	4	21	12.07	4.61	21.27
Weight	26	0.9	75.7	18.71	16.78	281.74

Table 6.10: Summary Metric Data for Side Scrapers.

Side Scrapers						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	11	16	124	62.18	29.76	866.16
Width	16	11	61	37.87	13.54	183.58
Thickness	23	4	41	11.86	8.40	70.57
Weight	23	0.5	107.1	27.11	29.35	861.55

Table 6.11: Summary Metric Data for Complete Uniface Tools.

Uniface Tools						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	7	23	84	51.00	23.43	549.33
Width	8	28	76	48.25	17.55	308.21
Thickness	10	6	27	14.00	6.79	46.22
Weight	10	2.7	125.8	38.28	39.84	1587.33

Table 6.12: Summary Metric Data for Complete Utilized Flakes.

Utilized/Retouched Flakes						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	169	13	99	37.89	16.37	268.23
Width	272	11	83	30.68	14.01	196.40
Thickness	338	2	32	8.81	4.65	21.67
Weight	338	0.2	127.3	13.37	19.83	393.59

Unifaces are defined as tools with shallow angle retouch on one face and/or one or more margins, but only one face per margin (Owens et al. 2000:244). It should be noted that some early-stage projectile point preforms are often difficult to distinguish from unifaces. In this analysis, flakes that lacked invasive retouch and exhibited use-wear were classified as unifaces. Ten of these tools were recorded in the assemblage. These artifacts were made from a wide variety of materials suggesting that they were employed for many different tasks. A selection preference is seen for microcrystalline materials (7, 70%); crptocrystalline (2, 20%), and macrocrystalline (1, 10%) materials were also used. Table 6.11 shows the metric data for the uniface tools. All unifaces were used all used for steep angle work like scraping. Two of these tools were freshly resharpenned with no apparent wear.

A total of 339 utilized flakes were recorded in the tool assemblage. Utilized flakes are defined as flakes that lacked patterned flake removal, but exhibit macroscopically visible use-wear (Figure 6.7). Most (255, 75%) utilized flakes were made from the coarser-grained materials. It is unknown whether the preference for microcrystalline materials is the product of raw material availability or the higher fracture toughness of the material. Based on edge angle assessment, most (92%) utilized flakes were used for an activity where a steep edge angle was beneficial (e.g., scraping), while the remainder exhibited acute edges with longitudinal wear (8%). In the complete utilized flakes, the mean length is 37.9 mm, width 30.7 mm and weight 13.4 g (Table 6.12).

6.4.2.1 Projectile Points

A total of 98 projectile points were collected during the 2002 field investigations. This section provides a descriptive summary of these artifacts. When possible, projectile points were categorized according to the system developed by Anderson (1989:111-315) for PCMS projectile points. For points that did not morphologically fit within the Anderson system, other sources were consulted. The primary division within this system is between large (43) and small (55)

projectile points. The larger styles are thought to generally be atlatl dart points or thrusting spear points, whereas the small point styles probably includes more recent arrow points.

Projectile point preforms comprise a small proportion of the overall point assemblage (20%). Preforms were classified as either early stage or nearly completed. It is often difficult to distinguish early stage preforms from a variety of different artifact types including unifaces and bifacial knives. Relatively flat artifacts with shallow angle retouch that lacked usewear were classified as early-stage preforms. Early-stage and nearly-completed preforms were not noted in the large point assemblage. This may be a result of a tendency to misclassify these artifacts as bifacial knives.

Projectile points were made from a variety of different raw materials, but fine-grained materials were more commonly used. Material types varied substantially for large and small points (Table 6.13). Cryptocrystalline materials (chert and silicified wood for example) that are more brittle and consequently easier to retouch were used more frequently used for small points, whereas materials with higher fracture toughness like orthoquartzite and quartzite are more often used in the manufacture of large points

Table 6.13: Material Type by Projectile Point Size.

	Projectile Point Size					
Material	Small Point	Percent	Large Point	Percent	Total	Percent
Alibates	0	0.0%	1	1.0%	1	1.0%
Argillite	4	4.1%	6	6.1%	10	10.2%
Black Forest	4	4.1%	1	1.0%	5	5.1%
Chalcedony	0	0.0%	1	1.0%	1	1.0%
Chert	30	30.6%	15	15.3%	45	45.9%
Fine Quartzite	5	5.1%	8	8.2%	13	13.3%
Hornfels/Basalt	1	1.0%	1	1.0%	2	2.0%
Obsidian	1	1.0%	3	3.1%	4	4.1%
Orthoquartzite	5	5.1%	6	6.1%	11	11.2%
Quartz	1	1.0%	0	0.0%	1	1.0%
Ralston Creek	1	1.0%	0	0.0%	1	1.0%
Silicified Wood	3	3.1%	1	1.0%	4	4.1%
Total	55	56.1%	43	43.9%	98	100.00%

6.4.2.2 Diagnostic Projectile Points

This section summarizes the metric attribute and shape characteristics for points classifiable within the Anderson (1989) system. Sixty-four specimens were assigned to a type, while 34 were too fragmentary for analysts to type.

The following sections describe the projectile point classes in the Anderson system, and each of the different categories that are represented in the BRAC survey artifact assemblage. In order to facilitate comparisons with previous analyses (Loendorf and Loendorf 1999; Owens et al. 2000; Schiavitti et al. 2001; Owens et al. 2002), data are presented here in much the same format employed by Anderson (1989), with project specific modifications added where needed.

6.4.2.2.1 Large Unstemmed Point Class

This class consists of large Paleoindian lanceolate projectile points that lack shoulders and stems. This class of points is relatively rare in PCMS assemblages (Owens et al. 2000:248 and Owens and Loendorf 2002:138) and it accounts for only 6.12% of the projectile point assemblage. A total of six artifacts (representing two types) were classified as large unstemmed points.

CATEGORY P1 (Figure 6.8)

Number of Artifacts: 3
Catalogue Number: 5LA4751 FS200, 5LA9957 FS1, 5LA9959 FS1

Description: These points have all broken; only the medial portion containing the blade and base remains. They exhibit bi-convex cross-sections, sloping shoulders, pointed tangs, and notched or concave bases. All exhibit some degree of basal grinding. Anderson (1989:116) places Plainview, Allen, Fredrick, and other Paleoindian lanceolate points within this category and suggests an age range between 8500 BC and 5900 BC for P1 points. Hofman (personal communications, 2001) identifies one of the specimens as a Jimmy Allen. The other two items were thought to represent Plainview points.

Metric Attributes:

Length:	----
Width:	21.2 mm, n=1
Greatest Thickness:	4.5 – 5.5 mm, mean=5 mm, n=2
Blade Length:	----
Blade Width:	21.2 mm, n=1
Haft Width:	4.1 – 4.9 mm, mean 4.4 mm, n=3
Base Thickness:	20.8 – 21.1 mm, mean 20.93 mm, n=3

Material Types: Argillite (33.33%), Chert (33.33%), Orthoquartzite (33.33%)

CATEGORY P2 (Figure 6.8)

Number of Artifacts: 3
Catalogue Numbers: 5LA10075 FS2, 5LA10096 FS1, 5LA10100 FS230

Description: Two points were nearly complete, the other was a basal fragment. They have bi-convex to diamond-shaped cross-sections, the lower third of the points were contracting, and their bases were straight. Anderson (1989:117) indicates there is some difficulty in assigning an accurate date range for P2 points, but in the case of the 2002 project, all points were distinctly of the Hell Gap variety. Artifacts from the Hell Gap complex have been dated from 10,000 to 9,500 radiocarbon years ago (Frison 1974, 1978). All points were made of locally available quartzite, so they likely were manufactured in the area of the PCMS.

Metric Attributes:

Length:	38.7 mm and 56.2 mm, mean=50.30 mm, n=3
Width:	19.8 mm and 26.8 mm, mean=24.20 mm, n=3
Greatest Thickness:	6.7 mm and 9.0 mm, mean=8.20 mm, n=3
Blade Length:	23.4 and 28.1 mm, mean=25.75 mm, n=2
Blade Width:	19.8 mm and 26.8 mm, mean=23.3 mm, n=2
Haft Width:	5.9 and 7.7 mm, mean=6.8 mm, n=3
Base Width:	12.3 and 17.3 mm, mean=16 mm, n=1

Material Types: Fine-grained Quartzite (3)

6.4.2.2.2 Large Straight Stemmed Point Class

This class includes only two items and both were of the same category. This class has always been one of the rarest on the PCMS (Anderson 1989:120-124; Owens and Loendorf 2002:141; Owens et al. 2000:250), and constituted only 2.04% of the classifiable projectile points encountered during the 2002 survey project. Projectile points in this class appear to have been in use from the Middle Archaic period through the beginning of the Late Archaic period (4000 BC to 1000 BC) according to Anderson (1989:124).

CATEGORY P9 (Figure 6.14)

Number of Artifacts: 2
Catalogue Numbers: 5LA10005 FS2, 5LA10065 FS3

Description: These thick, but narrow-bladed points include one complete and one nearly complete specimen. According to Anderson (1989:123-124) points of this class have sharp to very sharp tips, straight blade edges, rounded shoulders, long, straight to very slightly expanding stems, rounded tangs, and convex bases. The flaking is typically crude. For the most part, the 2002 points meet these criteria, though there seems much variability in the overall class. Despite this stylistic variability, Anderson (1989:124) estimates a rather narrow age range for this category (3300 to 2800 BC), though she admits more analysis is required for an accurate age assessment.

Metric Attributes:

Length:	29.8 mm, n=1
Width:	14.2 mm and 19.2 mm, mean=16.7 mm, n=2
Greatest Thickness:	5.6 mm and 6.2 mm, mean=5.9 mm, n=2
Blade Length:	21.9 mm, n=1
Blade Width:	14.2 and 19.2 mm, mean=16.7 mm, n=2
Haft Width:	4.9 and 5.6 mm, mean=5.25, n=2
Base Width:	10.8 and 11.8 mm, mean=11.30 mm, n=2

Material Types: Chalcedony (50%), Fine-grained Quartzite (50%)

6.4.2.2.3 Large Expanding Stem Point Class

This rather common point class included 15 projectile points from 10 categories. These artifacts constituted 15.33% of the classifiable projectile points recovered during our 2002 fieldwork. Projectile points in this class appear to have been manufactured over a long time span, beginning as early as 5500 BC and ending as late as AD 1600 (Anderson 1989:163-164).

CATEGORY P10 (Figure 6.9)

Number of Artifacts: 1
Catalogue Numbers: 5LA10008 FS1

Description: Like the Category P10 points described by Anderson (1989:124), this point had a dull tip, slightly convex blade edges, bi-convex cross-section, rounded shoulders, broad and shallow side-notches, an expanding stem, and convex base. Points of this style are thought to have been made around 5500 BC to 3000 BC (Anderson 1989:125).

Metric Attributes:

Length:	27.8 mm
Width:	22.7 mm
Greatest Thickness:	8.1
Blade Length:	16.1 mm
Blade Width:	22.7 mm
Haft Width:	6.4 mm
Base Width:	20.6 mm

Material Type: Argillite

CATEGORY P19 (Figure 6.9)

Number of Artifacts: 2
Catalogue Numbers: 5LA10100 FS158, 5LA10132 FS21

Description: These were medial portions of two large projectile points. They exhibit bi-convex cross-sections, slightly concave to convex blade edges, and barbed shoulders. Points of this class (Anderson 1989:134) also have expanding stems, and a convex base, but these elements were missing from the 2002 specimens. Thick points such as these were in use between 2000 BC and AD 1000.

Metric Attributes:

Length:	----
Width:	----
Greatest Thickness:	4.2 mm and 5.2 mm, mean=4.65, n=2
Blade Length:	----
Blade Width:	----

Haft Width:	2.7 mm, n=1
Base Width:	----

Material Types: Black Forest silicified wood (50%), Unspecified silicified wood (50%)

CATEGORY P21 (Figure 6.9)

Number of Artifacts: 1
Catalogue Numbers: 5LA10017 FS2

Description: This large specimen was thin, with sharp tip, broad blade, convex blade edges, weakly barbed shoulders, pointed barbs, an expanding stem, pointed tangs, and straight base. It was a highly patinated point that appears to have been broken, then re-worked by pressure flaking to its present form. Points from this category are thought to date between 1000 BC and AD 500/1000 (Anderson 1989:143).

Metric Attributes:

Length:	32.3 mm
Width:	23.4 mm
Greatest Thickness:	7.2 mm
Blade Length:	21.6 mm
Blade Width:	23.4 mm
Haft Width:	5.4 mm
Base Width:	17.3 mm

Material Type: Argillite

CATEGORY P22 (Figure 6.9)

Number of Artifacts: 1
Catalogue Numbers: 5LA9934 FS2

Description: Only the tip was missing from this large projectile point. It exhibited a bi-convex cross-section, straight blade edges, weakly barbed shoulders, an expanding stem, rounded tangs, and concave base. It shows a red cast from heat exposure and the base and notches exhibit heavy grinding. Points of this type have been cautiously dated to the time between 1500 BC and AD 500 (Anderson 1989:140).

Metric Attributes:

Length:	----
Width:	----
Greatest Thickness:	6.9 mm
Blade Length:	----
Blade Width:	----
Haft Width:	5.5 mm
Base Width:	18.8 mm

Material Type: Chert

CATEGORY P26 (Figures 6.3)

Number of Artifacts: 1
Catalogue Numbers: 5LA3551 FS3

Description: Though its tip and one barb were missing, the point remains a good example of P26. It had a bi-convex cross-section, straight blade edges, weakly barbed shoulders, an expanding base, pointed tangs, and convex base. Anderson (1989:142-143) seems to have made this category a "catch all" for large corner-notched projectile points, thus they exhibit a relatively wide date range (1000 BC to AD 500, possibly as late as AD 1400).

Metric Attributes:

Length:	----
Width:	21.8 mm
Greatest Thickness:	4.9 mm
Blade Length:	----
Blade Width:	21.8 mm
Haft Width:	4.3 mm
Base Width:	15.5 mm

Material Type: Chert

CATEGORY P29 (Figure 6.10)

Number of Artifacts: 1
Catalogue Numbers: 5LA10029 FS1

Description: Points of this category are asymmetrical in outline and have been reworked to function differently than a projectile point. The 5LA10029 specimen was broken, then resharpened to create a hafted knife. Its tip has broken, and the tool exhibits straight asymmetrical blade edges, weakly barbed shoulders, an expanding stem, rounded tangs, and concave base. Red color change and glossy sheen indicate the point spent time in a hot fire. Anderson (1989:146) suggests points of this category were made between 500 BC and AD 600, but the reworked nature of the artifacts makes the assignment of temporal affiliation impractical.

Metric Attributes;

Length:	----
Width:	21.1 mm
Greatest Thickness:	5.4 mm
Blade Length:	----
Blade Width:	20.0 mm
Haft Width:	4.7 mm
Base Width:	20.3 mm

Material Type: Chert

CATEGORY P30 (Figure 6.10)

Number of Artifacts: 1
Catalogue Numbers: 5LA10058 FS2

Description: Though much smaller than most projectiles assigned to the category, this specimen is stylistically the same. Its tangs are broken and the blade has a lateral break across its medial ridgeline. Otherwise, it exhibits a bi-convex cross-section, straight blade edges, weakly barbed shoulders, an expanding stem, and straight base. This category has been suggested to date between 1000 BC and AD 1000 (Anderson 1989:148).

Metric Attributes:

Length:	----
Width:	21.8 mm
Greatest Thickness:	4.9 mm
Blade Length:	----
Blade Width:	21.8 mm
Haft Width:	3.9 mm
Base Width:	----

Material Type: Chert

CATEGORY P32 (Figure 6.9)

Number of Artifacts: 1
Catalogue Numbers: 5LA10010 FS1

Description: Though only the base and lower blade remain, the specimen was found to correlate nicely with P32. It had a weakly barbed shoulder, slightly expanding stem, rounded tangs, and a narrow straight base. This category is suggested to date between 500 BC and AD 1000 (Anderson 1989:152).

Metric Attributes:

Length:	----
Width:	----
Greatest Thickness:	----
Blade Length:	----
Blade Width:	----
Haft Width:	3.7 mm
Base Width:	10.3 mm

Material Type: Chert

CATEGORY P35 (Figure 6.10)

Number of Artifacts: 5
Catalogue Numbers: 5LA3551 FS1, 5LA9952 FS2, 5LA10000 FS69, 5LA10100 FS157, 5LA10137 FS37

Description: This point category has an extreme range of variation in regard to its morphological attributes. According to Anderson (1989:153-155), P35 points have sharp to very sharp tips, broad triangular blades, straight to convex to I-E recurved blade edges, abrupt to weakly barbed shoulders, broad expanding stems, rounded to pointed tangs, and straight to slightly convex bases. Anderson suggests these points date between 1000 BC and AD 1200.

Metric Attributes:

Length:	15.1 – 24.6 mm, mean=19.95 mm, n=4
Width:	16.1 – 19.8 mm, mean=18.00 mm, n=4
Greatest Thickness:	3.9 – 5.9 mm, mean=4.86, n=5
Blade Length:	9.2 – 18.1 mm, mean=13.5 mm, n=4
Blade Width:	16.1 – 19.8 mm, mean=18.53 mm, n=3
Haft Width:	3.7 – 4.4 mm, mean 4.15 mm, n=4
Base Width:	11.8 mm, n=1

Material Types: Argillite (40%), Fine-grained Quartzite (20%), Orthoquartzite (40%)

CATEGORY P41 (Figure 6.10)

Number of Artifacts: 1
Catalogue Numbers: 5LA3521 FS3

Description: This large point was formed by unifacial flaking and its edges exhibit serration. It has a dull tip, plano-convex cross-section, straight blade edges, barbed shoulders, an expanding stem, pointed tangs, and convex base. Anderson (1989:160) presents an age estimate of AD 600 to AD 1200 for points assigned to this category.

Metric Attributes:

Length:	30.1 mm
Width:	18.2 mm
Greatest Thickness:	3.8 mm
Blade Length:	24.5 mm
Blade Width:	18.2 mm
Haft Width:	2.87 mm
Base Width:	----

Material Type: Chert

6.4.2.2.4 Large Contracting Stem Point Class

Only a single 2002 projectile point was assigned to this class. The relative scarcity of this point class in PCMS assemblages has been well documented (Anderson 1989:166; Owens and Loendorf 2002:149). It likely results from a selection preference for notched points; these better for secure hafting. Contracting stem points were apparently in use between 3,000 BC and AD 500 (Anderson 1989:166).

CATEGORY P43 (Figure 6.11)

Number of Artifacts: 1
Catalogue Numbers: 5LA9965 FS12

Description: This large point lacked its tip and a shoulder. It had a bi-convex cross-section, incurvate blade edges, abrupt shoulders, a contracting stem, rounded tangs, and convex base. Anderson (1989:164-165) suggests an age estimate of 3000 BC to 500 BC for this point category.

Metric Attributes:

Length:	----
Width:	----
Greatest Thickness:	5.8 mm
Blade Length:	----
Blade Width:	----
Haft Width:	4.8 mm
Base Width:	9.1 mm

Material Type: Orthoquartzite

6.4.2.2.5 Small Unstemmed Point Class

A total of 19 items were assigned to this class which comprises 19.39% of the classifiable projectile point assemblage. These were small unfinished projectile point performs, presumably discarded or lost prior to final notching. It is realistic to assume some of these artifacts were used to tip projectiles "as is," though most were medially thicker on average than other small point styles and frequently had large step fractures or other naturally occurring defects that prevented additional thinning.

CATEGORY P48 (Figure 6.11)

Number of Artifacts: 5
Catalogue Numbers: 5LA3551 FS14, 5LA9973 FS1, 5LA10000 FS112, 5LA10100 FS119, 5LA10135 FS6

Description: According to Anderson (1989:170-171), these triangular preforms were manufactured between AD 1000 and 1400. Morphologically, they exhibit sharp to very sharp tips, straight to convex blade edges, rounded to pointed tangs, and convex bases.

Metric Attributes	
Length:	15.7 mm – 22.6 mm, mean=20.26 mm, n=3
Width:	13.1 mm – 13.2 mm, mean=13.15 mm, n=2
Greatest Thickness:	3.1 – 5.6 mm, mean=3.88 mm, n=5
Blade Length:	----
Blade Width:	----
Haft Width:	----
Base Width:	----

Material Types: Argillite (20%), Chert (40%), Orthoquartzite (40%)

CATEGORY P49 (Figure 6.11)

Number of Artifacts: 8
Catalogue Numbers: 5LA3521 FS23, 5LA9949 FS2, 5LA9990 FS1, 5LA10100 FS81, 5LA10100 FS141, 5LA10100 FS180, 5LA10132 FS1, 5LA10137 FS14

Description: This is one of the most common artifact categories in the entire assemblage. These unnotched preforms have dull or sharp tips, bi-convex or plano-convex cross-sections, convex blade edges, rounded tangs, and bases either straight or convex. Anderson (1989:173-175) suggests small preforms like these were in use between AD 800 and AD 1750. They may date as early as 200 BC, however.

Metric Attributes:	
Length:	18.2 mm – 21.6 mm, mean 19.90 mm, n=2
Width:	13.4 mm – 17.3 mm, mean=15.14 mm, n=8
Greatest Thickness:	3.3 – 6.1 mm, mean=4.53 mm, n=8
Blade Length:	----
Blade Width:	----
Haft Width:	----
Base Width:	----

Material Types: Argillite (12.5%), Chert (25%), Fine-grained Quartzite (25%), Orthoquartzite (12.5%), Ralston Creek chert (12.5%), Unspecified Silicified Wood (12.5%)

CATEGORY P50 (Figure 6.12)

Number of Artifacts: 4
Catalogue Numbers: 5LA9960 FS5, 5LA10093 FS16, 5LA10100 FS218, 5LA10100 FS251

Description: These small unstemmed point preforms show sharp to very sharp tips, bi-convex or plano-convex cross-sections, convex or straight blade edges, pointed or rounded tangs, and

straight bases. Anderson (1989:175-176) suggests performs of this category were made between AD 1000 and 1750.

Metric Attributes:

Length:	14.7 mm, n=1
Width:	10.3 mm – 15.4 mm, mean=12.4 mm, n=4
Greatest Thickness:	3.2 – 4.35 mm, mean=3.85 mm, n=4
Blade Length:	----
Blade Width:	----
Haft Width:	----
Base Width:	----

Material Types: Black Forest silicified wood (25%), Chert (50%), Unspecified silicified wood (25%)

CATEGORY P51

Number of Artifacts: 2
Catalogue Numbers: 5LA3551 FS16, 5LA10100 FS203

Description: These small unstemmed point preforms have sharp tips, bi-convex cross-sections, E-I recurved blade edges, rounded or pointed tangs, and concave or notched bases. Anderson (1989:177) indicates preforms of this category were made between AD 1200 and 1750.

Metric Attributes:

Length:	18.6 mm, n=1
Width:	12.2 mm and 15.8 mm, mean=14.00 mm, n=2
Greatest Thickness:	2.9 mm and 4.5 mm, mean=3.7 mm, n=2
Blade Length:	----
Blade Width:	----
Haft Width:	----
Base Width:	----

Material Types: Black Forest silicified wood (50%), Fine-grained Quartzite (50%)

6.4.2.2.6 Small Straight Stemmed Point Class

Points of this Anderson category are also rarely found in PCMS assemblages (Owens and Loendorf 2002:152; Owens et al. 2000:265). Only a single fragment was identified as a small straight stemmed point in 2002. Projectile points placed within this class appear to have been manufactured between AD 500 and 1450 (Anderson 1989:182).

CATEGORY P53 (Figure 6.12)

Number of Artifacts: 1
Catalogue Numbers: 5LA10100 FS240

Description: This small projectile point was made on a small thin flake. Its tip was missing and a red color change keys extreme heat exposure. As typical of flakes, the point had a plano-convex cross-section. Blade edges were convex, shoulders abrupt, stem straight, tangs round, and base straight. Small stemmed points of this type have been tentatively dated between AD 700 and 1200 (Anderson 1989:180).

Metric Attributes	
Length:	----
Width:	12.3 mm
Greatest Thickness:	2.7 mm
Blade Length:	----
Blade Width:	12.3 mm
Haft Width:	2.0 mm
Base Width:	6.2 mm

Material Type: Black Forest silicified wood

6.4.2.2.7 Small Expanding Stem Point Class

This class includes small corner-notched projectile points. A total of eight points from three distinct categories were assigned to this class (8.16% of the 2002 projectile points). Small expanding stem points appear to have been manufactured over a long time period, AD 270 to 1750 (Anderson 1989:207-208). This being said, Anderson's proposed dates for the class overlap considerably between AD 500 and AD 1300 and likely key the highest rate of popularity.

CATEGORY P59 (Figure 6.12)

Number of Artifacts: 3
Catalogue Numbers: 5LA3521 FS32, 5LA9959 FS23, 5LA10085 FS3

Description: In the Anderson typology (1989:187-189), P59 points exhibit sharp to very sharp tips, straight blade edges, barbed to extended barbed shoulders, slightly expanding to expanding stems, rounded tangs, and straight to slightly convex bases. All three of the current P59 points exhibit similar attributes, though they represent only the medial portions of what would have been finished tools. Anderson (1989:189) confers a presumed age range of AD 500 to AD 1200 for this point category, but an ending date of AD 1450 is also possible.

Metric Attributes:	
Length:	28.7 mm, n=1
Width:	14.3 mm, n=1

Greatest Thickness:	2.8 – 4.1 mm, mean=3.5 mm, n=3
Blade Length:	24.2 mm, n=1
Blade Width:	14.3 mm, n=1
Haft Width:	2.1 – 3.1 mm, mean 2.63 mm, n=3
Base Width:	7.1 mm

Material Types: Fine-grained Quartzite (33.33%), Orthoquartzite (66.67%)

CATEGORY P62 (Figure 6.12)

Number of Artifacts: 4
Catalogue Numbers: 5LA9958 FS2, 5LA10058 FS1, 5LA10100 FS95, 5LA10105 FS2

Description: These were small corner-notched points with sharp to very sharp tips, bi-convex and plano-convex cross-sections, convex and straight blade edges, weakly barbed to extended barbed shoulders, expanding stems, pointed tangs, and convex or straight bases. This is one of the few point categories with associated radiocarbon dates from PCMS contexts. From this information, local P62 points were likely produced between AD 500 and AD 1400 (Anderson 1989:195).

Metric Attributes:

Length:	17.2 mm, n=1
Width:	12.2 mm, n=2
Greatest Thickness:	2.5 – 3.3 mm, mean=2.85 mm, n=4
Blade Length:	12.1 – 13.7 mm, mean=12.90 mm, n=2
Blade Width:	12.2 mm, n=2
Haft Width:	1.9 – 2.8 mm, mean 2.32 mm, n=4
Base Width:	9.7 mm, n=1

Material Types: Chert (100%)

CATEGORY P66 (Figure 6.13)

Number of Artifacts: 1
Catalogue Numbers: 5LA9961 FS9

Description: This nearly complete corner-notched point lacks one lateral edge. It has a sharp tip, bi-convex cross-section, convex blade edges, weakly barbed shoulders, an expanding stem, rounded tangs, and convex base. The category is thought to date AD 800 to 1450 (Anderson 1989:200).

Metric Attributes:

Length:	13.1 mm
Width:	----
Greatest Thickness:	2.2 mm
Blade Length:	9.1 mm

Blade Width:	----
Haft Width:	1.6 mm
Base Width:	----

Material Type: Quartz

6.4.2.2.8 Small Flanged Stem Point Class

A total of 12 artifacts from five different categories were assigned to this class. One of the more common classes, it accounts for 12.24% of the classifiable projectile points. Nearly all of the more temporally recent projectile point classes discussed in Anderson (1989) were of the flanged stemmed variety. These artifacts date largely from the end of the Developmental period through the Protohistoric period (Anderson 1989:224), though P81 points appear to have been used later in the Developmental period. Stylistically, the P81 specimens look nothing like the other flange stemmed points, so the difference in age is not surprising.

CATEGORY P79 (Figure 6.13)

Number of Artifacts: 6
Catalogue Numbers: 5LA3521 FS1, 5LA9966 FS3, 5LA9991 FS2, 5LA10100 FS83, 5LA10100 FS87, 5LA10137 FS16

Description: These small triangular points have very sharp tips, bi-convex cross-sections, convex or straight blade edges, abrupt shoulders, expanding flanges, pointed tangs, and concave bases. P79 points date between AD 1000 and 1750 (Anderson 1989:211-213), but the occupation on PCMS site 5LA9187 has been radiocarbon dated to ca. 700 BP (Ahler et al. 2002:104).

Metric Attributes:

Length:	20.8 mm, n=1
Width:	12.1 mm – 15.3 mm, mean=13.13 mm, n=4
Greatest Thickness:	2.8 – 4.9 mm, mean=3.5 mm, n=5
Blade Length:	12.9 mm, n=1
Blade Width:	10.1 – 14.6 mm, mean=11.44 mm, n=5
Haft Width:	1.9 – 3.8 mm, mean=2.75 mm, n=6
Base Width:	12.1 – 15.3 mm, mean 13.14 mm, n=5

Material Types: Chert (83.33%), Orthoquartzite (16.67%)

CATEGORY P80 (Figure 6.13)

Number of Artifacts: 1
Catalogue Numbers: 5LA10060 FS55

Description: The tip and one tang are missing from this small triangular specimen. It exhibits a bi-convex cross-section, convex blade edges, abrupt shoulders, an expanding flange, pointed

tangs, and convex base. Anderson (1989:214) indicates points of this type date between AD 1000 and 1750.

Metric Attributes:

Length:	----
Width:	----
Greatest Thickness:	3.1 mm
Blade Length:	----
Blade Width:	11.3 mm
Haft Width:	2.8 mm
Base Width:	----

Material Type: Chert

CATEGORY P81 (Figure 6.13)

Number of Artifacts: 1
Catalogue Numbers: 5LA10100 FS239

Description: The tip was missing from this small side-notched point. It had a bi-convex cross-section, straight blade edges, abrupt shoulders, slightly expanding flange, pointed tangs, and convex base. Points of this category date 100 BC to AD 900 (Anderson 1989:215), though we expect this specimen was made toward the end of this time range.

Metric Attributes:

Length:	----
Width:	11.5 mm
Greatest Thickness:	3.3 mm
Blade Length:	----
Blade Width:	11.2 mm
Haft Width:	2.2 mm
Base Width:	11.7 mm

Material Type: Chert

CATEGORY P82 (Figure 6.13)

Number of Artifacts: 1
Catalogue Numbers: 5LA10132 FS3

Description: This basal fragment is bi-convex in cross-section, has abrupt shoulders, an expanding flange, and u-shaped notch at its base. Anderson (1989:216) presents a date range of AD 750 to 1725 for this projectile point category.

Metric Attributes:
Length:

Width:	----
Greatest Thickness:	3.8 mm
Blade Length:	----
Blade Width:	----
Haft Width:	3.3 mm
Base Width:	----

Material Type: Chert

CATEGORY P83 (Figure 6.14)

Number of Artifacts: 3
Catalogue Numbers: 5LA10000 FS81, 5LA10100 FS258, 5LA10137 FS17

Description: All three of these triangular projectile points were broken. They were found to have dull to sharp tips, bi-convex cross-sections, convex and straight blade edges, abrupt shoulders, straight flange stems, pointed tangs, and straight or concave bases. These points appear to date between AD 750 and 1650 (Anderson 1989:217-221), but a more precise date of 700 BP can be assigned for the P83 points at site 5LA9187 (Ahler et al. 2002:104).

Metric Attributes:

Length:	----
Width:	13.1 mm, n=1
Greatest Thickness:	2.3 – 3.7 mm, mean=3.00 mm, n=2
Blade Length:	11.1 mm, n=1
Blade Width:	8.8 – 10.0 mm, mean=9.4 mm, n=2
Haft Width:	2.1 – 3.7 mm, mean=2.90 mm, n=2
Base Width:	13.1 mm, n=1

Material Types: Fine-grained Quartzite (33.33%), Hornfels/Basalt (33.33%), Obsidian (33.33%)

6.4.2.3 Cores and Core-Tools

The core and core-tool class consisted of 220 non-bipolar cores, 11 bipolar cores, and nine core-tools. Since NMSUs work began on the PCMS, tested cobbles have been considered non-bipolar cores. Cores, core-tools, and tested cobbles were recorded among the surface remains on 60 sites; 37 sites had more than one specimen in the assemblage. Unlike the TAs 10 and 12 core and core-tool assemblage (Owens and Loendorf 2004), where a high proportion of the items were exhausted (26%), the 2002 assemblage exhibited 4% exhausted tools. This is directly related to the fact that the 2002 project sites were found along the canyon edges, or in the breaks between the Black Hills and Stage Canyon, where outcroppings of high quality raw materials expose at the surface. Because of this, most (91%) cores/core-tools were large in size, with fewer medium (7%), and small (2%) artifacts identified. Heat exposure was noted of slightly over 1% of the assemblage.

Non-bipolar cores are a mass of raw material with patterned or unpatterned flake detachment from at least one direction (Owens and Loendorf 2002:160). From the 2002 artifact assemblage, a total of seven material types (all locally available) were identified (Table 6.14). These materials were microcrystalline or macrocrystalline (79%) and include argillite, hornfels/basalt, orthoquartzite, and fine- or coarse-grained quartzite. Cryptocrystalline materials (21%), with better conchoidal fracture properties, included chert and silicified wood. The high proportion of macro and microcrystalline materials can be attributed to the fact most of the raw material outcropping near the project sites was coarser-grained.

Table 6.14: Material Type for the Cores and Core-Tools

	Core Class			
Material	Core-Tool	Bipolar Core	Non-Bipolar Core	Total
Argillite	1	0	37	38
Chert	0	8	39	47
Hornfels/Basalt	1	0	17	18
Orthoquartzite	0	0	2	2
Quartzite	7	3	122	132
Ralston Creek	0	0	1	1
Silicified Wood	0	0	2	2
Total	9	11	220	240

There were only nine multifunctional core-tools identified within the project lithic assemblage. Owens and Loendorf (2002:172) characterize a core-tool as a formal non-bipolar core of raw material exhibiting negative flake scars, coupled with visible use wear patterns resulting from the performance of another functional task. All 2002 core-tools were used for hammering or chopping as they exhibited ring-fractures along one edge, or around the entire periphery. Core-tools were primarily large (89%) and all made of more durable micro or macrocrystalline material.

Bipolar cores, a mass of raw material with concurrent impact fractures on both ends, are a type of artifact seldom encountered on PCMS sites (Owens and Loendorf 2002:172). The 2002 specimens were primarily water worn chert nodules (8) or large tabular pieces of sandstone (3).

6.4.3 Chipped-Stone Tool Analysis Summary

The tool assemblage was comprised of 14 tool classes. Of these, nearly 64% were likely related to hunting and game processing activities and 36 % were associated with raw material reduction. Flaked lithic tools include utilized/retouched flakes (38%), bifaces (16%), cores and core-tools (27%), projectile points (11%), scrapers (6%), and unifaces (6%). The remaining 2% were choppers, drills, and a graving tool. Expedient tool to formal tool ratio was almost 3:1. Because expedient tools signal lower degrees of residential mobility (Parry and Kelly 1987), the assemblage data suggests the inhabitants of the projects areas were highly mobile. The high proportion of multidirectional cores, also expedient artifacts, suggests some sedentary tendencies, however.

Non-local lithic materials were Alibates dolomite (3), Flattop chalcedony, (1), Hartville uplift chert (6), Black Forest silicified wood (10), and obsidians from the Jemez Mountain area, Smokey Hills jasper (6), and Tiger-eye chert (1). The non-local tool kit contains 55% utilized flakes, 20% small projectile points, 17% patterned tools like scrapers, 5% large projectile points, and 3% large, unpatterned bifaces. Local materials (those found within PCMS landholdings) were mostly quartzite (42%), chert (26%), hornfels/basalt (10%), argillite (19%), and chalcedony (2%). Artifacts of the local tool kit were cores and core-tools (29%), projectile points (15%), bifaces (8%), utilized/retouched flakes (40%), and patterned tools such as scrapers and drills (8%).

It is widely recognized that projectile points are ambiguous temporal indicators. Nonetheless, archaeologists continue to use them for assigning ages to sites on the PCMS because for surface sites lacking ceramic artifacts or rock art, they are the only temporal indicators regarding site occupation. To aid in relative site dating, Anderson (1989) developed a coding system for the PCMS based on similar point styles recovered from the region (i.e., southeast Colorado) and areas within the southern Plains States. From this system, we believe it safe to assign rough age estimates to sites recorded during the scope of our work.

Of the 98 projectile points collected during the 2002 survey, 64 exhibited characteristics allowing them to be classed according within the Anderson (1989) system. As shown by Table 6.15, the project area has experienced continuous prehistoric use from the Plano period of the Paleoindian stage to the Protohistoric period of the Late Prehistoric stage. Changes in projectile point morphology are presumably related to the well-established shift from the use of a spear and atlatl by Paleoindian and Archaic groups to the bow-and-arrow by Late Prehistoric groups.

In many of Anderson's (1989) classes, the estimated time-range spans more than one prehistoric stage. Though these age estimations are broad, two general statements can be made concerning the projectile point assemblage. Only six Paleoindian projectile points were recovered; all date to the Plano Period.

Table 6.15: Age Range and Anderson (1989) Type for 2002 Classifiable Points.

Age Range	Anderson Types	Total Count
Plano	P1 (3), P2 (3)	6
Early Archaic	P10	1
Early Archaic to Middle Archaic	P9 (2)	2
Early Archaic to Developmental Period		0
Middle Archaic		0
Middle Archaic to Late Archaic	P43	1
Middle Archaic to Developmental Period	P19 (2), P22	3
Late Archaic		0
Late Archaic to Developmental Period	P21, P26, P29, P30, P32, P81	6
Late Archaic to Diversification Period	P35 (5)	5
Developmental to Diversification	P41, P48 (5), P53, P59 (3), P62 (4), P66	15
Developmental to Protohistoric	P49 (8), P50 (4), P51 (2), P79 (6), P80, P82, P83 (3)	25
Total		64

6.5 Ground Stone and Miscellaneous Items

Four hundred and fifty ground-stone tools and 73 miscellaneous artifacts were identified in the project assemblage. Regarding the former, three classifiable artifact groups were present – manos, metates, and edge-ground cobbles. The latter, miscellaneous items were artifacts that do not fall within the flaked tool criteria and appear more closely related to the ground-stone artifacts. All will be briefly discussed in this portion of the report, as well as the more well known ground-stone tools. Table 6.16 summarizes ground stone tool type. General metric data is presented in Tables 6.18, 6.19, and 6.21, as well as in the text.

6.5.1 Methods

The ground-stone artifacts were analyzed in the field using the analysis format found in Owens and Loendorf (2002) Appendix A. This generalized system was developed during the 1997 PCMS field season and is based, in part, on the procedures described in Dean (1992). The general data categories examined for each tool include – artifact type, material type, overall condition, length, width, burning, surface designation, use-area condition, technology, shape, striations, use-wear, use location length, use location width, and metate depth. Measurements for all field artifacts were taken to the nearest centimeter but because of the considerable effort required to carry scales in the field, weights were not recorded. It should be noted that all field examinations were made without the aid of a hand lens.

6.5.2 Manos

Manos are defined by Bender (1990) as: "groundstone artifacts which exhibit ground surfaces and/or edges. Manos are hand held implements used on large grinding surfaces (metates)." Fifty-four 2002 sites had manos in their artifact assemblages. Table 6.16 presents material data for the 139 project manos. Six material types were identified – sandstone (125), quartzite (22), granite (8), limestone (1), and diorite (1).

Thirty-three of the 139 manos were complete. Among the remaining specimens, 79 were small (<50%) fragments and 27 were more than 50% complete. Complete mano length ranges from 8 to 18 cm (average 11.16 cm), width from 6 to 11 cm (average 7.92 cm), and thickness from 2 to 9 cm (average 3.75 cm). Summary metric data for all complete manos is illustrated in Table 6.17. The distinction between one- and two-handed manos is subjective. Using the dimensions and width/length ratios of others, Bender (1990) was not able to ascertain a distinct size difference for one and two-handed manos within PSMS assemblages. Comparing the 2002 project manos to Bender's (1990) definitions, descriptions, and size data, all were of the one-handed variety.

Table 6.16: Summary of Analyzed Ground Stone

Artifact Group	Total	Percent
Edge Ground Cobble	7	1.6%
Mano	139	30.9%
Metate	304	67.6%
Total	450	100.00%

Table 6.17: Material Type by Mano Type

	Mano
Material	Total
Conglomerate	2
Quartzite	22
Diorite	1
Granite	8
Limestone	1
Sandstone	105
Total	139

Table 6.18: Summary Metric Data for Whole Manos.

	Manos					
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	33	8	18	11.1600	2.2592	5.1041
Width	33	6	11	7.9242	1.2382	1.5331
Thickness	33	2	9	3.7576	1.5669	2.4550

Note: All measurements in cm.

All manos were made on natural cobbles or nodules of locally available material and show only minimal facial or edge preparation prior to usage. All exhibit at least one utilized face; in nine cases both faces were used, and one triangularly shaped mano exhibits three recognizable use facets. Both incidental and purposeful grinding was observed in 99% of the specimens. Of these, 74% display grinding only, 15% show combination grinding and pecking, 9% were ground and battered, and four specimens (2%) show polish only. For 101 (72%) manos the striation pattern could not be determined. Visible striation patterns were longitudinal (9%), transverse (9%), oblique (7%), circular (2%), and multiple (1%). Three degrees of wear were identified – moderate usage (43%), light usage (21%), and heavy usage (36%).

Viewed in planview, manos were 60% oval, 2% irregular, 13% rectangular, 4% circular, 2% triangular, and 1% square. The remaining manos were so highly fragmented that this attribute could not be determined. Twenty-four percent of the manos evidence some degree of burning in the form of cracking or color change.

6.5.3 Edge-Ground Cobbles/Manos

Edge-ground cobbles are hide-processing tools in this part of the southern Plains. That being said, they are also multiple function tools with edge battering from hammerstone use and facial grinding from "typical" mano usage (Owens 2006).

Fourteen artifacts from eight project sites were classified as edge-ground cobbles. Twelve were collected and further analyzed based on the attributes listed in the coding sheet presented in Owens and Loendorf (2002: Appendix B). The material types are 71% sandstone, 14% quartzite, 7% granodiorite, and 7% conglomerate. There is no material selection preference for edge-ground cobbles as fine-grained materials account for 50% of the assemblage and course-grained are 50% as well. Parent pieces for these tools were collected in either cobble (93%) or chunk/block (7%) form.

Seven of the 14 specimens collected were whole. For the most part, these edge-ground artifacts were much larger than other hand held tools in the overall mano class. They are close in overall size to what could be considered a two-handed mano in the American Southwest. Among the 2002 specimens, length ranges from 90 to 162 mm, width 64 to 93 mm, thickness 38 to 53 mm, and weight from 436.9 to 797.8 g. The metric data for all edge-ground cobbles is illustrated below in Table 6.19.

Table 6.19: Summary Metric Data for Whole Edge-Ground Cobbles.

Edge Ground Cobbles						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	7	90	162	129.8571	22.9087	524.8095
Width	7	64	93	78.1428	10.0568	101.1428
Thickness	7	38	53	45.8571	5.4292	29.4762
Weight	7	436.9	797.8	740.9714	185.045	34241.672
Use Angle	14	75	87	80.8571	4.18045	17.4761
Striation Degree	14	0	90	44.6666	38.7986	1505.3333

Only one edge-ground cobble was modified to enhance its working edge before use occurred. Nearly two-thirds (64%) of the specimens were oval in cross-section with subtriangular (21%), round (7%), and indeterminate (7%) cross-sections also identified. Planviews were oval (43%) subrectangular (43%), rectangular (7), and irregular (7); this depended wholly on parent piece outline.

Four specimens exhibit a single working edge. Of the remainder, six exhibit two edges and four display four distinctly beveled edges. Edge-ground cobbles were held at 66 to 90° angles to the object being worked. Nine specimens, show double-beveled facets and in five single bevels were observed. Viewed from end to end these beveled edges were 57% straight and 43% convex. Six edge-ground cobbles exhibit ground/polished use wear and the others exhibit more abrasive wear. Over half (8) display oblique striations, one shows longitudinal striations, and striation direction could not be determined for five. Visible striation angles vary from perpendicular (90°) to parallel (0°) in relation to the long axis of the artifact. What this means is that most were used for a transverse action with little reliance on a sawing motion. All but one edge-ground cobble exhibit end battering indicative of secondary hammerstone usage. In addition, nine specimens display facial striations indicative of secondary mano usage.

6.5.4. Metates

Metates are artifacts characterized by at least one large grinding surface upon which vegetal foodstuffs or pigments were crushed or ground with a mano (Bender 1990). All of the metates recorded during the BRAC survey project possess attributes that fit well within Bender's generalized description. Only two basic types were identified – slab (281) and bedrock metates (23). The metates, shown in Table 6.20, were primarily sandstone (91%), with hornfels/basalt (3%), quartzite (5%), and orthoquartzite (1%) materials represented. Only 20% percent of the assemblage was comprised of whole artifacts and most were of the bedrock variety. Of fragmented specimens, 72% represent less than half of the original artifact and 8% were larger than half. Metates were recorded on 65 project sites.

Complete slab metates ranged from 11 to 57 cm (average 31.67 cm) in length, 11 to 37 cm (average 20.93 cm) in width, and 0.5 to 23 cm (average 7.61 cm) in thickness (Table 6.21). Though measurements for the bedrock metates/milling slicks were taken in the field, they are not presented here, as most were encountered on large sandstone bedrock boulders measuring several meters in size.

Table 6.20: Material Type by Metate Type

	Metate Type		
Material	Bedrock	Slab	Total
Quartzite	0	15	15
Hornfels/Basalt	0	8	8
Orthoquartzite	0	1	1
Sandstone	23	257	280
Total	23	281	304

Table 6.21: Summary Measurement Data for Whole Slab Metates.

	Metates					
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	56	11	57	31.6714	14.2465	202.9638
Width	56	11	37	20.9375	8.6767	75.2863
Thickness	56	0.5	23	7.6122	4.1404	17.1429

Note: All measurements in cm.

6.5.5 Miscellaneous Items

Seventy-three miscellaneous items were recorded during the 2002 project. They include 26 hammerstones, 23 pieces of bone, eight ceramic sherds (Figure 6.15), five polishing stones, four manuports, three abraders, a bead, jewelry item, steatite bowl fragment, and a whetstone/abrader. A description of the sherds, found on sites 5LA5497, 5LA10000, 5LA10096, and 5LA10100, can be found in Owens and Loendorf 2004: Appendix III). The bones are part of the 5LA10000 assemblage, discussed in detail in Appendix III of this report. Other miscellaneous artifacts are briefly addressed as either a group or as isolated items listed by site

and FS number. In the latter cases, artifacts will be described in terms of tool type, lithic material type, attributes, dimensions, and weight.

Abrader

Abrading tools are hand held implements that lack specialized features other than a rough surface for removing material from another contacted surface (Adams 2002:79). These items may be flat or grooved, like arrow-shaft abraders. The 2002 project abraders are of the latter variety with distinct u-shaped grooves on one face (Figure 6.16). All (5LA10100 FS 90, 97, 221) were medial portions of finished tools and made on tabular pieces of sandstone. Found in different areas of the same site, their size and material composition indicate they were parts of three separate tools.

Bead

This artifact is a bead of blue glass (5LA10100, FS 260). It measures approximately .5 cm in diameter, has a distinct drill hole just off center, and exhibits several ground facets around its perimeter (Figure 6.16). Its temporal affiliation is unknown as it was found in an area of the site containing historic artifacts and prehistoric lithics.

Hammerstone

Haury (1976:279) defines hammerstones as irregularly shaped rocks selected for their useful size and weight, and they are expediently designed for use without modification. Adams (2002:151) adds, "they are used for applying forceful strokes to other surfaces." Obviously, high specific gravity is crucial for any material selected for battering. This was the case when the twenty-six project hammerstones were considered. Materials represented in this class of artifact were coarse-grained quartzite (12), granite (4), hornfels/basalt (4), argillite (2), sandstone (2), diorite (1), and fine-grained quartzite (1). Most project hammerstones evidence ring fractures on one or more lateral edges. In some cases, wear was observed around the whole perimeter. Hammerstones were not artifacts collected for additional analysis so measurements are not provided.

Jewelry Pieces

This artifact (5LA10100 FS 257) was placed in this category because we really do not know how it functioned. A broken piece of quartzite measuring 2 x 1 cm, it has been intentionally shaped (incised) to look like a tube (Figure 6.16). Heavy polish was visible on the outside of the piece suggesting it might have been part of an effigy.

Manuports

Four manuports from three project sites (5LA10020, 5LA10083, 5LA10100) were recorded. These are pieces of hornfels/basalt (2), quartz (1), and sandstone (1) that are nondescript other than being "out of place" on the sites in which they were found. None show

any evidence for purposeful modification and a lack of polish or striations suggest they were not used for smoothing clay.

Polishing Stone

A total of five polishing stones were analyzed; these identified on sites 5LA10000, 5LA10103, 5LA10137, 5LA3521, and 5LA9964. Adams (2002:91) describes the general attributes of a polisher as, "a rubbing tool that alters the surface of another object through abrasive and tribochemical mechanisms." Because abrasion is a key component for this type of wear, grainy materials were preferred. The polishing stones we recorded were made of baked clay (1), chalcedony (1), course-grained quartzite (1), and sandstone (2). All polishing stones were generally large, with a length from 3 to 7 cm (average 5.1 cm), width 2 to 27 cm (average 9.8 cm), and a thickness 1 to 16 cm (average 6.5 cm).

Steatite Bowl

FS 16, site 5LA9959, is an edge fragment from a thick-walled steatite vessel (Figure 6.16). It measures 30 x 26 mm with a maximum thickness of 13 mm. Inside and outside surfaces were polished and thick manufacturing striations appeared evident on each surface as well. Steatite, often referred to as soapstone, is a very soft metamorphic rock. Sources vary, but this material has been utilized by prehistoric peoples in Wyoming, Montana, and several places along the North and Middle Atlantic coast (Tuck 1978). It seems likely that the piece sourced somewhere in the Rocky Mountain Region. This assumption was loosely based on the presence of other trade and exchange items in PCMS assemblages.

Whetstone

This is a new class of artifact for the PCMS, though archaeologists would have trouble telling the difference between these and most internal slab metate fragments. Adams (2002:79) classifies a whetstone as, "an abrading tool used for removing material from a contact surface." The 2002 artifact (5LA3521 FS17), is a tabular piece of baked clay with one highly polished and finely striated use surface (Figure 6.17). Overall the artifact measures 14.5 x 8 x 3.5 cm and its use surface was 12.5 x 8 cm. The parent material was very fine-grained and friable, so it is unlikely the tool would have functioned for heavy abrasion (i.e., seed processing).

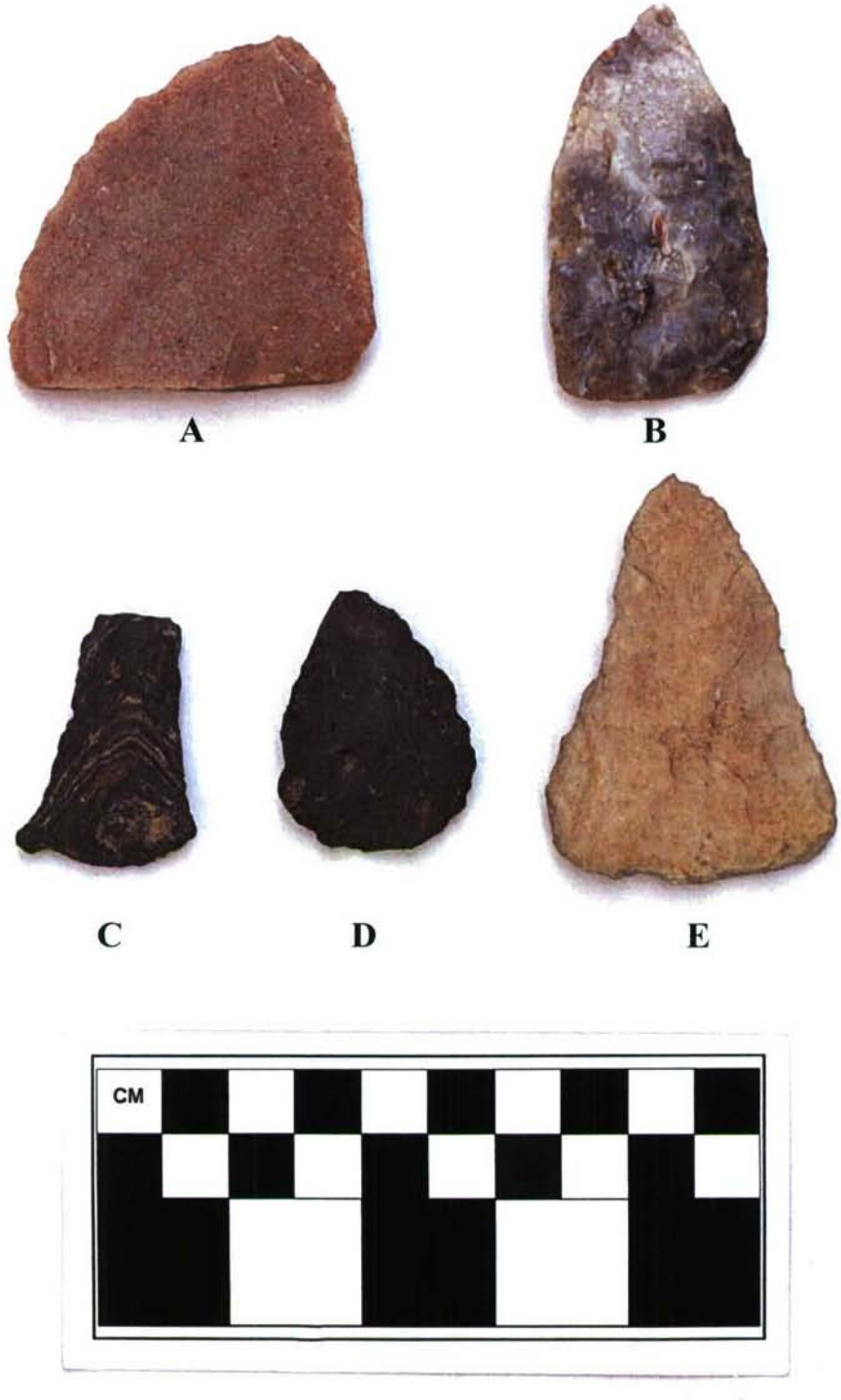


Figure 6.1: Select bifaces recovered during the 2002 project: A-5LA10000 FS100, B-5LA10016 FS5, C-5LA10063 FS8, D-5LA10091 FS1, E-5LA9965 FS56.

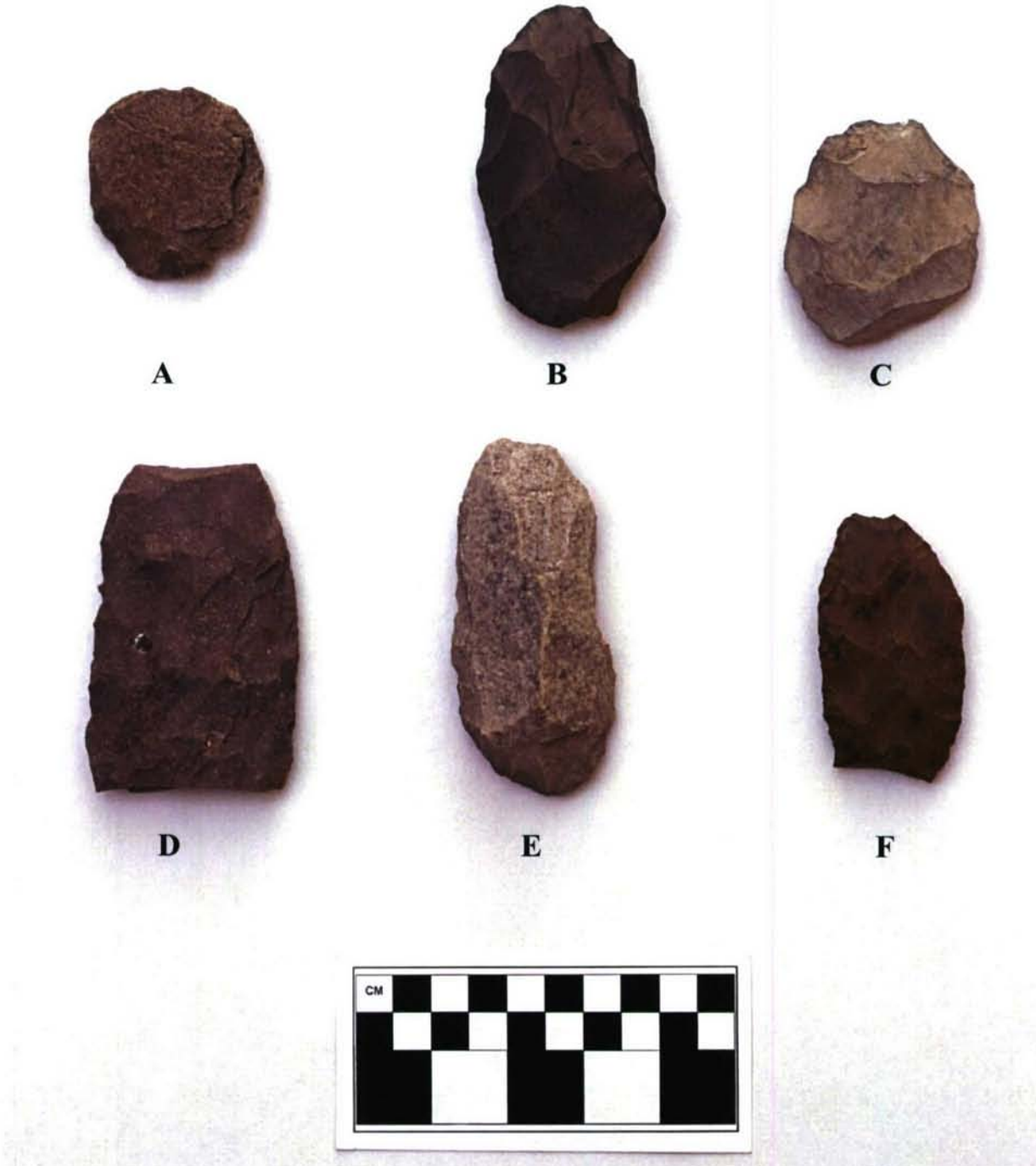


Figure 6.2: Select bifaces recovered during the 2002 project: A-5LA10000 FS82, B-5LA10015 FS31, C-5LA10016 FS7, D-5LA10060 FS17, E-5LA10088 FS12, F-5LA10137 FS4.

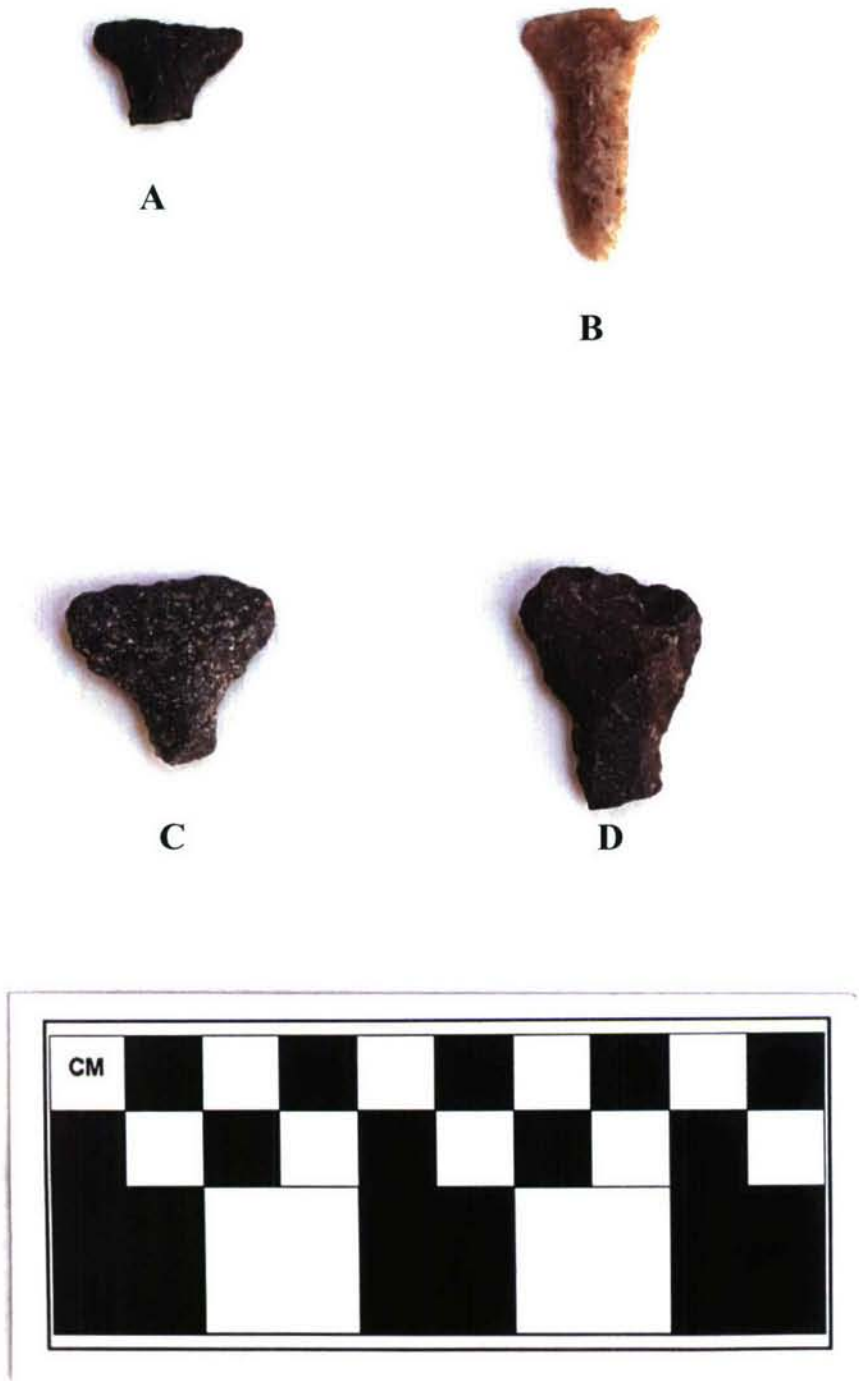


Figure 6.3: Drills encountered during the 2002 survey: A-5LA10000 FS108, B-5LA10100 FS115, C-5LA10100 FS144, D-5LA4751 FS207.

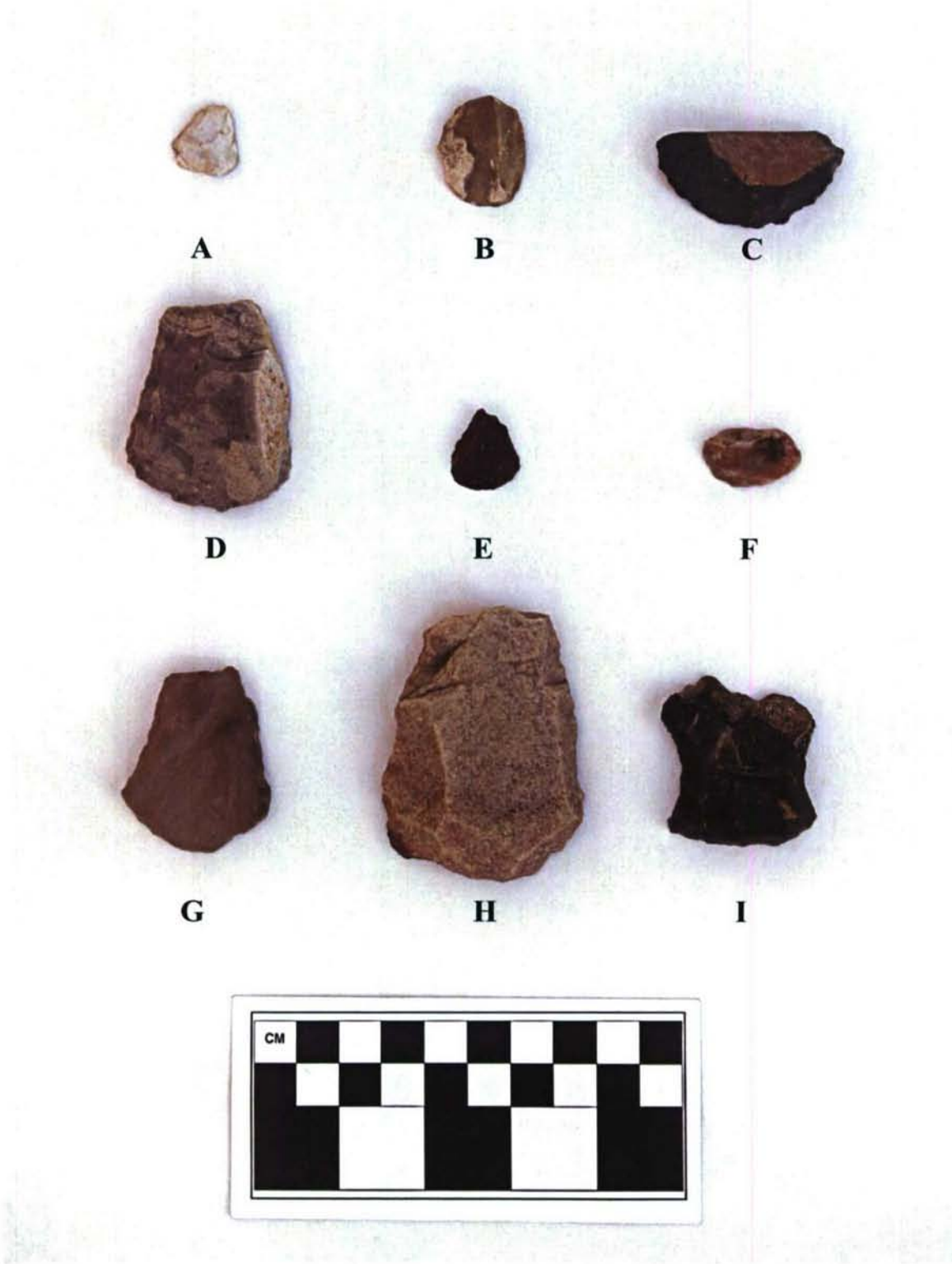


Figure 6.4: End and End/side scrapers from the 2002 survey: A-5LA10083 FS3, B-5LA4751 FS206, C-5LA9954 FS7, D-5LA10010 FS2, E-5LA10060 FS6,F-5LA10070 FS1, G-5LA10072 FS6, H-5LA10075 FS8, I-5LA10097 FS1.

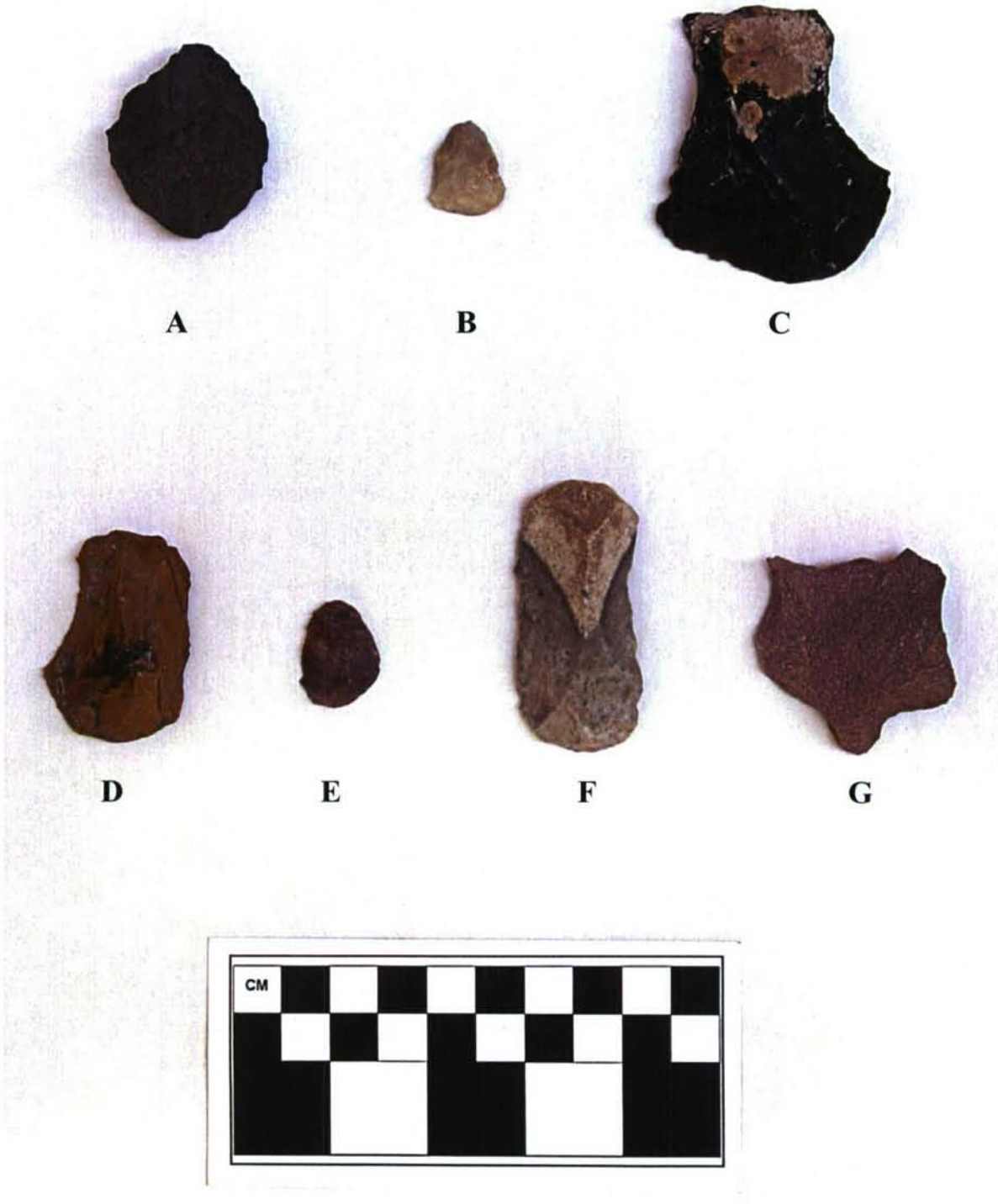


Figure 6.5: End/side scrapers and graver recovered during the 2002 survey: A-5LA10132 FS18, B-5LA10137 FS33, C-5LA3521 FS2, D-5LA3551 FS15, E-5LA9949 FS3, F-5LA9953 FS4, G-5LA10101 FS63.

Figure 6.6: Side scrapers recovered during the 2002 survey: A-5LA10000 FS37, B-5LA10000 FS78, C-5LA10001 FS1, D-5LA10002 FS6, E-5LA10116 FS3, F-5LA9953 FS2.

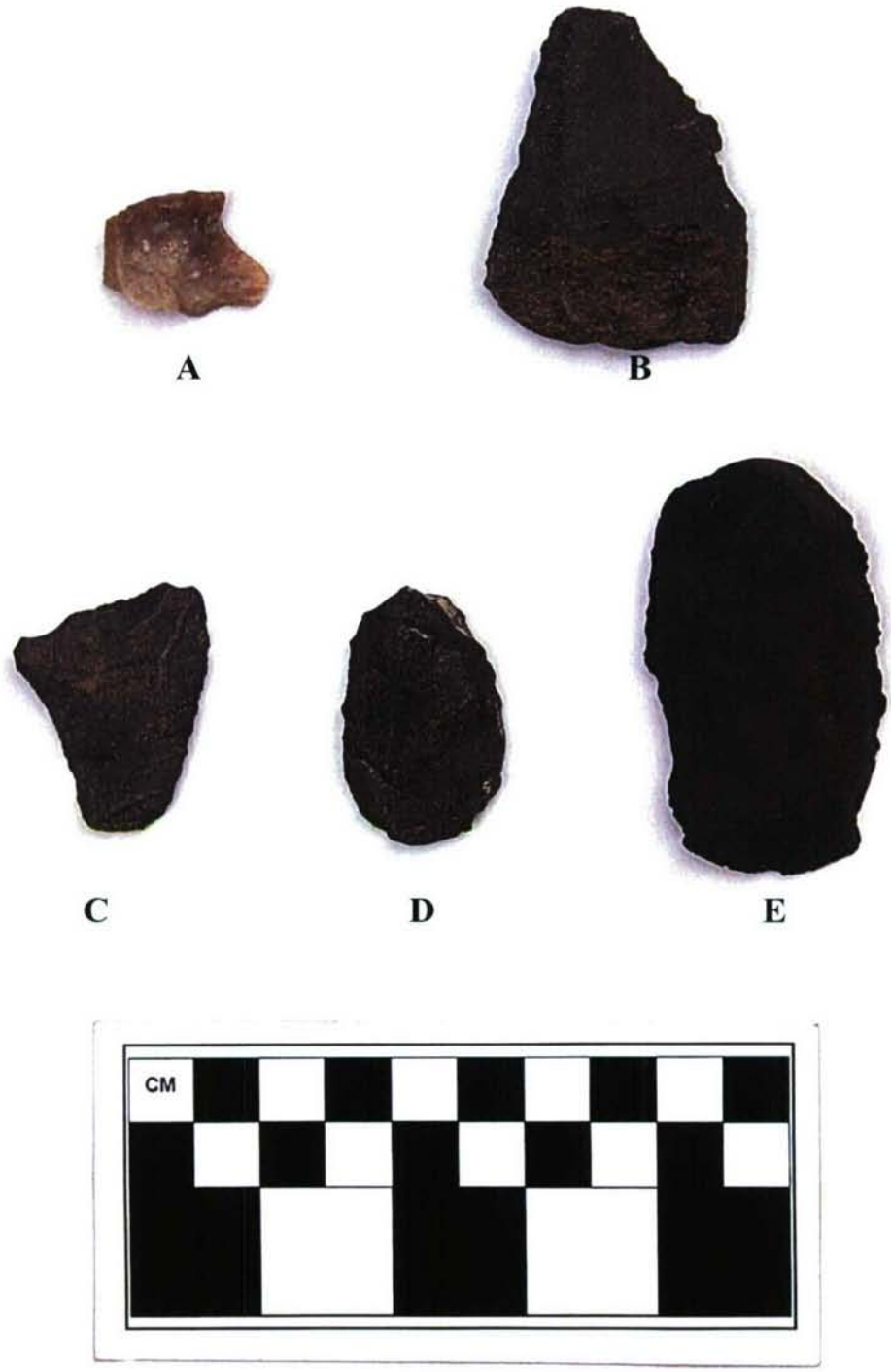


Figure 6.7: Spokeshave and utilized flakes recovered during the 2002 survey: A-5LA9954 FS8, B-5LA10100 FS59, C-5LA10100 FS171, D-5LA9959 FS18, E-5LA9967 FS2.

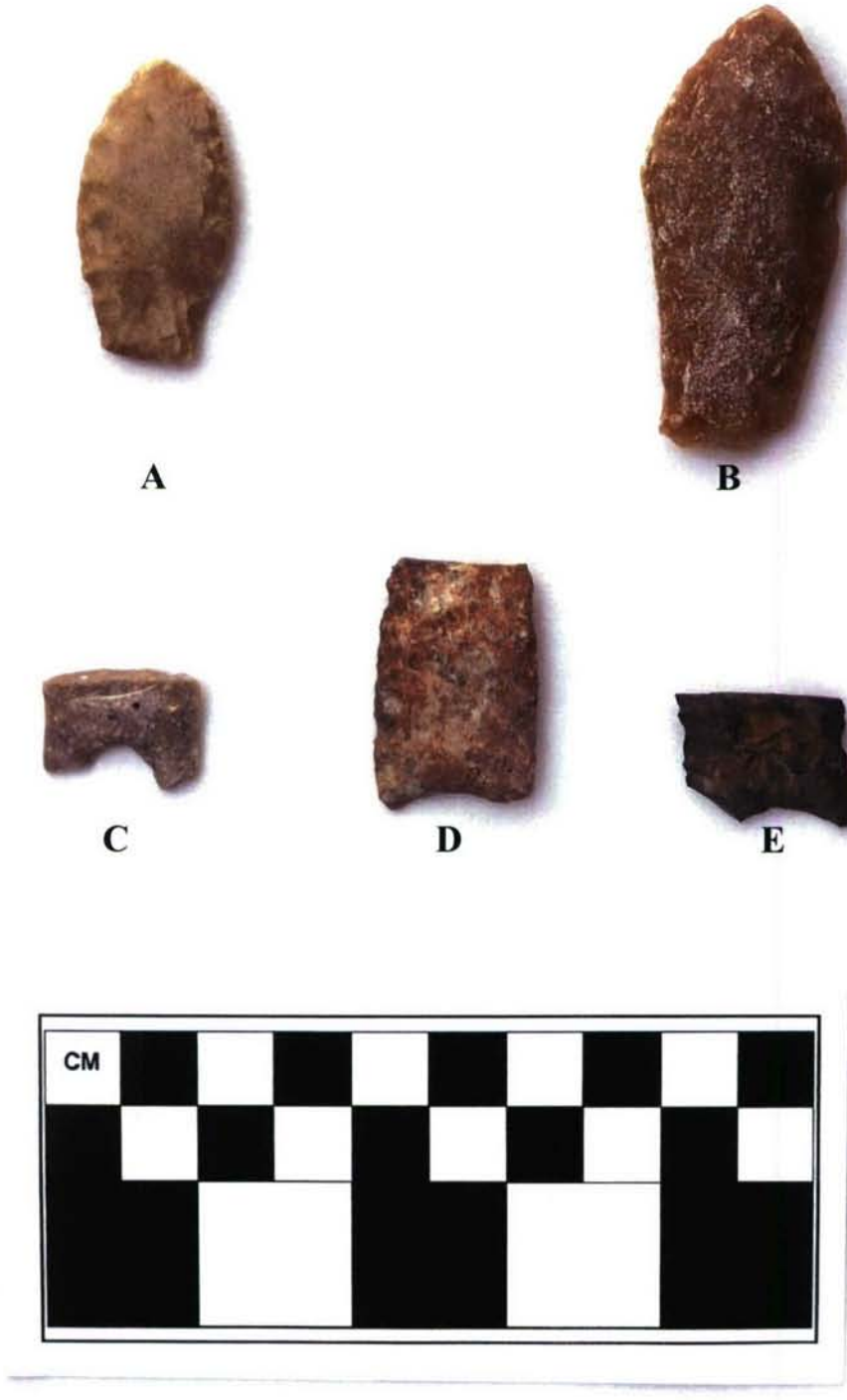


Figure 6.8: Diagnostic projectile points: A-5LA10075 FS2, B-5LA10096 FS1, C-5LA9957 FS1, D-5LA9959 FS 1, E-5LA4751 FS200

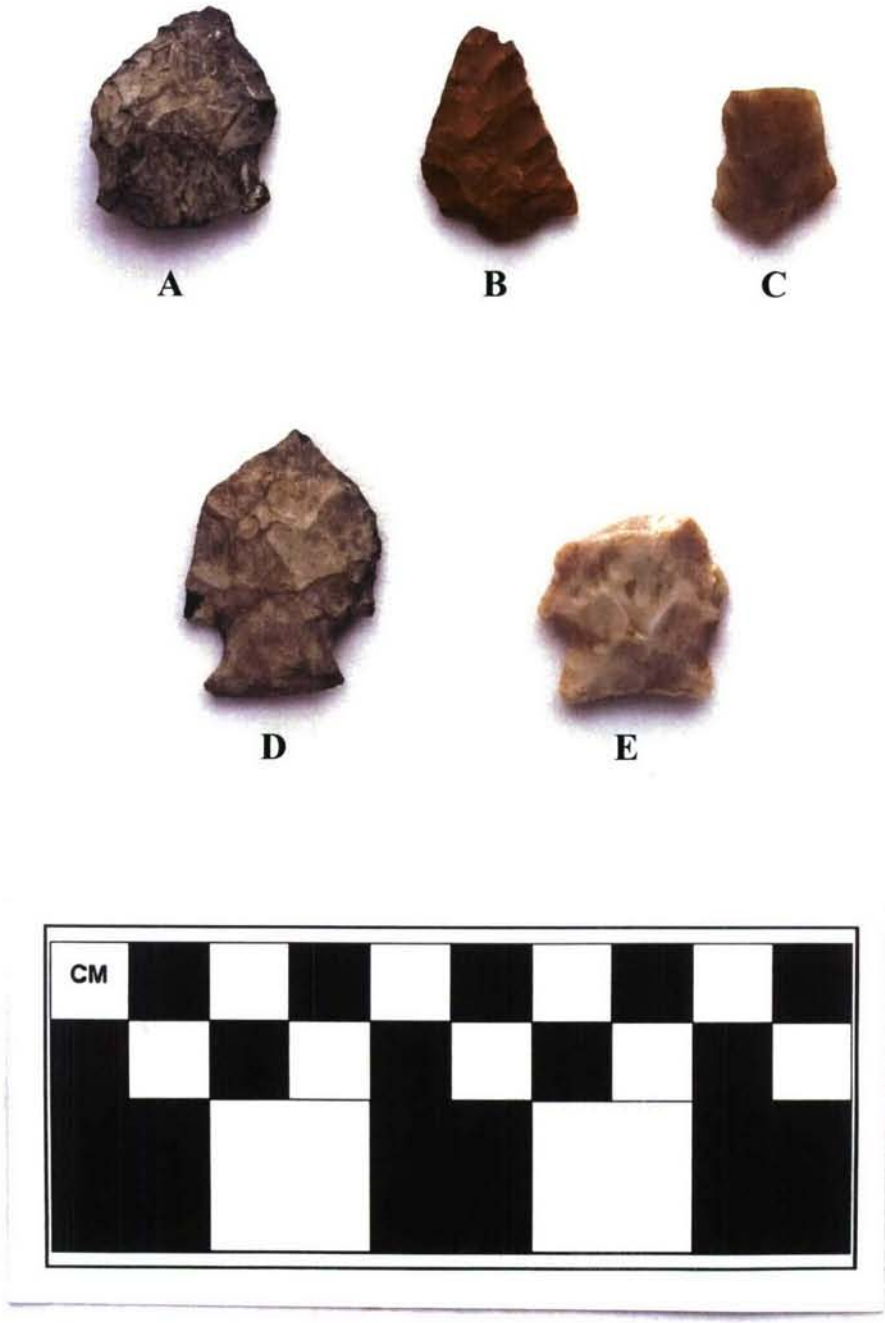


Figure 6.9: Diagnostic projectile points: A-5LA10008 FS1, B-5LA10100 FS158, C-5LA10132 FS21, D-5LA10017 FS2, E-5LA9934 FS2

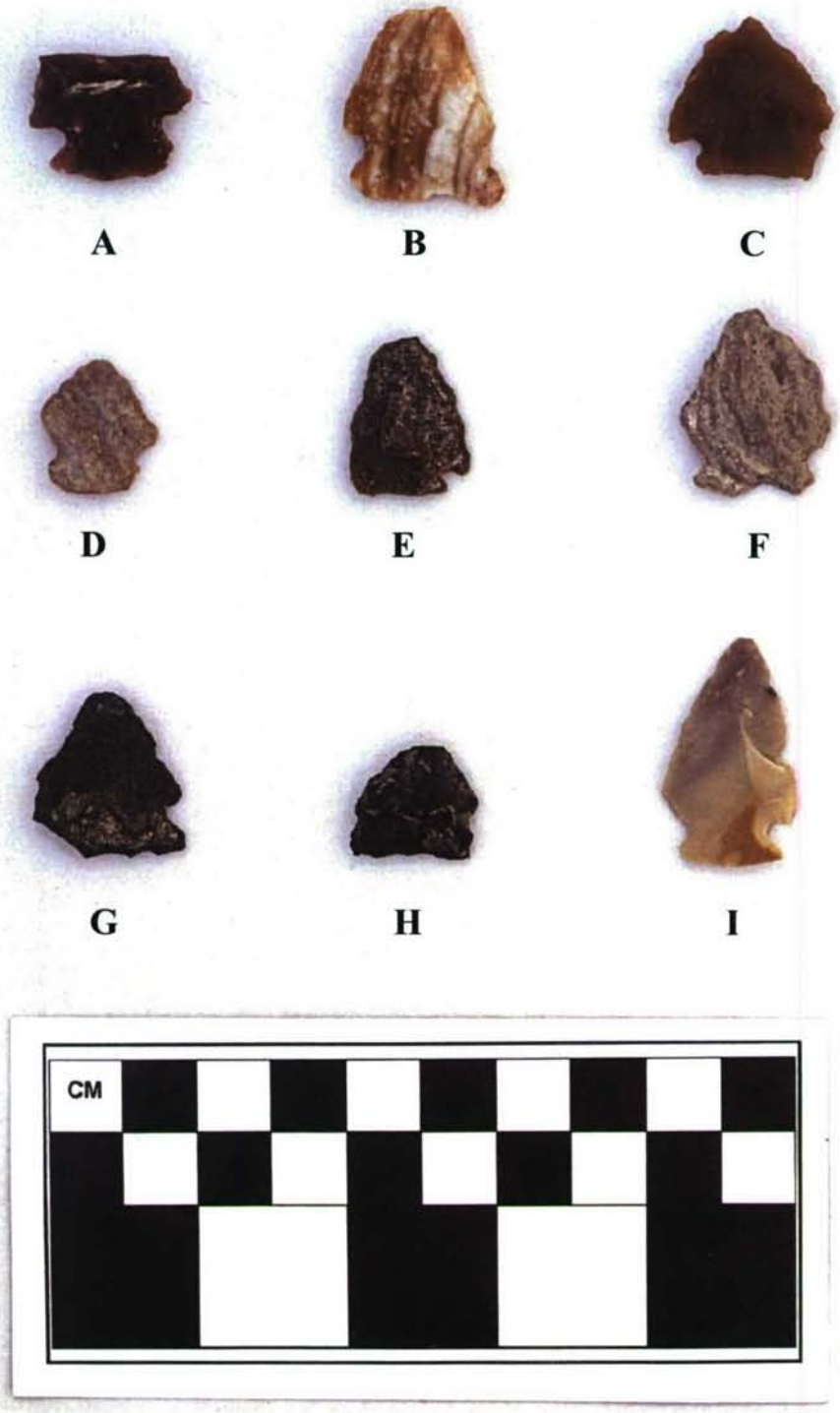


Figure 6.10: Diagnostic projectile points: A-3551 FS3, B-5LA10029 FS1, C-5LA10058 FS2, D-5LA10000 FS69, E-5LA10100 FS157, F-5LA10137 FS37, G-5LA3551 FS1, H-5LA9952 FS2, 5LA3521 FS3

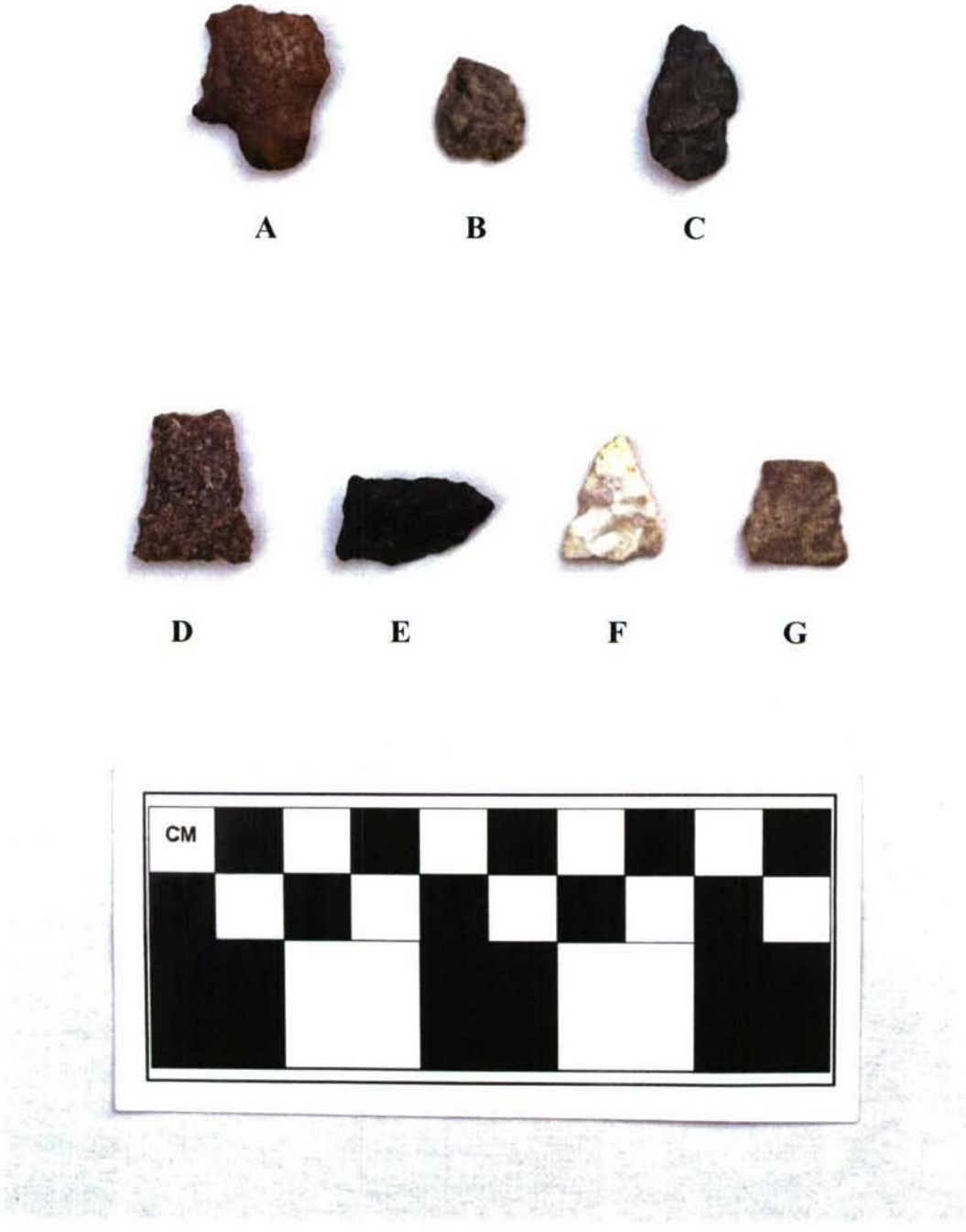


Figure 6.11: Diagnostic projectile points: A-9965 FS12, B-5LA3551 FS14, C-5LA9973 FS1, D-5LA10100 FS 81, E-5LA10100 FS141, F-5LA10132 FS1, G-5LA9949 FS2

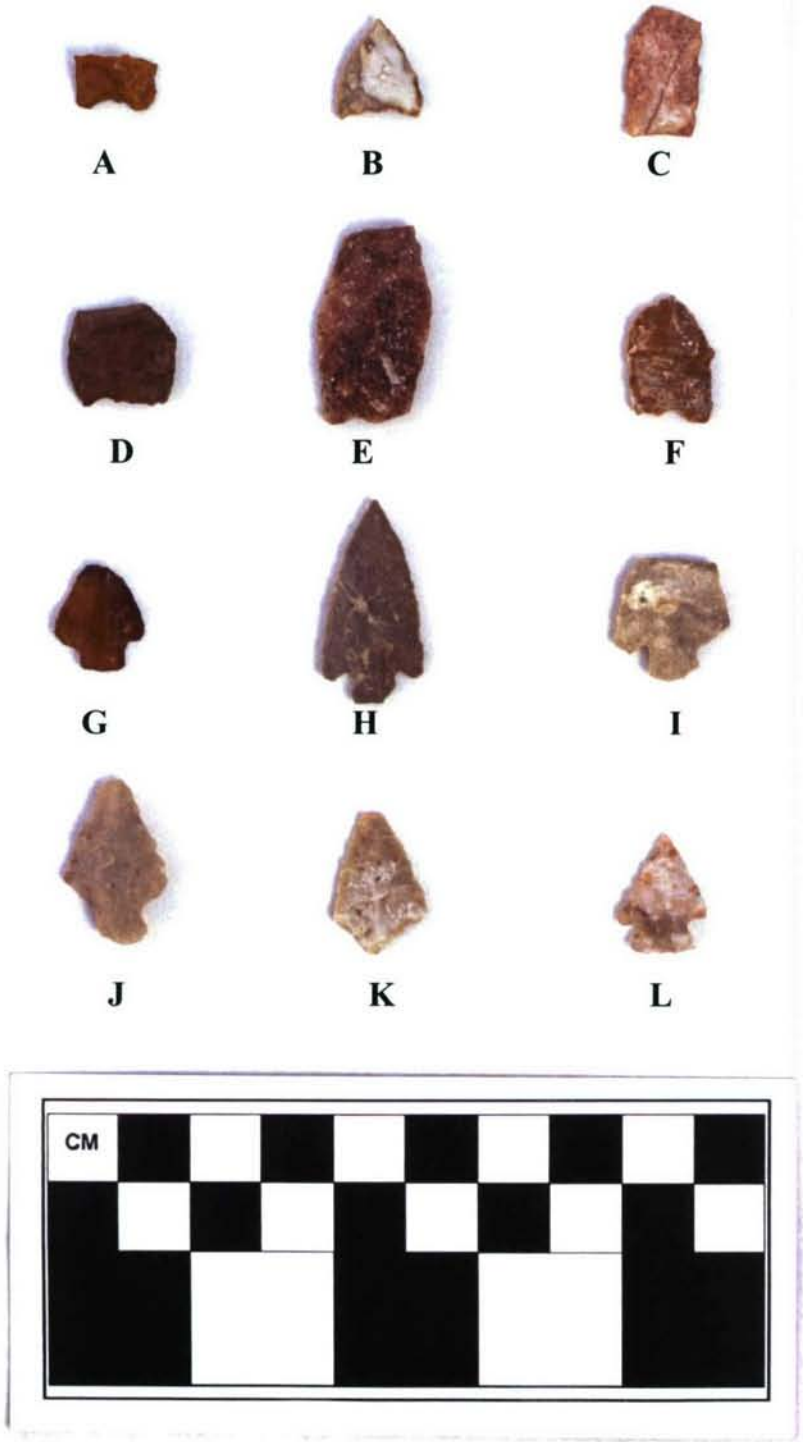


Figure 6.12: Diagnostic projectile points: A-10093 FS16, B-5LA10100 FS218, C-5LA10100 FS251, D-5LA9960 FS 5, E-5LA10100 FS203, F-5LA3551 FS16, G-5LA10100 FS240, H-5LA10085 FS3, I-5LA3521 FS32, J-5LA9959 FS23, K-5LA10058 FS1, L-5LA10100

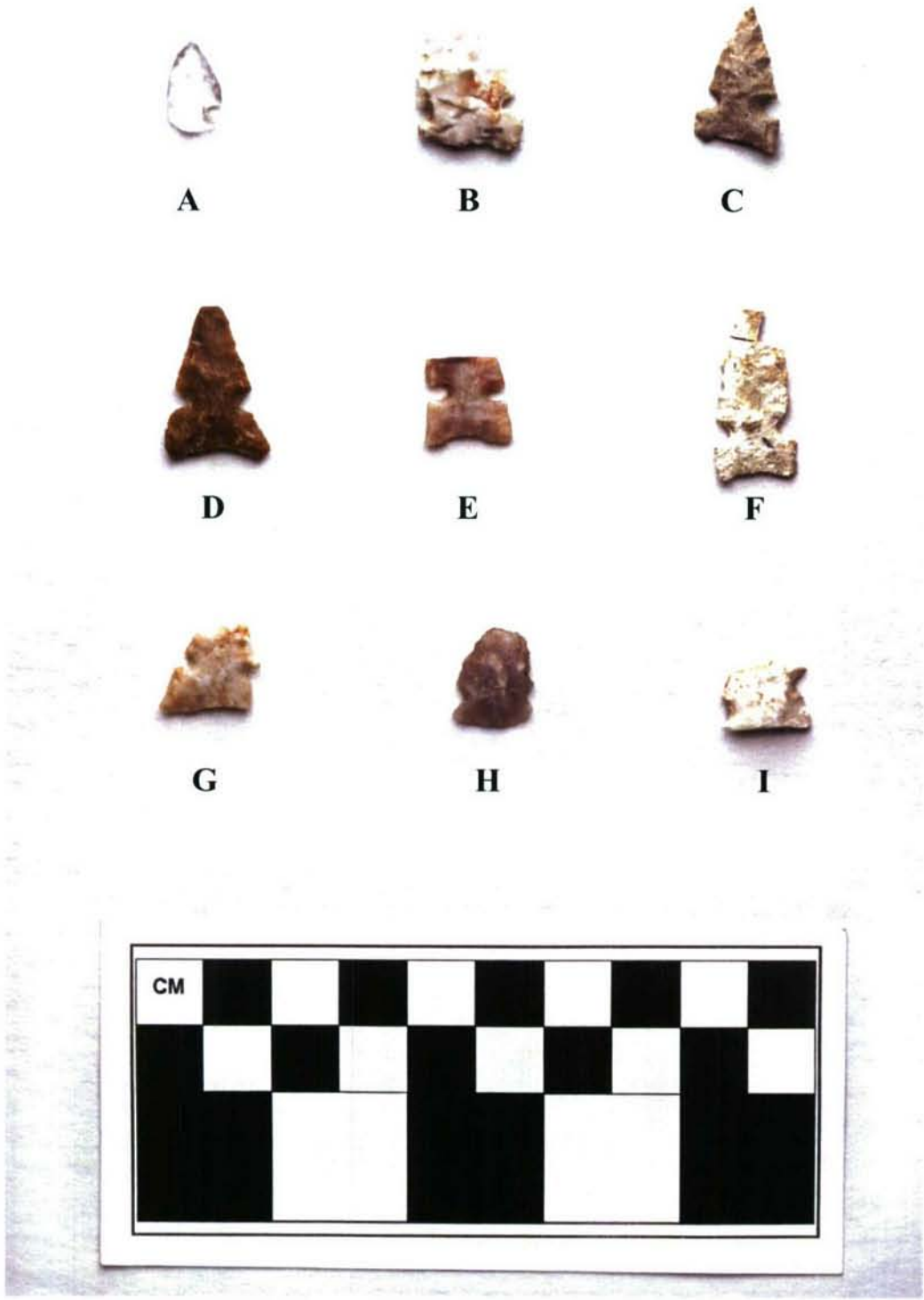


Figure 6.13: Diagnostic projectile points: A-9961 FS9, B-5LA10100 FS83, C-10100 FS87, D-5LA3521 FS1, E-5LA9966 FS3, F-5LA9991 FS2, G-5LA10060 FS55, H-5LA10100 FS239, I-5LA10132

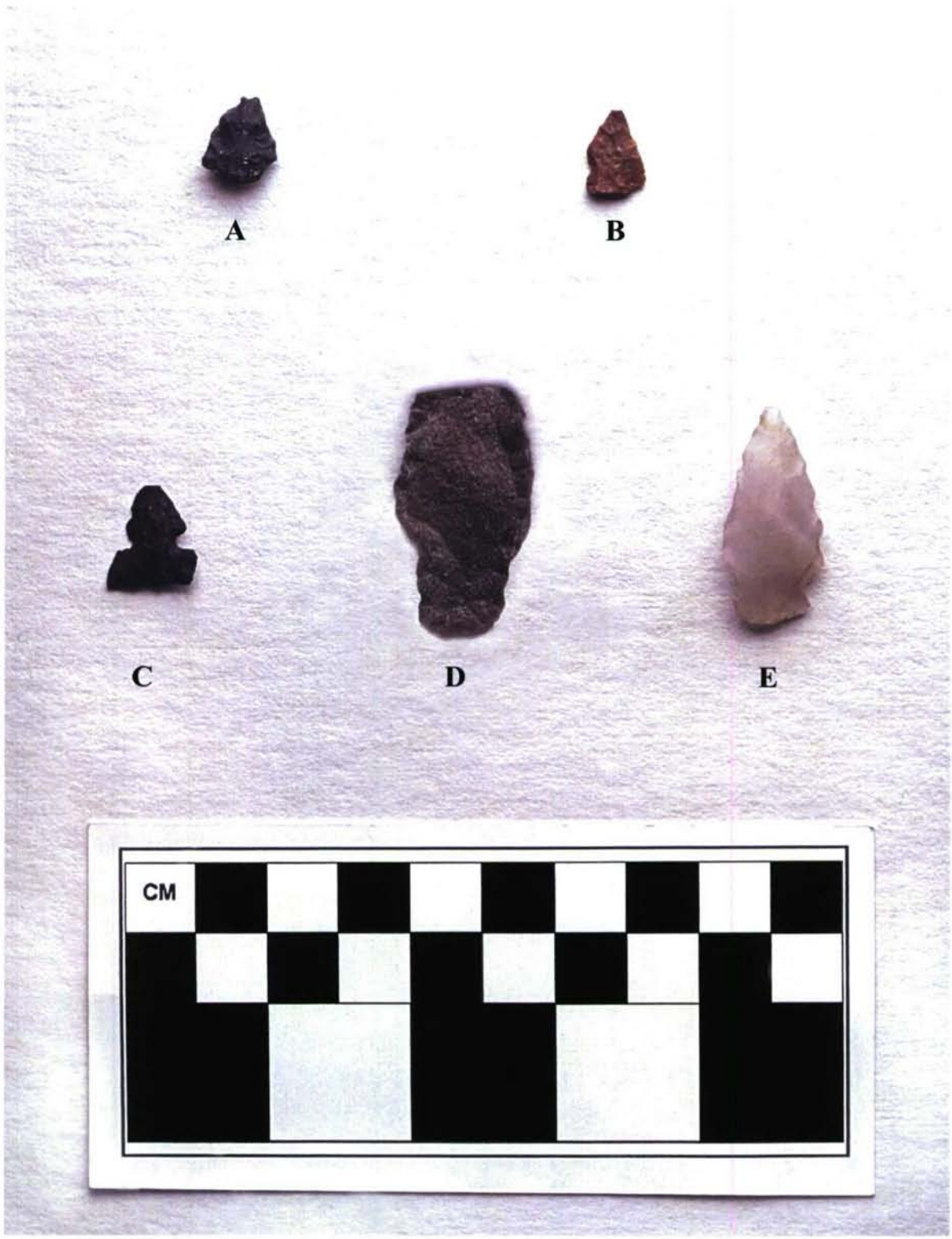


Figure 6.14: Diagnostic projectile points: A-5LA10000 FS81, B-5LA10100 FS258, C-5LA10137 FS17, D-5LA10005 FS2, E-5LA10065 FS3

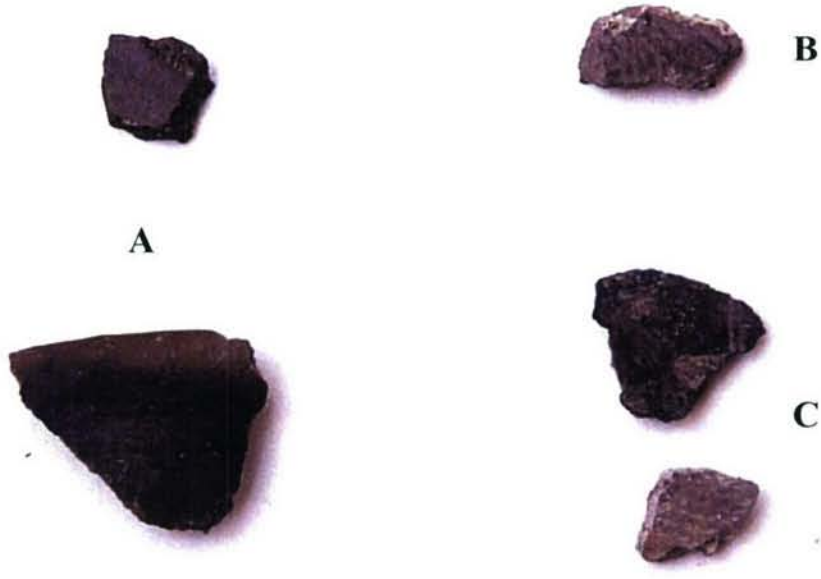


Figure 6.15: Ceramic sherds from 2002 survey: A-5LA10096 FS15 (two left sherds), B-5LA10000 FS125 (upper right), C-5LA10000 FS127 (two lower right).

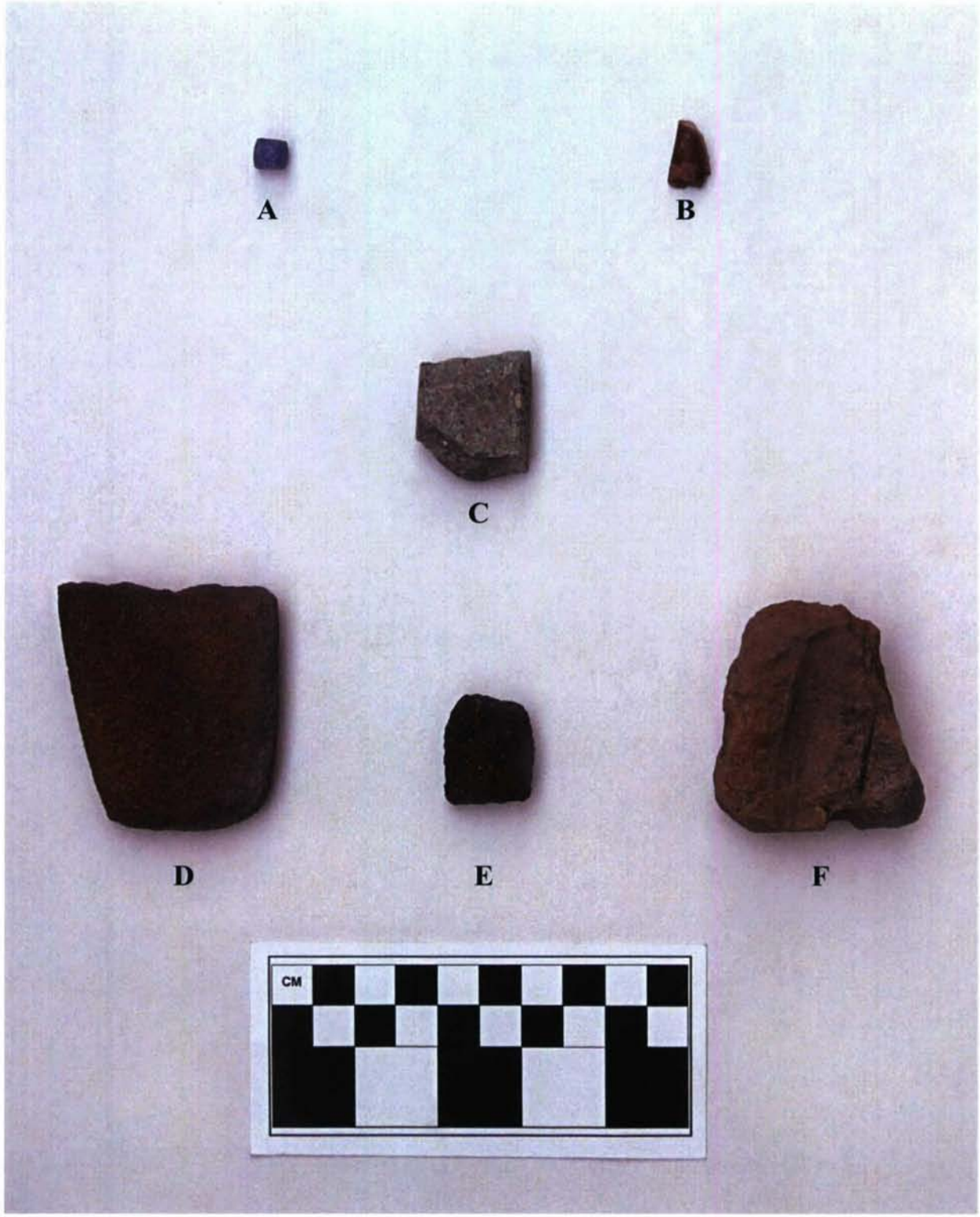


Figure 6.16: Jewelry items (A-5LA10100 FS276, B-5LA10100 FS257), steatite bowl fragment (C-5LA9959 FS16), and shaft abraders (D-5LA10100 FS221, E-5LA10100 FS 90, F-5LA10100 FS97) recovered during the 2002 survey.

Figure 6.17: Whetstone/abrader (5LA3521 FS17) recovered during the 2002 survey project.

7.0 Conclusions

In the past, archaeological research on the PCMS has been guided by a series of research themes/questions identified in Andrefsky et al (1990). Research questions have changed through time as more data has been accumulated in the field. As such, the professional archaeological community of Colorado prepared a regional context to help researchers synthesize field accumulated data (Zier and Kalasz 1999) and to help meet cultural resource management and professional goals. As discussed earlier in this document, the major research domains addressed in this report include chronology, population dynamics, technology, settlement and subsistence strategies, economy, architecture, rock art, and geomorphology and paleoclimates. These will now be discussed in regards to data collected during the project.

Field crews from NMSU discovered and evaluated 112 historic and prehistoric sites from the project survey areas. These included 107 new cultural material locations and 5 previously recorded sites with evidence for new features and components. Our work demonstrated 20 of the sites are eligible for listing on the NRHP and six require eligibility testing. A variety of different site types were identified during the project and included 68 (60%) lithic scatters, 25 (22%) prehistoric cultural material scatters with architectural or habitation features, ten (9%) prehistoric quarry locations, six (5%), historic sites, and four (4%) locations with rock art. Regarding the latter, they only evidenced rock art as recorded cultural material. In reality, rock art was identified on ten additional project sites, but the others were multi-component habitation locales. The low number of quarry sites might seem odd to those that know the terrain of the PCMS. Again, the above sites identified as quarry locations only had evidence for prehistoric quarrying activity. Eighty (71%) project sites were found along the rims of the major canyon systems of the PCMS, the area of the Hogback, and the Black and Cedar Hills landforms, so high-quality lithic material resources (i.e., chert and quartzite) were often less than 200 m away. In these few instances, quarrying activities were considered minor with respect to other economic endeavors.

When compared to site type designations from other PCMS projects, similarities and differences are apparent. In Welsh Canyon (Loendorf and Loendorf 1999:53-57), lithic scatters comprise 56% of all site types with many quarry sites (10%) identified. Since only the bottom and sidewalls of the large watercourse were surveyed, many rockshelter habitations were recorded (31%), but open-air architecture sites (3%) appeared nearly nonexistent. In the Black Hills (Owens et al. 2000:306-307), a high upland landform near the eastern portion of the PCMS, sites were 88% lithic scatters, 6% rockshelters, 3% open-air architecture sites, and 3% lithic procurement locations. A large open mechanized training location at the western part of the PCMS has also been surveyed. TA 7 (Owens and Loendorf 2002:188) contained 98% lithic scatters with the other 2% being both architectural and rock art sites. Collectively, the above data demonstrate that site type is highly variable based on landform, and to a lesser extent, elevation. Because the 2002 survey areas were placed over a wide variety of landforms, a great degree of variability is apparent regarding site type.

As a research theme, architectural studies are frequently used to address questions regarding demography, community development, cultural boundaries, technology, function, and social organizations (Zier and Kalasz 1999:239-250). For the purpose of this project, we are primarily concerned with feature function and spatial distribution. To understand the utility of

architecture in larger cultural systems, relationships between environmental and geographic factors and their overall influence on the placement of architectural sites must be examined. This can easily be done in the realm of a large-scale survey project, which promotes the discovery of more regional information in contrast to the site specific data normally collected during excavation work.

It is well known that prehistoric people locate themselves to interact socially, and to be near the resources they need for survival (Jochim 1976:47-63). Given the fact that sites encountered during the 2002 survey possessed abundant architectural features, we feel we have at least minimal diversity with which to look for trends in the placement of habitation sites.

Our project evidenced ten sites with architectural units more robust in construction (i.e., contiguous wall units) than that normally observed for spaced-stone circles. Based on Kalasz' (1989:901-92) structure attribute descriptions, these sites included eleven freestanding units, nineteen abutment structures, and four architectural units within rockshelters. On three project sites, there were at least three architectural units, and in four instances, only a single architectural feature was identified. Sites with architectural features were most often found along the canyon edges (3), in the hills (8), or the grassy steppes (2).

Those in the grassy steppes (5LA3521 and 5LA9944, three combined isolated structures); were found in relatively flat terrain, far from permanent water sources. This contrasts sharply when compared to other Late Prehistoric stage habitation sites that are in easily defensible positions (Angulski 1984: Chomko and DeVore 1990). From this perspective, contiguous walled structures had to have served at least two different functions. The difference in site placement is possibly related to subsistence practices, but without excavation (i.e., the recovery of pollen, faunal, or macrobotanical remains), this remains conjecture. When the architectural units of site 5LA10100 are considered, they are not in a defensible position either. In this case, the structures functioned for habitation; the site is a large village occupied for a long period of time, or it was reused several times by the same aboriginal group.

Spaced-stone circles (tipi rings), were identified on nine project sites. In most cases, the sites were found either at the northern fringe of the Big Arroyo Hills, near its contact with Bent Canyon, or at the east end of the Hogback. Both areas are where permanent and semi-permanent springs abound, and transitional ecozones at these locales would have allowed varied hunting and gathering strategies to be adopted. It is also in this type of environmental setting that high quality lithic raw materials were easily acquired.

Regarding site chronology, 37 project sites had temporarily diagnostic artifacts, features, ceramics, or a combination thereof. Tentative age determinations were assigned by consulting Anderson (1989) in the case of projectile points, Kalasz (1989) for architectural elements, Appendix III in Owens and Loendorf (2004) for ceramics, and Loendorf (1989) for rock art. It is clear that cultural materials were more often identified on the sites occupied during the Late Prehistoric stage (Table 7.1), though artifacts representing nearly every prehistoric stage were found. These data are consistent with that of other PCMS archaeological projects (Owens and Loendorf 2004:660).

Archaeological survey projects often have very little to offer regarding the recovery of paleoclimatic data. This being said, there are a few noteworthy points to be made when the age estimates for recorded field artifacts are considered in relation to known, and well documented, climatic episodes. First, Schuldenrein (1985) has hypothesized that post-Altithermal erosional episodes have eliminated the older sites from the PCMS. This is somewhat supported by the data in Figure 7.2 as intense occupation is certainly seen after 2500 BC. Benedict's (1979) two-stage Altithermal model (episodes between 5000 - 4500 BC and 4000 - 3500 BC), and that proposed by Johnson and Holliday (1986) from information recovered at the Lubbock Lake site (events from 4400 - 3500 BC and 3000 - 2500 BC) suggest drought conditions that correspond well with our project data. A lack of temporally diagnostic materials from this period suggests that resources within our portion of Colorado were poor and not many people lived here. It should be noted that most PCMS PaleoIndian points were from mixed surface assemblages, so Schuldenrein's model appears intact.

The Little Climatic Optimum (AD 200 to AD 900) is described as a period of heat and drought similar to those conditions seen during the Altithermal (Bryson et al. 1970). Again when Figure 7.2 is considered, we see very few midpoint age estimates for this time. This seems to reflect the poor conditions for habitation and area utilization. It is important to note that the xeric conditions for the time after AD 1000, described in Zier and Kalasz (1999:240), apparently had no effect on PCMS prehistoric populations.

The analysis of the lithic artifacts provides information regarding lithic material acquisition and manufacture, mobility, and chronological trends. From the 2002 project sites, hornfels/basalt, argillite, quartzite, and chert were the dominant local lithic materials. Argillite and hornfels/basalt outcrop near the southwestern project areas and fine- and coarse-grained quartzite outcrop in the numerous permanent and intermittent arroyos throughout the PCMS. Gravel deposits along the Purgatoire River, and on the erosional terraces of the major canyons, offer good potential for obtaining chert materials. What this means is that raw materials for making lithic artifacts were locally available, and most were collected utilizing an embedded tactic (Binford 1977, 1979; Brown 1991).

The 2002 survey project has produced an abundance of data regarding trade and exchange practices. Non-local materials identified in the debitage and chipped-stone tool assemblages included Alibates dolomite from Texas, Black Forest silicified wood from east-central Colorado, Flattop chalcedony (Colorado/Nebraska border), chert from the Hartville Uplift source in Wyoming, Niobrara/Smokey Hills jasper from various sources in the Plains, Jemez Mountain (Polvadera Peak, Obsidian Ridge, Canovas Canyon, and Cerro del Medio sources in New Mexico), and Malad (Idaho) obsidians, and Tiger-eye chert (western Colorado/Wyoming border). These materials were encountered as bifaces, bifacial-thinning flakes, complex flakes, cores, utilized/retouched flakes, perforating tools, scraping tools, simple flakes, and shatter.

The presence of cortex on 9% of the non-local lithic materials indicates that Jemez Mountain obsidian, Hartville Uplift chert, and Black Forest silicified wood entered the PCMS as unmodified and/or curated cobbles or nodules. Based on flake type, non-local materials also entered the area as unpatterned bifaces or prepared cores. Debitage data shows that once here, non-local materials were reduced to produce patterned tools (e.g., projectile points or scrapers),

flake tools, and flakes. It is unknown whether the procurement tactic for non-local materials involved seasonal movement or trade and exchange, but either way, the transport routes appear to be aligned north-south and along the eastern slope of the Rocky Mountains. Exceptions would be Tiger-eye chert, which outcrops in northwest Colorado/southeast Wyoming (Whittaker et al. 1988) and Alibates dolomite from the Texas panhandle.

Another artifact encountered during the project has bearing on trade and exchange issues. This item (5LA9959, FS 16) was an edge fragment from a steatite vessel. Steatite has been used for making containers throughout North America, but the likely source for this piece would be somewhere in the northern Rocky Mountain Region.

Data to study technology is easy to recover in any survey project, but a general point should be made. Sample size is not a problem for archaeologists working on the PCMS. In nearly every case, crews were able to collect a 150-piece debitage sample and every chipped- or ground-stone tool found on the modern ground surface. Regarding the debitage, it has been said that the larger the sample size in relation to the overall population size, the greater the precision of the estimate overall (Hardyck and Petrinovich 1969). While this may be true in many functional interpretations, it is not necessarily true when one is trying to identify temporally sensitive attributes for lithic items like debitage or scraping tools when compared to known, stylistic and diagnostic projectile points. We did find many projectile points that could be classified in Anderson's (1989) system, but the vast majority of our project sites were identified in deflated context, and thus, represent mixed lithic occupations. In short, our overall technological observations are very general, and temporal corollary data was impossible to obtain because of the mixed horizontal and vertical occupations of the sites.

When compared to the total number of artifacts, simple and complex flakes dominate the assemblage. Both expedient flake and bifacial technologies were utilized by the prehistoric inhabitants of the PCMS, and this is really not that surprising when the high number of overall artifacts is considered. High proportions of simple flakes and the presence of abundant shatter indicated formal core reduction or raw material procurement was the dominant lithic reduction strategy for locally available materials. This is no surprise as most project sites were less than 200 m from outcropping raw materials. At these locations, there is a strong emphasis on flake production and biface manufacture; the latter most associated with highly mobile people "gearing up" by producing bifaces for transport elsewhere.

Fourteen general tool classes were found in the chipped-stone tool assemblage – biface, bipolar core, chopper, core-tool, drill, end scraper, end/side scraper, graver, non-bipolar core, projectile point, side scraper, spokeshave, uniface, and utilized/retouched flake. When the overall chipped-artifact assemblage is considered (894), many (73%) artifacts were related to hunting or game processing activities, while only 27% were related to early-stage raw material reduction. The formal to expedient tool ratio is 1:1, suggesting more long-term occupation for sites within the project area. The TA 7 portion of the PCMS (Owens and Loendorf 2002:189) had a 4:1 patterned to expedient tool ratio suggesting more mobile populations occupied that area. The higher number of architectural and habitation features found in 2002 support the reason for this difference.

Our ground-stone analysis is descriptively functional in nature, and because artifacts were tallied, but not collected in the field, very little can be said regarding technological variability. Four hundred and fifty ground-stone artifacts were recorded from 2002 project sites. These were placed into one of four groups including mano (139 items), slab metate (281 items), edge-ground cobble (7), or bedrock metate (23). In addition, many miscellaneous artifacts were recorded including hammerstones, shaft abraders, jewelry items, polishing stones, a piece of an effigy, burned and calcined bone, ceramic sherds, a whetstone, and a steatite bowl fragment.

In an analysis of the recorded surface artifacts identified on the 2002 project sites, the four major topographic units defined in Schuldenrein et al. (1985) were used as units of comparative analysis. These topographic settings/units include the Steppes, Hogback, Canyons, and Hills. See Figure 2.1 for the location of these topographic features and a brief description for each can be found at the beginning of Chapter 2.0. Table 7.1 lists the project site data by topographic setting/unit. Some might call our sampling strategy an arbitrary breakdown, but we prefer to call it judgmental sampling because (1) after several years of fieldwork NMSU researchers have acquired knowledge about the PCMS region, and (2) this technique has led to the collection of reliable and meaningful data in the past (Owens and Loendorf 2000, 2002, 2004).

Table 7.1 provides information on project site, environmental, and lithic data. Most of the sites with temporally diagnostic materials can be attributed to the Late Prehistoric stage though it is noteworthy that only a single prehistoric site may be attributed to the Protohistoric period. Church (2002) indicates this may be due to the fact that archaeologists have trouble recognizing remains from this period in the field, but there is also a possibility that Kvamme's (1984, 1989) survey units were not placed where these types of cultural remains can be found. The high number of apparent Paleoindian sites is also important, as very few artifacts from this stage have ever been found at the PCMS.

In this, and past archaeological survey projects on the PCMS, remains of Hell Gap PaleoIndian projectiles have been identified (Figure 7.1). A pattern has started to emerge that needs to be addressed. Site locational data reveals that landforms on either side of Stage Canyon, and even more importantly the fringes of the Black and Cedar Hills landforms, have a high density of Hell Gap points. So what does this mean? Were the landforms on which these points were found favored by Hell Gap peoples, or were these locations where quaternary deposits exist? The latter is unlikely because on nearly every site, exposed Dakota group sandstone bedrock covers the modern ground surface and lithic artifacts were found in deflated context. We are seeing a pattern that likely relates to camp site location; places where food and non-food resources can be procured. Because all of the Hell Gap points found on the PCMS were made of quartzite, it is possible that Hell Gap peoples chose these types of locations to refurbish their tool kits. This notion is supported by the fact that Dakota quartzites outcrop in the area, and in every case except 5LA10069 and 5LA10100, only the broken bases were recovered by archaeologists.

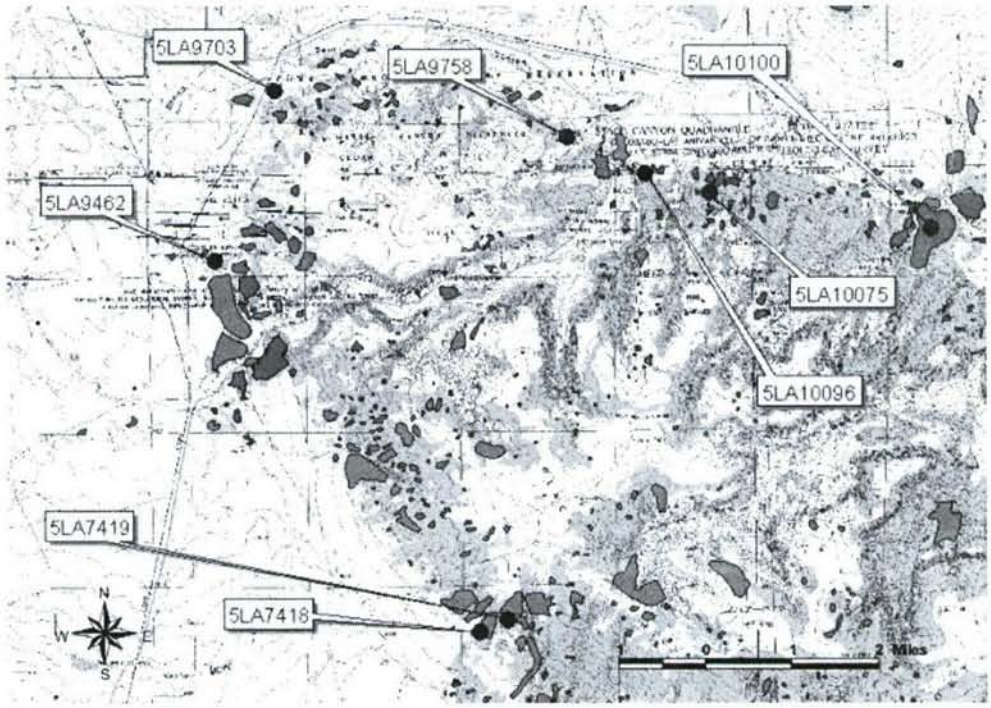


Figure 7.1: Map of Hell Gap projectile point locations in the area of the 2002 survey project.

Given the multi-component and mixed nature of the lithic assemblages it is surprising most project sites were encountered in the Hills portions of the base. One would suspect higher proportions of sites near the Canyons where abundant resources were easily obtained. We do not know if this represents cultural variation, or restrictions placed on this variable by the placement of Kvamme's (1984, 1989) predictive site model. It should be noted that the model is good for creating large site inventories for cultural resource management purposes, but it does not work well when trying to determine specific functional types or site age. This being said, researchers in the future should be able to take Kvamme's data and supplement it with site specific data to produce models for site type (i.e., food or lithic procurement locales).

Sub-dividing the project data allows us to make other generalizations regarding procurement target and subsistence method. Food, water, and lithic primary material sources were valuable commodities throughout prehistory. Because these resources were not distributed uniformly across a landscape, hunting and gathering groups, as well as semi-sedentary peoples, would have occupied landforms where the essential resources for maintaining life could be more easily obtained. This is the most important point when looking at human settlement patterns, and easily explains why there are usually more sites in the canyon areas of the PCMS (Owens and Loendorf 2004). Unfortunately, most of our 2002 project survey areas were placed away from the canyon edges, so this view does not readily apply. Nonetheless, a couple points can be made.

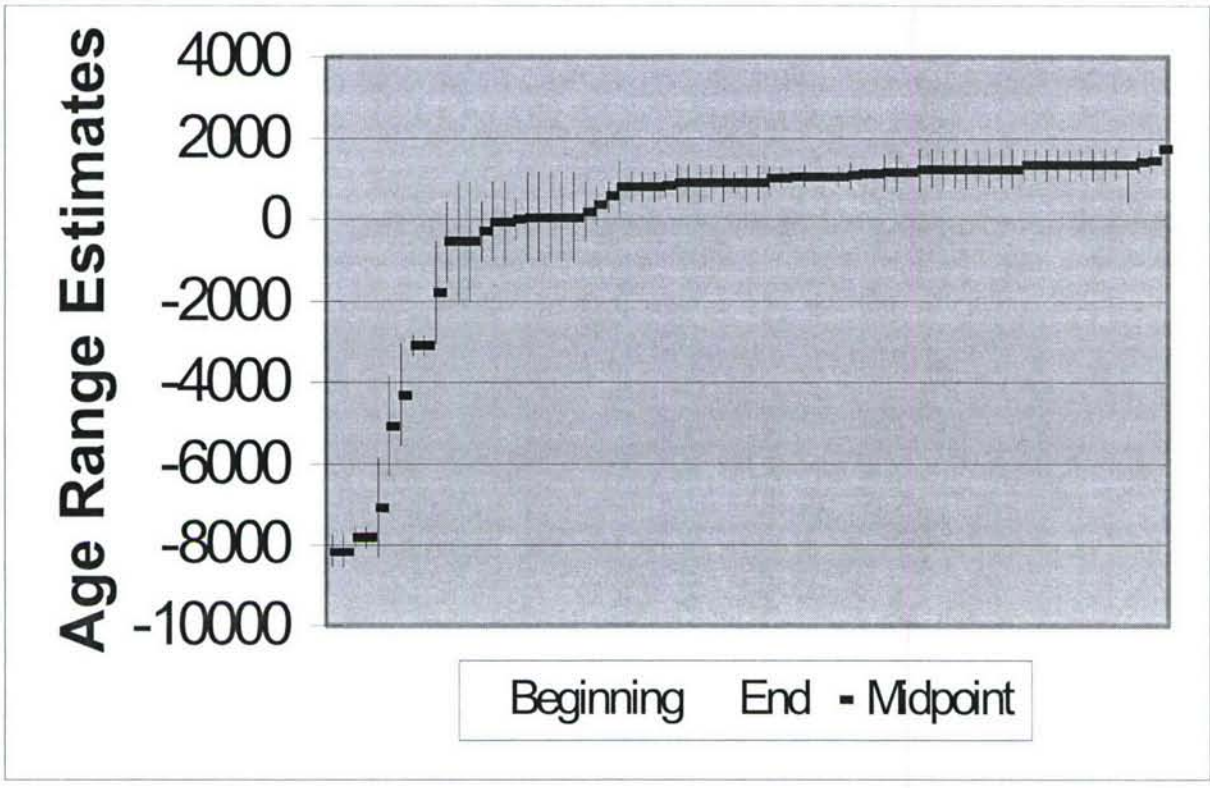


Figure 7.2: Chronological distribution for temporarily diagnostic artifacts or features encountered during the 2002 survey project.

2002 project sites were often long distances away from known sources of permanently available water, though seasonally water could likely be collected within a short distance of each. This suggests other resources where of high value to prehistoric site occupants. Non-food resources like water, firewood, and tool stone could have been easily obtained in the Hills and Canyon areas. The JUMO/BOER plant community (Shaw et al. 1989:28) was identified on over 41% of the project sites and is found in high proportions in Canyon (5%) and Hill settings (6%). Because environmental changes in the area of the PCMS have not been extreme since the Altithermal event, it seems likely that xeric species such as juniper trees, sagebrush, mountain mahogany, and skunkbrush would have been present in these areas throughout time. Multiple food resources would have been exploited from the Hills, Canyons, and Steppes and economic resources, such as lithic raw materials, were found in close proximity to the Hogback.

The Hills contain more lithic tools overall, but sites located on/near the Hogback, Canyons, and Steppes exhibit a higher average of tools per site. More ground-stone tools were found in the Hills and there is a high average of ground-stone tools per site, along with a low chipped- to ground-stone tool ratio. Conversely, there is a high chipped- to ground-stone tool ratio in the area of the Steppes and Hogback. These data indicate that subsistence strategies in the area of the Hills and Canyons are mixed hunting and gathering with an emphasis on food procurement. Based on the information presented in Table 7.1, we can argue the reason more ground-stone tools exist in the Hills is that prehistoric access to floral resources was good. In the Big Arroyo, Black, and Cedar Hills landforms, pinon trees and scrub oak, along with grass species like threeawn and Indian ricegrass were abundant. In addition, the trees and other woody shrubs would have provided fuel and cover for human inhabitants. These plants would have also

provided food, cover, and shelter for large herbivores like deer and elk. Visibility is another important attribute for sites found in the Hills.

Hogback sites differ dramatically from those found in other topographic settings. The ratio of chipped- to ground-stone tools is higher than that for Hills settings and the average number of stone tools per site is much higher than that for other settings. Because only five sites were recorded in the area of the Hogback, our sample is quite small. Given this shortcoming, the high number of debitage pieces per site and biface to core ratio is noteworthy. Argillite outcrops less than 500 m to the west of these locations so the proportion of bifaces to cores is surprising as one would expect to find more cores near a raw material source. It can be argued, that argillite was initially reduced at the quarry, and then more patterned artifacts were reduced at the site. The low number of ground-stone tools compared to chipped-stone tools suggests that vegetal food gathering was of lesser importance than the collection of lithic raw materials. From these data highly mobile hunters occupied the area of the Hogback. Many spaced-stone circle sites have been identified here, domiciles associated with highly mobile populations. Highly mobile groups produce more bifaces for transport, thus the reason for the high biface/core ratio now seems clear.

Comprising a smaller relative proportion, Canyon setting sites exhibit the highest ratio of flakes to chipped-stone tools and many more cores than bifaces were identified in their assemblages. It is here that Dakota quartzite outcrops everywhere and stratigraphic layers with flakable chert nodules are exposed as well. The sites found in the open and Grassy steppes were much more likely to contain non-local lithic material and a small number of ground-stone tools. This is related to higher degrees of residential mobility and an emphasis on hunting. The chipped- to ground-stone tool ratio and debitage to chipped-tool ratio suggest both hunting and gathering activities occur on open steppe sites, with a greater reliance on hunting.

In conclusion, surface sites have the ability to provide important archaeological data, especially in regards to the broad research themes that drive the archaeological profession (Andrefsky 1990; Zier and Kalasz 1999). Though the same may be said for excavated sites, this site-specific data normally does not allow for examining aspects in the broader context of regional perspective. The use of information recovered during the 2002 survey project has allowed us to look at the "big picture," and make generalizations regarding the past occupants of the PCMS. Temporally, this has been rather difficult as natural and cultural formation processes have impacted the landforms on which the project sites were identified.

The 2002 cultural resources survey project has produced a wealth of new data, and in the proceeding pages we have detailed these data and attempted to interpret, in our view, what they mean. On a contractual level, we hope to have provided a greater understanding of the archaeological resources found on the PCMS and how to protect them. On a larger scale, we hope to have made contributions to the larger research issues concerning prehistoric populations of southeastern Colorado, and the southern Plains States.

Table 7.1: Prehistoric Site Data for the Topographic Units Encompassed in the 2002 Survey Areas.

Prehistoric Site Data	Canyons	Hills	Hogback	Steppes
Number of sites	17	58	5	33
Total Number of Debitage Items	1188	2894	466	1743
Average Number of Debitage Items Per Site	74.2	54.6	116.5	56.2
Total number of Stone Tools	155	434	68	218
Average Number of Stone tools Per Site	9.6	8.1	17.0	7.1
Number of Sites with Stone Tools	14	45	4	28
Total Number of Ground-Stone Tools	95	293	8	45
Total Number of Sites with Ground Stone	13	40	2	18
Average Number of Ground-Stone Tools/Site	5.9	5.5	2	1.5
Multiple Component Sites	2	10	2	4
Ratio of Flakes to Chipped-Stone Tools	12.5	9.3	9.7	10.1
Ratio of Chipped- to Ground-Stone Tools	2.8	2.3	6.3	5.4
Ratio of Bifaces to Cores	0.8	0.9	2.1	1.3
Sites with PaleoIndian Component	1	4	0	1
Sites with Archaic Component	1	3	0	3
Sites with Late Prehistoric Component	3	16	4	7
Prehistoric Habitation Sites	5	14	3	3
Sites with Historic Component	2	12	1	3
Open-Air Lithic Scatters	2	37	1	28
Dominant Lithic Material	Quartzite	Quartzite	Argillite	Argillite
Presence of Prehistoric Ceramics	2	2	0	0
Average of Site Aspect	182	135	147	139
Average Distance to Water	920m	1401m	1659m	1079m
Sites with Thermal Features	4	13	0	1
Sites with Apishapa Phase Architecture	2	4	0	2
Sites with Tipi Rings	1	5	3	0
Sites with Rock Art	2	6	2	0
Sites with Nonlocal materials	4	13	3	12
Sites with Rockshelters	5	8	1	0

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9.0 APPENDIX I

Site Numbers for New Sites, Isolated Finds, and Site Revisits from the 2002 NMSU Survey Project.

Number	Type	Eligibility Status	Management Recommendation
5LA2289	Site	Eligible	No Further Consideration
5LA3521	Site	Eligible	No Further Consideration
5LA3551	Site	Not Eligible	No Further Work
5LA4751	Site	Eligible	Avoid and Test
5LA5497	Site	Not Eligible	No Further Work
5LA9931	Site	Not Eligible	No Further Work
5LA9932	Isolated Find	Not Eligible	n/a
5LA9933	Isolated Find	Not Eligible	n/a
5LA9934	Site	Not Eligible	No Further Work
5LA9935	Isolated Find	Not Eligible	n/a
5LA9937	Isolated Find	Not Eligible	n/a
5LA9938	Site	Not Eligible	No Further Work
5LA9939	Site	Eligible	No Further Consideration
5LA9940	Site	Not Eligible	No Further Work
5LA9941	Isolated Find	Not Eligible	n/a
5LA9942	Isolated Find	Not Eligible	n/a
5LA9943	Isolated Find	Not Eligible	n/a
5LA9944	Site	Eligible	No Further Consideration
5LA9945	Site	Not Eligible	No Further Work
5LA9946	Isolated Find	Not Eligible	n/a
5LA9947	Isolated Find	Not Eligible	n/a
5LA9948	Site	Not Eligible	No Further Work
5LA9949	Site	Not Eligible	No Further Work
5LA9950	Site	Not Eligible	No Further Work
5LA9951	Site	Not Eligible	No Further Work
5LA9952	Site	Not Eligible	No Further Work
5LA9953	Site	Not Eligible	No Further Work
5LA9954	Site	Not Eligible	No Further Work
5LA9955	Site	Not Eligible	No Further Work
5LA9956	Site	Eligible	Avoid and Test
5LA9957	Site	Needs Data	Avoid and Test
5LA9958	Site	Needs Data	Avoid and Test
5LA9959	Site	Eligible	Avoid and Test
5LA9960	Site	Not Eligible	No Further Work
5LA9961	Site	Not Eligible	No Further Work
5LA9962	Isolated Find	Not Eligible	n/a
5LA9963	Site	Not Eligible	No Further Work
5LA9964	Site	Eligible	Avoid
5LA9965	Site	Needs Data	Avoid and Test
5LA9966	Site	Not Eligible	No Further Work
5LA9967	Site	Not Eligible	No Further Work
5LA9968	Site	Not Eligible	No Further Work
5LA9969	Site	Not Eligible	No Further Work
5LA9970	Site	Not Eligible	No Further Work
5LA9971	Isolated Find	Not Eligible	n/a
5LA9972	Isolated Find	Not Eligible	n/a
5LA9973	Isolated Find	Not Eligible	n/a
5LA9974	Isolated Find	Not Eligible	n/a

Number	Type	Eligibility Status	Management Recommendation
5LA9975	Isolated Find	Not Eligible	n/a
5LA9976	Isolated Find	Not Eligible	n/a
5LA9977	Isolated Find	Not Eligible	n/a
5LA9978	Isolated Find	Not Eligible	n/a
5LA9979	Isolated Find	Not Eligible	n/a
5LA9980	Isolated Find	Not Eligible	n/a
5LA9981	Isolated Find	Not Eligible	n/a
5LA9982	Isolated Find	Not Eligible	n/a
5LA9983	Isolated Find	Not Eligible	n/a
5LA9984	Isolated Find	Not Eligible	n/a
5LA9985	Isolated Find	Not Eligible	n/a
5LA9986	Isolated Find	Not Eligible	n/a
5LA9987	Isolated Find	Not Eligible	n/a
5LA9988	Isolated Find	Not Eligible	n/a
5LA9989	Isolated Find	Not Eligible	n/a
5LA9990	Site	Needs Data	Avoid and Test
5LA9991	Site	Needs Data	Avoid and Test
5LA9992	Site	Needs Data	Avoid and Test
5LA9993	Site	Not Eligible	No Further Work
5LA9994	Site	Not Eligible	No Further Work
5LA9995	Site	Not Eligible	No Further Work
5LA9996	Isolated Find	Not Eligible	n/a
5LA9997	Site	Not Eligible	No Further Work
5LA9998	Site	Not Eligible	No Further Work
5LA9999	Site	Not Eligible	No Further Work
5LA10000	Site	Eligible	Data Recovery
5LA10001	Isolated Find	Not Eligible	n/a
5LA10002	Isolated Find	Not Eligible	n/a
5LA10003	Isolated Find	Not Eligible	n/a
5LA10004	Isolated Find	Not Eligible	n/a
5LA10005	Site	Not Eligible	No Further Work
5LA10006	Site	Not Eligible	No Further Work
5LA10007	Site	Not Eligible	No Further Work
5LA10008	Site	Not Eligible	No Further Work
5LA10009	Site	Not Eligible	No Further Work
5LA10010	Site	Eligible	Data Recovery
5LA10011	Site	Not Eligible	No Further Work
5LA10012	Site	Not Eligible	No Further Work
5LA10013	Site	Not Eligible	No Further Work
5LA10014	Site	Not Eligible	No Further Work
5LA10015	Site	Not Eligible	No Further Work
5LA10016	Site	Not Eligible	No Further Work
5LA10017	Site	Not Eligible	No Further Work
5LA10018	Site	Eligible	No Further Consideration
5LA10019	Site	Eligible	No Further Consideration
5LA10020	Site	Not Eligible	No Further Work
5LA10021	Isolated Find	Not Eligible	n/a
5LA10022	Isolated Find	Not Eligible	n/a
5LA10023	Isolated Find	Not Eligible	n/a
5LA10024	Isolated Find	Not Eligible	n/a
5LA10025	Isolated Find	Not Eligible	n/a
5LA10026	Isolated Find	Not Eligible	n/a
5LA10027	Isolated Find	Not Eligible	n/a
5LA10028	Isolated Find	Not Eligible	n/a
5LA10029	Site	Not Eligible	No Further Work

Number	Type	Eligibility Status	Management Recommendation
5LA10030	Site	Not Eligible	No Further Work
5LA10057	Isolated Find	Not Eligible	n/a
5LA10058	Site	Not Eligible	No Further Work
5LA10059	Site	Eligible	No Further Consideration
5LA10060	Site	Eligible	Data Recovery
5LA10061	Site	Not Eligible	No Further Work
5LA10062	Site	Not Eligible	No Further Work
5LA10063	Site	Eligible	Avoid and Test
5LA10064	Site	Not Eligible	No Further Work
5LA10065	Site	Not Eligible	No Further Work
5LA10066	Isolated Find	Not Eligible	n/a
5LA10067	Isolated Find	Not Eligible	n/a
5LA10068	Site	Not Eligible	No Further Work
5LA10069	Site	Not Eligible	No Further Work
5LA10070	Site	Not Eligible	No Further Work
5LA10071	Site	Not Eligible	No Further Work
5LA10072	Site	Not Eligible	No Further Work
5LA10073	Site	Not Eligible	No Further Work
5LA10074	Site	Not Eligible	No Further Work
5LA10075	Site	Not Eligible	No Further Work
5LA10076	Isolated Find	Not Eligible	n/a
5LA10077	Isolated Find	Not Eligible	n/a
5LA10078	Isolated Find	Not Eligible	n/a
5LA10079	Isolated Find	Not Eligible	n/a
5LA10080	Isolated Find	Not Eligible	n/a
5LA10081	Isolated Find	Not Eligible	n/a
5LA10082	Site	Not Eligible	No Further Work
5LA10083	Site	Not Eligible	No Further Work
5LA10084	Site	Not Eligible	No Further Work
5LA10085	Site	Not Eligible	No Further Work
5LA10086	Site	Not Eligible	No Further Work
5LA10087	Site	Not Eligible	No Further Work
5LA10088	Site	Not Eligible	No Further Work
5LA10089	Site	Not Eligible	No Further Work
5LA10090	Isolated Find	Not Eligible	n/a
5LA10091	Site	Not Eligible	No Further Work
5LA10092	Site	Not Eligible	No Further Work
5LA10093	Site	Not Eligible	No Further Work
5LA10094	Site	Not Eligible	No Further Work
5LA10095	Site	Not Eligible	No Further Work
5LA10096	Site	Not Eligible	No Further Work
5LA10097	Isolated Find	Not Eligible	n/a
5LA10098	Isolated Find	Not Eligible	n/a
5LA10099	Site	Not Eligible	No Further Work
5LA10100	Site	Eligible	Data Recovery
5LA10101	Site	Eligible	No Further Consideration
5LA10102	Site	Not Eligible	No Further Work
5LA10103	Site	Eligible	No Further Consideration
5LA10104	Site	Not Eligible	No Further Work
5LA10105	Site	Not Eligible	No Further Work
5LA10108	Isolated Find	Not Eligible	n/a
5LA10109	Isolated Find	Not Eligible	n/a
5LA10110	Isolated Find	Not Eligible	n/a
5LA10111	Isolated Find	Not Eligible	n/a

Number	Type	Eligibility Status	Management Recommendation
5LA10112	Isolated Find	Not Eligible	n/a
5LA10113	Site	Not Eligible	No Further Work
5LA10114	Site	Not Eligible	No Further Work
5LA10115	Site	Not Eligible	No Further Work
5LA10116	Site	Not Eligible	No Further Work
5LA10117	Site	Not Eligible	No Further Work
5LA10118	Site	Eligible	Avoid
5LA10119	Site	Not Eligible	No Further Work
5LA10121	Isolated Find	Not Eligible	n/a
5LA10122	Isolated Find	Not Eligible	n/a
5LA10123	Isolated Find	Not Eligible	n/a
5LA10124	Isolated Find	Not Eligible	n/a
5LA10125	Isolated Find	Not Eligible	n/a
5LA10126	Isolated Find	Not Eligible	n/a
5LA10127	Isolated Find	Not Eligible	n/a
5LA10128	Isolated Find	Not Eligible	n/a
5LA10129	Isolated Find	Not Eligible	n/a
5LA10130	Isolated Find	Not Eligible	n/a
5LA10131	Site	Not Eligible	No Further Work
5LA10132	Site	Not Eligible	No Further Work
5LA10133	Site	Not Eligible	No Further Work
5LA10134	Site	Not Eligible	n/a
5LA10135	Site	Eligible	n/a
5LA10136	Site	Not Eligible	No Further Work
5LA10137	Site	Not Eligible	No Further Work
5LA10138	Isolated Find	Not Eligible	n/a
5LA10139	Isolated Find	Not Eligible	n/a
5LA10140	Isolated Find	Not Eligible	n/a
5LA10141	Isolated Find	Not Eligible	n/a
5LA10142	Isolated Find	Not Eligible	n/a
5LA10143	Isolated Find	Not Eligible	n/a

10.0 APPENDIX II

Items Recorded as Isolated Finds

Number	Item/s
5LA9932	hornfels/basalt utilized flake
5LA9933	chert simple flake with patination
5LA9935	hornfels/basalt complex flake
5LA9937	stoneware jug
5LA9941	Fine-grained quartzite utilized flake
5LA9942	chert complex flake
5LA9943	hornfels/basalt simple flake
5LA9946	hornfels/basalt utilized flake
5LA9947	sandstone mano fragment
5LA9962	two fine-grained quartzite simple flakes
5LA9971	Black Forest silicified wood perform
5LA9972	quartzite complex flake, argillite complex flake, argillite simple flake
5LA9973	argillite preform, Anderson (1989) type P48
5LA9974	chert complex flake
5LA9975	argillite simple flake
5LA9976	two argillite simple flakes
5LA9977	chert complex flake
5LA9978	fine-grained quartzite complex flake
5LA9979	Ralston Creek chert simple flake, simple chert flake
5LA9980	chert shatter, fine-grained quartzite simple flake
5LA9981	chert simple flake
5LA9982	chert unfinished biface
5LA9983	Fine-grained quartzite simple flake
5LA9984	Fine-grained quartzite simple flake
5LA9985	argillite core
5LA9986	hornfels/basalt biface-thinning flake
5LA9987	Ralston Creek chert shatter
5LA9988	chert simple flake
5LA9989	sandstone mano fragment
5LA9996	sandstone slab metate fragment
5LA10001	argillite utilized flake with patination
5LA10002	chert biface-thinning flake
5LA10003	silicified wood tested cobble
5LA10004	chert utilized flake with patination
5LA10021	two argillite simple flakes, an argillite complex flake, and a piece of argillite shatter
5LA10022	three simple argillite flakes
5LA10023	argillite utilized flake
5LA10024	Alibates dolomite utilized flake
5LA10025	hornfels/basalt simple flake
5LA10026	sandstone mano
5LA10027	fine-grained quartzite complex flake
5LA10028	argillite core
5LA10057	two complex argillite flakes and a piece of argillite shatter
5LA10066	sandstone metate fragment
5LA10067	argillite simple flake
5LA10076	chert complex flake, chert biface-thinning flake

Number	Item/s
5LA10077	chert complex flake, obsidian simple flake, hornfels/basalt biface-thinning flake
5LA10078	argillite complex flake with patination
5LA10079	argillite complex flake with patination
5LA10080	argillite complex flake
5LA10081	three fine-grained quartzite simple flakes and a fine-grained quartzite complex flake
5LA10090	Coarse-grained quartzite mano fragment
5LA10097	Hartville Uplift side scraper
5LA10098	coarse-grained quartzite simple flake and a coarse-grained quartzite complex flake
5LA10108	fine-grained quartzite complex flake
5LA10109	sandstone edge-ground cobble
5LA10110	coarse-grained quartzite simple flake
5LA10111	coarse-grained quartzite utilized flake with patination
5LA10112	coarse-grained quartzite simple flake and a coarse-grained quartzite complex flake
5LA10121	four complex chert flakes
5LA10122	sandstone metate fragment
5LA10123	quartzite slab metate fragment
5LA10124	coarse-grained quartzite simple flake
5LA10125	Coarse-grained quartzite complex flake
5LA10126	chert simple flake
5LA10127	Coarse-grained quartzite utilized flake
5LA10128	glass insulator
5LA10129	medicine bottle
5LA10130	chert utilized flake
5LA10138	coarse-grained quartzite simple flake
5LA10139	two coarse-grained quartzite flakes and a chert simple flake
5LA10140	Coarse-grained quartzite hammerstone
5LA10141	sandstone metate fragment
5LA10142	chert utilized flake
5LA10143	Coarse-grained quartzite complex flake

11.0 APPENDIX III

2002 Eligible Sites with Historic Components
by
Pamela Rasfeld Owens

5LA2289

The site in the Big Arroyo Hills is on land patented (T29S R60W, section 11) by Cassander H. Minor and her deceased husband William E. Minor in 1924. Mr. Minor died in Model in 1922 at the age of 42, leaving her with 10 children. Cassander was born in about 1879, married William in Nebraska in 1900, and died in California in 1947. Historic artifacts encountered on the site include cans, glass, sheet metal, hardware, slag from a blacksmith, a foundation, well, dugout and privy.

5LA3521

The site, consisting of a trash scatter, is on the south side of the Hogback on land patented by Charles E. Julian in 1926 (T31S R59Wm southwest quarter of section 8). He was not located on the 1920 census.

5LA9939

This site in the Big Arroyo Hills is on land patented (T29S R60W, sections 10 and 11) by Daniel Ahern in 1922. A person by the name of Daniel Ahern, born in 1877 in Ireland, appears on the 1910 census in Denver. He was a motorman on a streetcar and had immigrated in 1901. In addition, he married Delia in 1908 and had two children- Daniel and Ellen.

A search of the census indicates there is also an 11 year old Daniel, the son of 42-year old Irishman Ben Ahurn, living in the Thatcher Precinct in 1920. Ben was married to Delia, and based on other similarities; this is likely the same man. Ben was a foreman for the railroad at this time.

The site is an historic mining camp and artifacts include hardware, glass, cans, a mattress, a baby powder can, bricks, sheet metal and coal.

5LA10000

This site in the Black Hills is on land patented by William D. Reid in 1921 (T28S R57W, northeast quarter of section 10). Reid was living in the Thatcher Precinct at the time of the 1920 census and is listed as a single, 47-year old Kansas born stockman. Historic cultural remains on this significant prehistoric site include rock art, a drift fence and axe cut junipers. Names appearing on the Dakota sandstone cliffs include Jake M. 1932, Alex, Rosy Cordova and Dorothy Howely. The latter women were not identified in the census records.

5LA10060

This site in the Black Hills is on land (T28S R57W, section 11) patented by Henry Halsey in 1921. Born in Alabama in 1879, Halsey, according to local resident Bobby Hill, worked for the Hohnbaums before filing on his own land claim. Henry was the census enumerator for the area in 1930.

The historic component of the site includes the names and initials Halsey, FG and LB. These are incised over the top of a Plains Biographic rock art panel at the south end of the site.

5LA10100

The site in the Black Hills is on a parcel of land (T28S R57W, southwest corner of section 7) patented by Richard L. Surrant in 1891. Survant is an early homesteader at Piñon and appears on the 1910 census in Trinidad. He was born in Tennessee in about 1860, married Margarite in about 1888, and their son Eugene was born in Colorado in about 1901. Richard worked as a fireman on the railroad.

Historic cultural remains on the site are etchings on the sandstone cliffs. Panel 2 contains the inscriptions: DUNNE "D" Co 19th INF July 31, 1874, LOWERY, HH, and W E DERBY D Co US 19th INF . These names have been tied to Company D of the 19th Infantry, which was stationed at Fort Lyon, and was transporting horses to the troops at Fort Union in New Mexico.

About 30 other historic inscriptions appear at this site, most of which are initials and dates ranging from 1900 to 1969. Full name inscriptions include Tony Aragon, Jr. 1969, Leonard Uiery 1942, CV Axton and EA Turley, DA Taylor, Nelling Ida Taylor, Dick Tinker, Daisy Flewel and Rose Hayes. A Leonard Usery appears on the Social Security death index as a railroad worker who died in Missouri in 1995 at the age of 84. Axton and Turley are two wives who lived in Rocky Ford in 1900. Clariss Axton was the second wife of William Axton, a teamster who died in Colorado in 1928. She was born in Iowa in 1878. Ella Turley was the wife of Thomas, an engineer on the railroad. She was born in Illinois in 1863. Flewel is a German surname that appears in Texas in the early 1900's, but Daisy was not located. The others were not positively identified in census records or the social security death index due to lack of information.

5LA10101

This site in the Black Hills is on land patented (T28S R57W, southwest quarter of section 12) by Daniel S. Miller in 1923. Miller appears on the 1920 census in Otero County as a dairy farmer who was born in Pennsylvania in about 1865. The historic component of this site is two rock art panels which read JG1832 and GG 1950. This is the earliest date yet found on the PCMS, however it is not associated with any known expeditions.

2002 Non- Eligible Sites with Historic Components

5LA9938, 5LA9940

These sites in the Big Arroyo Hills are on land patented by Julian Herrera in 1882. He lived in El Moro in 1910, and was born in about 1861 in New Mexico. Recorded historic artifacts include glass, tin cans, ceramics, and a battery core.

5LA9963

The site, a light historic trash scatter, is on the south side of the Hogback is on state land (T31S R59W, section 16).

5LA9994

This site, on the south side of Van Bremer Arroyo, is on land (T30S R60W, section 29) purchased by Charles Conkle in 1913. Conkle appears on the 1910 census in El Paso County as a laborer on a stock farm. He was born in Iowa in about 1883.

Cultural materials include a trash scatter with a household fuse and items from a dairy operation.

5LA9997

This site is in T29S R60W, northeast quarter of section 13, in the Big Arroyo Hills. This land was patented by Clyde Hawkins in 1925. He was born in Kentucky in about 1891 and appears on the 1920 census in Crowley County as a farmer. Historic artifacts include milk glass, cans and a metal strap.

5LA9999, 5LA10084, 5LA10086

These three sites in the Big Arroyo Hills are on land patented (T29S R60W, section 12) by Lydia E. Blackmore in 1923. She was not identified in any census record. Cultural materials at 9999 and 10084 include household trash (glass, cans, porcelain, pot) and axe cut junipers. 5LA10086 exhibits similar trash plus a barrel, hardware, a box spring covering a well, a fence, a 1940's car and a 1942 license plate. These latter artifacts likely represent a later occupation.

5LA10006

This site of the south side of the Hogback in T30S R60W, section 34, in the northwest quarter, contains a historic panel which reads OCT 16 1921 TRUJILLO. Although a common surname for the area, no Trujillo's appear in the land patents for the land on which the site was identified.

5LA10013

This site on the southeast end of the Hogback is on land patented (T31S R59W, section 14) by Edward L. Hollingsworth in 1923. Hollingsworth not identified on the census. Recorded historic artifacts include various bits of glass, cans and metal.

5LA10069

This site in the Black Hills is on land patented in the southwest quarter of section 14 in T28S R57W by Missourian Henry A. Barnes in 1922. The only historic artifact encountered on the site is a 1" steel cable that runs down into the canyon. His homestead, 5LA6108, is nearby, and on top of the ridge.

5LA10014

This site in Stage Canyon is on land patented (T28S R57W, section 10) by Henry Halsey in 1921. His homestead is located nearby in the Bent Canyon Arroyo. Halsey was born in Alabama in 1879. Three historic inscriptions were found on the site: JSJ1871, G and arrows, and JC 1877. There were no early land grants recorded by people with these initials in this area.

12. 0 Appendix IV: Northern Technical Resources Letter Report

Prepared by:

Erica Hill, Ph.D.

NORTHERN TECHNICAL RESOURCES
Academic Editing & Analysis Services
P.O. Box 80327 / Fairbanks, AK 99708 · 907.374.0983

30 April 2004
Mark Owens
Department of Sociology and Anthropology
MSC 3BV
New Mexico State University
P.O. Box 30001
Las Cruces, NM 88003-8001

Dear Mark,
In this letter, I report on the materials from site 5LA10000, located in the PCMS, Las Animas county, Colorado, and excavated in 2002. The materials were excavated from Feature 2, an arroyo profile located within a rockshelter. Provenience is mixed.

Vertebrate Faunal Remains
A total of 286 faunal specimens were recovered from Feature 2 as a result of screening through two different screen sizes: ¼" ($n = 49$) and 1/8" ($n = 237$). Identifiable vertebrate (NISP = 58) remains include elements representing birds, amphibians or reptiles, and mammals.

One passerine bird element and two amphibian or reptile specimens were identified; the remaining 55 identified specimens represent mammals. A total of 228 specimens were too fragmentary to be identified.

Mammals represented in the Feature 2 assemblage include leporids ($n = 24$), rodents ($n = 7$), a single canid specimen, and 23 mammal elements not otherwise identified. The leporids include 15 cottontail (*Sylvilagus* spp.) and 7 jackrabbit (*Lepus* sp.) specimens. Two specimens were identified only as leporids (rabbits or hares). Rodents include 5 prairie dog (*Cynomys* sp.) and 2 woodrat (*Neotoma* spp.) specimens.

In addition to fragmentation, vertebrate faunal remains from Feature 2 were subject to both burning and root etching. A total of 90 specimens had evidence of burning, which ranged from charring and blackening to complete calcining, the latter producing friable specimens with a white, powdery consistency. The extent of burning on these specimens indicates exposure to a range of temperatures and may support the identification of a thermal feature at the site.

Root etching, a post-depositional taphonomic process, was observed on four specimens. Not cut, chop, or hack marks were observed on any specimen from this assemblage.

Artifactual Bone

Three (3) pieces of artifactual bone were recovered in the materials from Feature 2, as follows:

1) one bone tube or bead made from an unidentified bone, complete and unbroken, measuring 6 mm by 2 mm. Such tubes, usually interpreted as beads, have been commonly encountered at archaeological sites in the PCMS;

2) the smoothed shaft of what was probably a pointed implement or awl made from a bone of a medium to large mammal; 38 mm by 8 mm;

3) a flat, unidentified artifact made from a bone of a medium to large mammal with smooth lateral margins and transverse scratches on the surface; 23 mm by 15 mm.

Conclusions

All identified taxa presently inhabit the study area, and have been reported at other sites in the PCMS (Schiavitti et al. 2001). Leporids (rabbits and hares) are generally thought to represent a primary subsistence resource in the region throughout prehistory. Prairie dogs and woodrats may also have been consumed. The lack of clear markers of human modification, such as cut marks, makes it difficult to determine what role these taxa played in prehistoric subsistence. Large mammals, such as cervids (mule deer, Odocoileus hemionus, or white-tailed deer, Odocoileus virginianus) were probably also utilized, however no specimens were identified in this assemblage, although fragments of medium to large mammals were present..

While the small number of faunal specimens recovered from Feature 2 at 5LA10000 makes any conclusions speculative, this assemblage appears to be typical of materials recovered from prehistoric PCMS sites, i.e., mammal remains, specifically the remains of leporids (rabbits and hares), dominate the sample and probably represent the focus of prehistoric subsistence practices.

Thank you for the opportunity to examine these materials.

Sincerely,

Erica Hill, Ph.D.

13.0 Appendix V: Geochemical Research Laboratory Letter Report 2002-12

Prepared by:

Richard E. Hughes, Ph.D.

Director, Geochemical Research Laboratory
20 Portola Green Circle
Portola Valley, CA 94028-7833

April 29, 2004

Mr. Mark Owens
Department of Sociology and Anthropology
MSC 3BV
New Mexico State University
P.O. Box 30001
Las Cruces, New Mexico 88003-8001

Dear Mark:

Enclosed with this letter you will find a table presenting x-ray fluorescence (xrf) data generated from the analysis of 12 artifacts from various archaeological sites collected as part of the 2002 survey project at the Pinon Canyon Maneuver Site, southeastern Colorado. This research was conducted pursuant to your letter request of January 9, 2004.

Analyses of these obsidian samples were performed at my laboratory on a QuanX-EC™ (Thermo Electron Corporation) edxrf spectrometer equipped with a rhodium (Rh) x-ray tube, a 50 kV x-ray generator, digital pulse processor with automated energy calibration, and a Peltier cooled solid state detector with 145 eV resolution (FWHM) at 5.9 keV. The x-ray tube was operated at 40.0 kV using a 127 mm palladium (Pd) primary beam filter in an air path to generate x-ray intensity data for elements rubidium (Rb Kα), strontium (Sr Kα), yttrium (Y Kα), zirconium (Zr Kα), and niobium (Nb Kα). Barium (Ba Kα) intensities were generated by operating the x-ray tube at 50.0 kV with a.38 mm copper (Cu) filter, while those for titanium (Ti Kα), manganese (Mn Kα) and total iron ($Fe_2O_3^T$) were generated by operating the x-ray tube at 30.0 kV using a .025 mm Pd filter. Iron vs. manganese (Fe Kα/Mn Kα) ratios were computed from data generated by operating the x-ray tube at 30.0 kV with a .025 mm Pd filter. Each subroutine was run at 200 deadtime-corrected seconds, with tube current scaled to the physical size of each specimen. Otherwise, artifact-to-source (geochemical type) attribution procedures, element-specific measurement resolution, and literature references applicable to this group of samples are the same as I reported for other artifacts from Pinon Canyon Maneuver sites (Hughes 2002).

Xrf data (in the enclosed table) indicate that seven specimens were manufactured from obsidians erupted in the Jemez Mountains of northern New Mexico. Of this total, three have the same trace element composition as obsidian of the Cerro del Medio (a.k.a. Valles Rhyolite) chemical type, two conform to the geochemical signature of Polvadera Peak (a.k.a. El Rechuelos Rhyolite, and one sample each matches the Obsidian Ridge (a.k.a. Cerro Toledo Rhyolite) and the Canovas Canyon "fingerprint". Four other artifacts from have the same trace element composition as obsidian of the Malad, Idaho, geochemical type, and one sample (FS #29 from 5LA3521) was manufactured from a non-obsidian parent material. I hope this information will help in your analysis and interpretation of materials from these sites. Please contact me at my laboratory ([650] 851-1410; e-mail: rehughes@silcon.com) if I can be of further assistance.

Sincerely,

Richard E. Hughes, Ph.D.
Director, Geochemical Research Laboratory

REFERENCE

Hughes, Richard E.

2002 X-ray Fluorescence Analysis of Obsidian Artifacts from Various Archaeological Sites in the Training Area 10 Portion of the Pinon Canyon Maneuver Site, Southeastern Colorado. Geochemical Research Laboratory Letter Report 2002-24 submitted to Mark Owens, New Mexico State University, April 24, 2002.

Cat. Number	Trace and Selected Minor Element Concentrations											Ratio	Obsidian Source (Chemical Type)
	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Fe/Mn	
5LA10000, FS # 58	nm	nm	113 ±4	69 ±3	29 ±3	81 ±4	13 ±3	1628 ±18	nm	nm	nm	nm	Malad, Idaho
5LA10015, FS # 19	nm	nm	134 ±4	6 ±3	22 ±3	61 ±4	42 ±3	nm	nm	nm	nm	14	Polvadera Peak, New Mexico
5LA10015, FS # 35	nm	nm	115 ±4	67 ±3	31 ±3	85 ±4	14 ±3	1578 ±18	nm	nm	nm	nm	Malad, Idaho
5LA10058, FS # 3	nm	nm	120 ±4	70 ±3	32 ±3	87 ±4	12 ±3	1550 ±16	nm	nm	nm	nm	Malad, Idaho
5LA10091, FS # 5	nm	nm	156 ±4	7 ±3	23 ±3	68 ±4	44 ±3	nm	nm	nm	nm	14	Polvadera Peak, New Mexico
5LA10132, FS # 19	nm	nm	187 ±4	3 ±3	59 ±3	166 ±4	93 ±3	nm	nm	nm	nm	21	Obsidian Ridge, New Mexico
5LA3521, FS # 8	nm	nm	152 ±4	7 ±3	41 ±3	155 ±4	51 ±3	nm	nm	nm	nm	25	Cerro del Medio, New Mexico
5LA3521, FS # 29	nm	nm	0 ±4	1 ±3	1 ±3	8 ±4	1 ±3	nm	nm	nm	nm	nm	Not Obsidian
5LA3521, FS # 31	nm	nm	157 ±4	7 ±3	43 ±3	158 ±4	51 ±3	nm	nm	nm	nm	26	Cerro del Medio, New Mexico
5LA9953, FS # 3	nm	nm	126 ±4	73 ±3	31 ±3	88 ±4	11 ±3	1597 ±18	nm	nm	nm	nm	Malad, Idaho
5LA9955, FS # 1	nm	nm	150 ±4	8 ±3	41 ±3	160 ±4	51 ±3	nm	nm	nm	nm	27	Cerro del Medio, New Mexico
5LA9990, FS # 4	nm	nm	116 ±4	39 ±3	22 ±3	100 ±4	49 ±3	350 ±15	nm	nm	nm	14	Canovas Canyon, New Mexico
Comparative Geologic Reference Standards													
PP-L2-3a	36 ±6	16 ±3	149 ±4	8 ±3	22 ±3	71 ±4	39 ±3	nm	500 ±15	482 ±11	.64 ±.10	13	Polvadera Peak, New Mexico
LT-4	53 ±5	19 ±3	151 ±4	7 ±3	38 ±3	157 ±4	48 ±3	nm	577 ±16	447 ±11	1.20 ±.10	26	Cerro del Medio, New Mexico
GS8-2	87 ±5	20 ±3	193 ±4	4 ±3	58 ±3	156 ±4	84 ±3	nm	451 ±14	600 ±8	1.19 ±.08	21	Obsidian Ridge, New Mexico
CC-2	38 ±6	16 ±3	122 ±4	38 ±3	17 ±3	100 ±4	48 ±3	332 ±12	727 ±17	518 ±11	.80 ±.10	15	Canovas Canyon, New Mexico

Values in parts per million (ppm) except total iron (in weight percent) and Fe/Mn intensity ratios; ± = estimate of x-ray counting uncertainty and regression fitting error at 300 and 600 (*) seconds livetime; nm = not measured; ᵀ= patinated.

14.0 Appendix VI: Radiocarbon Age Determination Letter Reports

Prepared by:

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RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-29683-AMS**	Date Received:	10/24/2002
Your Reference:		Date Reported:	12/11/2002
Submitted by:	Mark Owens New Mexico State University Dept. of Sociology and Anthropology MSC 3BV PO Box 30001 Las Cruces, NM 88003-8001		

Sample Name: **5LA9959, FS 30**

AGE = **3680 ± 40 ^{14}C years BP (^{13}C corrected)**

Description: Sample of charcoal

Pretreatment: The charcoal fragments were separated from sand, silt, rootlets, or other foreign matter. The sample was then treated with hot dilute 1N HCl to remove any carbonates; with 0.1N dilute NaOH to remove humic acids and other organic contaminants; and a second time with dilute HCl. The sample was then rinsed and dried and the cleaned charcoal was combusted to recover carbon dioxide for the analysis.

Comments:

$\delta^{13}C_{PDB}$ = **-19.6 ‰**

Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

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RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-29682-AMS**	Date Received:	10/24/2002
Your Reference:		Date Reported:	12/11/2002
Submitted by:	Mark Owens New Mexico State University Dept. of Sociology and Anthropology MSC 3BV PO Box 30001 Las Cruces, NM 88003-8001		

Sample Name:	**5LA10000, FS 120**
AGE =	**1110 ± 40 ^{14}C years BP (^{13}C corrected)**
Description:	Sample of charcoal
Pretreatment:	The charcoal fragments were separated from sand, silt, rootlets, or other foreign matter. The sample was then treated with hot dilute 1N HCl to remove any carbonates; with 0.1N dilute NaOH to remove humic acids and other organic contaminants; and a second time with dilute HCl. The sample was then rinsed and dried and the cleaned charcoal was combusted to recover carbon dioxide for the analysis.
Comments:	
$\delta^{13}C_{PDB}$ =	**-23.1 ‰**

Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.