An Archaeological Assessment of the Upper Crossing Site, Saguache County, Colorado

Mark D. Mitchell

[For Public Distribution]

PCRG
PaleoCultural Research Group

An Archaeological Assessment of the Upper Crossing Site, Saguache County, Colorado

by

Mark D. Mitchell

With Contributions by

Carl R. Falk
Marvin Goad
Christopher M. Johnston
Cody Newton

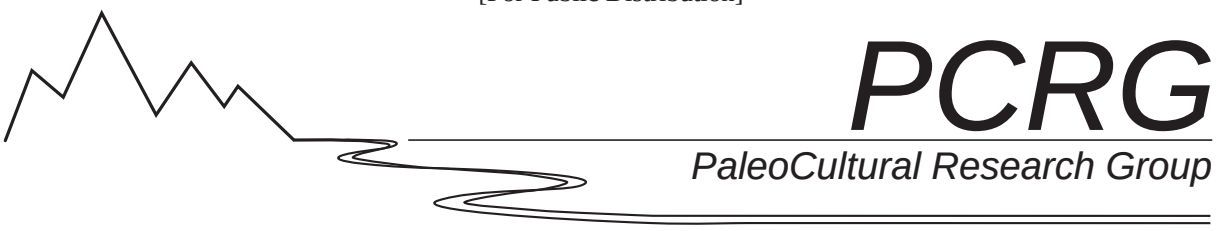
Prepared by:
Paleocultural Research Group
P. O. Box 745309, Arvada, Colorado 80006
Under
BLM Assistance Agreement L09AC15988
and
SHF Archaeological Assessment Grant 2009-AS-006

Submitted to:
History Colorado
State Historical Fund
1200 Broadway, Denver, Colorado 80203
and the
U. S. Department of the Interior, Bureau of Land Management
Colorado State Office
2850 Youngfield Street, Lakewood, Colorado 80215

April 2012

Research Contribution No. 88
Archaeological Investigations in the San Luis Valley No. 1

[For Public Distribution]



Abstract

In 2009, Paleocultural Research Group (PCRG) and the San Luis Valley Public Land Center (SLVPLC), a "Service First" partnership authority between the Bureau of Land Management (BLM) and the U. S. Forest Service, jointly undertook an archaeological assessment of the Upper Crossing Site, a multi-component archaeological locality located in western Saguache County, Colorado. Funding for the project was provided by an Assistance Agreement between PCRG and the BLM (L09AC15988) and by a History Colorado State Historical fund archaeological assessment grant awarded to PCRG (2009-AS-006). Archaeological field investigations were carried out during a 6-day period from June 1 to June 6. Fourteen people devoted a total of 64 person-days to the fieldwork, of which 37 person-days were donated.

The Upper Crossing site covers roughly 11.1 ha (27.4 ac) and preserves evidence of at least four major occupations. Intensive use of the area, represented by well-stratified cultural deposits preserved in a small alluvial fan, began during the Middle Archaic and continued into the Late Archaic. A second intensive occupation, represented by 29 stone enclosures grouped into two distinct clusters, occurred between about A.D. 500 and A.D. 1200. The site was used a third time in the eighteenth and nineteenth centuries, likely by Utes or Apaches. This third occupation is represented by at least 15 peeled ponderosa pine trees and three possible eagle-trapping pits. The fourth occupation took place in the twentieth century and is represented by the existing U.S. Forest Service administrative facility. In addition to these four major occupations, ephemeral evidence in the form of an isolated James Allen projectile point and pottery vessel fragments points to sporadic use of the area by Late Paleoindian, Puebloan, and Apachean groups.

The site is eligible for inclusion on the National Register of Historic Places under Criterion D. Stratified Archaic-age cultural deposits, such as those preserved in the southwest part of the site, are rare in the Rio Grande basin and data from such contexts are acutely lacking. The deposits at Upper Crossing may also contain portions of a Late Archaic basin house, only a few examples of which are known from the Southern Rocky Mountains. Upper Crossing also contains the best-preserved examples of Late Prehistoric stone architecture in the Saguache Creek valley. Few other sites anywhere in the Rio Grande basin have as much potential to provide information on first millennium cultural groups or their connections to people living in adjacent regions. Finally, Upper Crossing's peeled Ponderosa pines—a fragile and fast-disappearing resource—constitute an critical record of recent American Indian use of the Colorado High County. Together, data from these occupations can be used to study the changing uses native people made of a single locality over a span of more than four millennia.

Due to the extent and diversity of its well-preserved features and deposits, the Upper Crossing site may constitute a keystone resource that can anchor one or more national register districts or cultural landscapes. The many culturally modified trees in the middle Saguache Creek valley, including those at Upper Crossing, may form an ethnographic landscape. Stone enclosures at Upper Crossing could be incorporated into a prehistoric architecture district, along with similar structures located at other nearby sites.

Table of Contents

List of Figures

List of Tables

About the Contributors

Carl R. Falk is a consulting archaeologist. Formerly with the National Park Service's Midwest Archeological Center and the Department of Anthropology, University of Nebraska-Lincoln, Falk is a co-founder of Paleocultural Research Group. He has over 45 years of professional experience with a primary interest in the North American Great Plains and specialization in the archaeology and zooarchaeology of Late Prehistoric period village horticulturalists living within the Middle Missouri and Central Plains subareas. He has authored and co-authored numerous articles and technical reports, as well as papers presented at regional, national and international conferences.

Christopher M. Johnston is a graduate student at Colorado State University. He received his B.A. in Anthropology from the University of Colorado in 2010. Chris started his career as a work-study student at Paleocultural Research Group in 2009. Since then he was worked for the Forest Service and for a CRM company. He also has continued working with new PCRG work-study students in the lab as well as assisting on many PCRG field projects. His research interests include the peopling of the Americas, Paleoindian lithic technology, and, more broadly, the archaeology and prehistory of Colorado and the Great Plains.

Mark D. Mitchell is research director for Paleocultural Research Group. Previously, he worked for several cultural resource management firms and for the U. S. Forest Service in Colorado, Wyoming, and Kansas. Mitchell's research interests center on the archaeology of the northern Great Plains, with an emphasis on the farming villages of the Middle Missouri. He also has research interests in American Indian art, in the anthropology of technology, and in the history of archaeology. His research has appeared in *Plains Anthropologist, Antiquity, American Antiquity, Southwestern Lore*, and in a number of book chapters. He recently co-edited *Across A Great Divide: Continuity and Change in Native North American Societies, 1400-1900,* published by the University of Arizona Press (2010).

Cody Newton is a Ph.D. candidate in the Department of Anthropology at the University of Colorado at Boulder. He studies the archaeology of the western Great Plains and middle Rocky Mountains. His current research focuses on the early contact period and the development of Plains Indian equestrianism. Other research foci include Paleoindian studies, early European exploration and settlement, the historic bison robe trade, and the Plains Indian Wars.

1

Introduction

This report describes the results of an archaeological assessment of the Upper Crossing site (5SH134), jointly undertaken in 2009 by the San Luis Valley Public Lands Center (SLVPLC), a "Service First" partnership authority between the Bureau of Land Management (BLM) and the U.S. Forest Service, and Paleocultural Research Group (PCRG), a member-supported, non-profit organization dedicated to scientific research, student training, and public education in archaeology. Funding for the project was provided by the BLM through an Assistance Agreement with PCRG (No. L09AC15988) and by an archaeological assessment grant awarded to PCRG by History Colorado's State Historical Fund (No. 2009-AS-006).

The principal objectives of the project are to produce a comprehensive record of the structures, features, and cultural deposits comprising the Upper Crossing site and to document their current condition. The field investigation comprised three data collection tasks: pedestrian survey to better define the boundaries of the site; mapping and photography to document the site's stone structures; and limited subsurface testing to assess the depth, extent, and content of actively eroding cultural deposits in one part of the site. Lab analysis focused mainly on the modified stone assemblage (stone tools and flaking debris) and on modified and unmodified vertebrate remains.

This chapter introduces the site, describes previous investigations carried out there, and gives an overview of the 2009 field effort. Chapter 2 presents contextual environmental and archaeological data for the Saguache Creek valley. Descriptions of the site's stone enclosures are presented in chapter 3. Chapter 4 describes and summarizes the results of the 2009 test excavation, as well as the results of prior field investigations, including a testing project conducted in 1999 by U.S. Forest Service archaeologists. Chapter 5 describes and analyzes the stone tools, flaking debris, pottery, and faunal remains recovered during these projects. Artifacts collected from the surface of the site in 1977, 1989, 2006, 2007, and 2009 also are incorporated into these analyses. The final chapter summarizes and interprets these data and makes recommendations for future work at the site and in the region..

Site and Project Overview

Upper Crossing is a multi-component site located in western Saguache County, near the confluence of Sheep and Saguache creeks (figure 1.1). The artifacts and features documented in 2009 are scattered over roughly 11.1 ha (27.4 ac). However, pedestrian survey beyond the site's nominal boundaries reveals an extensive archaeological landscape, indicative of frequent visits to the area over a lengthy period of time by many different groups. The site proper preserves evidence of at least four major occupations. Intensive use of the area, represented by well-stratified cultural deposits preserved in a small alluvial fan, began during the Middle Archaic, likely more than 4,000 years ago, and continued into the Late Archaic. A second intensive occupation, represented by 29 stone enclosures grouped into two distinct clusters, likely occurred between A.D. 500 and A.D. 1200. The site was used a third time in the eighteenth and nineteenth centuries, likely by Utes or Apaches. This third occupation is represented by at least 15 peeled ponderosa pine trees and three possible eagle-trapping pits. The fourth occupation took place in the twentieth century and is represented by the existing U.S. Forest Service administrative facility, which originally housed the Supervisor's office of the Cochetopa Forest Reserve (figure 1.2). In addition to these four major occupations, ephemeral evidence in the form of an isolated Foothills-Mountain complex projectile point and pottery vessel fragments points to sporadic use of the area by Late Paleoindian and Puebloan groups.

History of Research

University of Denver archaeologist Etienne B. Renaud first documented the archaeology of the Saguache Creek valley (Renaud 1935). Renaud describes the Upper Crossing site, which he designated site C262, as a "campsite" and "rockshelter." He reports 14 additional sites upstream along Saguache Creek between Upper Crossing and the Stone Cellar Ranger Station (Renaud 1935:7). On two of these sites he observed pottery and on several others he notes the presence of "stone fences" that he interpreted as hunting features. Renaud tallies

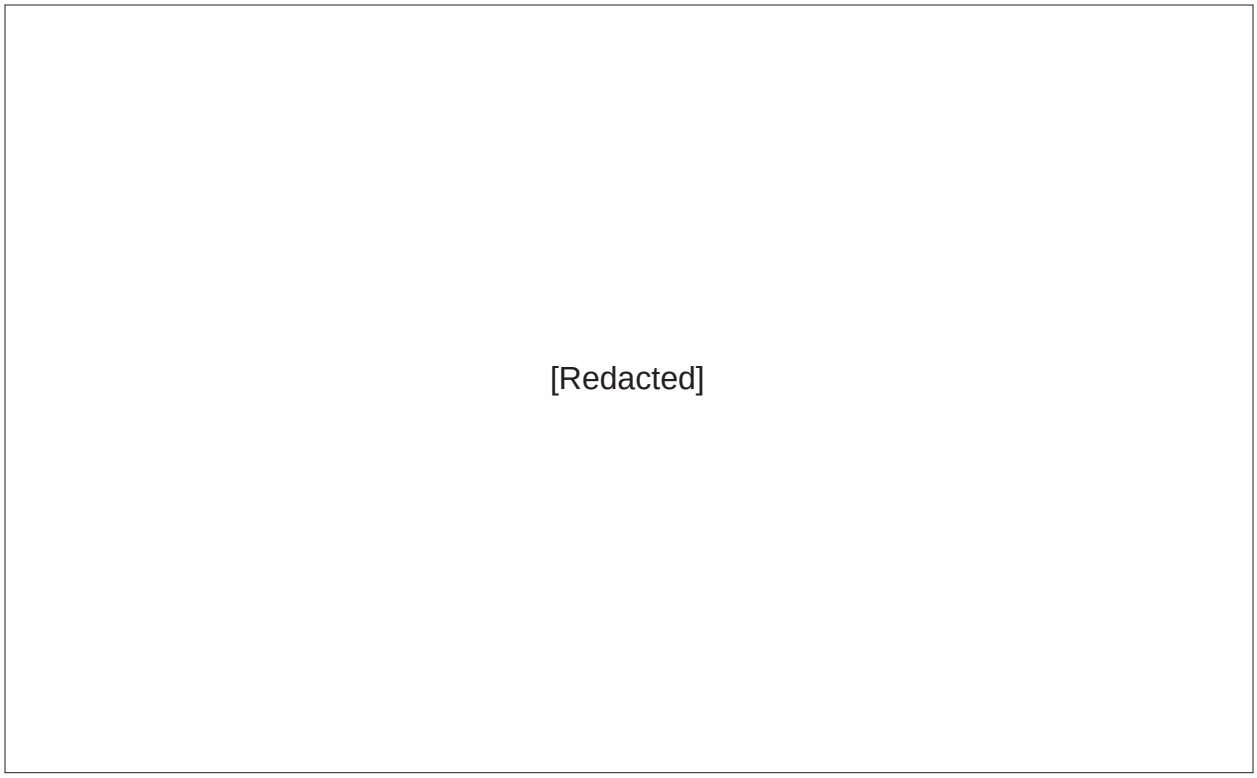


Figure 1.1. Overview of the Upper Crossing site from the south.

nine sites downstream, between Upper Crossing and the town of Saguache, two of which are rockshelters.

Upper Crossing was formally recorded as 5SH73 in 1977 by U.S. Forest Service archaeologists, who describe it as a scatter of chipped and ground stone tools, pottery, burned rock, and faunal remains covering about 0.88 ha (2.2 ac). They documented three rockshelters, a stone enclosure, a culturally modified tree, and three dense concentrations of artifacts. They observed 611 modified stone artifacts on the surface and collected an additional 89 artifacts, 88 of which are incorporated into the analyses presented in chapter 5. They also collected at least 34 pieces of pottery recovered from the slope adjacent to the stone enclosure and at least 11 more, along with a piece of unmodified animal bone, from the largest of the three rockshelters. The pottery they collected is described and illustrated in chapter 5. The field crew also documented five isolated artifacts north of 5SH73, two of which are now located within the site's currently defined boundary.

BLM archaeologists revisited Upper Crossing in 1987. Because the original site form for 5SH73 was not available at the time they re-recorded the site as 5SH134, retiring the previous number. They relocated the largest of the rockshelters documented by the Forest Service crew but did not observe any of the other features identified in 1977. They did not map the site, but the re-evaluation form they produced indicates that the artifacts and features they observed cover roughly 0.5 ha (1.2 ac). They report that artifacts had been removed from the surface and judged the site to be ineligible for inclusion on the National Register of Historic Places (NRHP).

Forest Service archaeologists surveying a portion of the floodplain adjacent to 5SH134 in 1989 located and collected the base of a Late Paleoindian projectile point made from Trickle Mountain quartzite, which they provisionally recorded as 5SH1461 (Jodry 1999a:Fig. 6-25). However, a form for this isolated find was never

Figure 1.2. Undated photograph of the Upper Saguache Guard Station, probably taken between 1920 and 1938.

submitted to the Office of Archaeology and Historic Preservation (OAHP). The location of the find is now within the currently defined site boundary.

In 1994, the Forest Service commissioned archaeologists from the National Park Service's Midwest Archaeological Center to document and evaluate historic administrative structures on the Rio Grande National Forest, including the Upper Saguache Guard Station, located some 200 m west of 5SH134 (Hartley and Schneck 1996). They recorded the structures there as 5SH1469, which they evaluated as NRHP ineligible.

Table 1.1 summarizes the current status of previously documented cultural resources in the vicinity of the Upper Crossing site as it currently is defined. Figure 1.3 illustrates the locations and boundaries of these resources.

Forest Service archaeologists returned to Upper Crossing in 1999 to carry out a small-scale testing project. They surveyed a portion of the level bench west of the original western boundary of 5SH134, in the process identifying six stone enclosures. Using volunteers from the San Luis Valley Archaeology Network, they opened two 1 x 1 m units and one 0.5 x 1 m unit inside three of these enclosures. This work documented the presence of substantial cultural deposits containing abundant artifacts, burned rock, and animal bones. An account of this work is provided in chapter 4 and the artifacts they recovered are described and analyzed in chapter 5.

In 2000, the Rio Grande National Forest and the Colorado College (CC) began cooperative investigations at Upper Crossing. This effort, directed by Dr. Michael Nowak, focused on mapping the stone enclosures first identified in 1999. The CC crew identified a total of 16 structures and, during their 2001 field investigation, drew small-scale maps of each as well as a sketch map showing the relationships among them. Their sketch map plots the approximate position of one of the 1999 test units and shows the position of a datum stake along with the orientation of the site grid they used. No artifacts were collected during this investigation. A report describing the work was never completed.

Dr. Nowak and his students returned to the site in the fall of 2003, this time to document stone enclosures located on a promontory overlooking the previously documented cluster of structures. They identified 17 enclosures on the promontory, which they designated 5SH73H, 16 of which they mapped. Nowak and Crocket (2003) summarizes their methods and findings.

During the course of routine monitoring in 2007, SLVPLC archaeologists discovered cultural deposits eroding from a small alluvial fan immediately north of the guard station. They tallied 25 artifacts visible on the eroded surface, including flakes, chipped and ground stone tools, burned bone, and three ceramic sherds. The field map they prepared shows that most of these materials are closely associated with an area of charcoal-stained sediment exposed by active downcutting on the east side of the fan.

In October 2008, PCRG and SLVPLC archaeologists visited the site to re-examine these deposits and to begin developing a research and public interpretation program for the site and a plan for its long-term management and preservation. The investigation described in this report represents the first phase of that work.

Overview of the 2009 Field Effort

The research team carried out field investigations at Upper Crossing out over a 6-day period in June 2009. Fourteen people devoted a total of 64 person-days to the effort (512 person-hours), of which 37 person-days (296 person-hours) were donated. Mark D. Mitchell, PCRG Research Director, and Angie M. Krall, SLVPLC Heritage Program Manager, served as field supervisors. They were assisted by Stacey Bennett, PCRG Lab Supervisor, and SLVPLC archaeologists Ken Frye and Marvin Goad. The PCRG volunteer crew included Erik Gantt, Dan Jepson, Steve Kalasz, Marilyn Martorano,

Table 1.1. Current status of documented cultural resources within and adjacent to the boundaries of the Upper Crossing site (5SH134).

Site Number	Year Recorded	Current Status
5SH73	1977	Retired in 1987; now part of 5SH134
5SH134	1987	Boundary expanded in 2012; revised site form submitted with this report
5SH546	1977	Retired in 2012; now part of 5SH134
5SH547	1977	Retired in 2012; now part of 5SH134
5SH548	1977	Current
5SH549	1977	Current
5SH550	1977	Current
5SH1461	1995	IF form never submitted to OAHP; retired in 2012; now part of 5SH134
5SH1469	1994	Retired in 2012; now part of 5SH134

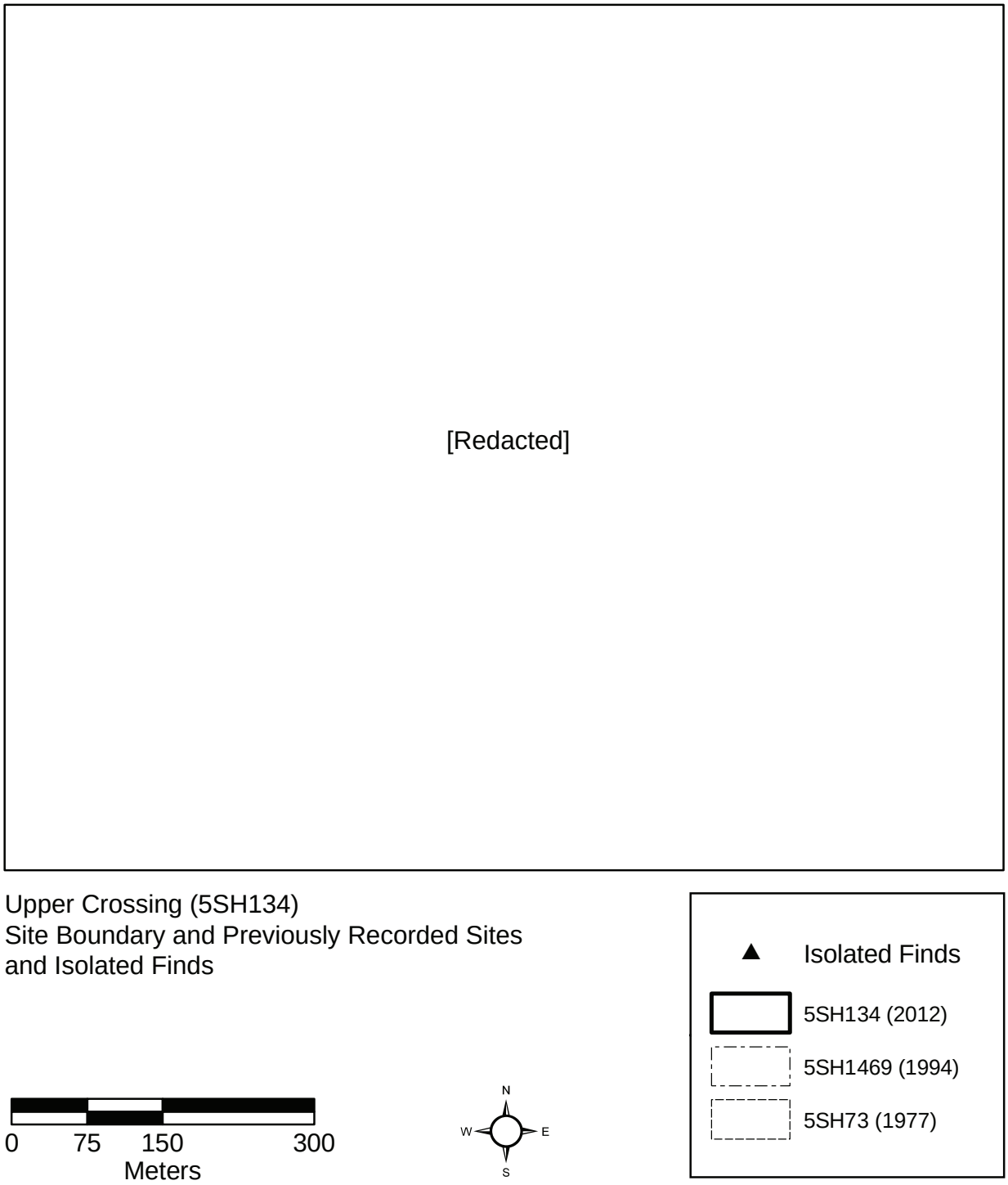


Figure 1.3. Boundaries of the Upper Crossing site and locations of previously recorded sites and isolated finds.

Andrea Martorano, Loretta Mitson, Dave Neal, Nancy Neal, and Meg Van Ness.

The field crew conducted reconnaissance survey on roughly 41.6 ha (103 ac) surrounding the known features and artifact concentrations comprising the site. They collected GPS data on previously documented and newly discovered features and drew small-scale sketch maps of 29 stone enclosures. Finally, they opened a single 1 x 1 m test unit north of the guard station to investigate cultural deposits eroding from the alluvial fan there.

2

Environmental and Archaeological Context

This chapter lays out a context for interpreting the archaeology of the Upper Crossing site. It begins with an overview of the regional effective environment, focusing on the available faunal, floral, and stone resources. The second part of the chapter provides an overview of what currently is known about the archaeological record of the Rio Grande basin and adjacent areas.

Physiography, Climate, and Ecology

Saguache Creek rises on the east side of the Continental Divide, on the north slope of the La Garita Mountains. It flows north and east to its confluence with Fourmile Creek, where enters a broad alluvium-filled valley. It terminates in the northern part of the San Luis Valley, a large intermontane basin that formed during the Miocene (Hoefer 1999a:6). The San Luis Valley is drained by the Rio Grande, but Saguache Creek is not connected to the Rio Grande watershed. Instead, it braids out as it enters the valley, eventually disappearing into permeable deposits and wetlands.

The Saguache Creek drainage can be partitioned into three sections (figure 2.1). Upper Saguache Creek includes the montane section of the valley, above the mouth of Fourmile Creek. Middle Saguache Creek, where the Upper Crossing site is located, runs from Fourmile Creek downstream to the mouth of Ford Creek. This section corresponds roughly to the Middle

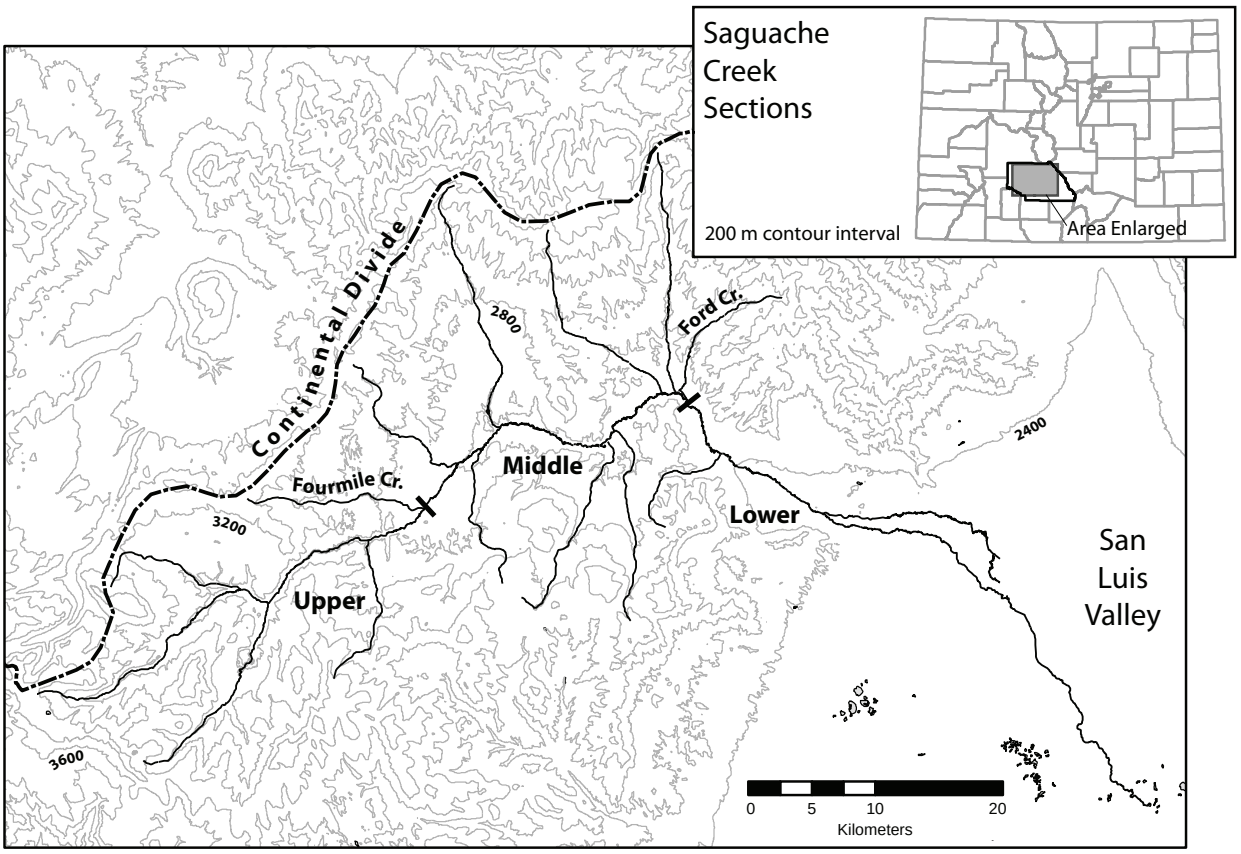


Figure 2.1. Sections of the Saguache Creek valley.

Saguache watershed, a fifth-level U.S. Geological Survey hydrological unit (1301000405) (San Luis Valley Public Lands Center 2009:2). Lower Saguache Creek includes the wide valley section from Ford Creek to the eastern termination of the stream on the floor of the San Luis Valley.

Each section supports a distinctive ecological community, owing to elevation- and topography-dependent differences in temperature and precipitation. Unfortunately, only limited weather station data are available for the region. At the town of Saguache, in the lower valley, mean annual precipitation is 8.27 inches (21 cm) (Western Regional Climate Center 2011). Mean maximum temperature during January is 35.5 F and mean minimum temperature is 4.1 F. Mean July temperatures range from a maximum of 81.1 F to a minimum of 47.6 F. Temperature values for the upper valley section may be approximated by data from the Cochetopa Creek weather station, located on the west side of the Continental Divide at an elevation of 8,000 ft. January temperatures there range from a mean maximum of 27.9 F to a mean minimum of -5.3 F (Western Regional Climate Center 2011). July temperatures range from 81.1 F to 42.4 F. Mean annual precipitation is just 11.02 inches (28 cm). No weather station data are available for the middle Saguache Creek valley, but estimated precipitation in that section ranges between about 10 inches (25.4 cm) at lower elevations to 20 inches (50.8 cm) at higher elevations (figure 2.2) (Colorado Division of Water Resources 2011; San Luis Valley Public Lands Center 2009:24). Precipitation at the highest elevations of the upper valley reaches 30 inches, with snowfall accounting for over half of the annual total. Peak stream flow occurs in the spring as the winter snowpack is melting; the lowest stream flow occurs in the fall.

The Saguache Creek valley is located in the Southern Parks and Rocky Mountain Range section (M331F) of the Southern Rocky Mountain Steppe—Open Woodland—Coniferous Forest—Alpine Meadow province (M331) (Bailey et al. 1994; McNab et al. 2005). The forest blanketing the upper valley, as well as the higher elevation portions of the middle and lower valley sections, is a southwest mixed conifer association, with Douglas fir and ponderosa pine dominant. However, stand composition varies and can include a mixture of other species such as aspen, spruce, limber pine, bristlecone pine, piñon, and juniper (San Luis Valley Public Lands Center 2009:29). Associated shrubby

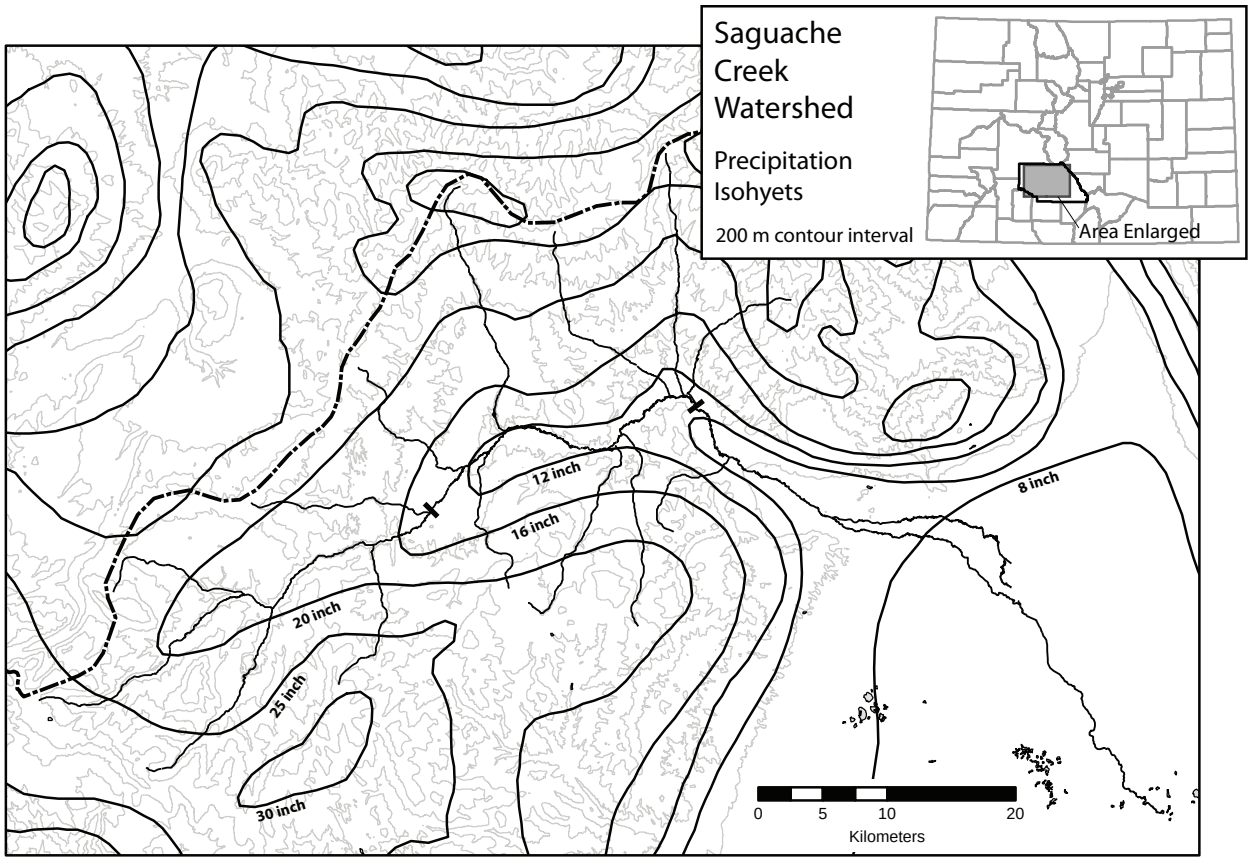


Figure 2.2. Precipitation isohyets in the Saguache Creek valley.

vegetation includes mountain mahogany, rabbitbrush, currant, skunkbush, serviceberry, and fringed sage.

Open, treeless portions of the valley are dominated by grasses with a minor component of woody species, such as sagebrush and snowberry (*Symphoricarpos albus*), and several forb species. Grasses include Idaho fescue (*Festuca idahoensis*), Arizona fescue (*Festuca arizonica*), slender wheatgrass (*Elymus trachycalulus*), bearded wheatgrass (*Elymus canimus*), native bluegrass (*Poa* spp.), nodding brome (*Bromus anomalus*), mountain brome (*Bromus marginatus*), Letterman's needlegrass (*Achnatherum lettermanii*), pine needlegrass (*Achnatherum pinetorum*), Mountain muhly (*Muhlenbergia montana*), and Parry oatgrass (*Dathonia paryii*). Forb species include lupine, geranium (*Geranium* spp.), groundsel (*Packera streptanthifolia*), and bluebells (*Mertensia* spp.) (San Luis Valley Public Lands Center 2009:12).

The lower slopes and riparian zones of the middle valley support grasses such as Arizona fescue (*Festuca arizonica*), Idaho fescue (*Festuca idahoensis*), western wheatgrass, and squirreltail, as well as sedges and rushes (*Juncus* spp.). Other grasses include mutton bluegrass (*Poa fendleriana*), other native bluegrasses (*Poa* spp.), needle-and-thread, Indian ricegrass, mountain muhly (*Muhlenbergia montana*), Junegrass (*Koeleria* spp.), blue grama, slimstem muhly, and three-awn. Forbs include phlox, mat penstemon (*Penstmon caespitosus*), buckwheat (*Eriogomum* spp.), pussytoes (*Antennaria* spp.), yarrow (*Achillea lamulosa*), aster (*Aster* spp.), daisy (*Chrysanthemum* sp.), and geranium (*Geranium* spp.). Shruby vegetation includes fringed sage, squawbush, big sagebrush, smooth horsebrush (*Tetradymia* spp.), yucca, four-wing saltbrush, and shrubby potentella (*Pentafoloides floribunda*) (San Luis Valley Public Lands Center 2009:12). Lyons (1993) provides a list of plant species available at around 3050 m (10,000 ft.) on the west side of the Continental Divide, some 25 km west of the middle Saguache Creek valley. Table 2.1 presents a roster of edible seeds recovered from archaeological contexts in the Gunnison River basin.

Table 2.1. Seeds recovered from archaeological contexts in the Gunnison River basin (data from Stiger 2001:Table 5.1).

Common Species Name	Taxon
Pinon pine	*Pinus edulis*
Juniper	*Juniperus* sp.
Hedgehog cactus	*Echinocereus* sp.
Prickly Pear cactus	*Opuntia* sp.
Goosefoot	*Chenopodium* sp.
Rose family (Serviceberry?)	Rosaceae
Skunkbush	*Rhus* sp.
Ground Cherry	*Physalis* sp.

Table 2.2 lists animal species currently present in Saguache County for all or part of the year. The wetland areas in the San Luis Valley, including along Saguache

Table 2.2. Mammal species currently present in Saguache County (Natural Diversity Information Source 2011).

Common Species Name	Taxon	Abundance
Abert's Squirrel	*Sciurus aberti*	Fairly Common
American Badger	*Taxidea taxus*	Common
American Beaver	*Castor canadensis*	Fairly Common
American Elk	*Cervus elaphus*	Abundant
American Marten	*Martes americana*	Fairly Common
American Pika	*Ochotona princeps*	Common
Big Brown Bat	*Eptesicus fuscus*	Abundant
Bighorn Sheep	*Ovis canadensis*	Common
Black Bear	*Ursus americanus*	Common
Black-tailed Jackrabbit	*Lepus californicus*	Uncommon
Bobcat	*Lynx rufus*	Common
Brazilian Free-tailed Bat	*Tadarida brasiliensis*	Abundant
Bushy-tailed Woodrat	*Neotoma cinerea*	Fairly Common
Colorado Chipmunk	*Tamias quadrivittatus*	Fairly Common
Common Muskrat	*Ondatra zibethicus*	Common
Common Porcupine	*Erethizon dorsatum*	Uncommon
Coyote	*Canis latrans*	Common
Deer Mouse	*Peromyscus maniculatus*	Abundant
Desert Cottontail	*Sylvilagus audubonii*	Abundant
Golden-mantled Ground Squirrel	*Spermophilus lateralis*	Fairly Common

Table 2.2. Animal species currently present in Saguache County, concluded.

Common Species Name	Taxon	Abundance
Gray Fox	*Urocyon cinereoargenteus*	Rare
Gunnison's Prairie Dog	*Cynomys gunnisoni*	Fairly Common
Hoary Bat	*Lasiurus cinereus*	Common
House Mouse	*Mus musculus*	Abundant
Least Chipmunk	*Tamias minimus*	Common
Little Brown Myotis	*Myotis lucifugus*	Abundant
Long-eared Myotis	*Myotis evotis*	Fairly Common
Long-legged Myotis	*Myotis volans*	Common
Long-tailed Vole	*Microtus longicaudus*	Fairly Common
Long-tailed Weasel	*Mustela frenata*	Fairly Common
Masked Shrew	*Sorex cinereus*	Fairly Common
Meadow Vole	*Microtus pennsylvanicus*	Common
Mink	*Mustela vison*	Uncommon
Montane Shrew	*Sorex monticolus*	Common
Montane Vole	*Microtus montanus*	Common
Moose	*Alces alces*	Uncommon
Mountain Cottontail	*Sylvilagus nuttallii*	Fairly Common
Mountain Goat	*Oreamnos americanus*	Casual/Accidental
Mountain Lion	*Felis concolor*	Common
Mule Deer	*Odocoileus hemionus*	Common
Northern Grasshopper Mouse	*Onychomys leucogaster*	Fairly Common
Northern Pocket Gopher	*Thomomys talpoides*	Common
Ord's Kangaroo Rat	*Dipodomys ordii*	Abundant
Pine Squirrel	*Tamiasciurus hudsonicus*	Fairly Common
Plains Pocket Mouse	*Perognathus flavescens*	Fairly Common
Pronghorn	*Antilocapra americana*	Abundant
Raccoon	*Procyon lotor*	Fairly Common
Red Fox	*Vulpes vulpes*	Common
Silky Pocket Mouse	*Perognathus flavus*	Fairly Common
Silver-haired Bat	*Lasionycteris noctivagans*	Common
Snowshoe Hare	*Lepus americanus*	Common
Southern Red-backed Vole	*Clethrionomys gapperi*	Fairly Common
Striped Skunk	*Mephitis mephitis*	Common
Thirteen-lined Ground Squirrel	*Spermophilus tridecemlineatus*	Common
Townsend's Big-eared Bat	*Plecotus townsendii*	Uncommon
Water Shrew	*Sorex palustris*	Uncommon
Western Harvest Mouse	*Reithrodontomys megalotis*	Fairly Common
Western Jumping Mouse	*Zapus princeps*	Fairly Common
Western Small-footed Myotis	*Myotis ciliolabrum*	Common
Western Spotted Skunk	*Spilogale gracilis*	Rare
White-tailed Jackrabbit	*Lepus townsendii*	Common
Wyoming Ground Squirrel	*Spermophilus elegans*	Common
Yellow-bellied Marmot	*Marmota flaviventris*	Common

Creek, provide seasonal habitat for large numbers of migratory waterfowl, which are not all listed in table 2.2, but could have been an important food resource in the past. Four native ungulate species occur in the Saguache Creek valley. Bighorn sheep, a reintroduced species following historic extirpation, occupy the rocky habitat of the Trickle Mountain area. Pronghorn inhabit the lower elevations, in the grasslands and piñon-juniper hill country. Mule deer use the area year round and elk frequently occupy the region based on available food and habitat resources (San Luis Valley Public Lands Center 2009:16). Although currently no longer found in

this area, the regional archaeological and paleontological evidence attests to the past occurrence of bison. Table 2.3 lists faunal remains recovered from archaeological sites in the Gunnison River valley.

Table 2.3. Mammal species recovered from archaeological contexts in the Gunnison River basin (data from Rood and Stiger 2001:Table 4.1).

Common Species Name	Taxon
Cottontail	*Sylvilagus* sp.
Jackrabbit or hare	*Lepus* sp.
Chipmunk	*Neotamias* sp.
Marmot	*Marmota* sp.
Ground Squirrel	*Spermophilus* sp.
Prairie Dog	*Cynomys* sp.
Pocket Gopher	*Thomomys* sp.
American Beaver	*Castor canadensis*
Mouse	*Peromyscus* sp.
Woodrat	*Neotoma* sp.
Vole	*Microtus* sp.
Canid	*Canis* sp.
Bear	*Ursus* sp.
American Badger	*Taxidea taxus*
Elk	*Cervus elaphus*
Mule Deer	*Odocoileus hemionus*
Pronghorn	*Antilocapra americana*
American Bison	*Bison bison*
Bighorn Sheep	*Ovis canadensis*

Geology

Exposed bedrock in the middle Saguache Creek valley consists primarily of extrusive igneous formations. Most prominent are a series of Oligocene-age tuff flows. Mapped flows include the Carpenter Ridge Tuff, the Fish Canyon Tuff, the Bonanza Tuff, the Tuff of Alkali Flat, and the Tuff of Saguache Creek (Turner 2004). Each flow exhibits a distinctive weathering pattern, which in turn dictates the sizes and shapes of the blocks locally available for constructing stone enclosures. Other igneous rocks exposed in the valley include flows of andesite and basalt. The Conejos Formation, which includes andesitic to basaltic flows, breccia flows, and lahars interlayered with sedimentary units composed of reworked ash, sandstone, and conglomerates, outcrops on the north side of the valley, from the confluence of Sheep Creek downstream to Ford Creek (Turner 2004). Sedimentary units of the Conejos Formation outcrop on the south side of the valley. A small, 80-ha exposure of Cretaceous Dakota and Morrison Formation rocks is located 2.5 km northwest of Upper Crossing. The bedrock underlying Cluster 1 at Upper Crossing is the Conejos Formation (undivided). The Fish Canyon Tuff underlies Cluster 2.

Many of these formations contain rocks suitable for use as chipped stone raw materials. The best documented nearby source is the Cretaceous-age Alkali Spring (or Trickle Mountain) Quartzite Quarry northwest of Upper Crossing. The documented portion of the quarry covers nearly 1.5 ha, but reconnaissance surveys indicate that knappable stone outcrops over an area several times that size. The quality of the quartzite is moderate; much of the material is coarse and poorly sorted, though finer-grained, better cemented stone also is available. Colors range from white to pink to brown and yellow. Dark mineral fragments are present in some examples, as are vugs and other irregularities. Cortex is generally buff-colored. Black (2000) and Stiger (2001) describe numerous other quartzite sources located in the Gunnison River basin. These raw materials vary greatly in color and quality.

Chert and chalcedony has formed within the region's tuff flows. Chert ranging in color from yellow to olive to black likely occurs in a number of locations around the valley. At least one small source of this material is located near the Alkali Spring Quartzite Quarry; however, the geologic context of this outcrop is not known. Macroscopically similar material is also widely available across much of the eastern San Juans. For instance, nearly identical material outcrops on the east face of Uncompahgre Peak, some 90 km to the west. Archaeologists have also noted sources of similar stone to the south, on the west side of the San Luis Valley in the La Garita Mountains. A true chalcedony, composed of fibrous silica, outcrops in the Fish Canyon Tuff just 1.5 km south of Upper Crossing. Stiger (2001) reports a number of chert and chalcedony sources near Cochetopa Dome, west of the Continental Divide. Black (2000) lists three chert sources in Saguache County, all of them on the Continental Divide north of Upper Crossing.

Archaeologists have yet to document outcrops of knappable basalt, but the surface geology of the region suggests that several may be present nearby. In particular, the Hinsdale Basalt, which outcrops south of Saguache Creek in the lower valley section, may contain toolstone quality rock (Turner 2004). Rhyolite outcrops near the Alkali Spring Quartzite Quarry and in other locations in the middle and lower valley sections. The sedimentary units of the Conejos Formation, particularly the conglomerates, may also include scattered cobbles of toolstone.

Small obsidian nodules occur on the flanks of Cochetopa Dome, 25 km northwest of Upper Crossing on the west side of the Continental Divide (Black 2000; Ferguson and Skinner 2003; Stiger 2001). However, the

few obsidian artifacts recovered from Upper Crossing all derive from Jemez sources, located some 250 km to the south.

Archaeological Context

Data on the American Indian occupation of the San Luis Valley and vicinity has accumulated rapidly in the last ten years. However, the region remains among the least studied parts of Colorado. This is particularly true for the northern half of the San Luis Valley and the Saguache Creek valley. Accordingly, this brief overview integrates data from adjacent regions, including the Gunnison River basin to the northwest and the upper Arkansas River basin to the east. Table 2.4 summarizes the broad chronological divisions used to systematize archaeological data from the Northern Colorado, Arkansas, and Rio Grande river basins.

Paleoindian Stage

In contrast with most other parts of the state, the archaeology of the Paleoindian period in the Rio Grande basin is comparatively well understood (Jodry1999a). Folsom use of the region is particularly well attested: 43 localities are known and excavation data are available for four sites. Folsom camps occur in a wide variety of ecological settings, from the floor of the San Luis Valley to alpine settings in the eastern San Juan Mountains. Camps on the valley floor are associated with bison kill and butchery localities; bison population density likely peaked in the San Luis Valley during Folsom times (Jodry 1999b). Data from the Stewart's Cattle Guard site show clearly the spatial organization of Folsom kill-camp localities, with the bison kill area segregated from contemporaneous residential and work areas. The residential area exhibited at least five discrete hearth-centered activity areas, each likely representing the refuse produced by a single household group. The kill area, located southeast of the camp, contained the remains of at least 49 bison. Initial butchery took place in the kill area. A separate work area southwest of the camp produced evidence of intensive hide processing. Additional data on Folsom site structure come from a camp on Tenderfoot Mountain in the Gunnison River basin (Stiger 2006).

Other Paleoindian technocomplexes are less well represented. Isolated finds of Clovis points are reported from a variety of settings (Jodry 1999a:86). The remains of a mammoth west of Great Sand Dunes National Park may be associated with Clovis-age artifacts. A small number of projectile points assigned to the Goshen/Plainview, Agate Basin, and Hell Gap complexes have been reported, but no sites associated with these types are currently known. Late Paleoindian Cody Complex points are more common and two probable Cody bison kill sites are known (Jodry 1999a:100).

Projectiles assigned to the Foothill-Mountain complex are also comparatively common in the Rio Grande basin and adjacent parts of the Northern Colorado River basin (Jodry 1999a; Pitblado 1998; Reed and Metcalf 1999). Though technologically and morphologically variable, Foothill-Mountain points mostly are lanceolate in form and commonly exhibit a parallel-oblique flaking pattern. A minority is weakly stemmed. Some specimens exhibit parallel-transverse to collateral flaking patterns. Many of the lanceolate forms have slightly concave ground bases. Foothill-Mountain flintknappers apparently preferred quartzite (Pitblado 2003; Reed and Metcalf 1999).

The Foothill-Mountain complex first appeared about 10,000 ^{14}C yr B.P. and persisted for two millennia and is therefore contemporaneous with a number of Middle to Late Paleoindian complexes on the Plains (Frison 1992; Kornfeld, Frison, and Larson 2010). Thus, the Foothill-Mountain complex is thought to represent one of two concurrent Paleoindian occupations. Foothill-Mountain groups pursued a broad-spectrum subsistence strategy, in contrast to their bison-focused contemporaries in the Plains (Frison 1992; Reed and Metcalf 1999:68). A Foothill-Mountain point comes from the Upper Crossing site, near the confluence of Sheep and Saguache creeks (Jodry 1999a:Figure 6-25). Jodry (1999a:102) speculates that Foothill-Mountain groups may have exploited wetland resources in combination with large and small artidactyls available in nearby mountain settings.

Table 2.4. Chronology of major culture-historical divisions in three Colorado river basins. Ages reported in uncalibrated radiocarbon years before 1950 (B.P.).

Stage or Era	Arkansas Basin (Zier and Kalasz 1999)	Northern Colorado Basin (Reed and Metcalf 1999)	Rio Grande Basin (Martorano et al. 1999)
Paleoindian	>11,500 – 7800	11,500 – 8350	11,200 - 7450
Archaic	7800 – 1850	8350 – 1950	7450 – 1450
Late Prehistoric/Formative	1850 – 500	2350 – 650	1450 – 350
Protohistoric	500 – 225	650 – 69	350 – 69

Archaic Stage

In the Rio Grande basin, few Archaic stage sites have been investigated intensively. However, a context for the San Luis Valley Archaic can be built using data and interpretations from adjacent regions. The record for the Northern Colorado River basin, including the Gunnison River basin immediately northwest of the San Luis Valley, is the most comprehensive. In the Arkansas River basin, Early Archaic sites are uncommon but data from Middle and Late Archaic sites are relatively abundant. Data also are available for Archaic occupations in northern New Mexico.

Most researchers working in the Southern Rockies accept the view that Archaic hunter-gatherers living there practiced a local, year-round, mountain-focused settlement and subsistence system distinct from that of groups living in adjacent regions (Black 1991). Most researchers also recognize long-term adaptive continuity in the region, beginning as early as the Late Paleoindian period (Metcalf 2011b). Whether this also reflects cultural continuity remains a subject of debate (Stiger 2001), as do the specific attributes that define a mountain adaptation (Reed and Metcalf 1999).

Reed and Metcalf (1999) partition the Archaic era in the Northern Colorado River basin into four periods. The earliest, dubbed the Pioneer period (8350-6450 B.P.), marked the initial settlement of the region by full-time residents practicing a seasonal settlement system. During the subsequent Settled period (6450-4450 B.P.), local bands practiced a central-place subsistence strategy that featured a combination of logistical moves around strategic habitation areas in the winter and residential mobility in the summer. This basic pattern continued into the Transitional period (4450-2950 B.P.), but was accompanied by increasing material culture variation, more restricted use of higher-elevation life zones, and possibly decreased sedentism. The final Archaic period, the Terminal (2950-1950 B.P.), was a period of subsistence stress that prompted various forms of economic intensification as well as technological change. (Metcalf [2011b] revises the bracketing dates and durations of the Reed and Metcalf [1999] periods and argues for the use of more neutral period names, including the Paleo-Archaic, Early Archaic, Middle Archaic, and Late Archaic.)

Stiger (2001) offers a model of settlement and subsistence change for the Gunnison basin. In Stiger's scenario, people took up full-time residence in the basin after 8000 B.P. Their central-place foraging system featured large and small mammal hunting combined with bulk processing and storage of plant resources. This basic pattern continued, apart from a brief interruption between 5000 and 4500 B.P., until about 3000 B.P., when central-place residences were replaced by seasonal, special-use sites occupied by groups wintering outside the basin. This shift coincided with local extirpation of piñon pines.

Exploitation of the tundra ecosystem in the San Juan Mountains, above roughly 3,400 m, occurred primarily during the Archaic (Mitchell 2012). Intensive use began at least by 5000 B.P. and declined after about 2000 B.P. The frequent occurrence on San Juan alpine sites of obsidian from source locations in northern New Mexico indicates that native groups using the high country maintained strong connections to the northern Southwest. However, the marked diversity of the stone tool raw materials present on many high-elevation sites, including a variety of cherts, orthoquartzites, rhyolites, and basalts, suggests either that a broad trade network linked groups living around the perimeter of the San Juans or that groups from different regions came together in the high country. Most San Juan high country sites are small, suggesting that they represent brief occupations. Assemblage diversity data indicate that high country land-use strategies were generalized, rather than focal.

In the Arkansas River basin, Middle Archaic sites, dating between 5000 and 3000 B.P., are located in a wide variety of ecological settings, from mid-elevation mountain valleys, to the Plains-foothills ecotone, to canyons and open steppe in the Plains (Zier 1999). Especially significant are Middle Archaic occupations in rockshelters, including Draper Cave (5CR1), Recon John Shelter (5PE648), Gooseberry Shelter (5PE910), and Wolf Spider Shelter (5LA6197) (Hagar 1976; Hand and Jepson 1996; Zier 1999; Zier and Kalasz 1991). The Dead of Winter site (5LK159) is the most thoroughly investigated Middle Archaic occupation in the mountains (Buckles 1978).

Middle Archaic sites in the Arkansas basin are primarily located near reliable water sources (Zier 1999a). Both open and sheltered sites exhibit evidence of regular reoccupation. The diversity of tool types present, along with the frequent occurrence of hearth features, suggests that these sites represent multi-activity residential camps. Floral and faunal inventories point to a broad-spectrum subsistence strategy. Together, assemblage diversity and evidence for reoccupation may reflect a small-group foraging economy; however, the potential for preservation differences between sheltered and open sites complicates interpretations of mobility patterns.

Late Archaic (3000 B.P-1850 B.P.) sites also occur throughout the Arkansas River basin, including in the open steppe, in shallow and deep canyons, in the Plains-foothills ecotone, and in high-elevation valleys. Important Late Archaic rockshelter sites include several that also contain Middle Archaic deposits (Recon John,

Gooseberry, and Wolf Spider), as well as Two Deer (5PE8), Carrizo (5LA1053), and Medina (5LA22) (Campbell 1969; Zier 1999). Open sites in steppe and shallow-canyon settings are widespread and common, but few have been intensively investigated. Excavated sites in the mountains include the Runberg site on Cottonwood Pass (Black 1986), the Venado Enojado site east of Buena Vista (Watkins et al. 2012), and site 5LK1999 and the Campion Hotel site southwest of Leadville (Zier 1999).

The co-occurrence of both Middle and Late Archaic cultural deposits at many Arkansas basin sites indicates long-term continuity in subsistence practices and mobility patterns (Zier 1999). Late Archaic radiocarbon dates are more numerous than Middle Archaic dates, but this likely is due to preservation and research biases rather than to an increase in population. Late Archaic deposits in stratified rockshelters generally are thicker and richer than Middle Archaic deposits, suggesting an increase in site-use intensity over time. The broad-spectrum subsistence strategy that began in the Middle Archaic continued into the Late Archaic. Late Archaic faunal and macrofloral assemblages are somewhat more diverse than Middle Archaic assemblages, but it is unclear whether this reflects increased diet breadth or sampling biases. Maize remains definitely occur in three Late Archaic assemblages, the earliest of which, from Gooseberry Shelter, dates to 2600 B.P. However, maize was certainly a minor element of Late Archaic diets and its occurrence did not lead to a real shift in subsistence practices (Zier 1999).

In the Rio Grande basin, data on Archaic stage archaeology frequently are organized around the periods of the Oshara tradition, a cultural taxonomy that Irwin-Williams (1973) developed to trace the antecedents of Pueblo culture in the northern Southwest. Based primarily on data from the Arroyo Cuervo region, located about 50 km northwest of Albuquerque, New Mexico, the Oshara tradition divides pre-Puebloan archaeology in to five phases spanning the period from about 7500 B.P. to 1550 B.P. These phases include the Jay (7500-6750 B.P.), the Bajada (6750-5150 B.P.), the San Jose (5150-3750 B.P.), the Armijo (3750-2750 B.P.), and the En Medio (2750-1550 B.P.).

In Irwin-Williams's scenario, components of the Jay and Bajada phases represent small-group, short-term residential camps. Jay and Bajada microbands practiced a local, year-round, "mixed spectrum" subsistence strategy (Irwin-Williams 1973:5). Climate, and therefore resource patch productivity, improved during the subsequent San Jose phase, permitting an increase in site-use intensity. Diet breadth increased, especially through the incorporation of more small seeds and other floral resources.

Important subsistence and settlement changes took place during the Armijo phase. Paralleling a similar development in the Arkansas basin, limited quantities of maize appear in Armijo phase macrofloral assemblages. Fall or fall-winter seasonal aggregation sites first appeared during this time, as did specialized-function sites. The final Archaic phase of the Oshara tradition, the En Medio, witnessed an amplification of trends begun during the Armijo. Storage features first appeared during the En Medio phase and groundstone tools became more common and morphologically diverse. Irwin-Williams argues that increases in the number of sites and in the size and intensity of site use reflect population growth during the En Medio phase. Bands began exploiting seasonally productive, but previously untapped, resource patches. This shift may point to either an increasing reliance on logistical organization or to periodic small-group residential mobility punctuated by annual macroband aggregation.

Although Irwin-Williams identifies material similarities between the phases of the Oshara tradition and Renaud's (1942b, 1944, 1946) Rio Grande complex, which he defines using San Luis Valley data, the dearth of excavated Archaic-stage sites in the Rio Grande basin has nevertheless limited the development of region-specific chronologies or settlement models (Hoefer 1999a). All of the published radiocarbon dates come from sites within or immediately adjacent to the GRSA in the east-central portion of the valley, and most of these derive from individual features rather than from stratigraphic sequences.

Bevilacqua (2011) reports 57 radiocarbon dates from GRSA contexts. Five are too recent to calibrate and a single date from a site immediately outside the park can be added to the list (Jones 1977). Among the 53 interpretable dates, 32 come from Archaic contexts, between 7450 and 1450 B.P. The median date is 2380 B.P. and arithmetic mean date is about 2800 B.P. Thus, the latest Archaic contexts—which could be assigned to the Late Archaic period, the En Medio phase, or the Terminal period—are much more abundantly represented in the radiocarbon record from the bajada zone than are all other Archaic contexts.

Among the most interesting dated Archaic contexts is site 5AL80/81, a multi-function camp located on the valley floor just west of GRSA that produced flaked stone tools, ground stone tools, and a diverse archaeofauna composed of fish, bird, and mammal remains (Farmer 1978; Jones 1977). However, most Archaic sites located on the west flank of the Sangre de Cristo Range consist of concentrations of burned rock and ground stone tools, indicative of intensive processing of plant resources, possibly including Indian ricegrass (*Achnatherum hymenoides*) and piñon nuts (*Pinus edulis*) (Bevilacqua

et at. 2008; Hendrickson et al. 2011; Martorano et al. 2005). The attributes of these sites and their associated assemblages point to seasonal, logistical use of this portion of the valley (Andrews et al. 2004). The fact that logistical use of the eastern valley margin dates primarily to the mid- to late En Medio lends some support to Irwin-Williams's proposed developmental sequence for the Oshara tradition.

Architectural features are important elements of the Archaic stage record in the Southern Rockies (Pool and Moore 2011). Winter-occupied habitation structures appeared in the Northern Colorado River basin as early as the Pioneer period and are well attested through the Transitional period (Pool and Moore 2011; Reed and Metcalf 1999; Rood 1998; Shields 1998; Stiger 2001). Most were semi-subterranean with shallow, saucer-shaped floors. Superstructures varied significantly, incorporating upright poles or cribbed logs along with lighter materials in a variety of configurations. Many incorporated adobe plaster. Other Archaic-period structure types include wickiups (timbered lodges) and masonry surface structures (Black 1990).

Just one Middle Archaic basin house is known from the Arkansas River context area (Zier 1999). However, a cluster of such features has been documented immediately north of the Arkansas-South Platte divide in Douglas County, Colorado (Gantt 2007). Habitation structures dating the Late Archaic also are uncommon in the Arkansas basin, but include basin houses at the McEndree Ranch site in Baca County (Shields 1980) and at the Veltri site in the upper Purgatoire River valley (Rood 1990), and, possibly, one or more basin houses at the Venado Enojado site in Chaffee County (Watkins et al. 2012).

Documented Archaic-stage architectural features in the San Luis Valley include four basin houses at two sites located in the GRSA and one probable basin house at the Upper Crossing site in the middle Saguache Creek valley (this report; Bevilacqua 2011a). Two of the GRSA basin houses have been excavated, yielding a Middle Archaic date for one structure at the Big Spring site (5SH181) and a Late Archaic date for another at the Little Spring site (5AL10) (Jodry 2002). The probable basin house at Upper Crossing likely dates to the Late Archaic. Hoefer (1999a) assigns some of the Rio Grande basin's stone enclosures to the Archaic, but no radiocarbon dates are available to confirm this. However, rock art panels that may date to the Archaic occur on four sites that also include stone enclosures (Hoefer 1999a:123).

One hallmark of Archaic assemblages from the Southern Rockies is the diversity of associated projectile point styles (Metcalf 2011a; Mullen 2009; Reed and Metcalf 1999). Many Archaic point styles were produced over long periods of time and many well-dated components incorporate multiple styles. As Reed and Metcalf (1999:86) observe, "broad series show some patterning, but the rule is for diversity within sites and temporal periods." For the San Luis Valley and adjacent mountains, this problem is compounded by the routine use of style names linked to sequences originally developed for sites in other regions, including the northern Southwest, the Great Basin, and the Plains. In view of the chaotic diversity of Archaic point types in the Southern Rockies, it is likely that projectile point morphology there provides little or no information on interregional cultural connections (Stiger 2001). More importantly, this diversity means that the morphologies of projectile points recovered from surface contexts cannot be used to assign sites to particular periods within the Archaic.

Late Prehistoric Stage

Diversity characterizes the post-Archaic record of the Southern Rockies and adjacent areas. Reed and Metcalf (1999) partition the Formative era in the Northern Colorado River basin into a series of separate cultural traditions, including the Fremont, Gateway, Anasazi, and Aspen traditions. All share use of the bow and arrow. With the exception of the Aspen tradition, all of the Northern Colorado River basin's Formative societies relied to some extent on maize cultivation, though it was less important to them than it was to the ancestral Puebloan farmers who lived south of the San Juan Mountains. Northern Colorado's Formative-era architectural features varied in design and construction technology, both within and between traditions. Manufacture and use of pottery also varied: some groups produced high-quality vessels while others made only limited use of pottery. Settlement systems also varied. In some locations, Formative-era people maintained Archaic-era settlement and subsistence patterns but in others they were tethered to long-term habitation sites near maize fields. Formative-era projectile point styles are less diverse than are those of the Archaic.

In the Arkansas River basin, Late Prehistoric stage archaeology is partitioned into two periods (Kalasz et al. 1999). (Kalasz and others [1999:250-263] also include the Protohistoric period in the Late Prehistoric stage; however, the post-500 B.P. archaeology of the Rio Grande basin is considered separately in the next section.) The beginning of the Developmental period (1850-900 B.P.) was marked by the first appearance of the bow and arrow and, perhaps asynchronously, ceramic containers. Small corner-notched arrow points occur at Recon John Shelter as early as 1900 B.P. Pottery may be present on several roughly contemporaneous sites and definitely occurs on sites dating to between 1500 and 1700 B.P. However,

apart from these undoubtedly important technological changes, Developmental period lithic technology is markedly similar to that of the preceding Late Archaic period, a pattern indicative of local cultural development.

Goosefoot (*Chenopodium* sp.) seeds dominate Developmental period macrofloral assemblages. Other wild plant foods include a variety of cacti and weedy annuals. Remains of maize are consistently, though not ubiquitously, present. However, maize likely was not significant a component of Developmental period diets (Kalasz et al. 1999). Developmental period archaeofauna are very diverse and include numerous small mammals in addition to small and large artiodactyls.

In the Plains, Developmental period architectural features are uncommon and varied. The best-known include two basin houses at the Belwood site, one with a low encircling rock foundation; an enigmatic basin house at the Running Pithouse site; and two stone enclosures at the Forgotten site (Kalasz et al. 1999). By contrast, circular to oval basin houses with rock foundations are relatively common in the southern Park Plateau, in the Plains-foothills ecotone.

The succeeding Diversification period (900-500 B.P.) in the Arkansas basin is characterized by increased investment in domestic architecture and by the widespread use of triangular, side-notched arrow points (Kalasz et al. 1999). The Diversification period is further partitioned into the Sopris phase and the Apishapa phase. Sopris phase sites are confined to the Park Plateau, both north and south of the New Mexico-Colorado border, while Apishapa phase sites occur throughout a broad arc south the Arkansas River. Sopris phase houses are heterogeneous and include both single- and multiple-room structures built from stone masonry, adobe, and jacal. Apishapa phase houses include single- and multiple-room structures built nearly exclusively from vertical slabs. Stone barrier walls or fences also are common, as are walled or partitioned rockshelters.

Although wild resources continued to be the backbone of Diversification period diets, the consumption of maize clearly increased. Small mammals appear to dominate rockshelter archaeofauna while bison dominate open-site archaeofauna (Kalasz et al. 199:218). Interregional interaction increased during the Diversification period, particularly for Sopris phase communities who maintained routine connections with ancestral Puebloans in the Rio Grande basin.

Comparatively little is known about the archaeology of the Late Prehistoric or Ceramic stage in the Rio Grande basin (Martorano 1999a). The early Late Prehistoric encompasses Irwin-Williams's (1973) Trujillo phase. Trujillo phase groups adopted bow-and-arrow technology and used a modest number of ceramic containers. However, Irwin-Williams detects no change from earlier En Medio phase economic practices. Economic intensification that began in Armijo phase times continued through the En Medio and into the Trujillo. Both En Medio and Trujillo phase sites represent a "strongly seasonal annual economic cycle" (Irwin-Williams 1973:14).

Maize horticulture likely was not possible north of the New Mexico-Colorado border. The data available suggest that the San Luis Valley and adjacent foothills and mountains were used both by indigenous hunter-gatherers and by groups who resided for much of the year either farther south along the Rio Grande or to the east in the Arkansas River basin. Late Prehistoric sites occur primarily on the floor of the San Luis Valley, especially along San Luis and Saguache creeks and in the hydrologic sump west of GRSA (Martorano 1999a:133). Many are large and exhibit diverse tool assemblages suggestive of central-place foraging camps. A number exhibit evidence of repeated re-occupation.

Use of the San Luis Valley by ancestral Pueblo groups, particularly during the Pueblo II and Pueblo III periods, is attested by data from several sites, including the Mill Creek site (5SH354) and Saguache Shelter (5SH1458) on the northern end of the valley. Cord-marked pottery found sporadically throughout the valley suggests visits by Plains groups (Bevilacqua 2011b; Martorano 1999a).

The number of people living in the San Luis Valley and adjacent regions peaked during the Late Prehistoric, but the timing of local peaks likely varied. In the Northern Colorado basin, population peaked at about 950 B.P then began declining slowly. South of the San Juan Mountains, ancestral Puebloan population waxed and waned locally, but likely reached a regional peak between 800 and 700 B.P., immediately prior to a sharp decline just prior to 650 B.P. (Lipe and Varien 1999). Radiocarbon data from the San Luis Valley suggest a population peak early in the first millennium, followed by a significant decline. However, all of the available radiocarbon data come from sites located within or adjacent to GRSA and so may not be representative of valley-wide trends. In northern New Mexico, population likely peaked during the early centuries of the first millennium (Irwin-Williams 1973:12). Population in the Arkansas basin likely rose during the Developmental period and peaked about 750 B.P. in the west and 600 B.P. in the east.

Stone Enclosures in the San Luis Valley

Pioneering University of Denver archaeologist Etienne B. Renuad (1935, 1942a:3) first alerted archaeologists to the presence of stone enclosures in the San Luis Valley, but it was Betty and Harold Huscher (1942, 1943:7) who attempted the first broad-scale, systematic investigation

of what they called "non-Pueblo masonry ruins" found throughout southern and western Colorado. During three field seasons in 1939, 1940, and 1941 the Huschers identified 35 sites containing more than 200 structures, including several sites in the San Luis Valley. In fact, the Huschers begin their synthesis with a detailed description of a prominent site they called "HSH," located near the town of Saguache (Huscher and Huscher 1943:8). Renaud (1942a:23-27) designated this site "C318" and it is now recorded as 5SH2.

The Huschers (1943:7) firmly believed that the masonry structures they called "hogans," which they define expansively as "circular or curvilinear walls of dry-laid masonry … characteristically built in prominent locations," were the remains of residential structures put up by small bands of southward migrating Athapaskans. They marshal multiple lines of evidence to support this interpretation, including architectural data, artifact associations, and historical data, all itemized in comparative trait lists.

Renaud (1942a:47) was skeptical of the Huschers' interpretation, wondering in print whether they were simply affirming the consequent: Navajos build hogans, so ancient hogans must have been built by Navajos. However, Renaud's more circumspect approach was no more productive. Admitting that he could offer no "satisfactory" account of their function or cultural affiliation, Renaud (1942a:46-47) simply notes that "they all seem eminently fitted to serve as observation posts," and that they were not constructed by Plains groups, ancestral Puebloans, or Utes.

Recorded stone enclosures in the San Luis Valley occur singly and in clusters and range in size from about 1 m in diameter to more than 9 m (Hoefer 1999c). The mean size is roughly 4 or 5 m. Enclosure morphologies range from circular to oval to subrectangular. Many enclosures are entirely closed but open or semi-circular structures are also common. Foundation rock sizes vary, but blocks 50 cm long or larger are not uncommon. Foundation height varies from as low as 10 cm to as high as 80 cm. Some enclosure sites also contain walls and cairns.

The inventory of surface-documented stone enclosure sites is now much larger than it was when Renaud and the Huschers were working. However, excavation data are available for just three San Luis Valley enclosures at two sites. This includes two structures at the Upper Crossing site and one at the Duncan Townsite (5SH3484) (this report; Dominguez 2009). The Duncan Townsite enclosure, the only structure for which radiocarbon data are available, likely dates to between 980 and 800 B.P. (Dominquez 2009:196). Associated projectile points suggest that the Upper Crossing enclosures date to between 1450 and 750 B.P. (this report).

Post-500 B.P. American Indian Groups

Ceramic and rock art evidence indicates that numerous groups visited the San Luis Valley and surrounding mountains after 500 B.P., including ancestral Puebloans, multiple Apache bands, Utes, Comanches, Navajos, and possibly other groups (this report; Bevilacqua 2011b; Cole 2008; Crosser et al. 2008; Eiselt and Darling 2012; Martorano 1999b; White 2005). However, by about 250 B.P. the Utes were the dominant cultural group occupying the region. Utes, or related Numic-speaking peoples, first appeared in the Southern Rockies around 850 B.P. (Reed 1994), though debate continues both on the timing of their arrival and on their relationships, if any, to Formative or Late Prehistoric groups (Reed and Metcalf 1999).

Post-500 B.P. projectile point styles include triangular side-notched and unnotched arrowpoints. Documented architectural features include conical timber lodges, brush wickiups, forked-stick hogans, and possibly circular spaced-rock features (Martorano 1999b; Reed and Metcalf 1999).

Perhaps the most common and visible type of archaeological resource dating the last several centuries is culturally modified or peeled trees (Martorano 2011). American Indians harvested tree bark for comestible and medicinal purposes, for building materials, and to obtain raw materials for manufacturing a wide variety of tools, containers, and other objects. Scars left by harvesting are readily observable on both living and dead trees in many parts of the western United States and Canada. Culturally modified trees are widespread, but unevenly distributed, throughout the montane ecozone surrounding the San Luis Valley. The largest documented cluster occurs in the GRSA (Martorano 2011).

3

Stone Structure Descriptions

This chapter describes the findings of the site boundary survey and presents data on the stone structures identified and documented in 2009.

Site Boundary Survey

To establish a coherent boundary for the site the crew carried out an informal survey on roughly 41.6 ha (102.8 ac) surrounding and including the known and previously documented features and cultural deposits (figures 3.1 and 3.2). The area examined encompasses a small promontory to the east as well as the slopes bounding the major drainage west of the site. The survey revealed a complex archaeological landscape indicative of frequent visits to the area, undoubtedly over a lengthy period of time by many different groups. Concentrations of surface artifacts are present on the ridge north of Upper Crossing, as are several stone enclosures and at least one spaced-rock ring. A stone enclosure and associated linear stone "fence" is located on the eastern promontory. Some these artifacts and features likely are contemporaneous with those systematically documented during the 2009 field investigation. However, the survey also demonstrated that the density of features and artifacts varies across the landscape and moreover that the site boundary illustrated in figure 3.1 encloses a relatively compact and well-defined sample of the varied cultural resources present in the vicinity. Defined in this way, the Upper Crossing site covers approximately 11.1 ha (27.4 ac).

Stone Enclosure Documentation

The PCRG/SLVPLC field crew used three methods to document stone enclosures. Teams of two or three people drew scaled sketch maps of each feature, measuring the positions of the largest wall stones and major bedrock exposures from a baseline aligned to magnetic north. Smaller stones were drawn impressionistically. The mapping crew also prepared narrative descriptions of each feature that list details of wall construction techniques, structure orientation and layout, and associated artifacts. A second crew took a series of photographs of each structure showing its overall form as well as the details of wall construction.

The area enclosed by each structure is estimated from the plan maps. For circular structures, perpendicular measurements were made across the middle of the structure from the estimated centers of opposing walls. Elliptical structures were measured on the short and long axes. Where large boulders or bedrock outcrops are incorporated into the structure one measurement was made perpendicular to the rock face. Where the arc of the wall is less than 180 degrees the estimated size of the structure was derived from a circle matching the extant wall segment. For consistency, the mid-point of each wall was chosen as a convenient measuring point, to account for the possibility that wall stones may have fallen both to the inside and to the outside of the original wall axis. The actual usable floor area inside each structure would very likely have been somewhat less than the calculated area. Depending on their shape, formulas for the area of a circle, ellipse, or rectangle were used to calculate the area of each structure.

For each structure, data were collected from the sketch maps on the positions of large boulders or bedrock outcrops incorporated into the wall and on the position of gaps in the wall thought to represent entryways. Nominal cardinal and intercardinal directions were used to code these variables. Data were also collected on the type of modification made to the original ground surface when each structure was built. The "cut" attribute indicates that the floor of the structure was leveled by excavating into the uphill slope. The floor of "fill" structures was leveled by building up the wall on the downhill side. Some structures exhibit both cut and fill attributes.

Cluster 1 Features

When the Upper Crossing site was first recorded as 5SH73 in November 1977, the U. S. Forest Service field crew identified seven cultural features, including one stone enclosure; one large, overhanging boulder with a stacked masonry wall; two small overhanging boulder shelters; and three areas of eroding cultural deposits. All of these features are located on the eastern edge of what is now designated Cluster 1 (figures 1.3). The Forest Service's Feature 2, the stone enclosure, was not observed during the 1987 re-visit by the Bureau of Land Management

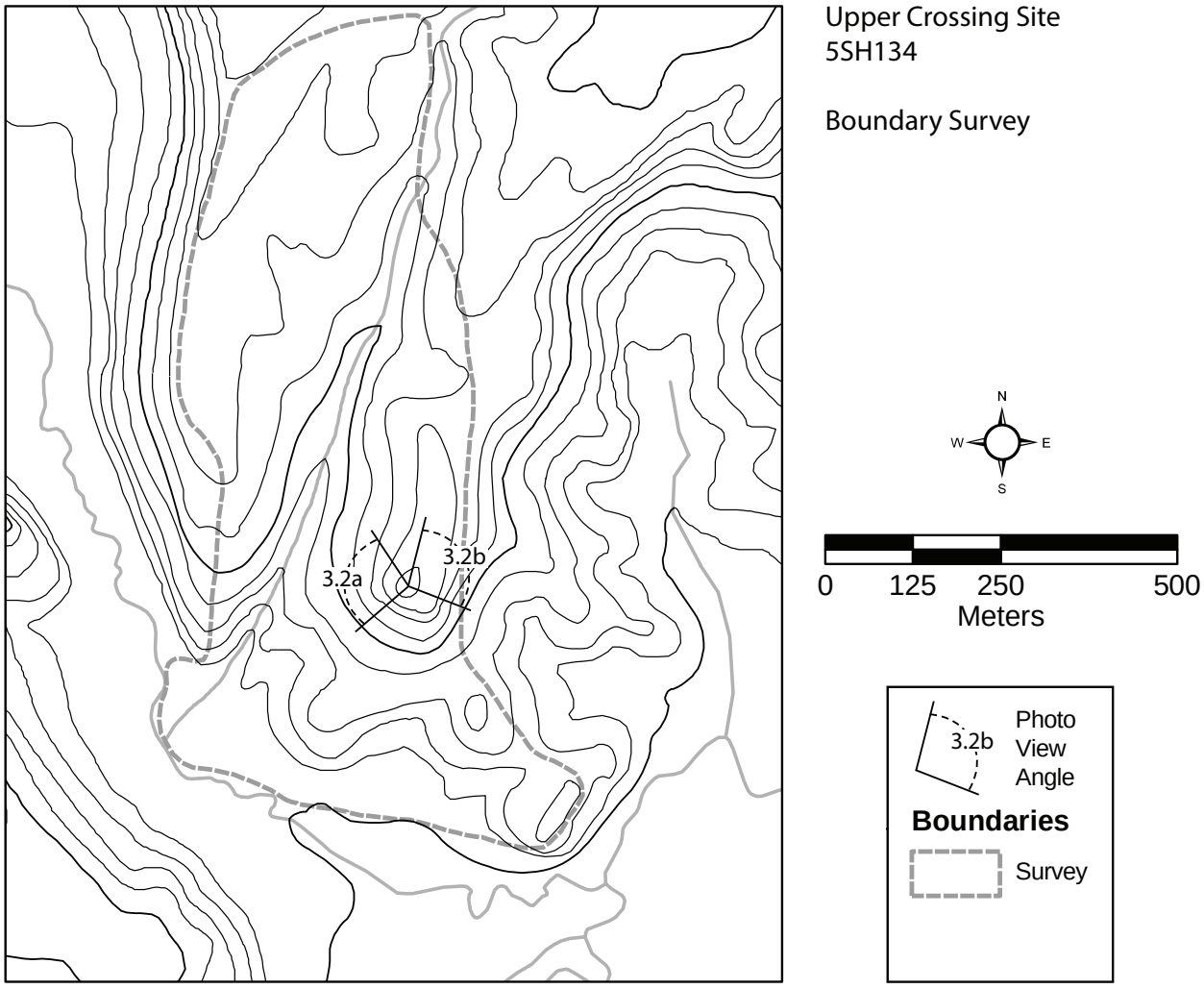


Figure 3.1. Map showing the boundary of the informal survey area surrounding the Upper Crossing site.

crew, but was relocated and mapped in 2009; it now carries the designation Feature 34. Another, previously undocumented stone enclosure located immediately adjacent to Feature 34 was also identified and mapped in 2009 and is designated Feature 22.

Prior to their 1999 testing project, which is described in more detail in chapter 4, the Forest Service surveyed a portion of Cluster 1 and prepared a map showing the locations of six stone enclosures, numbered 1 through 6. None of these features were documented during the 1977 recording. In 2001, Colorado College (CC) field school students carried out a complete survey of Cluster 1. The CC map shows the approximate sizes and positions of 16 enclosures, numbered 1 through 16. For the most part, the CC crew retained the structure numbers assigned previously by the Forest Service, though they did renumber two of the enclosures originally identified in 1999, changing Feature 1 to Feature 4 and Feature 4 to Feature 14. The 2009 mapping project used the designations assigned by CC. However, additional investigation demonstrated that the alignments CC designated Features 1, 3, and 8 are merely fortuitous arrangements of naturally occurring bedrock spalls rather than constructed enclosures. In addition, CC's Feature 14 is designated here as a "possible structure" owing to its ephemeral character. Five previously undocumented enclosures, designated Features 17, 18, 19, 21, and 33, were also identified in the core area of Cluster 1 during the 2009 field investigation. In sum, a total of 19 enclosures, plus one possible enclosure, comprise Cluster 1; basic data on these features are summarized in table 3.1 and their locations are illustrated in figure 3.3.

Most of the structures in Cluster 1 are well preserved. Only a few show evidence of substantial disturbance by burrowing animals; data obtained during the 1999 testing project corroborate the observation that the intensity of rodent activity varies among structures. Features 9 and 10 exhibit limited evidence of unprofessional digging

Figure 3.2. Two views of the Middle Saguache Creek valley from the Upper Crossing site. A: view to the west; B: view to the northeast. See figure 3.1 for photo orientation.

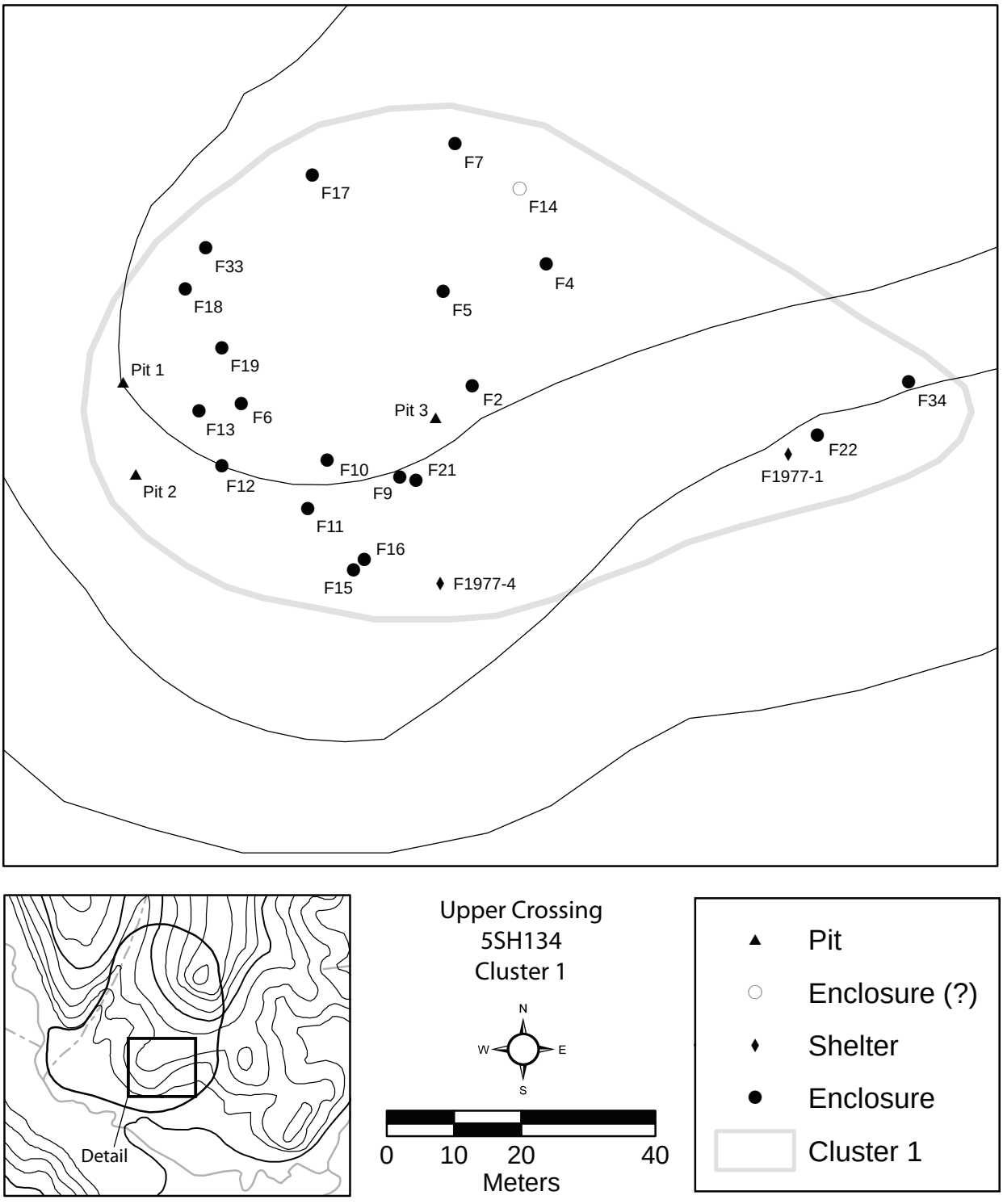


Figure 3.3. Map showing the location of stone enclosures and other features in Cluster 1.

in the form of shallow interior depressions. The overall paucity of chipped stone tools on the surface suggests that artifacts have been removed by recent visitors, a conclusion supported by a note on the 1987 site re-evaluation form indicating that the site was "thoroughly collected." Post-occupation surface erosion has damaged a few structures, notably Feature 22.

Table 3.1. Summary data on Cluster 1 stone enclosures.

Feature Number	Field Year[a]	Dimensions (m)[b]	Floor Area (sq. m)[c]	Vertical Bedrock	Surface Modification	Entryway[d]
2	1999	3.7x3.7	10.8	NW	fill (SW)	none observed
4	1999	3.0x4.3	10.1	NW	cut (N)	S (?)
5	1999	4.5x3.9	13.8	NW	none	SE
6	1999	3.2x3.4	8.5	NW	fill (SE)	S (?)
7	2001	3.5x4.3	11.8	none	none	no data
9	2001	4.1x4.1	13.2	none	cut (NW, W); fill? (SE)	SE
10	2001	4.1x3.7	11.9	SW	cut (W); fill (E)	NE
11	2001	4.2x4.5 (5.5x5.0)[e]	14.8 (21.6)	N, NE	cut (W)	SE (?)
12	2001	4.2x3.0	9.9	none	cut (W)	none observed
13	2001	2.9x2.8	6.4	S	cut (NW)	no data
15	2001	2.5x2.5	4.9	none	none	SE
16	2001	no data	no data	NW, SE	cut (N, NE)	no data
17	2009	3.9x3.7	11.3	N	none	S (?)
18	2009	3.3x4.5	11.7	none	none	no data
19	2009	2.5x3.1	6.1	none	none	E
21	2009	3.5x4.2	11.5	NW, NE, SE, S	none	no data
22	2009	3.5x6.5	22.8[f]	NW	fill (SE)	none observed
33	2009	4.0x2.0	8.0[f]	E	none	no data
34	1977	4.3x3.0	10.1	N	fill (S, SE)	W (?)

[a] Year first recorded.
[b] See text for explanation of measurements.
[c] Except as noted, the formula for the area of a circle or ellipse was used to calculate structure sizes.
[d] "No data" indicates that the wall is too poorly preserved to determine the position of the entryway; "none observed" indicates that the wall is continuous or substantially complete.
[e] Two measurements are given owing to uncertainty about wall alignment; see text for details. The smaller size is used to calculate mean structure area for the cluster.
[f] Rectangular area.

Enclosure Descriptions

Feature 2 is a well defined, circular enclosure approximately 3.7 m in diameter (figure 3.4). The wall is constructed from small- to moderate-sized blocks and cobbles, the largest of which measures about 70 cm in length. The southern arc of the wall incorporates more stones than the northern. The wall is best preserved in the southwest quadrant of the structure, where several partially collapsed examples of vertically placed slabs are visible (figure 3.4c). The wall is tied to a large, low boulder or bedrock outcrop, about 0.5 m high, on the northwest corner of the structure. No gaps in the wall suggesting an entryway were observed, though only a few stones mark the location of the eastern wall.

A moderate amount of flaking debris is visible on the surface adjacent to Feature 2, particularly on the north side. No burned rock or charcoal-stained sediment was observed within the structure. However, a test excavation carried out within this structure in 1999 revealed the presence of abundant artifacts and bone in the fill (see chapter 4). Stratigraphic data suggest that the original floor of the structure may have been roughly 25 cm below the modern surface. Overall, Feature 2 is well preserved, exhibiting little evidence of looting, surface erosion, or animal burrowing.

Feature 4 is an oval stone enclosure located northwest of Feature 2. The wall, which is constructed mostly from large flat slabs and angular boulders, abuts the southeast face of a boulder or bedrock outcrop approximately 3.5 m in height (figure 3.5). Partially collapsed, vertically set slabs as well as horizontally stacked or piled blocks are evident. The vertical slabs appear to be set on and supported by underlying courses of angular and tabular elements. The structure appears to have been excavated into the slope on the north side. An apparent gap in the southern portion of the wall may indicate the location of an entrance. A small pinon pine is growing up through the eastern arc of the wall.

Cultural deposits containing abundant charcoal, burned rock, and flaking debris are visible immediately outside the wall on the north and, especially, on the southwest sides of the structure. Few artifacts are visible on the surface inside the structure but substantial cultural deposits appear to be present in and around it.

Feature 5 is an oval stone enclosure that incorporates a boulder or bedrock outcrop about 1 m high on the northwest side (figure 3.6). The boulder is highly weathered; a low shelf or ledge is present on its southeast side, inside the structure. On the north side of the structure the wall is built on a foundation of bedrock spalls. This structure is among the most substantial and best preserved in Cluster 1. With the exception of a narrow gap on the southeast side likely indicative of an entryway, the density of slabs and blocks making up the wall is relatively uniform along its length. Many of the stones are set vertically, with the interior slabs leaning outward and the exterior slabs leaning inward. The basal course of stones consists mostly of horizontally laid slabs.

Flaking debris and a few ground stone tool fragments are visible on the surface inside the structure. Charcoal-stained soil can be seen under the partially collapsed vertical slabs on the northern side of the structure. The feature appears to preserve substantial intact cultural deposits.

Feature 6 is a moderately well-defined, circular structure enclosing about 8.5 sq. m, set against a large, upright boulder nearly 2.5 m high (figure 3.7). The boulder forms the northwest quadrant of the structure. A large, flat bedrock outcrop is incorporated into the wall on the northeast. On the southwest, a short wall segment spans the gap between the major outcrop and a smaller bedrock boulder (figure 3.7c). Three courses of stacked stones form the wall on the south, retaining sediment inside the structure. The natural topography outside the enclosure dips gently to the south and east. On the south, the elevation difference between the level interior and the exterior slope is about 40 cm. Gaps in the wall on the south could represent the location of an entryway; however, it seems more likely that they are simply fortuitous, given the comparatively poor preservation of the wall.

A slight depression representing the location of the 1 m x 50 cm test unit excavated in 1999 (designated TS-3) is located just west of the structure's center point. Details on the stratigraphy and content of this test are presented in chapter 4. Chert and quartzite flakes are visible on the surface both inside and outside Feature 6. A handstone fragment is present inside the enclosure, near the north wall. A large boulder incorporated into the north wall exhibits two possible pecked depressions 8 to 10 cm in diameter and 5 cm deep.

Feature 7 is a semi-circular stone structure enclosing nearly 12 sq. m (figure 3.8). The walls of Feature 7 are lightly built compared to most of the other enclosures in Cluster 1. The only intact wall segment is located on the east and consists solely of one to two courses of horizontally laid stones (figure 3.8c). Low bedrock outcrops anchor this segment on both ends. Despite its ephermeral character, Feature 7 preserves evidence of the techniques used to build these structures. On the northwestern quadrant of the wall, a single outward-leaning slab is propped against a smaller stone set into a crack in the bedrock (figure 3.8d). The placement of the prop rock leaves little doubt that it was set intentionally.

Only two flakes were observed on the surface near Feature 7 and there is no evidence that buried cultural

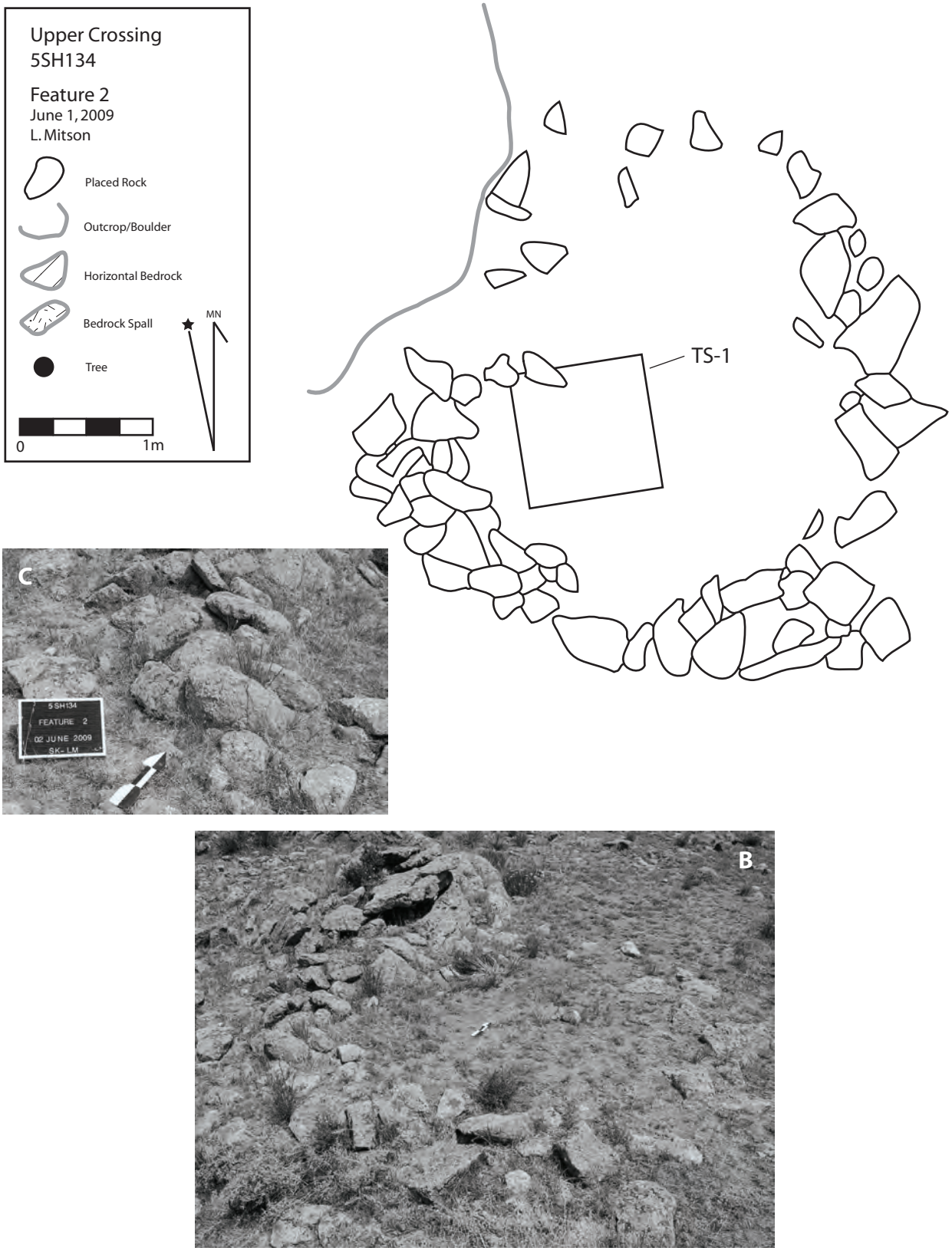


Figure 3.4. Sketch map and photographs of Feature 2. B: view to the northwest; C: southwest wall detail.

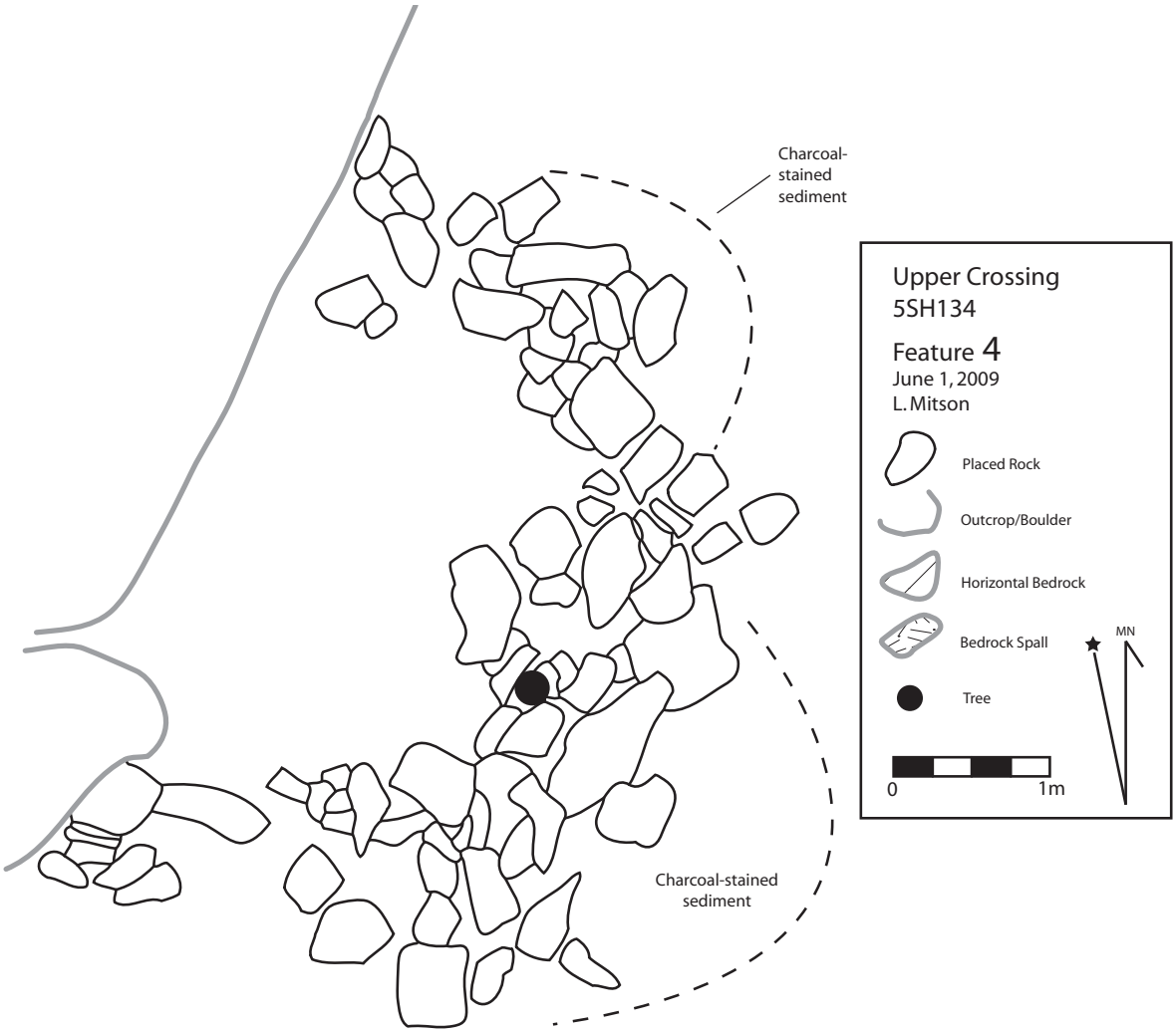


Figure 3.5. Sketch map and photographs of Feature 4. B: view to the northwest.

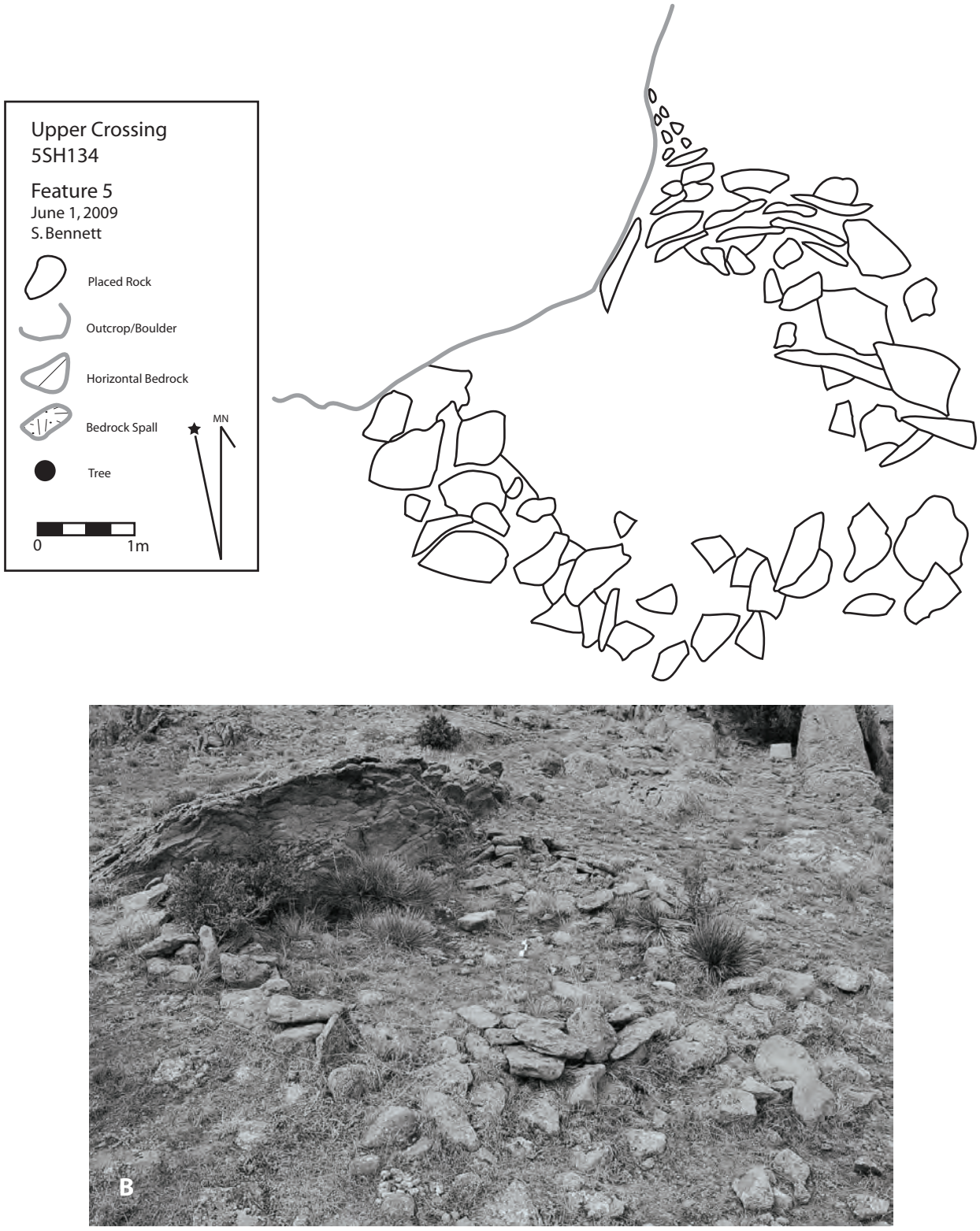


Figure 3.6. Sketch map and photographs of Feature 5. B: view to the northwest.

Figure 3.7. Sketch map and photographs of Feature 6. B: view to the northwest; C: southwest wall detail.

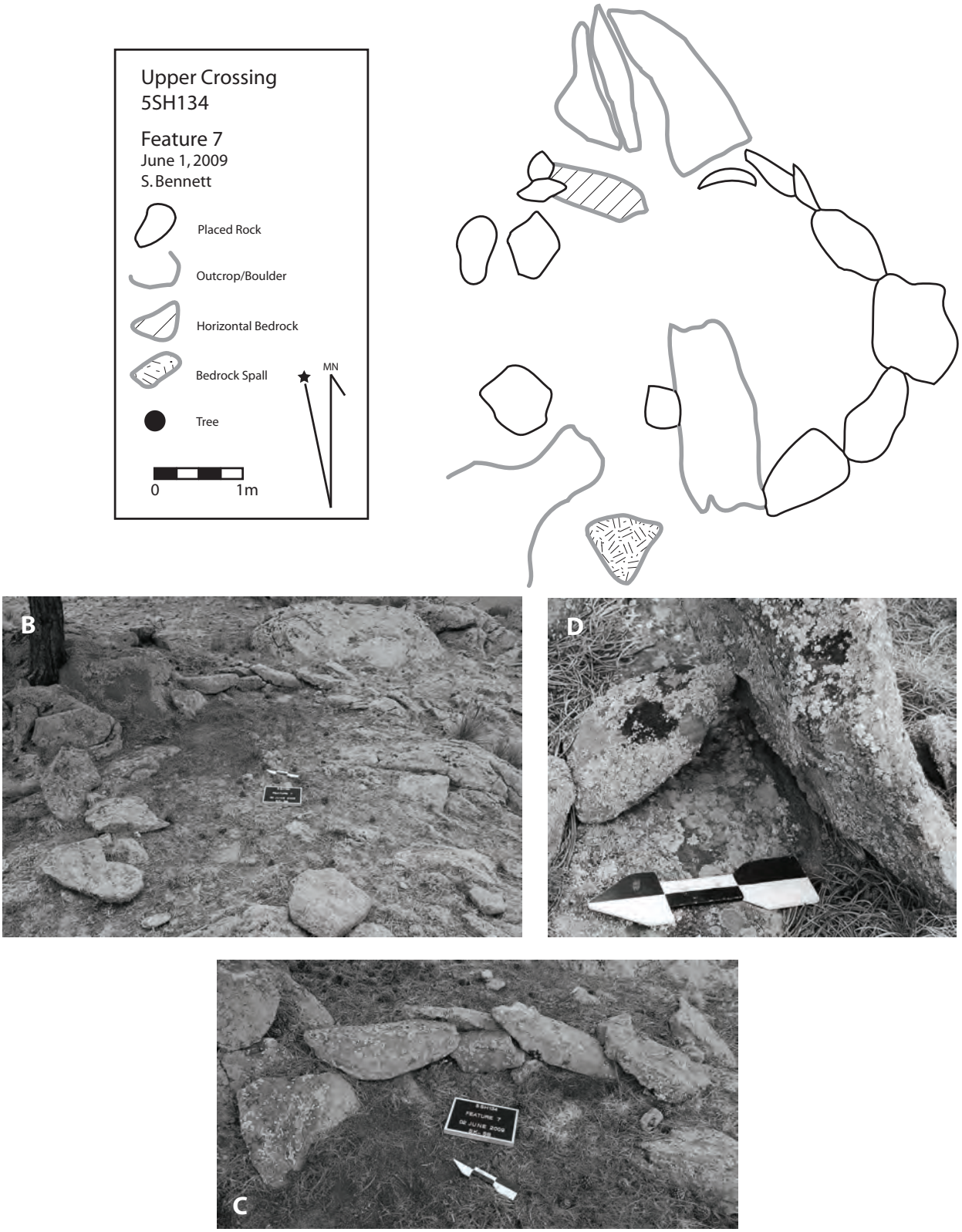


Figure 3.8. Sketch map and photographs of Feature 7. B: view to the northeast; C: northeast wall detail; D: prop rock supporting wall rock.

deposits are present within or around it. The lack of associated artifacts, coupled with the comparative dearth of wall stones, suggests that this enclosure may have functioned as a ramada or other temporary construction rather than as a residential structure.

Feature 9 is a large, massively built, circular stone enclosure located on the east side of Cluster 1 (figure 3.9). The structure was excavated into the slope on the north and northwest. The resulting cut was buttressed with large, vertically set slabs and stacked blocks (figure 3.9c). On the south, the wall is represented by a massive pile of tumbled cobbles and boulders. A gap in the wall on the east-southeast probably indicates the location of an entryway. Several low bedrock slabs are located on the east side of the structure, but the wall is not tied directly to them. The floor inside the enclosure slopes down slightly to the west, perhaps indicating the location of prior unprofessional digging. The depression could also have resulted from erosion of sediment inside the structure through gaps between the stones comprising the collapsed southern wall.

Artifacts and charcoal-stained sediment are eroding from the base of the wall on the south. The items observed include chipped stone tools, ground stone tools, flaking debris, and burned rock. Intact cultural deposits also appear to be present inside the enclosure.

Feature 10 is an oval structure that incorporates a large bedrock boulder on the southwest side (figure 3.10). It is 4.1 m long, 3.7 m wide, and encloses about 11.9 sq. m. Like Feature 9, this structure was partially excavated into the slope on the northwest and the cut was lined with slabs and large blocks. On its south end, this retaining wall extends into a large crevice between two bedrock blocks (figure 3.10c). The wall is massively built on the southeast, perhaps owing to the need to retain sediment there (figure 3.10d). Overall, vertically set slabs are comparatively uncommon in this structure. An opening in the wall on the northeast may represent an entryway. The interior floor dips toward the center, a likely result of unprofessional digging. Another enclosure (Feature 11) is located immediately to the south, adjacent and connected to the large boulder forming the southern wall of Feature 10.

Artifacts are moderately abundant on the surface within and around Feature 10. Cultural materials appear to be eroding from the southeastern section of the wall. A significant cultural deposit likely is present inside the structure. No signs of rodent activity were observed, but a portion of the interior may have been disturbed by artifact collectors.

Feature 11 is a circular stone structure backed on the north by a large, curving bedrock outcrop, the same block that forms the southwest wall of Feature 10 (figure 3.11). The wall of the structure is well preserved on the west but heavily disturbed on the east. Several large bedrock blocks are located immediately northeast of the structure and if the wall originally was connected to these blocks, then the structure would have enclosed about 21.6 sq. m. However, on the north, the wall seems to connect to a low bedrock slab, rather than to the larger boulder. It therefore seems likely that Feature 11 enclosed a smaller area, probably about 14.8 sq. m. The structure was excavated into the slope on the northwest and north. No vertically set slabs are preserved in the wall, which consists mostly of large subangular blocks (figure 3.11c). The floor of the structure is generally level, in contrast to the gently sloping terrain outside the wall. A section of the wall on the southeast, marked by relatively small stones, could represent the location of an entryway.

Heat-altered chert flakes and fragments of burned rock are eroding from the southern edge of the structure. Cultural deposits of unknown depth appear to be preserved inside the structure.

Feature 12 is a free-standing, oval structure located on the southwest edge of Cluster 1 (figure 3.12). The terrain slopes steeply away from the structure to the south. On the north and west, the wall of the structure is excavated into the slope and the cut is lined with large blocks and slabs up to 50 cm high (figure 3.12c). The wall is difficult to define on the south because it has fallen onto a natural talus slope. No gaps are evident in the wall. Several upright slabs remain in the southeast quadrant of the structure (figure 3.12d). Feature 9 encloses about 9.9 sq. m.

Relatively few artifacts are visible on the surface inside or around Feature 9. Sediment deposition with the structure appears to be minimal.

Feature 13 is a poorly preserved, circular stone enclosure (figure 3.13). The eastern arc of the wall is not preserved. On the south side, the wall abuts a series of large bedrock blocks. Stones filling a crevice between the two largest boulders likely represent wall fall, as do several larger stones adjacent to the boulders inside the structure. The best-preserved section of the wall occurs on the west side, where the structure is slightly excavated into the slope (figure 3.13c).

No artifacts were observed on the surface inside or adjacent to Feature 13. The potential for sediment deposition in the interior is limited, judging by the bedrock slabs exposed on the surface.

Feature 15 is an unusual circular structure (figure 3.14). It is the smallest feature in Cluster 1, enclosing just 4.9 sq. m. It also is the best preserved feature in the cluster. The wall is composed of three to four courses of large blocks, along with a few partially collapsed upright slabs (figure 3.14c). Unlike any of the other structures in Cluster 1, the floor of Feature 15 appears

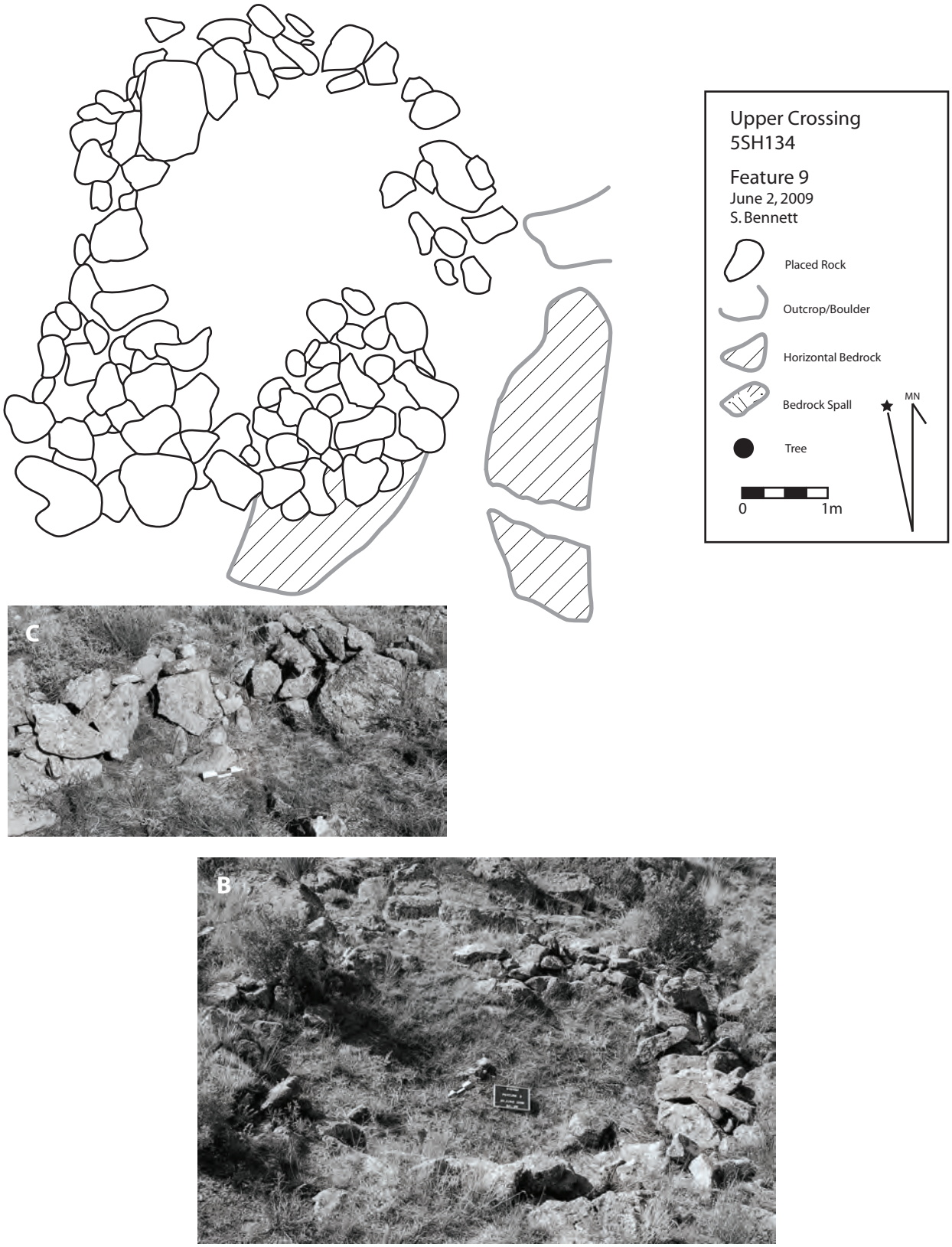


Figure 3.9. Sketch map and photographs of Feature 9. B: view to the southeast; C: northwest wall detail.

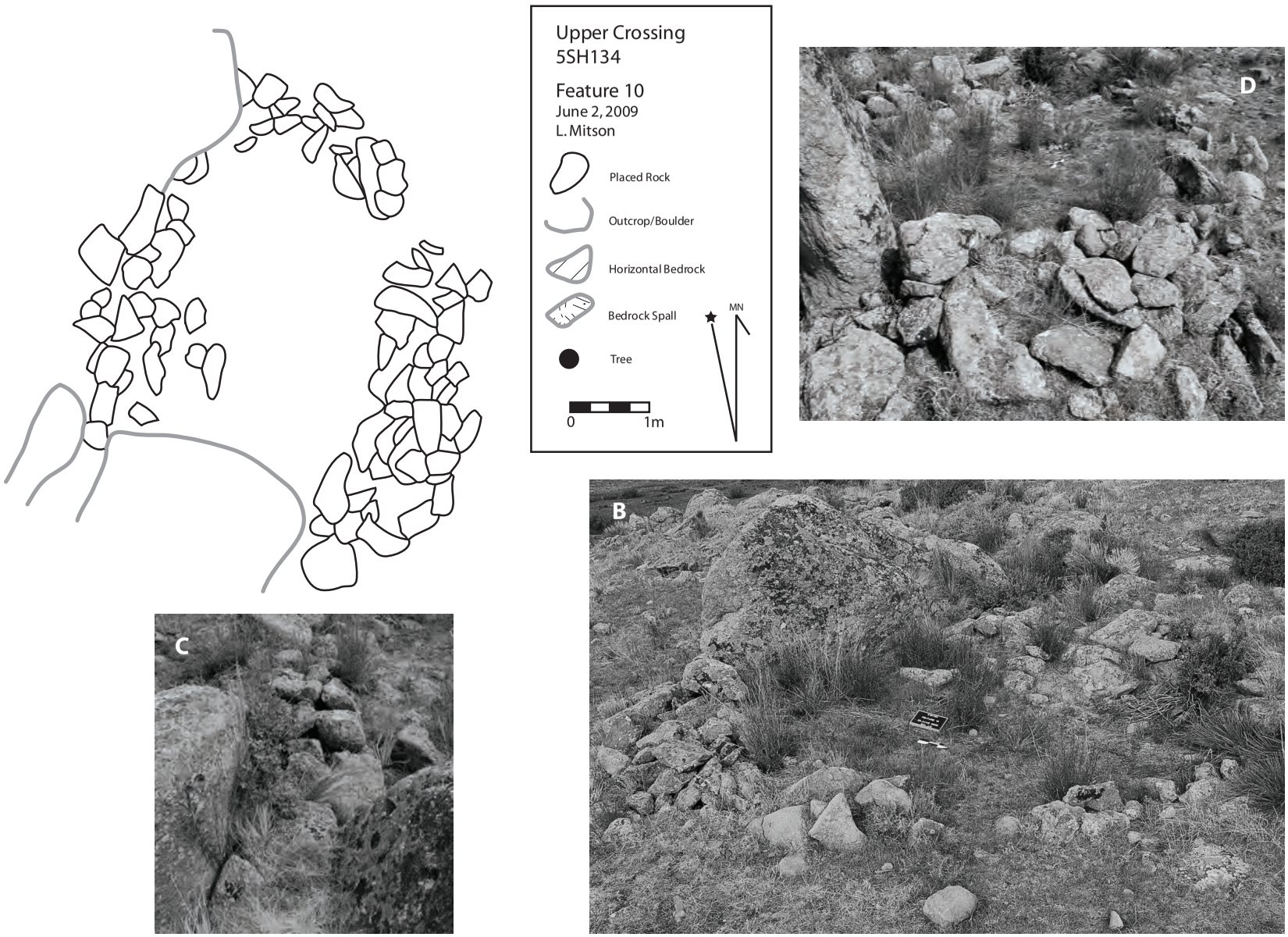


Figure 3.10. Sketch map and photographs of Feature 10. B: view to the southwest; C: southwest wall detail; D: southeast wall detail.

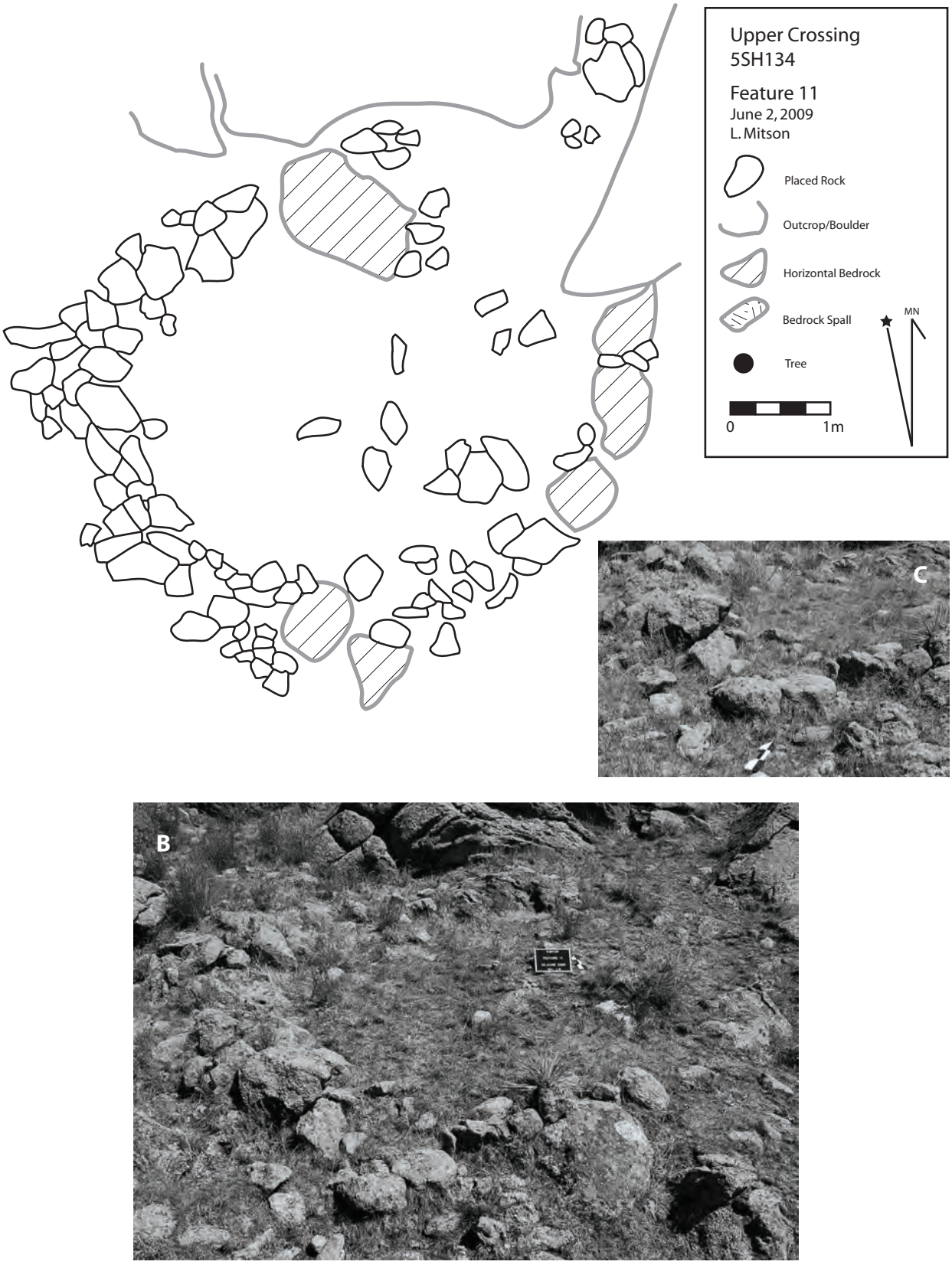


Figure 3.11. Sketch map and photographs of Feature 11. B: view to the north; C: south wall detail.

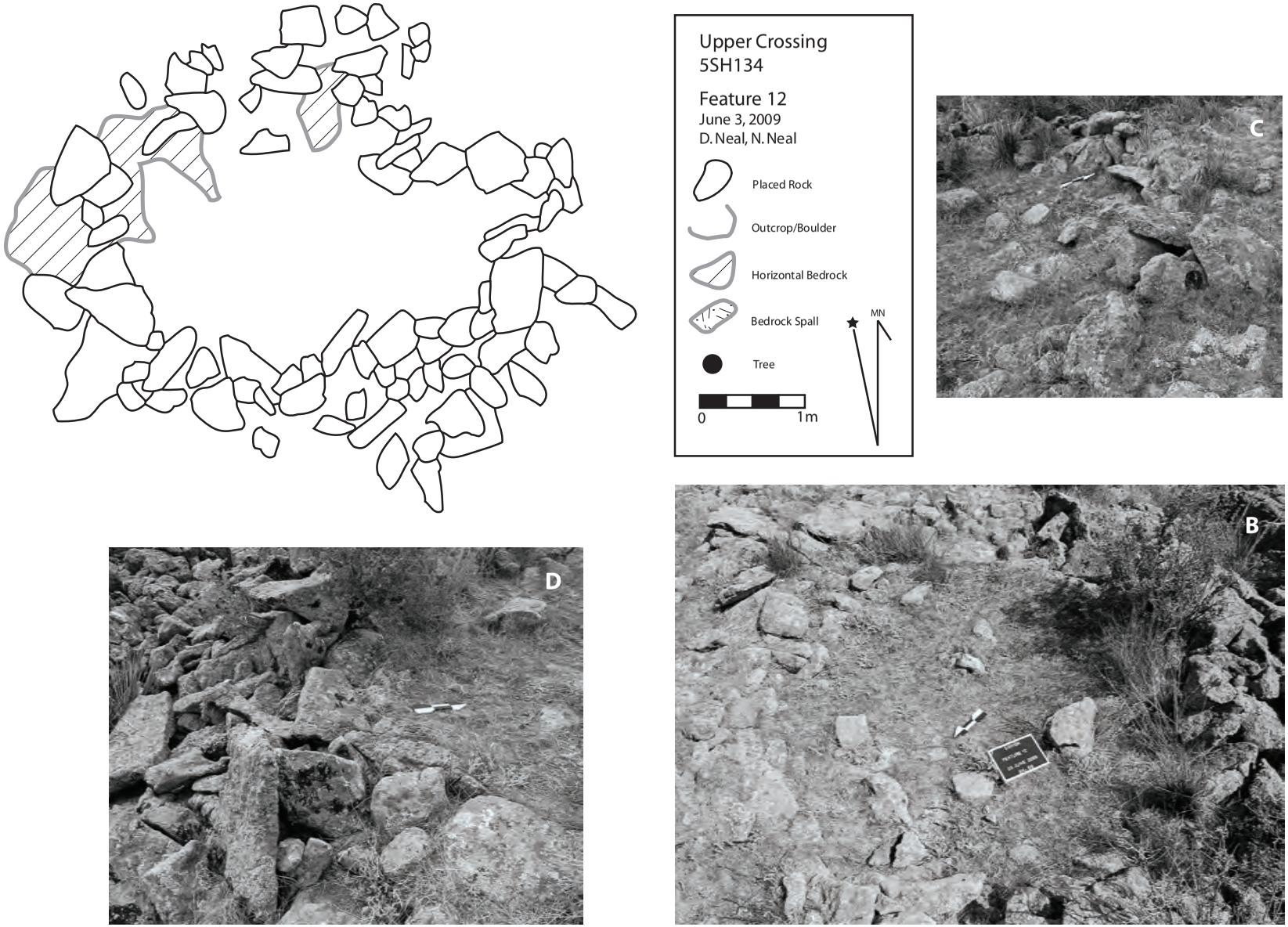


Figure 3.12. Sketch map and photographs of Feature 12. B: view to the southeast; C: north wall detail; D: southeast wall detail.

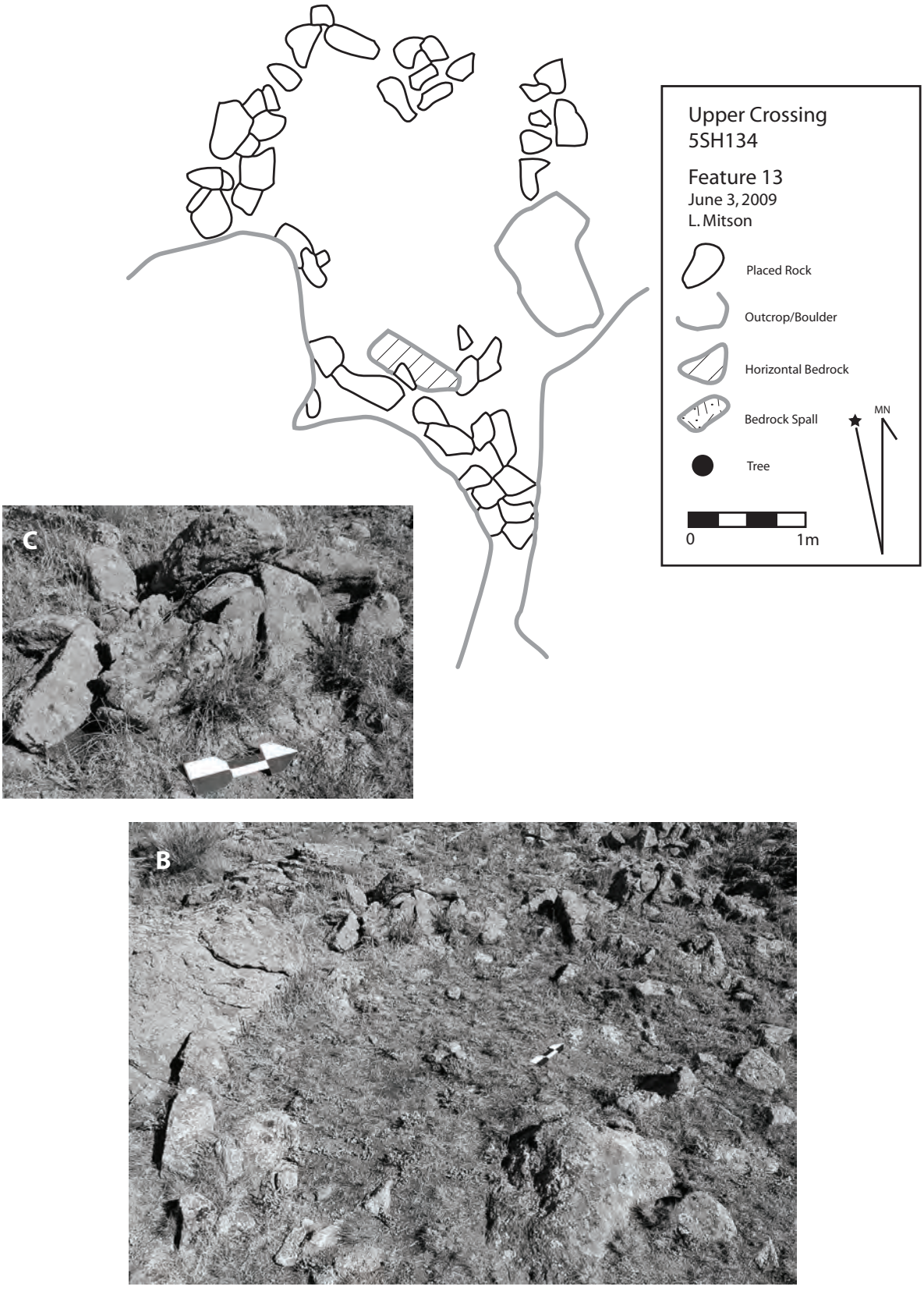


Figure 3.13. Sketch map and photographs of Feature 13. B: view to the northwest; C: west wall detail.

to be paved with small flat slabs, though some of these may simply represent fallen wall stones. A narrow but relatively well-defined gap in the southeastern arc of the wall may represent an entryway. The structure is free-standing, although substantial bedrock outcrops are located immediately to the east and west. No artifacts are visible on the surface around the structure. The presence of the interior paving slabs, as well as nearby bedrock outcrops, suggest that cultural deposits, if present, may be thin and discontinuous.

Feature 15 is superimposed on a larger, but poorly preserved, enclosure designated **Feature 16.** The northern edge of Feature 16 may have been excavated into the slope. The north wall consists of both large blocks and smaller cobbles; two particularly large stones may represent bedrock outcrops or boulders incorporated into the wall. No vertically set slabs are evident. This section of the wall is tied on either end to large bedrock outcrops. The south wall is not preserved or is hidden beneath Feature 15. It is possible that some of the wall stones originally used to construct Feature 16 were later re-used to build Feature 15. A few artifacts, including a heat-treated chert biface and a millingstone fragment, are visible on the surface within Feature 16. Limited cultural deposits may be present inside the structure.

The extant wall of Feature 16 appears to have trapped sediment on its north side, creating a relatively level activity area between the north side of Feature 16 and the south side of Feature 9. When Cluster 1 was mapped in 1999 and again in 2001, this area was designated Feature 3; however, the 2009 field investigation demonstrated that the line of stones thought to mark the east side of this structure is simply a fortuitous alignment. A 1 x 1 m test unit, designated TS-2, was excavated in this area in 1999; the results of that test are discussed in chapter 4.

Feature 17 is a sub-rectangular stone enclosure built on the south side of a large bedrock outcrop. The structure encloses roughly 11.3 sq. m. The eastern wall is well preserved (figure 3.15), but the southern and western walls are only represented by a single course of evenly spaced stones (figure 3.15c). Several collapsed, vertically placed slabs and blocks are present in the eastern wall; however, the wall is partly obscured by vegetation. An entryway may be present on the south, at the southern end of the east wall. The area around the enclosure is level and the walls do not appear to have been cut into the slope.

A relatively dense concentration of flaking debris, made from both chert and quartzite, is present within the structure, along with a burned rhyolite cobble, a basalt core, and a small pebble with one polished surface. Though the architectural integrity of Feature 17 is low, archaeological deposits up to 20 or 30 cm thick may be present within and around it.

Feature 18 is an oval stone enclosure similar in size to Feature 17 (11.7 sq. m). It is somewhat unusual in that much of the wall consists of low outcrops of fractured bedrock (figure 3.16). Constructed segments, which are most substantial on the southeast and northwest, consist of small cobbles and angular blocks. There are a number of gaps in the wall, but it is not clear whether any of them represent an entryway. The structure may originally have been more substantial, given the presence of a large, propped upright slab in the southeast arc of the wall (figure 3.16c), as well as groups of overlapping, obliquely angled slabs in the north and west (figure 3.16d).

Cultural material within the structure includes 10 chert and quartzite flakes, some of which are burned, along with several fragments of burned rock. A biface fragment was observed on the surface immediately south of the structure. Given the presence of numerous bedrock outcrops adjacent to Feature 18, the potential for buried subsurface deposits is low.

Feature 19 is an oval to sub-rectangular structure measuring roughly 2.5 m by 3.1 m. It is unique among the enclosures documented in Cluster 1 in that a low constructed wall partitions the interior space into two adjoining "rooms" (figure 3.17). The floor of the northern room is roughly 10 to 15 cm higher than the floor of the southern. The east end of the partition wall is not connected to the exterior wall of the structure; this gap may represent an entryway. As is the case for Feature 18, the walls of Feature 19 incorporate low outcrops of fractured bedrock, particularly on the north. The southwest segment of the wall is the best preserved, consisting of a series of slabs leaning toward the interior of the structure (figure 3.17c). A small pit or gap, measuring about 10 by 15 cm, in the center of the southwest arc of the wall may represent the former location of a post.

One chert flake and several pieces of burned rock were observed on the surface close to the possible entryway. A chert biface fragment was noted outside the east wall of the northern room. Cultural deposits of unknown depth may be present inside the structure, particularly in the southern room.

Feature 21 consists of a series of short wall segments spanning gaps between 10 large bedrock boulders, which together make up about half of the structure's perimeter (figure 3.18). The area enclosed by the wall segments and boulders measures about 3.5 m by 4.2 m. The boulders range in height from 50 to 120 cm high. The wall segments are poorly preserved, but one vertical slab, 70 cm long and 35 cm high, remains in the southwest quadrant (figure 3.18b). No evidence for an entryway was observed. The east wall of Feature 9 is about 60 cm west of the west wall of Feature 21.

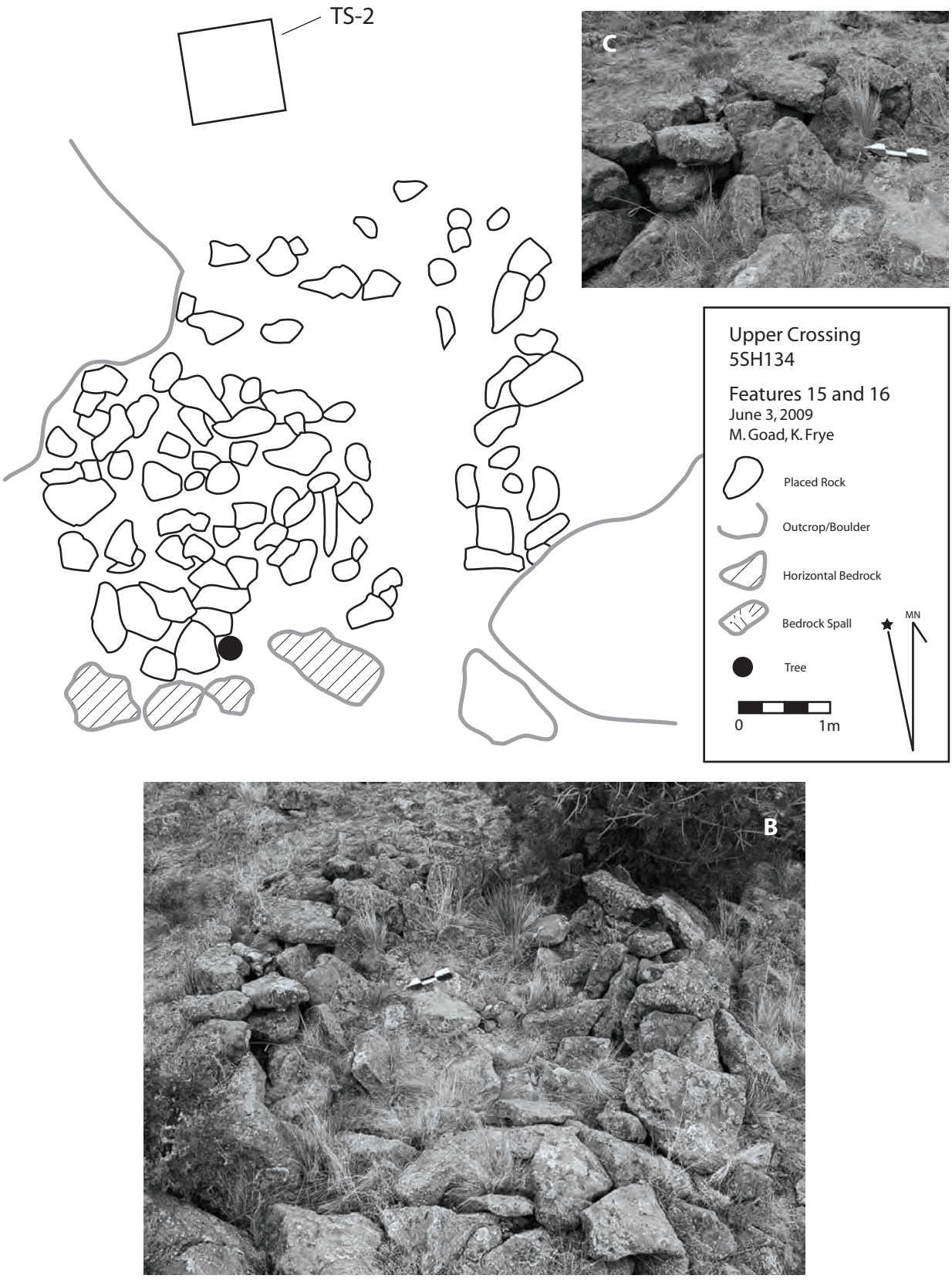


Figure 3.14. Sketch map and photographs of Features 15 and 16. B: view of Feature 15 to the northeast; C: Feature 15 northeast wall detail.

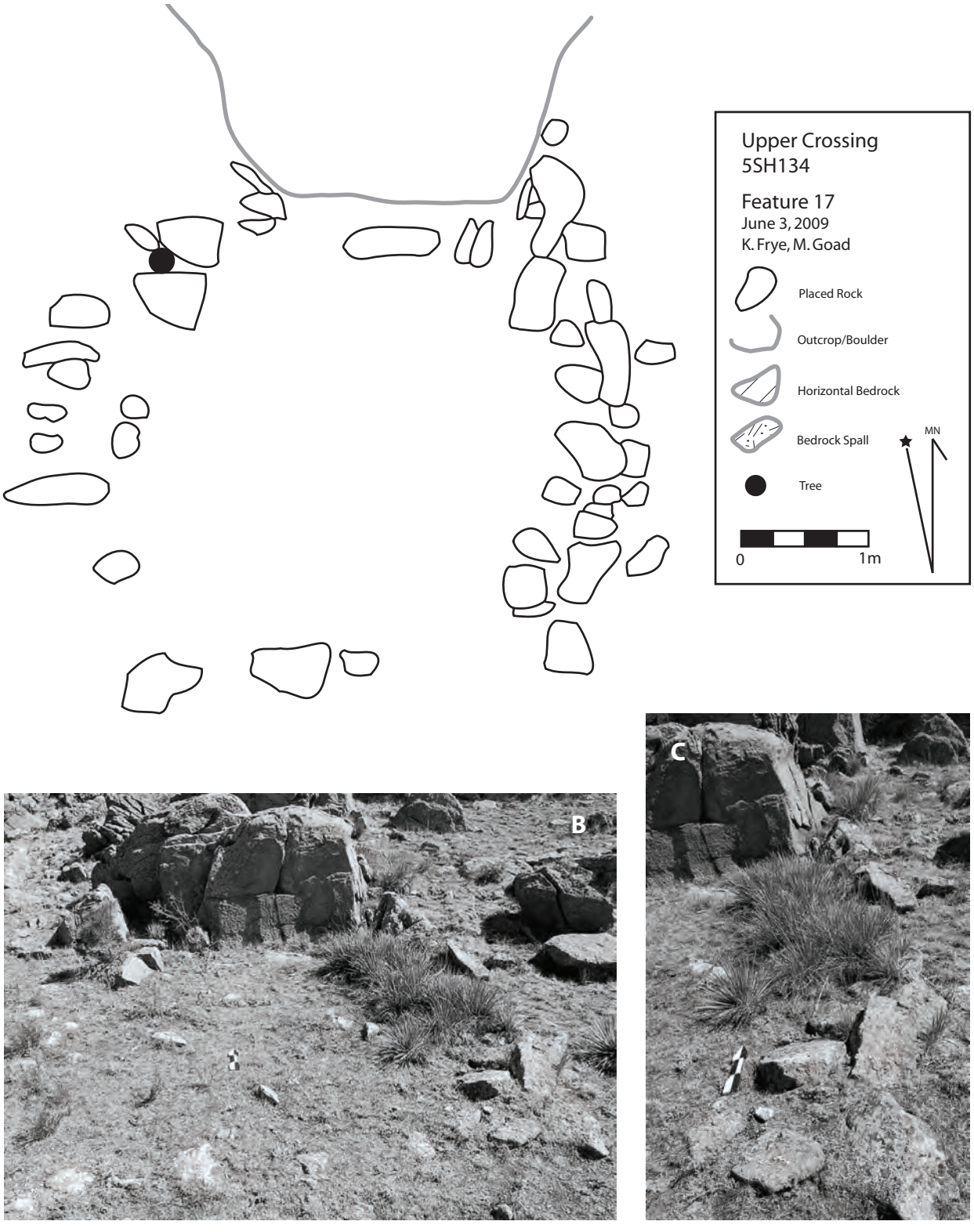


Figure 3.15. Sketch map and photographs of Feature 17. B: view to the north; C: east wall detail.

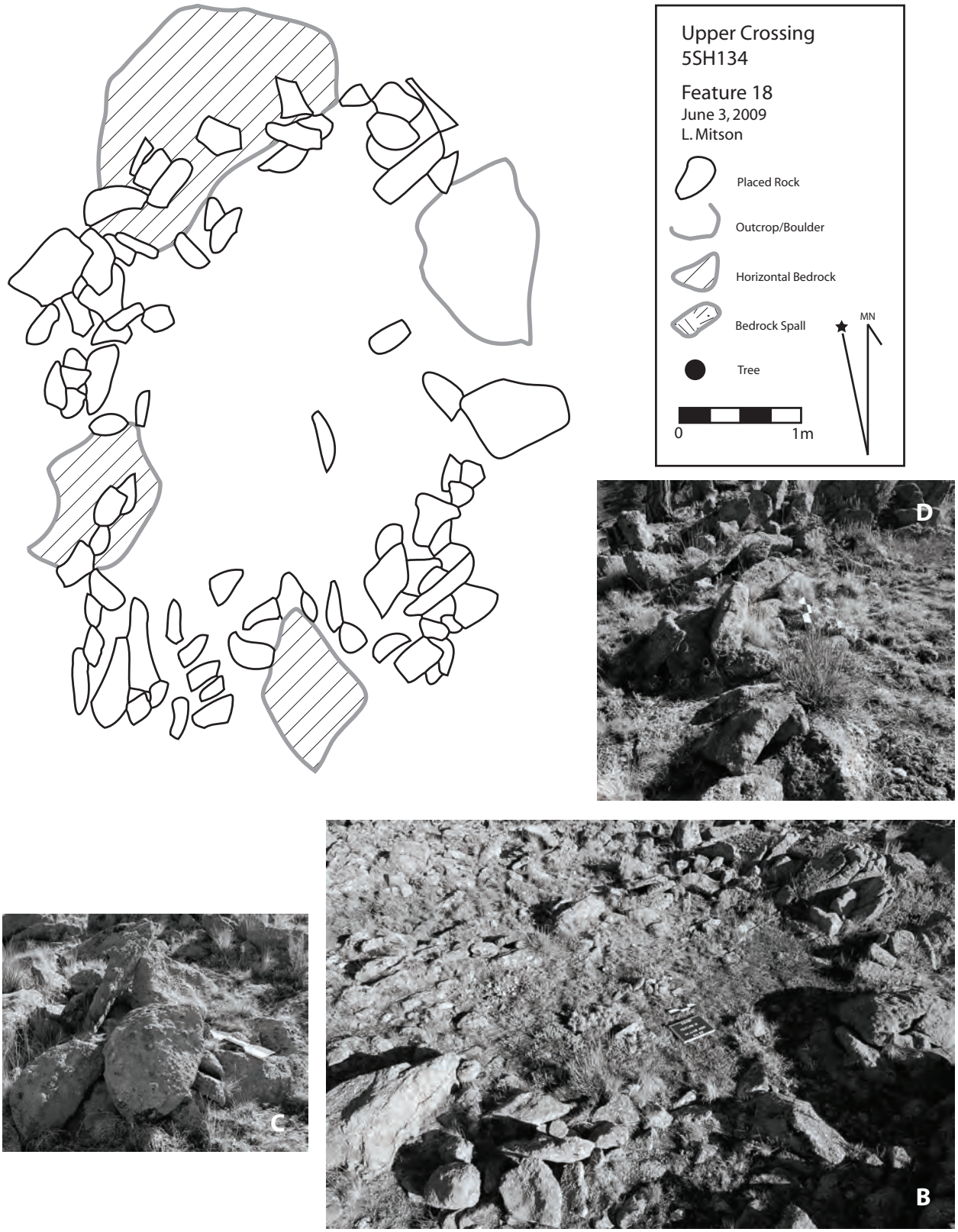


Figure 3.16. Sketch map and photographs of Feature 18. B: view to the northwest; C: southeast wall detail; D: northwest wall detail.

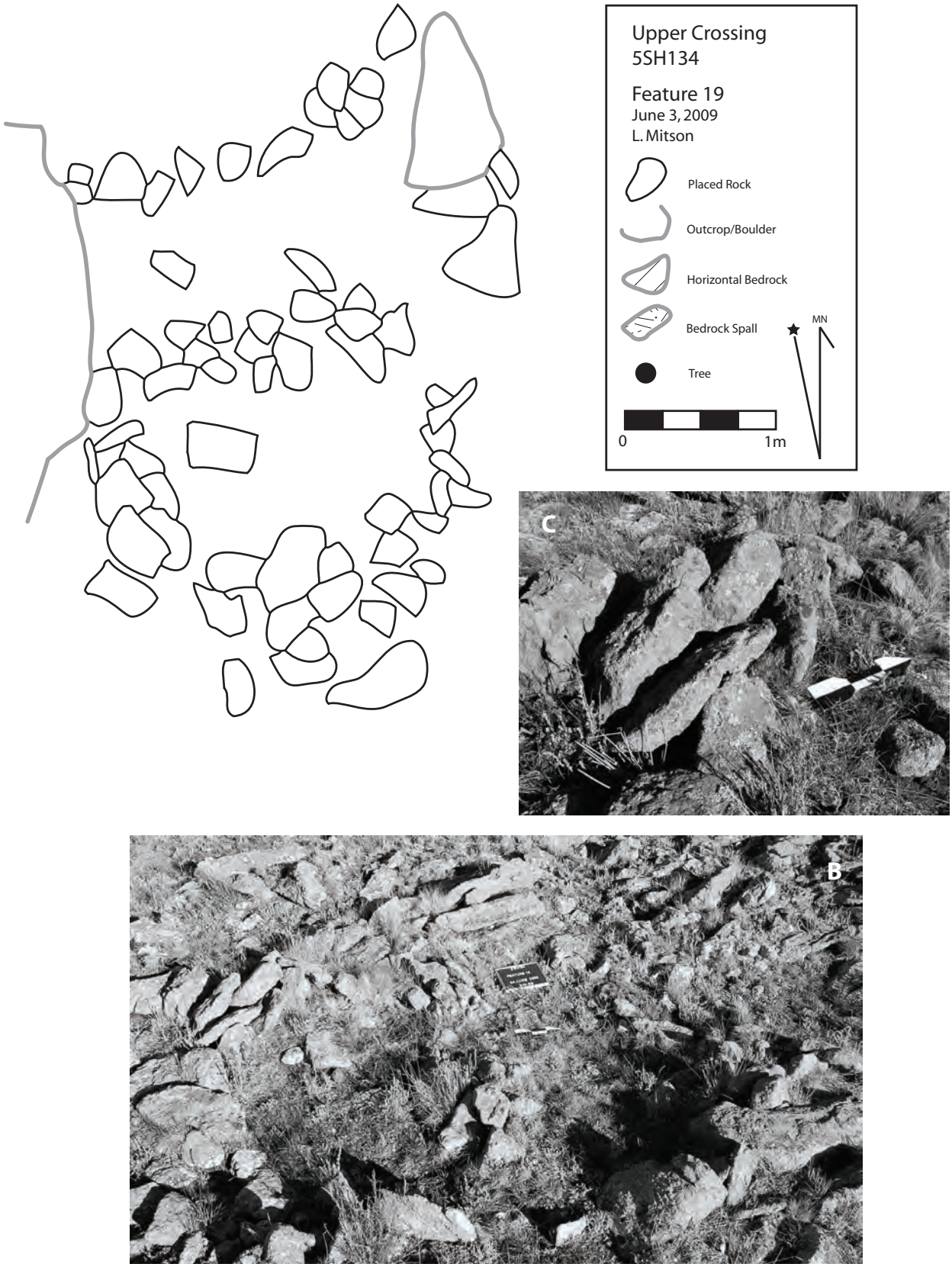


Figure 3.17. Sketch map and photographs of Feature 19. B: view to the west; C: southwest wall detail.

No artifacts were observed on the surface within or around Feature 21, but surface visibility is low. Approximately 20 cm of fill is present within the structure.

Feature 22 is a sub-rectangular terrace bounded by bedrock boulders on the northwest and by a constructed linear wall on the southeast (figure 3.19). The axis of the wall parallels the contour of the southeast-facing slope. The south end of the wall abuts a large bedrock boulder. The north end is poorly preserved, but appears to tie into a series of smaller boulders. An entryway was not observed. The wall was built from large and small tabular and angular blocks (figure 3.19c). The relatively level floor of the terrace behind the wall is 60 to 80 cm above the slope on which the wall was built. Erosion has stripped away a portion of the terrace fill, exposing a layer of friable volcanic ash.

A single brown chert core fragment was observed inside the enclosure. Only a thin layer of fill exists inside the structure and much of this has been lost to erosion.

Feature 33 consists of two linear arrangements of tabular and angular blocks spanning a long gap between bedrock outcrops and enclosing roughly 8 sq. m (figure 3.20). The east ends of the wall segments are poorly preserved but appear to abut a fractured outcrop just over 1 m high. The west ends are more substantial and include a series of upright slabs (figure 3.20b and c) resting on and against low, fractured bedrock. No data are available on the location of an entryway. The floor of the structure is flat and free of large cobbles.

No artifacts were observed within or around Feature 33. Fill within the structure appears to be about 35 cm deep.

Feature 34 is a circular stone enclosure located on the northeast edge of Cluster 1, about 5 m north of Feature 22 (figure 3.21). This structure was first documented as Feature 2 during the 1977 FS survey. The wall of Feature 34, which consists of angular blocks and rounded boulders, abuts several large bedrock outcrops on the north (figure 3.21b). The northeast and southeast quadrants are the best preserved parts of the wall (figure 3.21c). Erosion may have undercut the wall on the west, though a gap between stones on that side could represent an entryway (figure 3.21d). The level interior of the structure is some 50 to 70 cm above the slope east of the wall.

Flaking debris, made from chert and quartzite, along with a rhyolite core is scattered on the slope outside the structure. A single sherd from a thin-walled micaceous vessel was collected from inside Feature 34. More sherds from what likely is the same vessel were collected from the slope below. In addition, the FS crew collected similar micaceous pottery from this structure in 1977. Given the likely age of the stone enclosures in Cluster 1 (see chapter 4), these sherds almost certainly post-date the original construction of Feature 34. Just 10 to 15 cm of cultural fill appears to be preserved within the structure.

One possible stone enclosure was documented in Cluster 1. First observed by the CC crew in 2001 and designated Feature 14, is consists of two or three lines of stacked stones spanning gaps between high bedrock outcrops (figure 3.22a). The space created by these lines of stones is relatively flat and similar in area to many of the enclosures in Cluster 1. However, the stones making up apparent wall segments are unusually large and easily could have fallen from the surrounding bedrock. In addition, water periodically runs through this space and so the "floor" of the structure may simply be an artifact of natural sediment deposition.

An angular block spans a narrow crevice between two bedrock outcrops on the south side of this possible enclosure (figure 3.22b). It seems unlikely that this block fell fortuitously across the crevice. However, even if it was intentionally placed, it is not clear that it forms part of a wall. Two small sherds were collected from the south end of this crevice and a few flakes were observed on the surface within the possible structure.

Other Features

In addition to these stone enclosures, two other types of feature are present in Cluster 1. One type consists of alcoves or shelters under large bedrock boulders. The largest, most substantial of these was first documented by the FS crew in 1977 and is designated Feature 1977-1 (figure 3.23a). Short walls have been constructed around the perimeter of the boulder, enclosing a low hollow under the boulder (figure 3.23b and c). The floor of the shelter slopes to the southeast. The lower surface of the boulder is smoke-blackened and a few chipped stone artifacts are scattered on a narrow bench just below the shelter. In addition, the FS crew collected several sherds from the surface around the structure, representing one or more thin-walled micaceous vessels. However, the method used to construct the wall segments is distinctly different than was used to build the nearby enclosures, suggesting that Feature 1977-1 may represent a different, and perhaps historic, use of the site.

The FS crew identified two other, smaller boulder shelters, designated Features 1977-3 and 1977-4, the latter of which was re-located by the PCRG crew in 2009 (figure 3.24). Like Feature 1977-1, this shelter features a low rock wall around the perimeter of the boulder. No artifacts are now associated with this shelter. The PCRG crew also noted a number of other boulder alcoves in Cluster 1. Though lacking perimeter walls, artifacts are associated with some of these.

Figure 3.18. Sketch map and photograph of Feature 21. B: southwest wall detail.

Figure 3.19. Sketch map and photographs of Feature 22. B: west wall detail; C: southwest wall detail.

Figure 3.20. Sketch map and photographs of Feature 33. B: southwest wall detail; C: northwest wall detail.

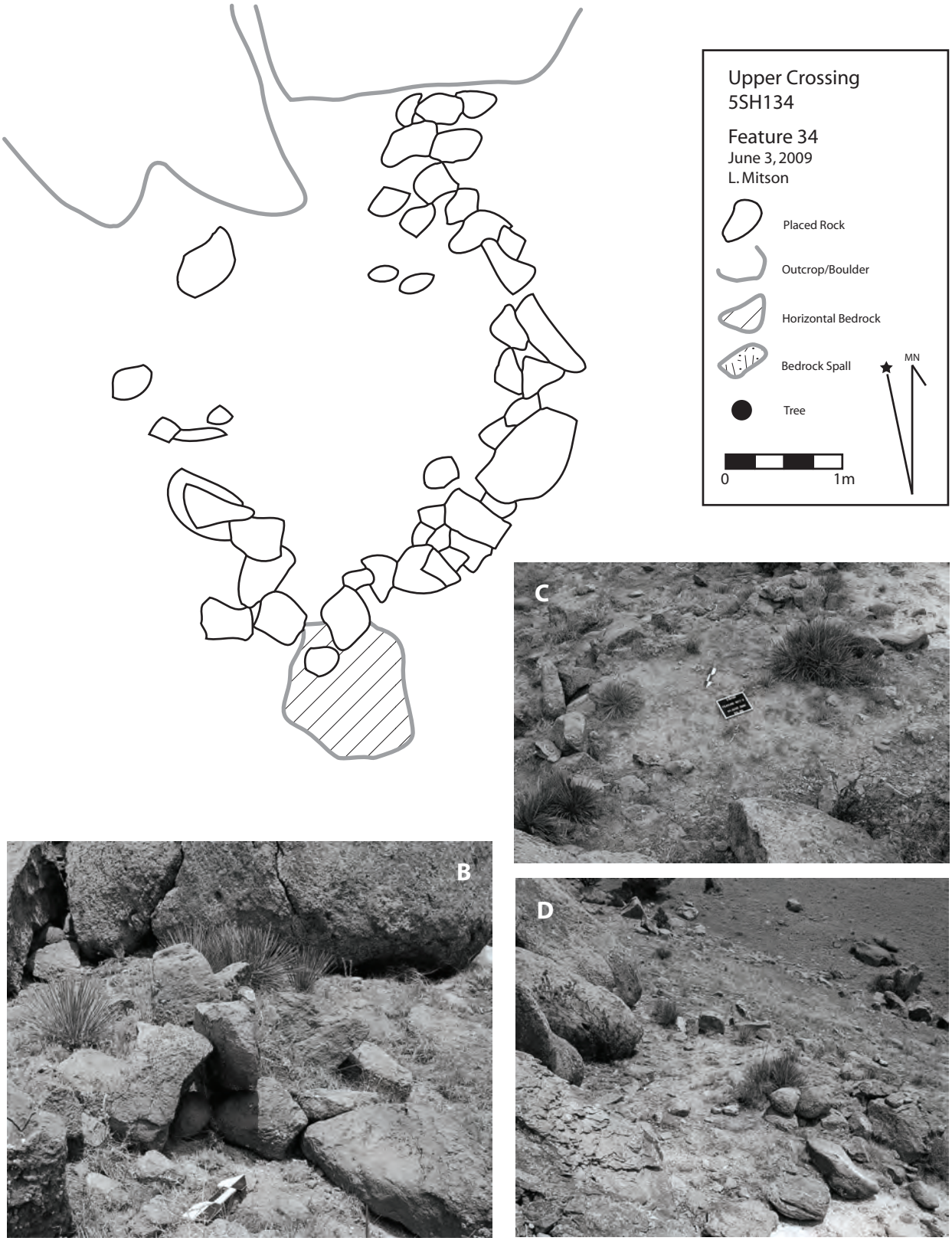


Figure 3.21. Sketch map and photographs of Feature 34. B: southwest wall detail; C: view to the southeast; D: view to the northeast.

Figure 3.22. Photographs of Feature 14. A: view to the south; B: south wall detail.

Figure 3.23. Photographs of Feature 1977-1. A: view to the west; B: northeast wall detail; C: south wall detail.

Figure 3.24. Photograph of Feature 1977-4.

The second type of non-enclosure feature in Cluster 1 consists of apparently constructed pits. Three such features were identified, all of them located on the slope break marking the perimeter of the bench on which most Cluster 1 structures are located. The most prominent of these is located on the southwest side of Cluster 1 (figure 3.25). It appears to have been constructed by removing loose stones from the center and piling them on the perimeter. As the structure collapsed many of the perimeter stones fell back into the pit, partially filling it. Originally, the pit likely was about 1.2 m deep and 1.5 m in diameter. The stones in and around the pit do not appear to have been moved recently, judging by the growth patterns of lichen on them. Pits 2 and 3 are similar in size and form, although they were built against large, roughly vertical bedrock blocks (figure 3.26a and b).

Cluster 2 Features

The existence of stone enclosures on the rocky point overlooking Cluster 1, a part of the site now designated Cluster 2, was first noted by the CC field school crew in 2000 or 2001. In 2003, they returned to the site to document these features. Their rather impressionistic map shows the locations of 17 enclosures, which they assigned letter designations from A through Q (Nowak and Crocket 2003). Teams of two or three students each prepared large-scale sketch maps of 16 of these features; data from four of their maps are incorporated into the illustrations in this chapter.

During the 2009 field investigation, the crew re-located all of the rock alignments the CC crew had identified as features. Seven of them proved to be fortuitous arrangements of bedrock spalls. Two factors make the identification of constructed features in this part of the site especially problematic. First, bedrock is exposed on the surface throughout Cluster 2 and this formation commonly breaks into relatively thin, tabular pieces. Vertical jointing is particularly prominent (figure 3.27). For this reason, is sometimes is difficult to differentiate placed stones from naturally occurring bedrock spalls. Second, when trees growing in the thin soil covering the outcrop are blown down, they easily can lever bedrock slabs into wall-like arrangements (figure 3.28). Accordingly, the PCRG crew adopted a conservative approach to identifying structural elements, only mapping stones that clearly represented parts of walls.

For the 2009 recording, enclosures in Cluster 2 were re-assigned numerical designations. New large-scale maps were drawn of five structures (Features 20, 23, 25, 27, and 30). Maps of four others originally prepared by CC were checked and redrawn as necessary (Features 24, 28, 29, and 32). Feature 31 was not mapped, but photographs were taken. In addition, one possible enclosure, Feature 26, was identified; it was described and photographed, but not mapped. In sum, a total of ten documented enclosures, and one possible enclosure, comprise Cluster 2. Table 3.2 presents metric and attribute date on these features. Their locations are illustrated in figure 3.29.

Figure 3.25. Photograph of Pit 1.

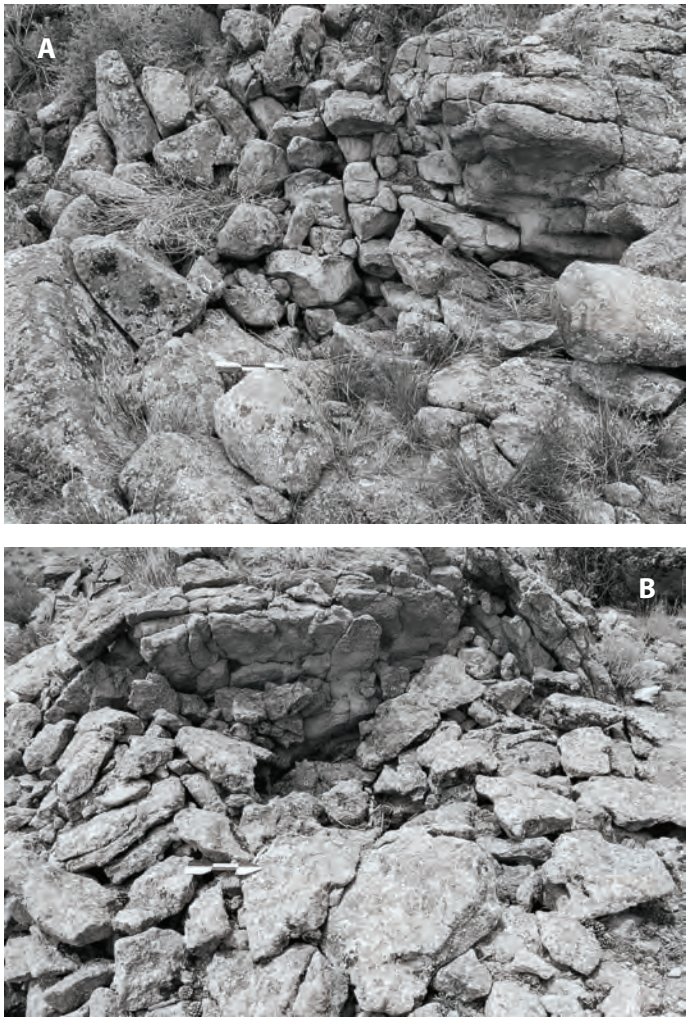


Figure 3.26. Photographs of Pit 2 (A) and Pit 3 (B).

Figure 3.27. Vertical bedrock joints in Cluster 2.

Figure 3.28. A tree throw in Cluster 2.

Owing mostly to the lack of deposition in Cluster 2 the structures there are poorly preserved compared to those in Cluster 1. Surface erosion has undercut the walls of some structures and transported artifacts downhill. Some wall rocks may have been removed or rearranged by recent visitors.

Enclosure Descriptions

Feature 20 is a substantial structure that encloses 9.6 sq. m. It is semi-circular and opens to the east (figure 3.30). The highest, best preserved wall segment is located on the north and northwest (figure 3.30c). The wall combines stacked stones with a few vertically set elements. On the south, the wall has partly collapsed, though one especially large (80 cm long) vertically set slab remains in place (figure 3.30d). A low cairn of stacked stones is located on the east side of the structure. The floor of the structure is basin-shaped.

About 15 quartzite flakes and a burned handstone fragment are located inside the structure. A light scatter of flaking debris extends to the east, between Feature 20 and Feature 23. No more than 10 cm of fill is present inside Feature 20.

Feature 23 is a well-built, somewhat elliptical stone structure measuring 3.4 by 3.8 m (figure 3.31). It actually consists of two semi-circular wall segments, one on the north and one on the south. The west ends of these segments abut a jumble of bedrock spalls. A gap of about 1.5 m between the east ends of the segments likely represents an entryway. On the northwest, the wall is just over 80 cm high. North of the entryway, the wall incorporates eight upright slabs (figure 3.31c). Four of five leaning slabs are clustered on the south side of the entryway. The interior floor is approximately level.

Roughly 20 flakes, made from chert, quartzite, and petrified wood, were observed inside the structure, along with several fragments of burned rock. One-hundred or more small flakes are scattered around the outside of the feature. Just over 20 cm of fill is present within the enclosure on the east site. Patches of charcoal-stained sediment are present.

Feature 24 is a small, lightly built structure perched on the edge of the cliff marking the southern boundary of Cluster 2 (figure 3.32). The west side of the structure incorporates a low bedrock shelf about 75 cm high. On the south, extending east from the bedrock bench, is a series of leaning slabs and columnar blocks about 2 m long (figure 3.32b). The most substantial blocks are on the west end of this alignment, closest to the outcrop. The largest of these is a narrow column about 1 m high. Blocks and slabs on the outside of the alignment lean inward and those on the inside lean outward. On the north side of the enclosure several small stones are stacked against the outcrop, but other nearby stacked stones may simply represent natural spalls. Fill inside the structure is retained by a few small blocks on the east side.

Only a sparse scatter of artifacts is associated with Feature 24. The slopes to the east and especially the south are relatively steep and sediment and artifacts from the interior may have washed downhill.

Feature 25 is a massive, circular structure enclosing some 18.1 sq. m (figure 3.33). The west side of the structure is excavated into the slope and the cut is lined with large slabs, some of which originally were set vertically (figure 3.33c). Parts of the wall incorporate six to eight courses of horizontal slabs. Bedrock is exposed at the base of the wall. This western wall was at least 1.2 m high. On the east, opposite this wall, the floor of the structure merges with the surrounding slope. Erosion certainly has impacted the enclosure: a moderately dense scatter of artifacts extends from the interior of the structure down the slope to the east. A scatter of wall-sized slabs also spills down the slope several m.

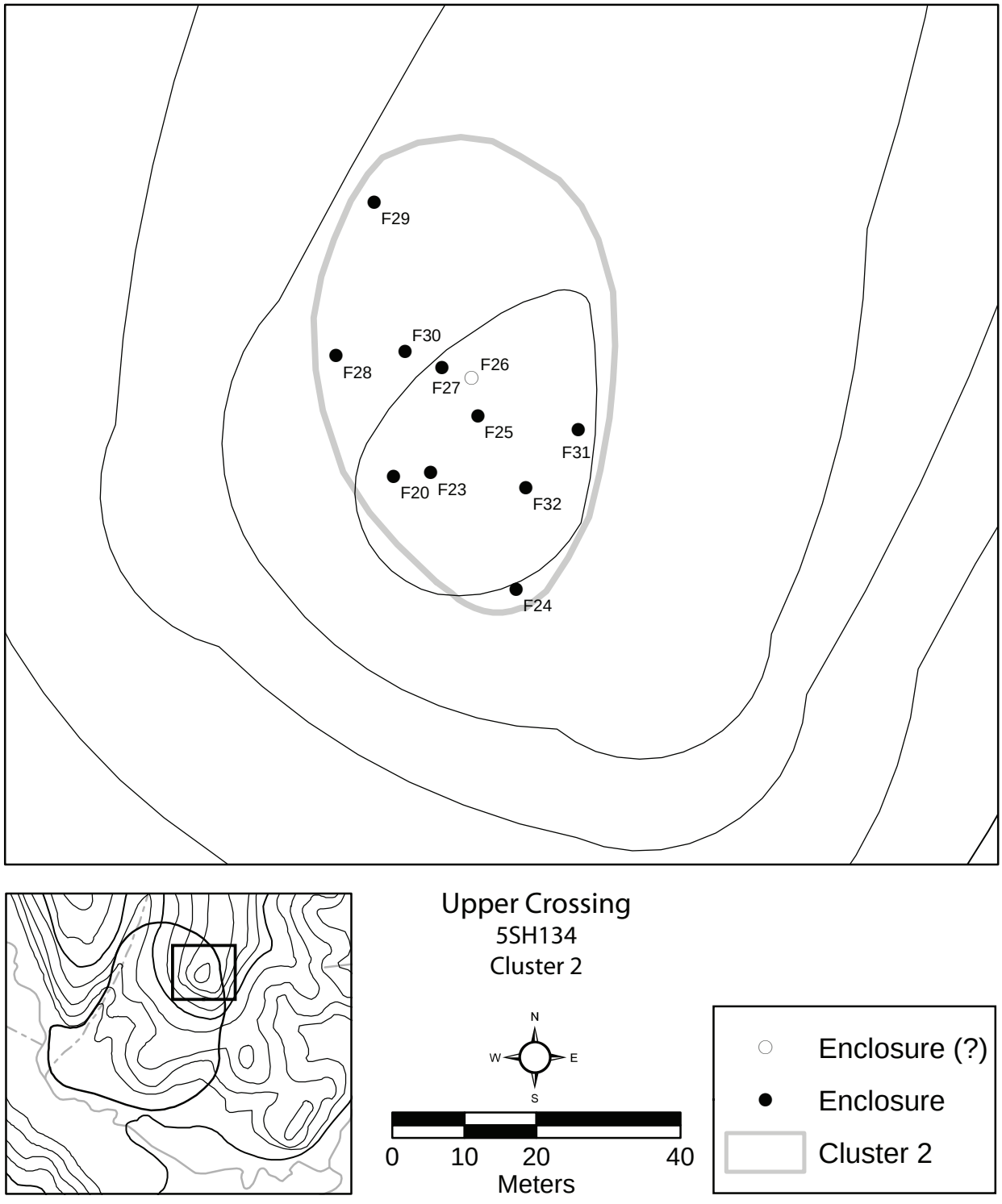


Figure 3.29. Map showing the location of stone enclosures in Cluster 2.

However, the relatively small number of stones in this scatter suggests that the eastern wall never was very substantial. On the north and south sides the walls are a maximum of about 70 cm high. No evidence for an entryway was observed, but if originally present it must have been located on the east side.

Only about 15 cm of windblown sediment exists inside the structure. Artifacts observed on the surface include flaking debris and burned rocks.

Feature 27 is a small, horseshoe-shaped enclosure,

Table 3.2. Summary data on Cluster 2 stone enclosures.

Feature Number	Field Year[a]	Dimensions (m)[b]	Floor Area (sq. m)[c]	Vertical Bedrock	Surface Modification	Entryway[d]
20	2003	3.5x3.5	9.6	none	none	E
23	2003	3.8x3.4	10.1	none	none	E
24	2003	3.0x2.2	5.2	W	none	no data
25	2003	4.8x4.8	18.1	none	cut (W)	E (?)
27	2003	2.7x2.7	5.7	none	none	no data
28	2003	2.3x2.3	4.2	none	cut[e] (S)	none observed
29	2003	3.3x2.3	8.6	none	cut[e] (S)	none observed
30	2003	2.7x2.7	5.7	none	none	S (?)
31	2003	no data	no data	N	fill (E)	none observed
32	2003	3.0x4.5	10.6	none	cut (W)	E (?)

[a] Year first recorded.
[b] See text for explanation of measurements.
[c] Except as noted, the formula for the area of a circle or ellipse was used to calculate structure sizes.
[d] "No data" indicates that the wall is too poorly preserved to determine the position of the entryway; "none observed" indicates that the wall is continuous or substantially complete.
[e] Bedrock slabs removed; see text for details.

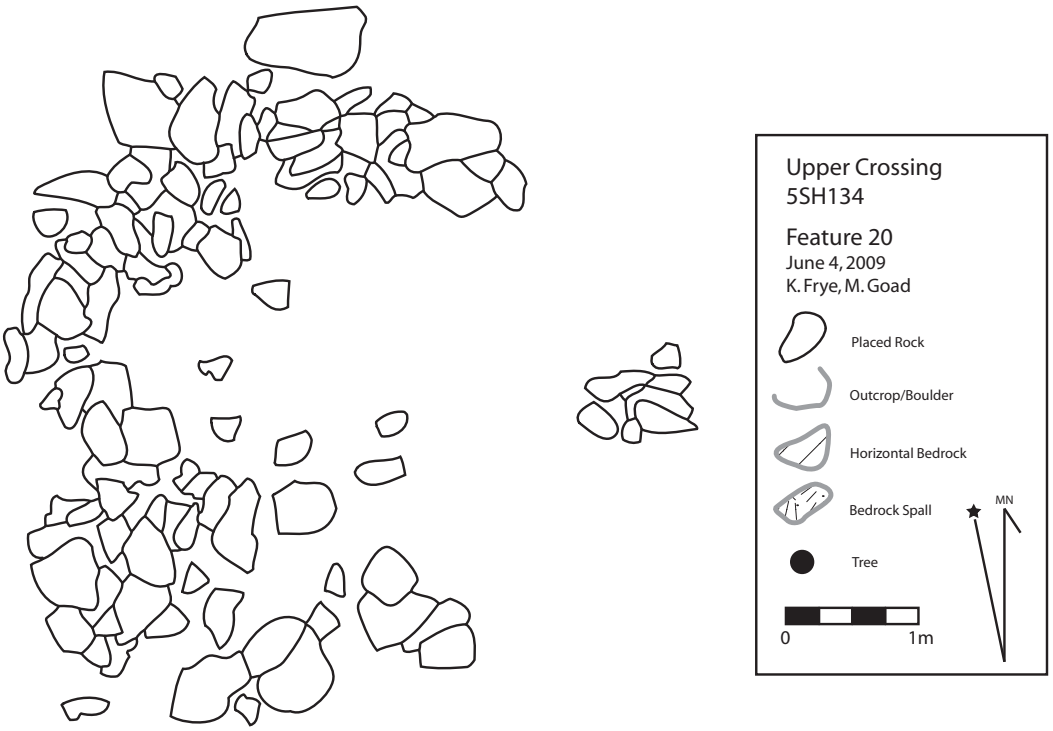


Figure 3.30. Sketch map and photographs of Feature 20. B: view to the northwest; C:north wall detail; D: south wall detail.

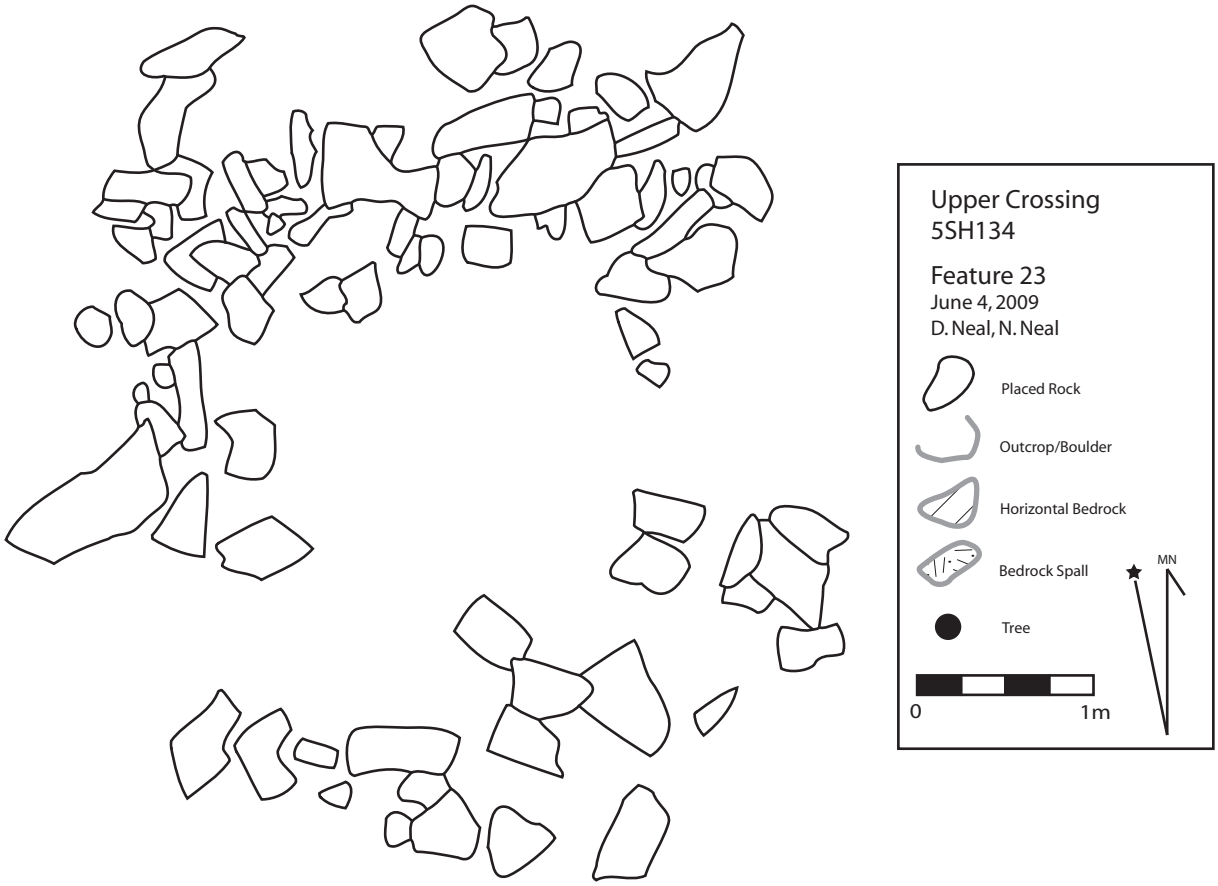


Figure 3.31. Sketch map and photographs of Feature 23. B: view to the northwest; C: northeast wall detail.

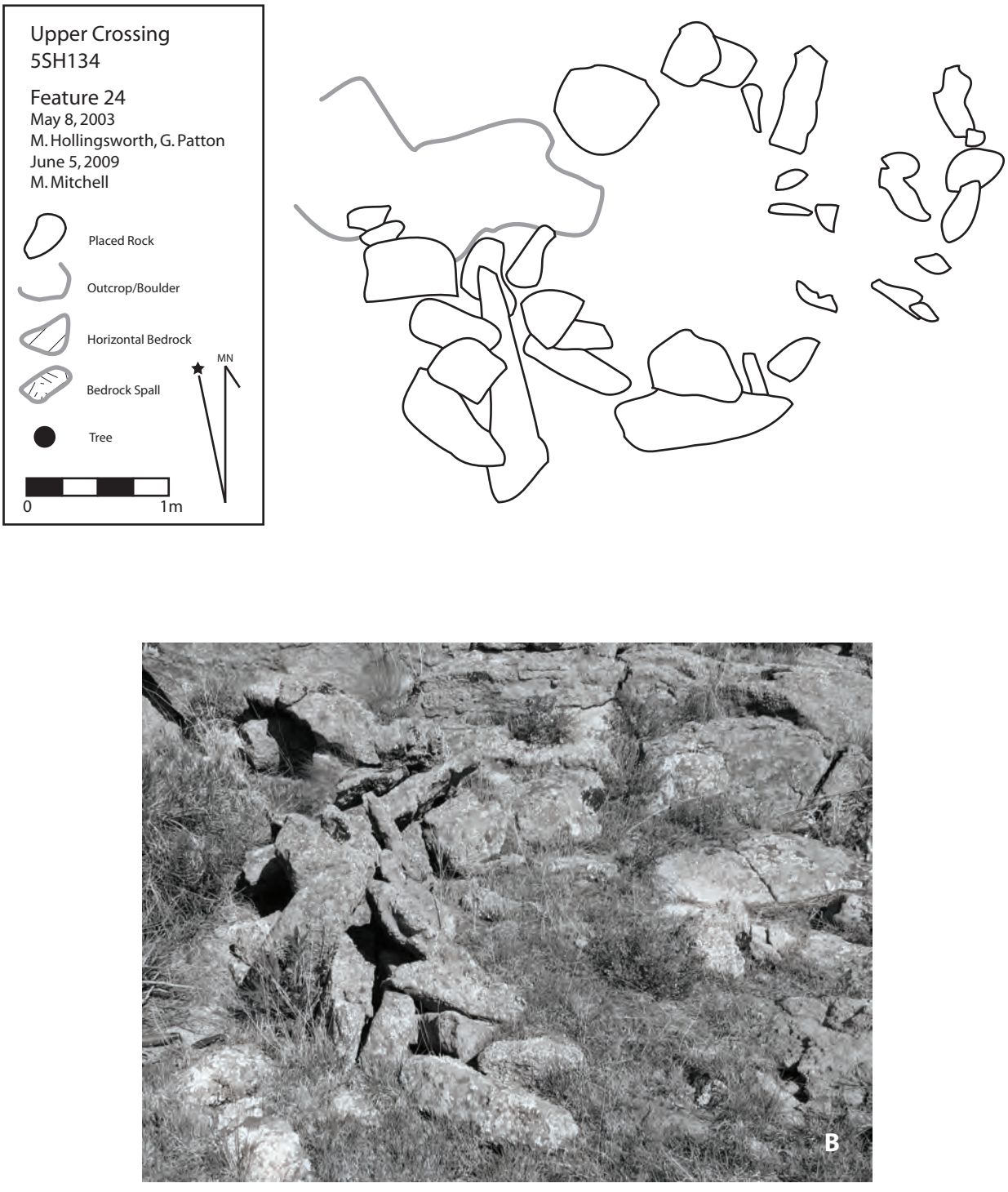


Figure 3.32. Sketch map and photograph of Feature 24. B: view to the west.

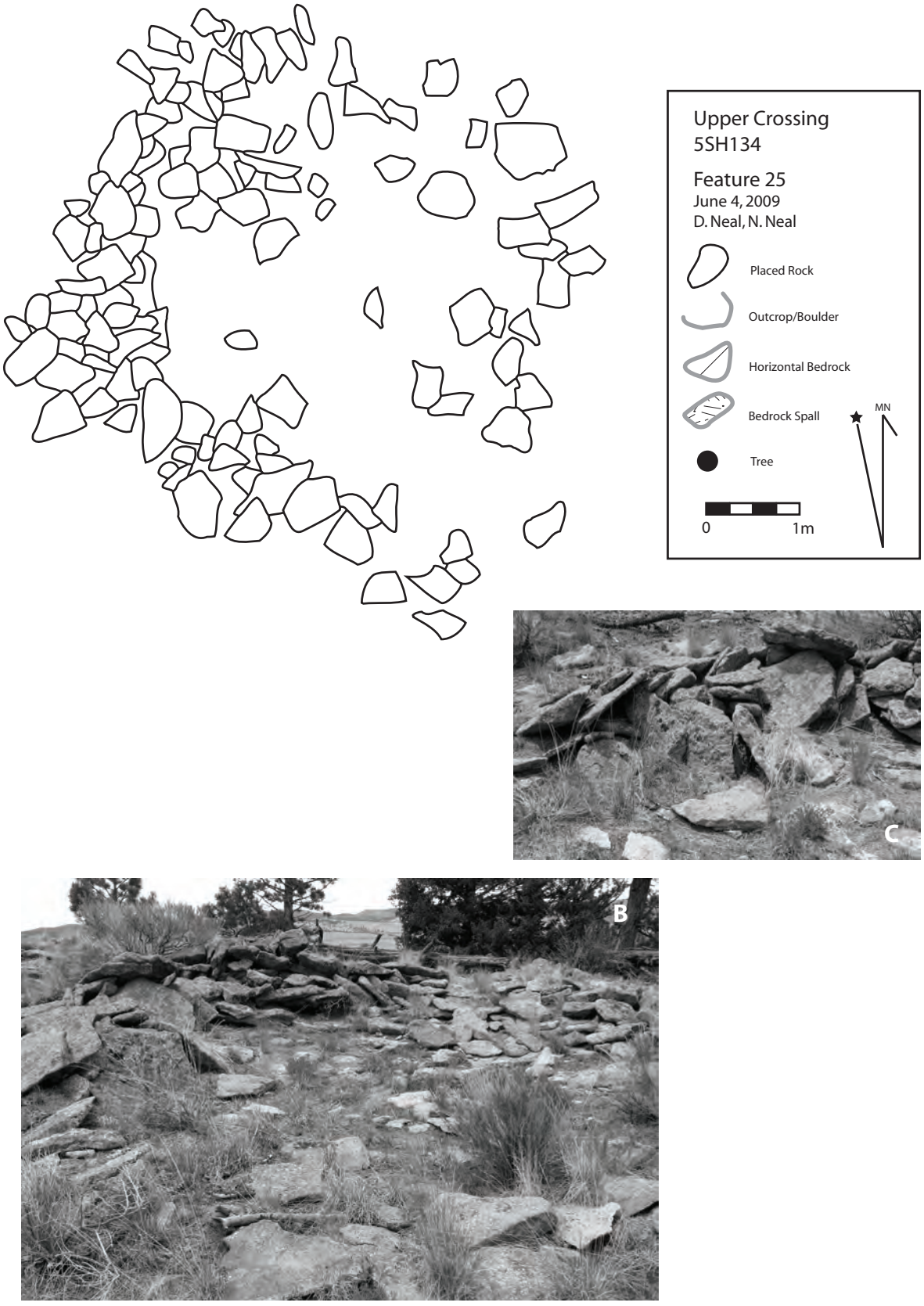


Figure 3.33. Sketch map and photographs of Feature 25. B: view to the northwest; C: west wall detail.

built directly on bedrock on the north side of Cluster 2 (figure 3.34). The extant wall is confined to the northern arc of the enclosure; however, the lack of wall-sized stones on the south side suggests that the wall never was continuous. The distance between the southwest and southeast ends of the wall is about 4 m. Most of the stones making up the wall originally were set vertically (figure 3.34c). Partly collapsed stones mostly lean outward from the interior. No modification to the original bedrock surface is apparent. A ponderosa pine is now growing just outside the wall on the northeast, and almost certainly has distorted the wall to some extent. This tree may have been culturally peeled. Two scars are visible: one about 55 cm long that begins 30 cm above the modern surface and a second one about 50 cm long that begins 15 cm above the first. Both are 20 to 25 cm across.

A single burned cobble fragment is associated with Feature 27. No sediment is present inside the structure.

Feature 28 is a small circular enclosure on the west edge of Cluster 2 (figure 3.35). It was constructed by removing loose bedrock spalls from the interior and building a wall consisting mostly of propped vertical slabs on the north site. The plan map of the structure shows a course of tabular spalls forming the south wall, but because the bedrock dips to the north here, toward the enclosure, it is possible that some of these simply have slid into the structure. Most of the constructed portion of the wall has collapsed into a jumble of stones, so it is difficult to determine the original position or thickness of the wall. However, a series of very large slabs remain intact in the northwestern arc (figure 3.35c). All of these intact slabs lean toward the interior of the enclosure. One very large vertical stone remains in the northeast arc of the wall.

The floor of the structure consists entirely of bedrock. No artifacts were observed inside or around Feature 28.

Feature 29 is somewhat larger that Feature 28, but is similar in plan, orientation, and construction method. Like Feature 28, it was built by clearing loose bedrock spalls from the interior and constructing a wall on the north side (figure 3.36). The west wall of Feature 29 also consists of stacked and vertically set tabular spalls and blocks. Stones on the north side tip inward from the outside (figure 3.36c), but on the west the wall has largely collapsed. Two particularly large blocks form the northwest arc of the wall. Two large trees, a ponderosa pine and a Douglas fir, are growing just outside the wall, with the latter growing directly against these large blocks (figure 3.36d). It is possible that this tree has partly distorted the wall. As was the case for Feature 28, it is not entirely clear which of the tabular spalls marking the southern edge of the enclosure have been moved to form the wall. Some may simply have slid into the structure, off the slope that rises to the south. However, the wall of Feature 29 covers a longer sweep of the structure perimeter, and in general is better preserved, than the wall of Feature 28.

No artifacts were observed on the surface within or around Feature 29. However, pine cones and need litter cover the northern half of the floor. Bedrock is exposed on the south side, but a thin layer of sediment may have been captured by the wall on the north.

Feature 30 is a small, slightly elliptical structure that encloses roughly 5.7 sq. m (figure 3.37). The slope around it drops away to the north and west. Standing wall segments remain on the west, north, and east sides. Like Feature 27, which is located immediately to the east, Feature 30 is open to the south and it seems unlikely that the wall originally was continuous around the perimeter. The wall incorporates both vertically and horizontally placed stones. However, the wall's most prominent feature is a group of massive, vertical stones (figure 3.37c). These blocks are up to 60 cm high and are supported by prop stones along the base. While the floor of the enclosure mostly consists of bedrock, several of these large stones appear to be set in a thin layer of sandy sediment. This group of vertical blocks also exhibits what appears to be an intentionally constructed niche or alcove, formed by positioning a lintel stone over two, parallel-sided, closely set vertical slabs.

No artifacts were observed within or around the structure. Needle litter from a nearby Douglas fir partly obscures the surface. Pockets of sediment just 10 cm or so thick are present on the interior.

Feature 31 consists of a low retaining wall built across a shallow swale downhill from Feature 25 (figure 3.38). The wall incorporates both vertical and horizontal elements; vertical elements are placed perpendicular to the fall line and propped with smaller stones on the east or exterior side. Several of the stones in the wall are relatively large. Several of the tabular spalls on the north end of the wall lean outward from the interior. The wall abuts a bedrock outcrop on the north end. A part of this wall appears to have collapsed; apparently displaced wall rocks form a rubble pile below and southeast of Feature 31. The level space created by this retaining wall may also have been bounded on the west by a wall. The extant remnant consists of slabs set against a shallow cut in the slope. A number of these slabs subsequently slid downhill to the east, creating a flattened arc of stones.

The wall forming the east side of Feature 31 has trapped around 25 cm of sediment. Flaking debris is present on the floor of the structure and on the slopes surrounding it. Some of these artifacts may have washed down the swale from Feature 25, in which the artifact density is somewhat higher. A few burned rocks also are present in Feature 31.

Figure 3.34. Sketch map and photographs of Feature 27. B: view to the north; C: southeast wall detail.

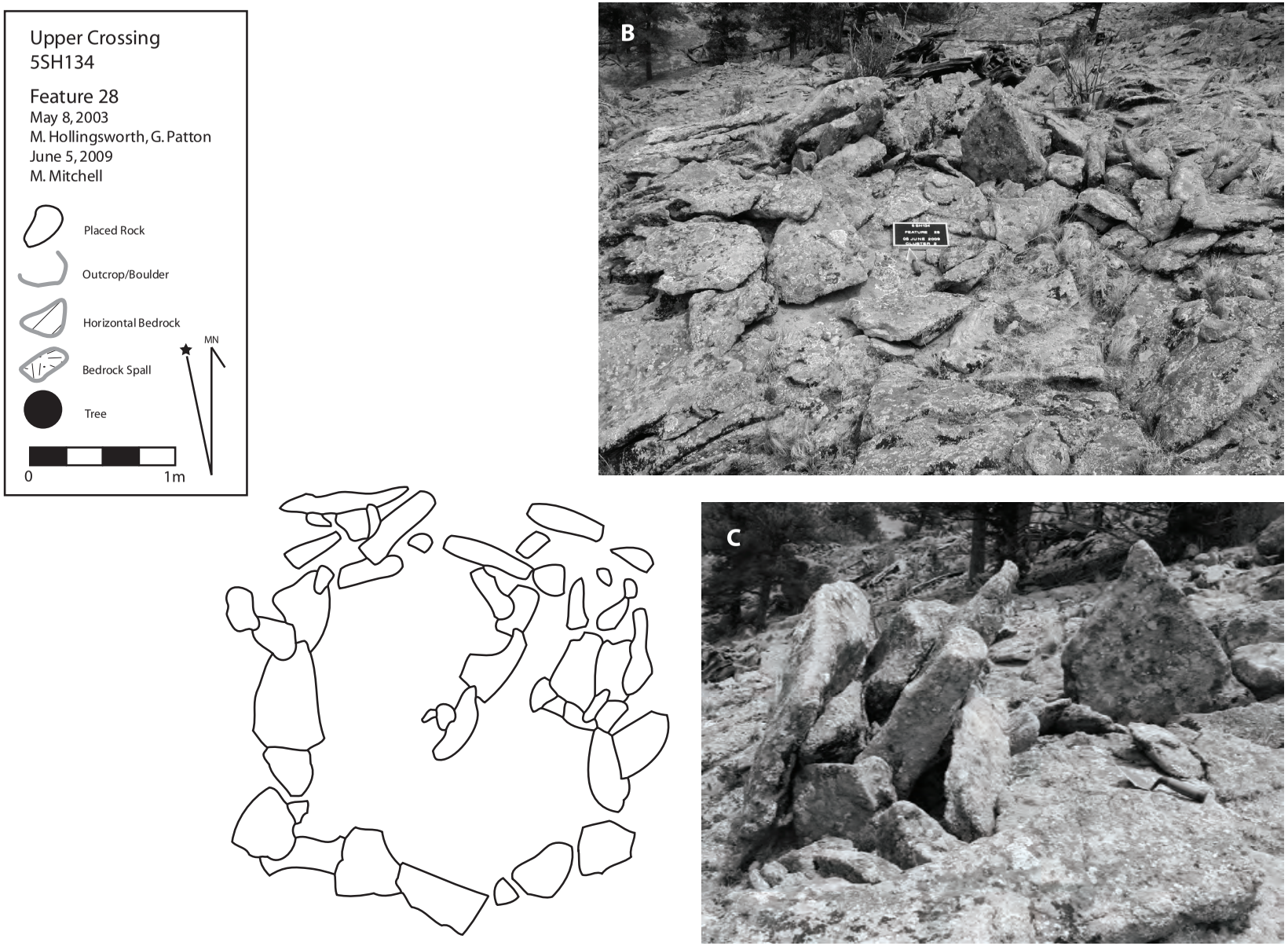


Figure 3.35. Sketch map and photographs of Feature 28. B: view to the north; C: northeast wall detail.

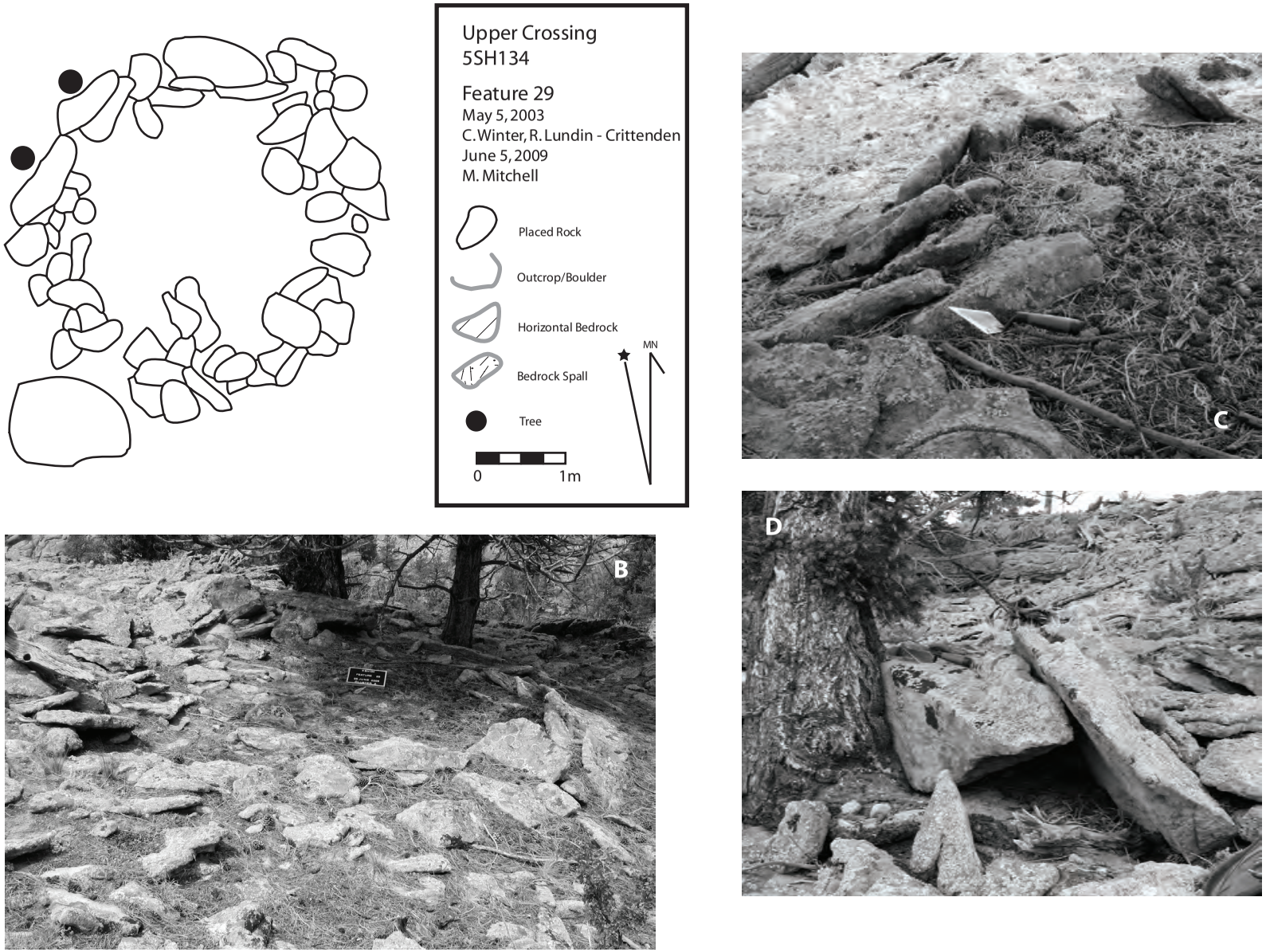


Figure 3.36. Sketch map and photographs of Feature 29. B: view to the northwest; C: north wall detail; D: west wall detail.

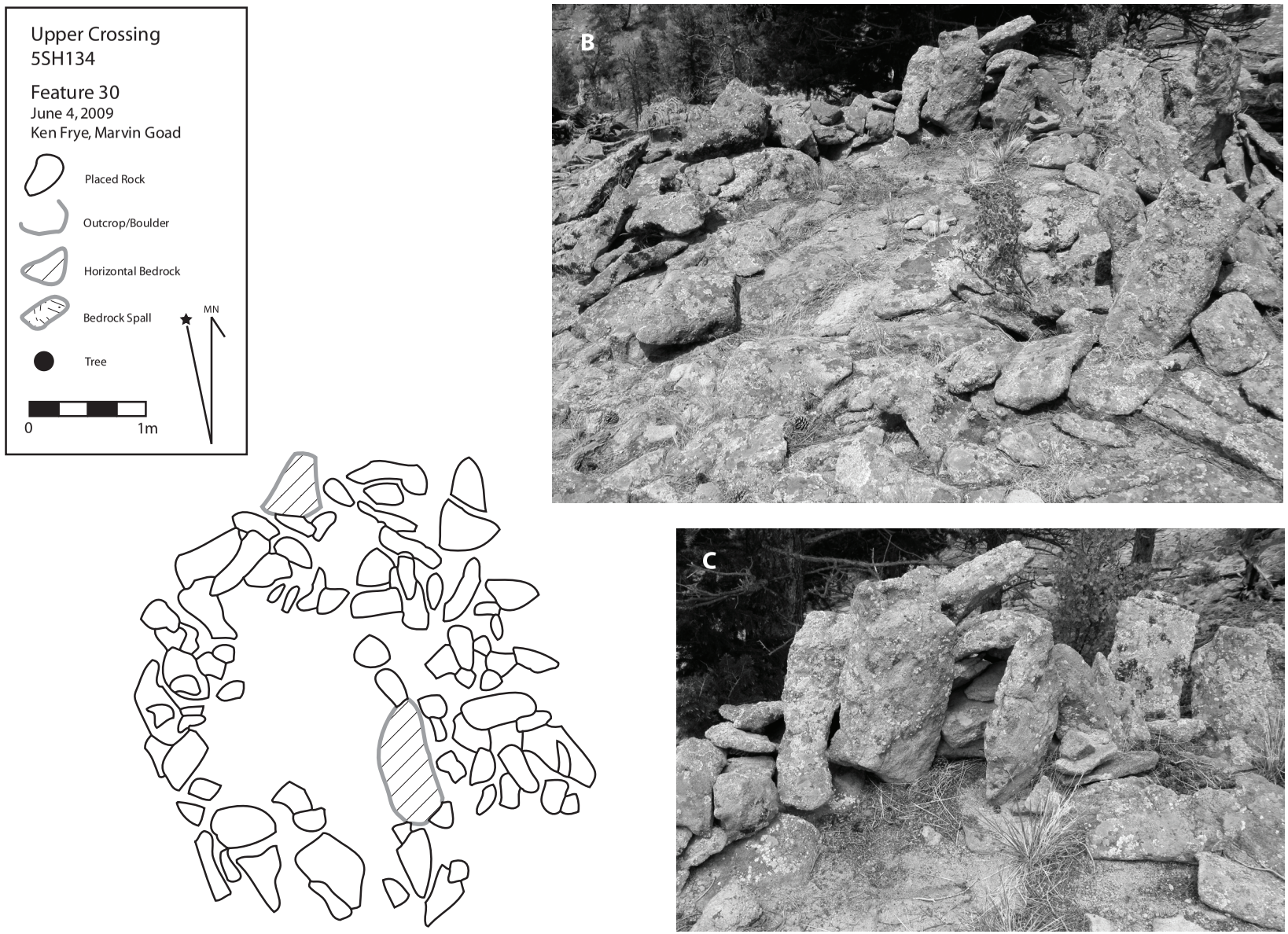


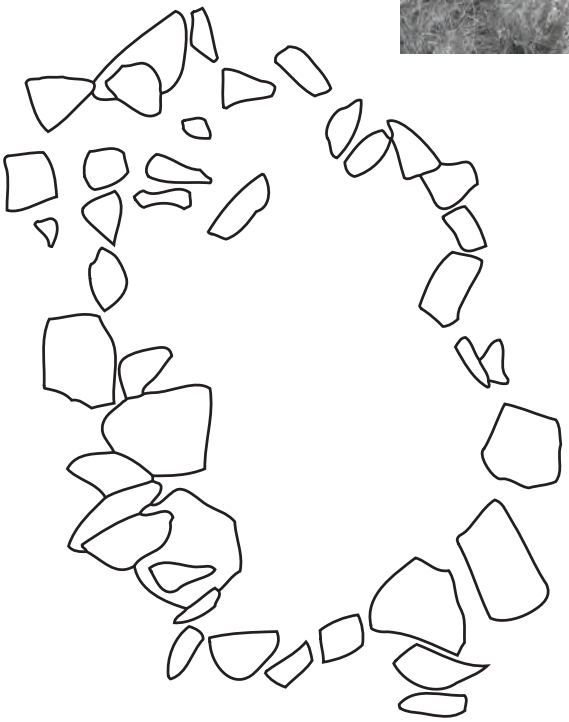
Figure 3.37. Sketch map and photographs of Feature 30. B: view to the northwest; C: northwest wall detail.

Figure 3.38. Photograph of Feature 31; view to the southeast.

Feature 32 is a moderately large, oval enclosure on the east side of Cluster 2 (figure 3.39). The structure is excavated into the slope on the west about 50 cm and the cut is lined with horizontally stacked tabular spalls; however, a large ponderosa pine has fallen across the structure, partly obscuring the wall. Two large *Chrysothamnus* bushes also are growing in the interior. A few leaning stones on the exterior of the wall tip inward, especially in the southwest quadrant (figure 3.39c). On the north side of the structure, leaning wall slabs tip outward from the interior. A low, rather ephemeral retaining wall, constructed from large horizontal slabs arranged in a rough semi-circle, forms the east side of the structure.

A moderate number of chipped stone artifacts are scattered on the surface inside and around the structure, along with several pieces of burned rock. The eastern wall has captured some sediment, but bedrock is at or near the surface, especially on the west side of the structure.

One possible stone enclosure was observed in Cluster 2. Designated Feature 26, it consists of a roughly semi-circular alignment of stacked and piled stones immediately east of Feature 27 and north of Feature 25 (figure 3.40). The most substantial section of the alignment is located on the west and north sides of the potential structure. On the north, several stones leaning outward from the interior of the structure are stacked in a manner suggestive of a wall (figure 3.40b). However, a tree-throw in the center of this alignment has raised several other stones to nearly vertical positions, casting some doubt on the alignment's cultural origin. Several stones are also piled on the southwest segment; however, nearby natural fractures roughly parallel these stacked stones. The southeast quadrant of Feature 26 nearly abuts the north wall of Feature 25. A dead tree has fallen across Feature 26 and the interior space is filled with needle litter and pine cones. Only a few artifacts were observed on the surface within and around it. Bedrock is exposed on the surface outside the wall.



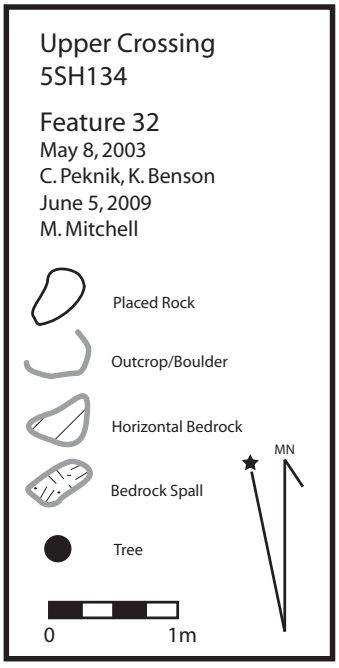


Figure 3.39. Sketch map and photographs of Feature 32. B: view to the northeast; C: southwest wall detail.

Figure 3.40. Photographs of Feature 26. A: view to the east; B: northwest wall detail.

Discussion

The data obtained in 2009 permit a number of generalizations about the stone enclosure occupation at the Upper Crossing site. This section summarizes data on structure plan, size, orientation, and construction technique, comparing and contrasting the structures comprising Cluster 1 and Cluster 2.

Structure Size

Table 3.3 summarizes data on the interior space enclosed by the structures documented in 2009. Figure 3.41 illustrates the distribution of structure sizes. The mean size of all structures is just over 10 sq. m. The smallest cover between 4 and 5 sq. m, while the largest are around four times larger. The mean size of the structures in Cluster 2 is slightly less than the mean size of those in Cluster 1, but not significantly so (F=1.971, p=0.173). Both clusters include one especially large structure. The largest enclosure in Cluster 1 is Feature 22, a unique rectangular feature built on a bench on a southeast-facing slope on the east side of the site. The largest enclosure in Cluster 2 is Feature 25, a heavily built circular structure cut deeply into the hill slope.

Layout

Nearly all of the enclosures are circular to slightly elliptical in plan, though their specific form often is dictated in part by the shapes and orientations of the outcrops or large boulders against which they are built. About half exhibit some evidence for a ground-level entryway (table 3.4). In most cases the side of the structure opposite the entryway is built against bedrock, is excavated into the slope, or features a more substantial

Table 3.3. Summary data on stone enclosure size.

Cluster Number	N	Minimum (sq. m)	Maximum (sq. m)	Mean (sq. m)	Std. Deviation (sq. m)
1	18	4.9	22.8	10.98	3.98
2	9	4.2	18.1	8.64	4.26
Total	27	4.2	22.8	10.20	4.15

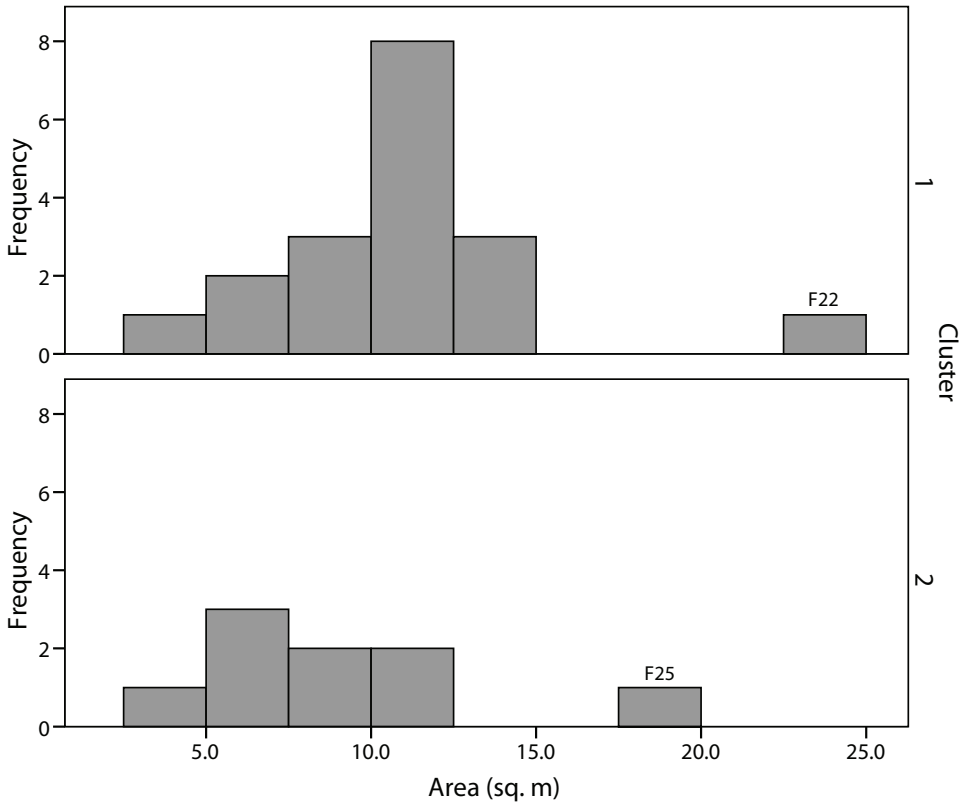


Figure 3.41. Distribution of stone enclosure sizes.

Table 3.4. Summary data on enclosure entryways.

Cluster Number	Entryway Definitely or Probably Present	None Observed	No Data	Total
1	10	3	6	19
2	5	3	2	10
Total	15	6	8	29

wall. This suggests a consistent arrangement of interior space—a "front" and a "rear." However, at the moment, no specific data are available on whether interior features are present and, if so, on their types or sizes.

Orientation and Topographic Setting

There are clear patterns in the orientation and topographic position of the enclosures in Cluster 1. These patterns are expressed in the relative positions of large bedrock boulders and in the types and locations of pre-construction surface modifications. Figure 3.42 illustrates the locations of bedrock boulders (the open polygon) and entryways (the shaded polygon) according to nominal cardinal and intercardinal directions. Most boulders are located on the north and northwest sides of structures. By contrast, most entryways are located on the south and southeast sides. A similar pattern can be seen in the locations of surface cuts and fills (figure 3.43). Excavations into the hill slope (the shaded polygon) occur on the west, northwest, and north,

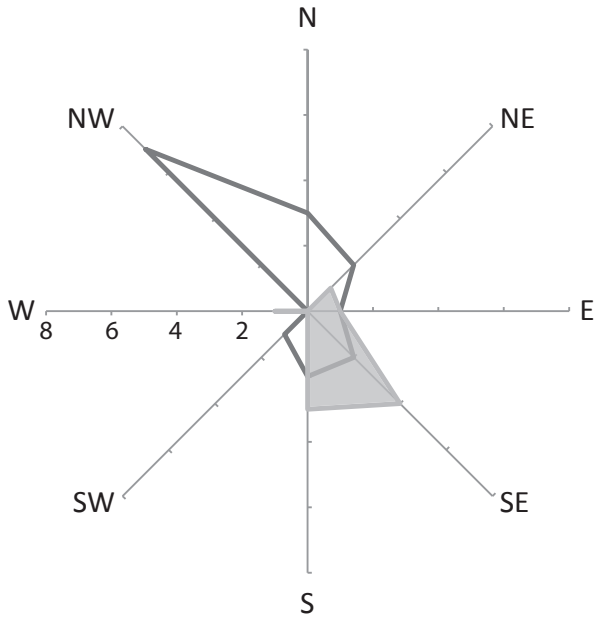


Figure 3.42. Rose diagram illustrating the positions of bedrock boulders (open polygon) and structure entryways (shaded polygon).

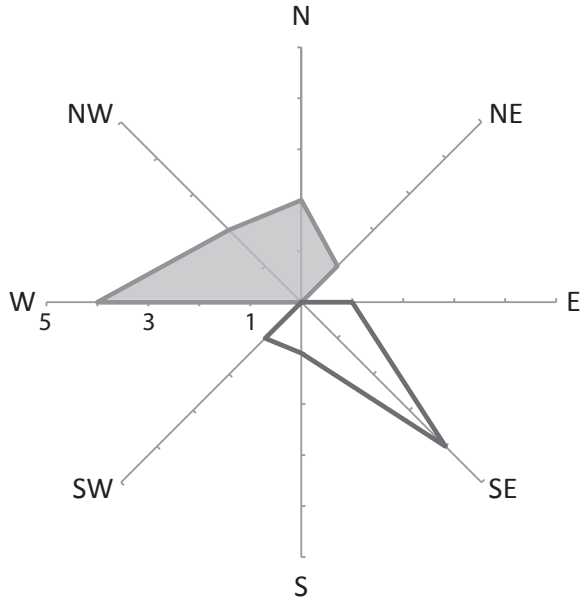


Figure 3.43. Rose diagram illustrating the positions of pre-construction cuts (shaded polygon) and fills (open polygon).

whereas retaining walls or fills (the open polygon) are located on the east, southeast, and south. From this it is apparent that nearly all of the structures in Cluster 1 face southeast and that the rear of the structure is formed by bedrock or by a slab-lined cut.

The situation in Cluster 2 is more complex. Several structures there exhibit the same orientation, notably Features 25 and 32. Features 20, 23, and 31 also face southeast, though they are not built against bedrock or dug into the slope but instead feature large, well-built walls on the north and west. This is also true of Features 27 and 30, even though in those cases the slope behind the rear wall dips to the north and west, away from the structure. By contrast, Features 28 and 29 face the opposite direction, toward the northwest. Interestingly, these two structures also exhibit a unique construction method.

Wall Construction Methods

A clear picture of the methods used to construct stone enclosures at the Upper Crossing site is difficult to

achieve in the absence of excavation data. However, several basic conclusions can be drawn from the available data. First, it is clear that even though the arcs of stones that constitute the preserved remnants of the enclosures are described throughout this report as "walls," they are in fact best viewed as "foundations." In all cases, the comparatively small number of displaced stones scattered within or around the structures suggests that their walls never were much higher than they are today. Second, significant variability exists in construction techniques among the documented structures. This variability could indicate either functional or temporal differences among the documented enclosures; the significance of different construction methods is considered in more detail in the concluding chapter.

One comparatively common construction technique incorporates a basal course of horizontally placed rocks that act as a supporting sill. Feature 5 provides a particularly clear example of this construction element. Horizontal bedrock sometimes served the same function. One or two courses of nearly vertical slabs or blocks were then set over this sill course, forming a sort of lean-to structure, with slabs on the interior leaning outward and slabs on the exterior leaning inward. In some cases these leaning stones were supported by "prop" rocks on the interior of the wall. It seems likely that mortar, perhaps incorporating smaller stones, was packed into the spaced formed by the leaning stones but no specific evidence of this was observed. In any case, the paired arrangement of leaning stones suggests that together they provided an anchor or footing for a superstructure made from bent branches or poles. This superstructure was, in turn, likely covered by hides or bundled reeds.

In addition to leaning stones, most structures also incorporate two to four courses of horizontally placed stones above the sill. It is not clear whether mortar was used to support this horizontal masonry, or how the enclosure's superstructure might have been tied to it. In some cases, the use of horizontal masonry may be more apparent than real: piles of horizontal slabs may simply represent collapsed or displaced leaning stones.

Two techniques were used to stabilize the back walls of enclosures excavated into the slope. In most cases the cut was lined with massive slabs set vertically; Feature 9 in Cluster 1 exhibits this method. In a few cases, such as Feature 25 in Cluster 2, large horizontal blocks were stacked against the cut.

The effort expended in the construction of different structures varied. Some, such as Features 4 and 5 in Cluster 1, feature essentially continuous, well-built walls. Others, such as Feature 7, consist of comparatively ephemeral wall segments. Many of the enclosures in Cluster 2 consist of open-ended wall arcs. In addition, the number of associated artifacts is weakly correlated with the completeness of the wall: more substantial structures are associated with more artifacts. These differences in wall completeness and artifact density do not seem to be functions of post-occupation disturbance, but rather reflect differences in the structure's original forms and functions. In short, it seems probable that different structures were used in different ways, with the lightly built enclosures serving as ramadas or sheltered work areas and the more stoutly built enclosures serving as residences. If so, the comparatively high frequency of open wall arcs in Cluster 2 suggests that that part of the site may have been used somewhat differently than Cluster 1, where more of the structures feature continuous walls.

Two structures—Features 28 and 29 in Cluster 2—exhibit a unique construction method. In both cases the structure was built up by removing loose bedrock spalls from the interior and piling them around the perimeter of the cleared space to create the wall. However, Feature 28 also incorporates several massive vertically placed slabs. The techniques used to build Feature 15 in Cluster 1 are also unique. This small enclosure features a slab-lined floor and continuous, well-preserved walls. The wall stones are comparatively uniform in size and few were placed in a vertical or leaning position.

Structure Superimposition and Remodeling

Only one instance of feature superimposition was observed during the 2009 documentation. Feature 15 clearly was placed over Feature 16. Feature 15 is among the best-preserved structures in Cluster 1, suggesting that it may also be more recent. No specific evidence of structure remodeling was observed; however, it seems unlikely that remodeling could be detected from surface documentation alone. For instance, it is unclear whether the interior wall of Feature 19, the only documented multi-room structure, was original to the enclosure or whether it was added later.

One line of evidence could point to limited remodeling or reconstruction. In several cases, including Features 4, 5, and 9, charcoal-stained sediment containing abundant artifacts appears to extend under the wall. If so, it must be the case that portions of the site were occupied before the structures were built or that the structures were maintained or reconfigured after they were first built and occupied.

4

Excavation Results

This chapter describes two testing projects carried out at the Upper Crossing site. The first, conducted in 1999 by Rio Grande National Forest archaeologists and San Luis Valley Archaeology Network volunteers, investigated the Late Prehistoric occupation in Cluster 1. The second testing project focused on Archaic-age deposits preserved in a small alluvial fan west of Cluster 1. This work was carried out in 2009 by PCRG and the SLVPLC.

1999 Forest Service Excavation

From June 10 to June 12, 1999, a volunteer crew led by Forest Service archaeologists Vince Spero and Ken Frye excavated three test units in Cluster 1. The crew included Jan Bennet, Art Glitzner, Marvin Goad, Kevin Lewis, Loretta Mitson, Virginia Simmons, Walt Smith, and Ann Marie Valasquez. The work was undertaken to learn more about the age and function of the site's stone enclosures and to obtain a sample of diagnostic projectile points from well-controlled contexts. The team also expected data from the excavations to contribute to regional cultural affiliation studies and to a better understanding of the use of toolstone from the nearby Alkali Springs quarry site, a large, easily accessible source of moderate-quality quartzite. This summary is based on Spero's field notes, along with plan maps and profiles drawn by the field crew. A series of photographs is also available. Artifacts and other materials collected during this work are described and analyzed in detail in chapter 5.

Initial horizontal control for the excavation was provided by a permanent datum located on the north side of Cluster 1. The location of each excavation unit was determined by measuring the distance and bearing from this datum to the unit's southwest corner. Each square was oriented to true north, which at the time was 10 degress, 55 minutes west of magnetic north. Depth measurements were made from the southwest corner of each unit. A unit-specific northing-and-easting system was used to record the horizontal positions of plotted items. Excavation proceeded in arbitrary 10-cm levels, with the local "surface depth" defined by the modern ground surface in the southwest corner. All excavated sediment was passed through ¼-inch hardware cloth to recover artifacts and other materials. In situ artifacts, faunal remains, and charcoal samples were piece-plotted whenever possible. The crew collected small sediment samples, generally about 50 to 100 ml in size, from several excavation levels.

Together the three test units cover 2.5 sq. m., with an aggregate volume of approximately 725 liters. Table 4.1 summarizes basic data on each of these units.

Test Square 1

Test Square 1 is located slightly south and west of the center of the Feature 2 stone enclosure (figure 4.1). Prior to excavation, 90 percent of the ground surface inside the enclosure was covered with vegetation, including grasses, forbs, and woody perennials. Four flakes were observed on the surface within the test unit. General Level 1 (extending to 10 cm below the modern ground surface) contained a few chipped stone tools and pieces of bone and a moderate amount of flaking debris (table 4.2). A fragment of a quartzite projectile point of uncertain morphology was recovered from the top of the level, just below the sod layer (CN3026). One large cobble, approximately 20 cm across, was located in the northwest quadrant of the unit. A 7-cm column of

Table 4.1. Data on three test units opened in 1999.

			Southwest Corner			
Unit No.	Feature No.	Unit Size	Azimuth	Distance (m)	General Levels	Excavated Volume (l)
TS-1	Feature 2	1 x 1 m	200	6.85	3	300
TS-2	Feature 3[a]	1 x 1 m	215	33.00	4	325
TS-3	Feature 6	0.5 x 1 m	n.d.	n.d.	2	100

[a] Fieldwork in 2009 demonstrated that "Feature 3" is not a constructed enclosure; see chapter 3 for additional details.

Figure 4.1. Map of stone enclosure Feature 2 showing the approximate location of Test Square 1.

Table 4.2. Summary of artifacts and faunal remains recovered during the 1999 excavations.

				Faunal Remains			
				Non-identifiable		Identifible	
Test Square	GL	Stone Tools	Flaking Debris	N	Percent Burned	N	Percent Burned
1	1 (0-10)	4	158	5	60%	0	--
	2 (10-20)	20	98	36	67%	3	100%
	3 (20-30)	12	244	218	41%	6 (12[a])	83% (0%[a])
2	1 (0-10)	24	353	6	67%	0	--
	2 (10-20)	18	83	3	0%	0	--
	3 (20-30)	2	8	1	100%	0	--
3	1 (0-10)	1	0	0	--	0	--
	Unspecified	1	3	0	--	0	--
Total		82	947	269	45%	9 (12[a])	88% (0%[a])

[a] Remains of a single cottontail rabbit likely not associated with the archaeological deposits.

sediment was collected from the center of the unit.

The density of stone tools and bone fragments increased in GL2 (10 to 20 cm below the modern surface), but the amount of flaking debris declined slightly. Two small, stemmed to corner-notched arrow points were recovered from this level (CN3020 and CN3007). Identifiable faunal elements include two *Sciuridae* bones and one small artiodactyl bone. No large wall stones or other cobbles were exposed in GL2. A sediment sample was taken from the center of the unit.

A larger number of bone pieces and pieces of flaking debris were recovered from GL3 (20-30 cm below the modern surface), most of which came from the upper part of the level. Identified faunal remains include *Sciuridae* and small artiodactyl bones. No temporally diagnostic stone tools were recovered from GL3.

Test Square 1 Stratigraphy

A profile drawing is not available for Test Square 1, but photographs and field notes indicate that three main sediment packages are present. The uppermost unit is about 10 cm thick and is capped by a weakly developed organic horizon. The excavators describe the color of this unit at the base of GL1 as brown (7.5YR 4/2, dry). The sediment beneath this upper stratum is darker (5Y 3/1, dry), but the texture is comparable. The large cobble exposed in the northwest quadrant of Level 1 appears to be resting on the base of this second sediment package at about 25 cm below the modern surface; the second stratum is therefore roughly 15 cm thick. The lowest stratum contains a large number of cobbles and blocks of various sizes. It also contains more gravel than either of the two overlying units. Lighter sediment was observed surrounding several large stones in the northeast quadrant at a depth of 30 cm below the modern surface. No cultural features were observed in this test unit. The bulk of the excavated assemblage appears to come from the second stratum, particularly the lower part of the second stratum.

Test Square 2

The crew placed Test Square 2 inside an area bounded by a sparse alignment of stones that they designated Feature 3. Data from the mapping and documentation work conducted in 2009 demonstrates that this alignment actually incorporates a natural terrace as well as a part of the wall forming Feature 16 (figure 4.2). The comparatively flat area created by the terrace and the wall therefore represents an open activity area located between Feature 9 to the north and Feature 16 to the south; chapter 3 presents additional data on these features.

As was the case for Test Square 1, vegetation consisting of grasses, forbs, and woody perennials covered about 90 percent of the surface of Test Square 2 prior to excavation. Five flakes were noted on the surface, along with several fist-sized cobbles and one lichen-covered stone measuring about 20 cm across. The excavators mapped an amorphous patch of charcoal-stained sediment in the center of the unit, but it is not clear if this stain could be seen prior to excavation or only became visible after the sod layer had been removed. In any case, several small pieces of charred wood were noted within and around this patch, particularly on the northeast. A sample of the stained sediment was collected.

Modified stone artifacts are abundant in GL1 (0 to 10 cm below the modern surface) (table 4.2). The only temporally diagnostic specimen is a small, stemmed to corner-notched projectile point (CN3044). Two unfinished arrowpoints are also present in the GL1 collection. The highest density of flaking debris encountered during the

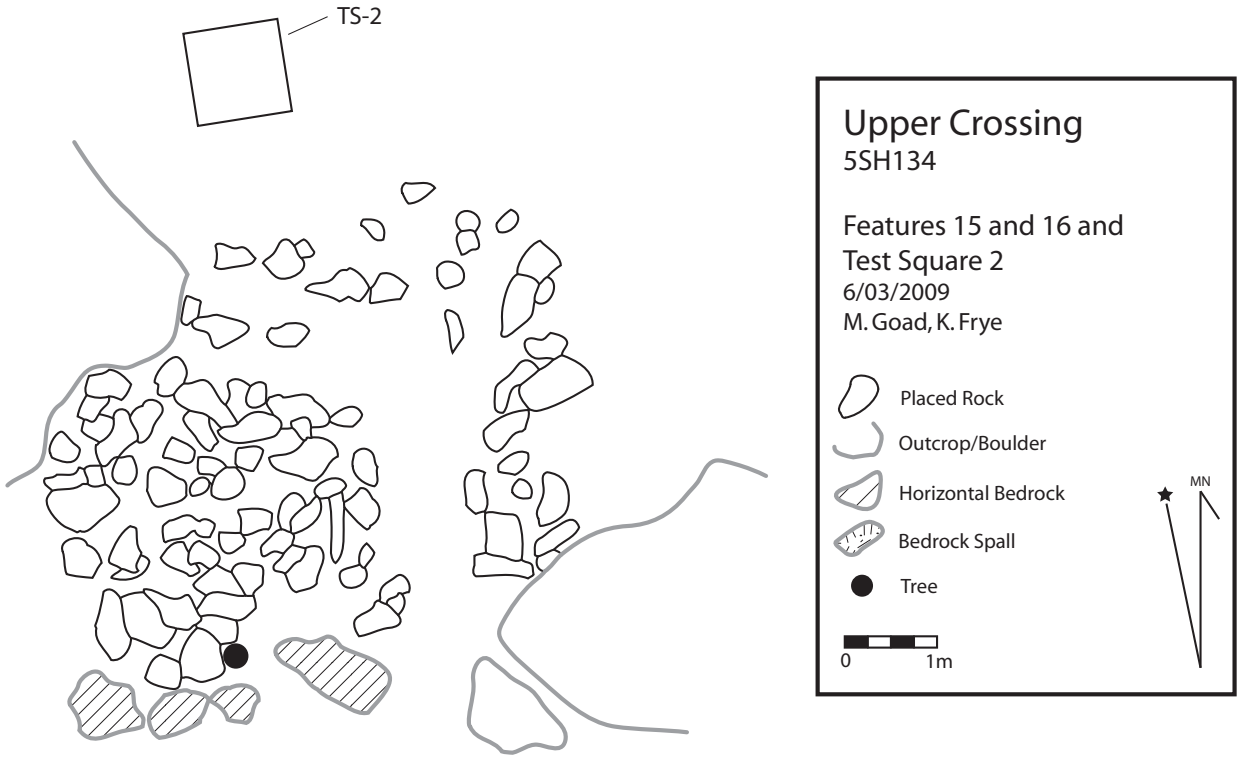


Figure 4.2. Map of stone enclosures Features 15 and 16 showing the approximate location of Test Square 2.

1999 excavation occurs in this level. However, just 6 pieces of bone were recovered from GL1, none of them identifiable. No large stones were exposed in this level.

In GL2, the excavators uncovered 10 to 15 large cobbles and blocks, mostly in the northwest quadrant, adjacent to the natural terrace. The number of recovered stone tools decreased slightly while the number of recovered flakes fell of dramatically. Just three unidentifiable bone fragments were plotted. Several charred wood fragments were also plotted, mostly in the northeast quadrant. Temporally diagnostic tools recovered from GL2 include two corner-notched dart points, one made from quartzite and one made from chert (CN3047 and CN3042). An unfinished arrowpoint preform was also recovered.

More large stones were exposed in GL3; at a depth of 30 cm, about two-thirds of the floor of the unit was covered with irregular blocks and cobbles. The density of flaking debris and other artifacts dropped nearly to zero in this level. Interestingly, both of the chipped stone tools recovered from GL3 are potentially temporally diagnostic, though both are fragmented. One is the base of what may be a side-notched dart point (CN3126). The other is burned, but may be an unfinished stemmed to corner-notched arrowpoint (CN3040).

At the base of GL3, an area of charcoal-stained sediment was observed in the southeast quadrant of the unit. To investigate this area, a roughly 50 x 50 cm sondage was excavated to a depth of about 40 cm below the modern surface. No artifacts or other materials were recovered and no feature was identified. The trend surface of the blocks and cobbles exposed in the sondage matches that of the stones exposed on the north and west side of the unit, indicating that the pre-occupation surface in this part of the site sloped evenly to the southeast.

Test Square 2 Stratigraphy

The deposits encountered in Test Square 2 are approximately equivalent to those seen in Test Square 1. The uppermost stratum consists of brown colluvial silt and sand capped by a weakly developed organic horizon. This stratum is thinner in Test Square 2 than in Test Square 1: on the Test Square 2 north wall profile this stratum is shown as 4 to 6 cm thick, roughly half the thickness of the uppermost stratum in Test Square 1. The origin of the stained sediment observed near the surface is not known, but it may represent the remains of an ephemeral hearth. The underlying sediment is darker and contains a relatively large number of artifacts, given the fact that GL1 spans the upper two lithostratigraphic units. The lowest stratum encountered in the excavation contains abundant large stones and relatively few artifacts. It is possible that the stained sediment exposed in the southeast quadrant of the unit represents a cultural feature originating in an overlying stratum, but its outline could not be defined.

Test Square 3

Initially, a 1 x 1 m excavation unit was laid out in the center of Feature 6, a stone enclosure built against a large bedrock boulder, but owing to time constraints the excavators decided to reduce its size to 50 cm x 1 m (figure 4.3). The western half (oriented north-south) was chosen for excavation because surface evidence suggested that the eastern half had been disturbed. Vegetation here covered only about 70 percent of the surface of the unit. The top of a large block was exposed on the surface along with one flake. Just one chipped stone artifact was plotted in GL1; three other modified stone artifacts were recovered from unspecified proveniences within the test square. None of these specimens is temporally diagnostic. A series of krotovina were identified in the north half of the unit and patches of charcoal-stained sediment were seen in the north half and in the southwest corner. Apparently, no artifacts, bones, or charcoal were recovered from GL2. Light-colored sediment was exposed in the northern part of the excavation near the base of this level.

Test Square 3 Stratigraphy

The sediment exposed in Test Square 3 differs markedly from that exposed in the other two excavation units. Three layers can be seen in profile photographs and drawings. The uppermost appears to be aeolian or colluvial and is 2 to 5 cm thick. Below that is a layer of silt, sand, and gravel that may be capped by a thin buried A horizon. This stratum is roughly 10 cm thick. The lowest stratum consists of silt, sand, and gravel with little organic matter. No cultural features were identified.

Discussion

These data permit a number of generalizations about the archaeology and chronology of Cluster 1. Stratigraphic data from Test Squares 1 and 2 suggest that a thin mantle of re-worked sediment covers much of the Cluster 1 occupation surface. Sheet wash is likely responsible for this mantle, perhaps combined with aeolian deposition. The presence of a weakly developed soil in both of these units suggests that the surface is currently stable. The stratum underlying this re-worked material likely represents the occupation surface associated with the stone enclosures. In Test Square 1, located inside an enclosure, this lithostratigraphic unit contains relatively abundant artifacts and faunal remains and is homogeneous

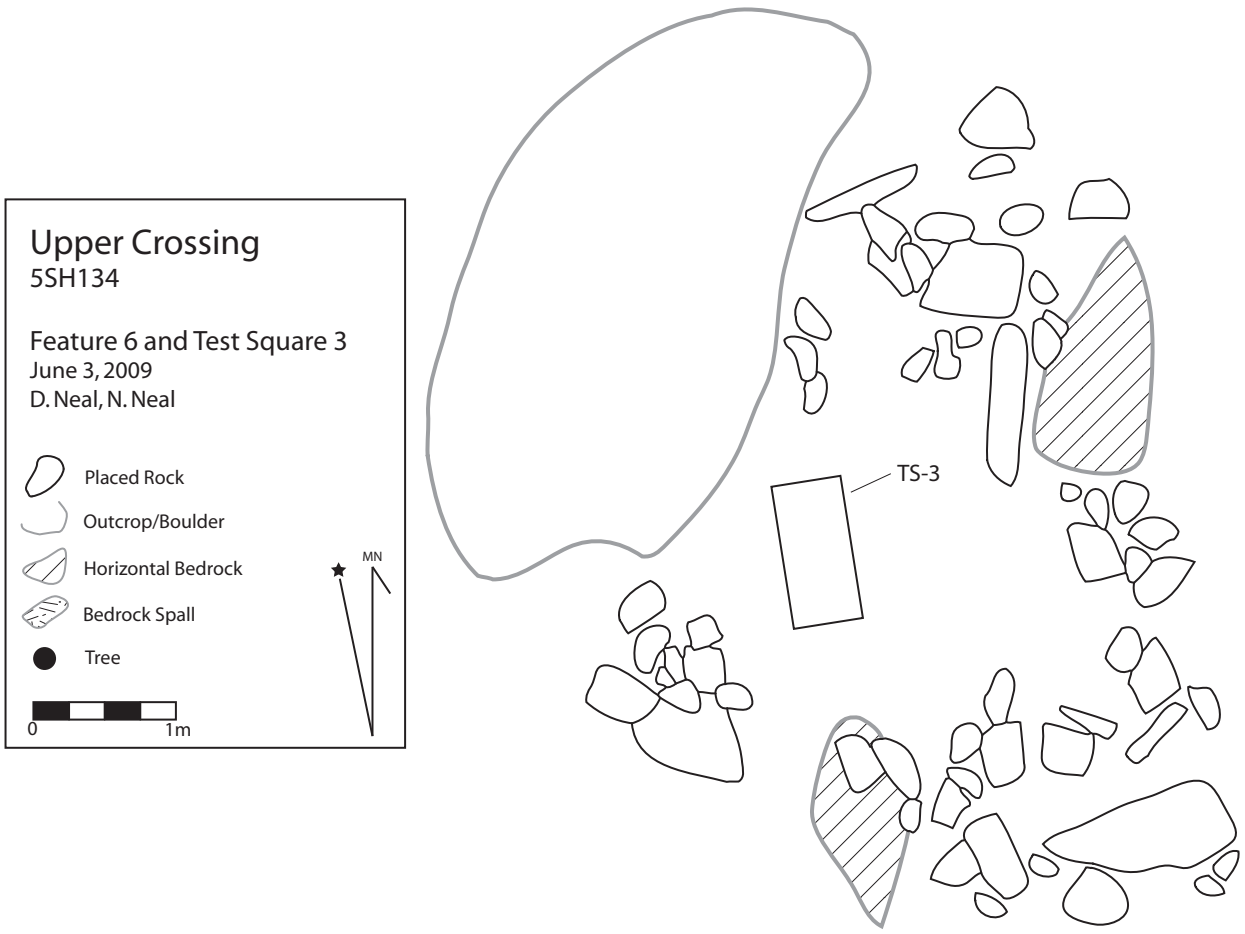


Figure 4.3. Map of stone enclosure Feature 6 showing the approximate location of Test Square 3.

and free of large stones. Profile photographs indicate that the base of this layer is flat and well-marked and may represent the original living surface inside Feature 2. The homogeneity of this layer further suggests that the structure was used for a period of time, during which cultural debris accumulated on the floor. The occurrence of many large, irregular stones immediately below this layer suggests that the floor may have been leveled and smoothed by importing sediment from nearby. Some artifacts are associated with these subfloor cobbles, but it is not clear whether they were brought in along with the floor fill or whether they were deposited during the occupation of the enclosure.

The large number and random orientation of large rocks exposed in Test Square 2 confirm the field assessment made in 2009 that this excavation unit sampled an area outside an enclosure. The presence of a similar dark silt stratum containing relatively abundant artifacts suggests that activities associated with the stone enclosure occupation occurred between, as well as within, domestic structures. The charcoal-stained soil observed near the surface could represent a second occupation of the site, perhaps associated with Feature 15 located a few meters south. Feature 15 is superimposed on Feature 16 and represents the only case of structure superimposition observed in Cluster 1.

The significance of the dearth of artifacts recovered from Test Square 3, located inside Feature 6, is not clear. One possibility is that the function of Feature 6 differed from the function of Feature 2, which produced abundant artifacts and faunal remains. Alternatively, the absence of cultural debris associated with Feature 6 could indicate that it was used only briefly. Finally, it is possible that deposits within Feature 6 were disturbed by artifact collectors or by other recent activities. However, this explanation is not supported by the stratigraphic evidence, which indicates a period of surface stability followed by a period of additional sediment accumulation.

Diagnostic projectile points recovered from these test units indicate a Late Prehistoric occupation of the stone enclosures in Cluster 1. Side-notched arrowpoints are not present in the collection, suggesting that the occupation

pre-dates A.D. 1050 or so. Small stemmed to corner-notched arrowpoints mark the Developmental period (A.D. 100—A.D. 1050) in the Arkansas River basin east of the Sangre de Cristo Mountains (Kalasz, Mitchell, and Zier 1999). Like the structures at Upper Crossing, many Arkansas basin Developmental-period assemblages also include larger corner-notched forms. At Upper Crossing, both small corner-notched arrowpoints (or unfinished arrowpoints) and large corner-notched, dart-sized points were recovered from the two main artifact-bearing lithostratigraphic units. The meaning of this co-occurrence is examined further in chapter 5.

2009 PCRG/SLVPLC Excavation

During the course of routine monitoring in 2007, SLVPLC archaeologists discovered cultural deposits eroding from an alluvial fan in a small valley on the west side of Cluster 1. Their tally of artifacts visible on the surface at the time includes 25 items, ranging from flakes and patterned chipped stone tools to ground stone tools, burned bone, and three ceramic sherds. The field map they prepared shows that most of these materials are closely associated with an area of charcoal-stained sediment exposed by active downcutting on the east side of the fan. The map identifies three features, defined by especially dense concentrations of artifacts and charcoal.

In October 2008, PCRG and SLVPLC archaeologists visited the site and re-examined these deposits. Erosion had continued following the original discovery and it was evident during the 2008 re-evaluation that the three features observed in 2007 in fact represented a single extensive cultural deposit at least 30 cm thick. The 2008 assessment also documented a previous episode of downcutting that had removed sediment from the west side of the fan, leaving a roughly triangular remnant of the original fan surface roughly 40 to 50 sq. m. in extent. The presence of a broad lag of artifacts and burned rock extending some 30 m south of this remnant fan surface indicates that the southern end of the fan also has been eroded. Several clusters of burned rock in this area likely represent the deflated remains of hearths or other features. Farther south, the fan deposits grade imperceptibly into alluvial deposits laid down by a much larger fan issuing from the drainage basin immediately to the west. It is not known whether these fan deposits also contain archaeological materials. Sparse animal bones and artifacts were also observed eroding from the larger fan. The relationship between these materials and the deposits in the smaller fan is not known.

Overview of Excavation Methods

The main goals of the 2009 testing effort were to better define the content, extent, and age of the cultural deposits first documented in 2007. To accomplish these objectives, the crew excavated a single 1 x 1 m test pit, designated Excavation Unit 1 (EU1) (table 4.3; figure 4.4). The unit was positioned to capture the uppermost surface of the alluvial fan. Originally, the research design for the project called for opening additional excavation units in other parts of the fan, but the complexity of the deposits encountered in EU1 precluded that. PCRG volunteer Erik Gantt carried out most of the work, with help from SLVPLC archaeologist Angie Krall and PCRG staff member Mark Mitchell. Excavation began June 1 and continued through June 5. Profiling took place on June 6.

Horizontal and vertical controls for the excavation were provided by a standard northing-and-easting grid system. The primary datum, consisting of an aluminum-capped steel reinforcing rod (arbitrarily designated 500NE100, Z100.000), was established immediately west of the best-preserved part of the fan. This same datum point was used during the 2007 monitoring work. Cobbles and small blocks were piled around the datum to make it more visible. A backsight was established below the crest of the bedrock ridge forming the west side of the small valley containing the alluvial fan (504.793NE86.833, Z101.086; HzA 290º 00’ 08”). Like the primary datum, the backsight is marked by an aluminum-capped steel reinforcing rod. The excavation grid is aligned to magnetic north, which during June 2009 was 9º 44’ east of true north.

The southwest corner of EU1 was set at grid point 495NE102; this nominal position is used in the catalog, on excavation forms, and on artifact and sample collection bags to identify the unit’s location. The local unit datum, a large steel spike from which horizontal positions and depth measurements were taken, was set on the northwest corner of the excavation unit at 496NE102, Z100.013. (Ordinarily, PCRG excavations designate the southwest corner of each unit as the local “surface datum (SD),” but in the case of EU1 a large stone in the southwest corner made that impractical).

Table 4.3. Test unit data, 2009 PCRG/SLVPLC field investigation.

		Surface Datum				
Unit No.	Unit Size	Position	Elevation	General Levels	Feature Levels	Excavated Volume (l)
EU1	1 x 1 m	496NE102	100.013 m	9	2	677

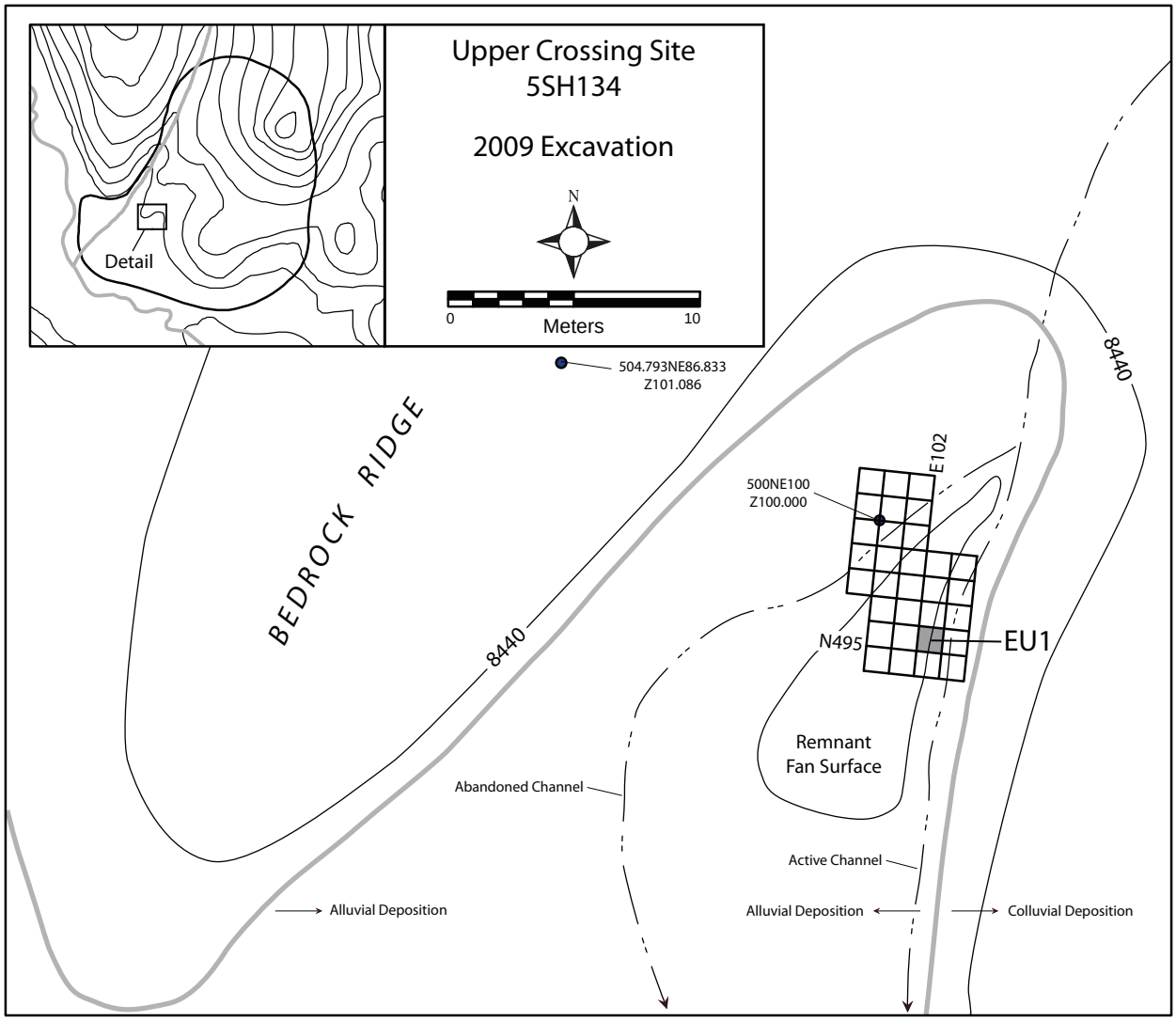


Figure 4.4. Map showing the location of the excavation unit opened in 2009.

Excavation levels were classified either as "general levels" (GL) if they included material from the entire test unit or as "feature levels" (FL) if they only included material from a defined and numbered cultural feature. The bulk of the sediment removed from EU1 was assigned to one of nine 10-cm-thick general levels. Two feature levels were also defined.

The work was carried out primarily with trowels, brushes, and other small hand tools. A skim shovel was used in a few instances. The bulk of the excavated sediment was dryscreened through ¼-inch hardware cloth; artifacts, bones, and burned rock were picked from the screen by hand and bagged by level. Material class sorting was accomplished in the lab; no sorting was undertaken in the field. In addition, a series of seven constant volume samples, each of about 4 l, was collected from the northwest corner of GL3 through GL9. A bulk sample was also taken from Feature 3, a rock-filled basin encountered in GL9. These samples were floated and size graded in the lab following the conclusion of fieldwork.

Data about each excavated level was recorded on forms designed for the project. Basic data on these forms include the unit's coordinates, excavation depths, and associated catalog numbers. The forms include spaces for excavators to write short narratives describing the sediment and artifacts they observed and problems they encountered during the course of excavation. A plan map was drawn at the end of each level; in a few instances maps depicting intermediate depths were also drawn. Profile drawings were made of each wall of the test unit. Completed levels were photographed, as were features and profiles. Catalog numbers were assigned to each arbitrary level in the field and all of the objects recovered during the excavation of that level were grouped under

that number. A few items were plotted and assigned individual catalog numbers.

The calculated total excavated volume is 677 liters, of which 633 liters came from general level contexts. Portions of five cultural features were exposed during this work, two of which, totaling 44 liters, were excavated under separate catalog numbers. The following sections describe the course of excavation and the strata and features encountered. The first section is a narrative description of the excavation process that focuses largely on the excavator's in-field observations and findings. Following that is a stratum-by-stratum description of the observed stratigraphy. The final section describes each of the five features encountered.

Excavation Process

Because EU1 straddles the west edge of the active channel, excavation in the first few general levels was limited to the northwest corner of the unit (figure 4.5). Cultural deposits in this area are capped by a thin mantle of nearly culturally sterile sand and gravel; mottled, artifact- and charcoal-bearing sediment was first observed about 5 cm below the modern surface. Several large rocks visible on the surface intrude slightly into this underlying cultural deposit. This deposit, exposed more fully in GL2, is a homogeneous sandy loam containing a great deal of fine charred plant material (figure 4.6). Artifacts, bones, and small stones within the deposit are mostly flat-lying. Near the bottom of GL2 the deposit is blacker and contains fewer and smaller pebbles. A corner-notched dart point made from translucent chalcedony (CN1004) was plotted in the northwest quadrant of the test unit, near the base of the level, along with a small ovoid biface (CN1003).

Figure 4.5. Photograph of the base of GL1.

Figure 4.6. Photograph of the base of GL3.

The color and texture of the deposit remain constant in GL3, but the excavators observed several changes in content. Mean artifact and natural clast size decreases with depth. Artifact density increases and burned rock density decreases. A tight cluster of flaking debris, likely derived from one or two parent nodules, was plotted in the northwest quadrant of the unit (CN1008), along with two samples of charred wood or other plant material. Some evidence of bioturbation was observed in this level: a rodent burrow filled with lighter-colored sediment runs across the unit at a depth of 24 to 26 cm below the modern surface.

Two changes were observed near the base of GL4. In the northern half of the unit, excavation exposed a lighter, sandier stratum underlying the artifact-rich black sandy loam. The upper surface of this sandier stratum first appeared at about 38 cm below the modern ground surface. In the southwest quadrant, a large concentration of burned stones was exposed (figure 4.7). The tops of the largest stones lie roughly 32 cm below the modern surface. The largest rock is about 30 cm long and 15 cm wide. The matrix surrounding theses stones is black and contains abundant charcoal. Ash is present beneath several of the larger stones. When they were removed in GL5, most were found to be resting on a common surface 42 to 45 cm below the modern surface. After the excavation was finished it became apparent that this concentration of burned rocks was in fact a shallow, flat-bottomed hearth feature, which eventually was designated Feature 5 (figure 4.8). A burned biface (CN1018) was plotted near the base of this pit. A very large corner-notched dart point was recovered from the south half of GL4, possibly within or slightly above the hearth. Other plotted items associated with GL4 include a large bone fragment (CN1012) and a sample of charred

Figure 4.7. Photograph showing the upper surface of Feature 5.

material (CN1014) from the edge of, but possibly above, Feature 5.

Mottled, sandy sediment was visible throughout the unit in GL5, about 45 cm below the modern ground surface. On the south side of the unit, the sediment underlying Feature 5 is predominantly gray. On the north side, and especially in the northwest quadrant, the sediment is tan to brown. A relatively clean gravel deposit was observed in the northwest corner. Flecks of charred plant material are scattered throughout GL5. Artifacts are present, but at much lower densities than in GL2, GL3, or GL4.

Near the bottom of GL5 a dense patch of charcoal-stained sediment was exposed on the east side of the unit. In GL6, it became apparent that this sediment, which is slightly mounded, marked the upper surface of a shallow basin feature filled with burned rock (figures 4.9 and 4.10). This basin was designated Feature 1 in the field, but because the sediment into which it was excavated also contained artifacts, charcoal, and burned rock, the

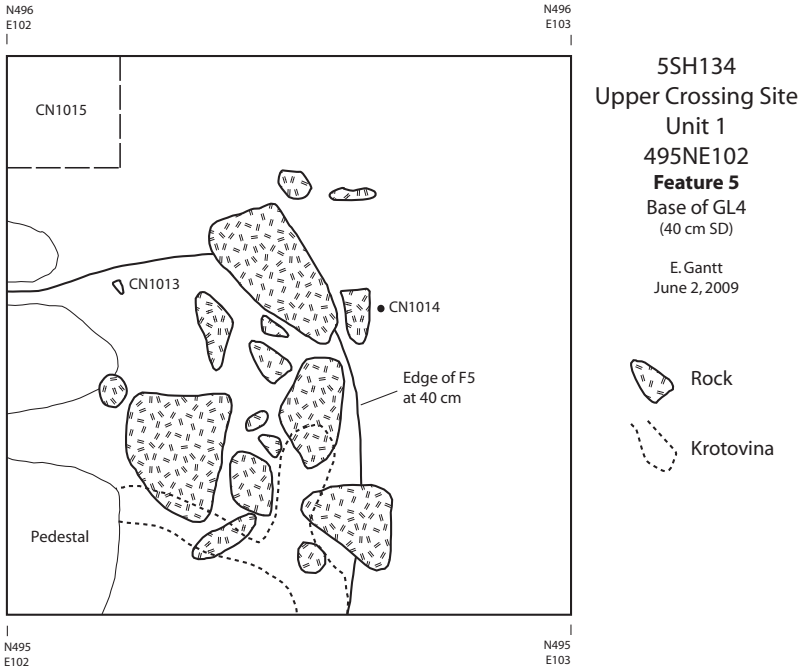


Figure 4.8. Sketch map of the base of GL4.

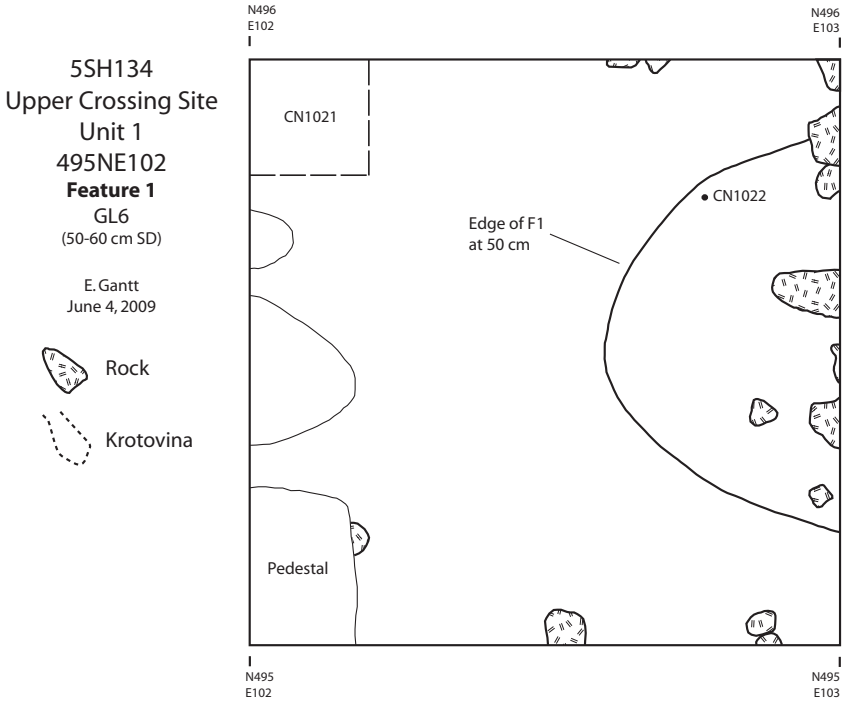


Figure 4.9. Sketch map of the base of GL6.

edges of the feature could not be defined well enough to excavate it separately. However, a sample of charred material was collected from the base of the feature on the north side. A thin oxidation rind marks the base of Feature 1, at a depth of about 55 to 60 cm.

Beneath Feature 1, in GL7, the sediment consists of non-cohesive sand and gravel; portions of this material were excavated with a skim shovel. The deposits exposed in this excavation level are heterogeneous, ranging from relatively clean, well-sorted sand, to mixed sand and gravel, to pea gravel. Owing mostly to the non-cohesive character of these materials, GL7 was inadvertently excavated to a maximum depth of 75 cm below the modern surface in the southeast corner. Feature 2, a small basin hearth, first became visible at a depth of 72 cm on the north side of the unit (figures 4.11 and 4.12).

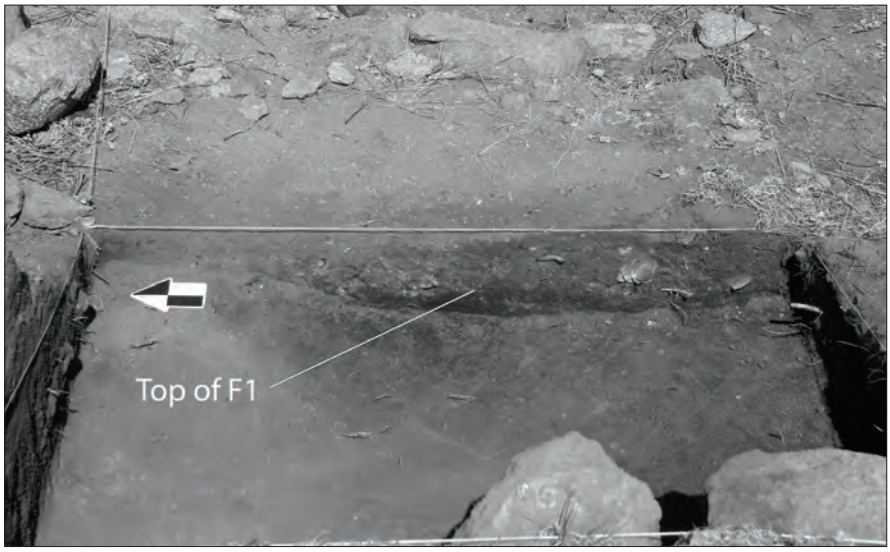


Figure 4.10. Photograph of the top of Feature 1 exposed in the east wall of EU1.

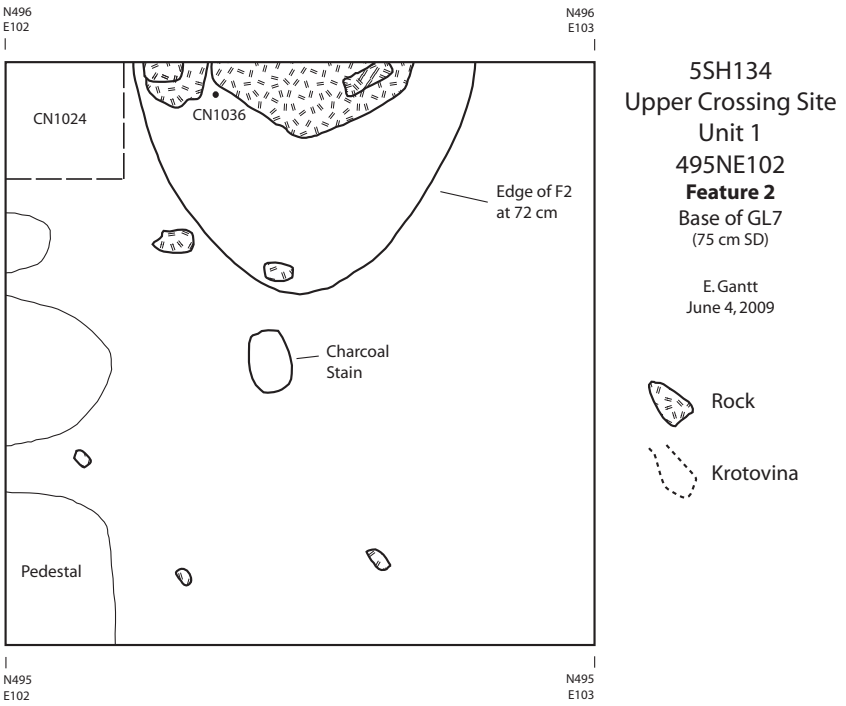


Figure 4.11. Sketch map of the base of GL7.

GL8 consists of non-cohesive sand and gravel deposits and a scattering of larger stones. A few fragments of charred plant material are present, along with a few flakes and burned bones. A stratigraphic break was observed at the base of GL8. In the eastern half of the unit, the sediment consists of a comparatively compact sandy clay loam, while the western half consists of gravel and sand. Both sediment packages are somewhat more homogenous than the overlying sand and gravel deposits present in GL8. At a depth of about 85 cm below the modern surface (in GL9) two additional cultural features were observed. On the north side of the unit a thick layer of charcoal, underlain by a distinct oxidation rind, was observed extending from the north wall. Initially, the excavators believed that these layers were part of Feature 2, but when the north wall profile was drawn it became apparent that a thin layer of sand was present between them; this earlier, underlying hearth was designated Feature 4 (figure 4.13). The other feature present in GL9 is a circular basin filled with burned rock and charcoal-laden sediment. The entire contents of this basin, designated Feature 3, was excavated separately and returned to the lab for flotation and fine-mesh screening. A re-worked side- and base-notched projectile point, likely Middle Archaic in age, was recovered from the north side of Feature 3. The remaining portion of GL9 was removed, after Feature 3 was excavated and mapped (figure 4.14). Excavation ceased at the bottom of GL9, 90 cm below the modern surface.

Figure 4.12. Photo showing the top of Feature 2.

Table 4.4 tallies the modified stone artifacts and faunal remains recovered from EU1 by excavation level. More than 80 percent of the flaking debris and 60 percent of the stone tools come from GL3 and GL4. These two levels alone account for one-quarter of the unidentified bone and just over half of the identified bone. Identified bones include those from small artiodactyls, a large artiodactyl, *Sciuridae* (a prairie dog or large squirrel), and *Muridae* (a small mouse). The highest density of bone scrap occurs in GL9, along with about 40 percent of the identified bone.

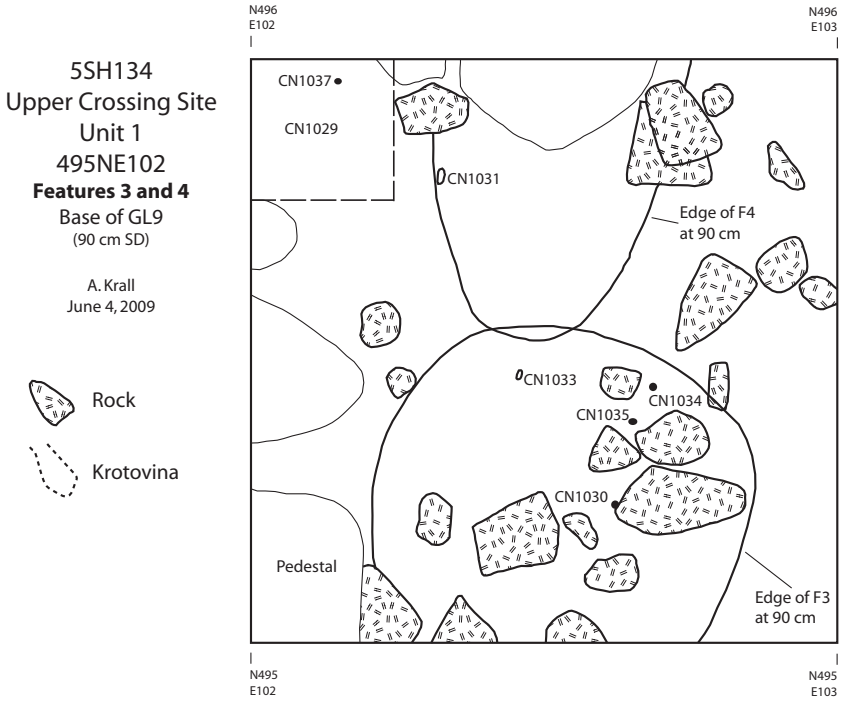


Figure 4.13. Sketch map of the base of GL9.

Constant volume samples measuring roughly 20 x 20 x 10 cm (4 liters, or about 4 percent of each level) were collected from the northwest corner of GL3 through GL9. Table 4.5 and figure 4.15 summarize data on the flaking debris and burned rock in each of these samples. Flakes are most abundant in the GL3 and GL4 samples. The bulk of the flaking debris falls in size grade 4, which consists of flakes smaller than one-quarter inch in maximum dimension--a size that normally passes through the hardware cloth used to screen the bulk of the excavated sediment. Flakes of this size sometimes were collected during the excavation, but not systematically. If fine-mesh recovery methods had been used to process all excavated sediment, the estimated number of size grade 4 flakes that would have been recovered from GL3 is 3,750. The estimated number of size grade 4 flakes in GL4 is 725. Burned rock is present in every sample, but is most abundant in GL9.

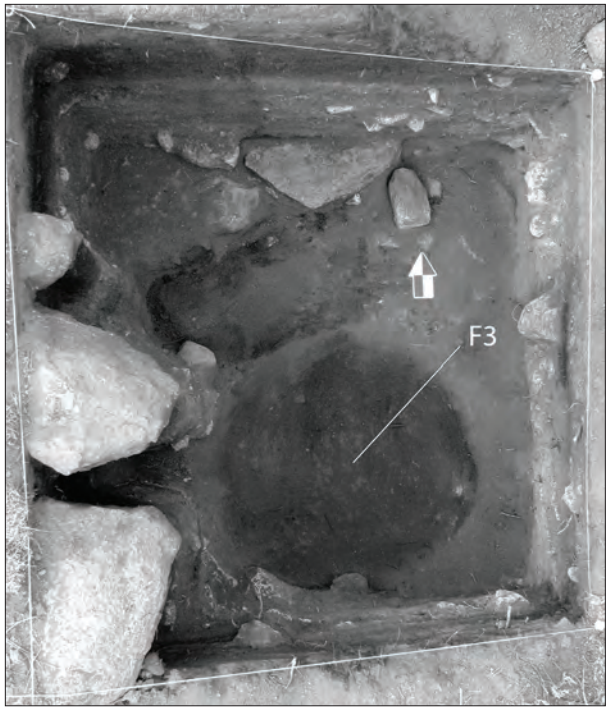


Figure 4.14. Photo showing Feature 3 after excavation.

Excavation Unit Stratigraphy

Eight distinct lithostratigraphic units were encountered in EU1 (Figures 4.16, 4.17, and 4.18). Figure 4.19 is a schematic depiction of the relationships among these strata. No pedogenic horizons were defined. The uppermost layer, designated Stratum 1, is a sandy loam containing subangular to angular pebbles, small cobbles, and several larger stones that measure up to 30 cm across. Sparse vegetation is present on the surface of this stratum, but an 'A' horizon has not yet developed. This layer is probably derived from a combination of colluvial and aeolian sources; the large, unburned stones contained within may have rolled down the slope

Table 4.4. Summary of artifacts and faunal recovered during the 2009 excavation.

			Faunal Remains			
			Non-Identifiable		Identifiable	
General Level	Stone Tools	Flaking Debris	N	Percent Burned	N	Percent Burned
1	2	1	0	--	0	--
2	5	30	51	2%	0	--
3	17	568	98	96%	4	50%
4	14	309	113	67%	13	31%
5	5	39	8	88%	0	--
6	1	6	2	100%	0	--
7	1	12	5	60%	0	--
8	0	9	7	100%	0	--
9	5	99	547	90%	12	42%
Total	50	1073	831	82%	29	38%

Table 4.5. Flake counts and burned rock weight from constant volume samples.

	Flaking Debris (N)				Burned Rock (g)				
	Size Grade				Size Grade				
General Level	G2	G3	G4	Total	G1	G2	G3	G4	Total
3	6	53	150	209	247	61	99	328	735
4	1	8	29	38	1000	19	79	201	1299
5			6	6	495	135	474	722	1826
6			2	2	208	82	183	499	972
7			2	2	404	111	313	602	1430
8			5	5	322	293	383	975	1973
9			24	24	700	357	499	813	2369
Total	7	61	218	286	3376	1058	2030	4140	10604

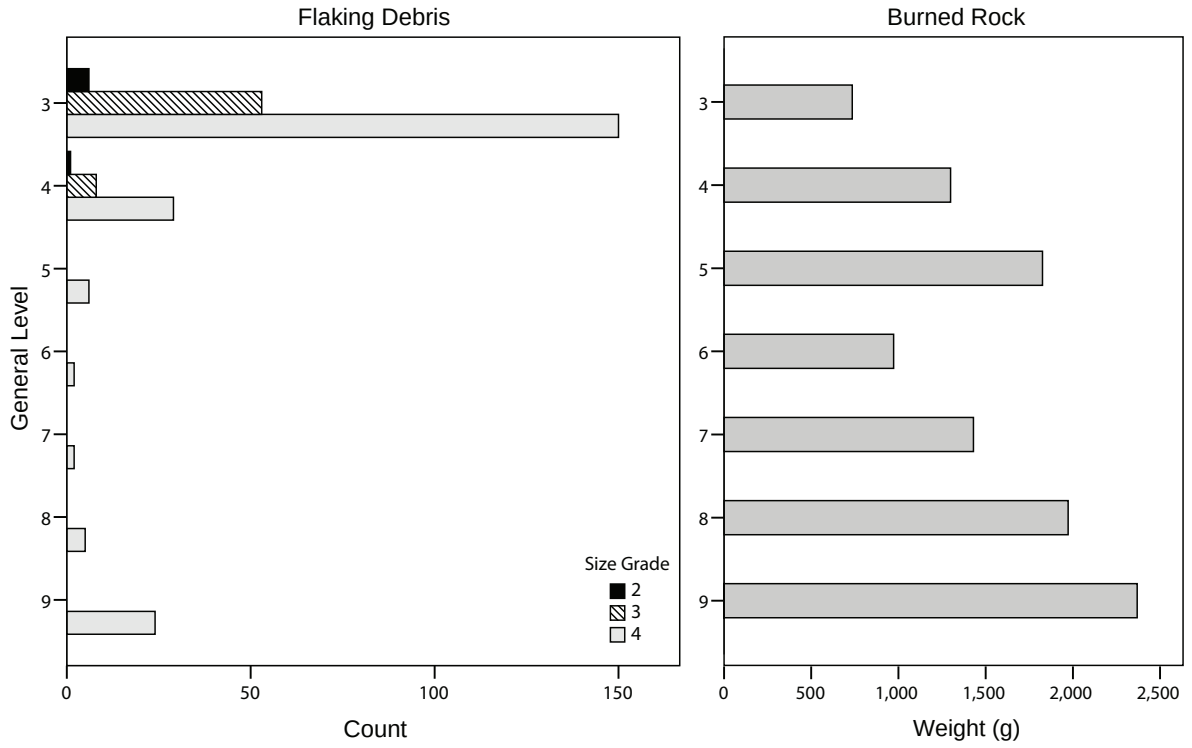


Figure 4.15. Flake counts and burned rock weight from general level constant volume samples.

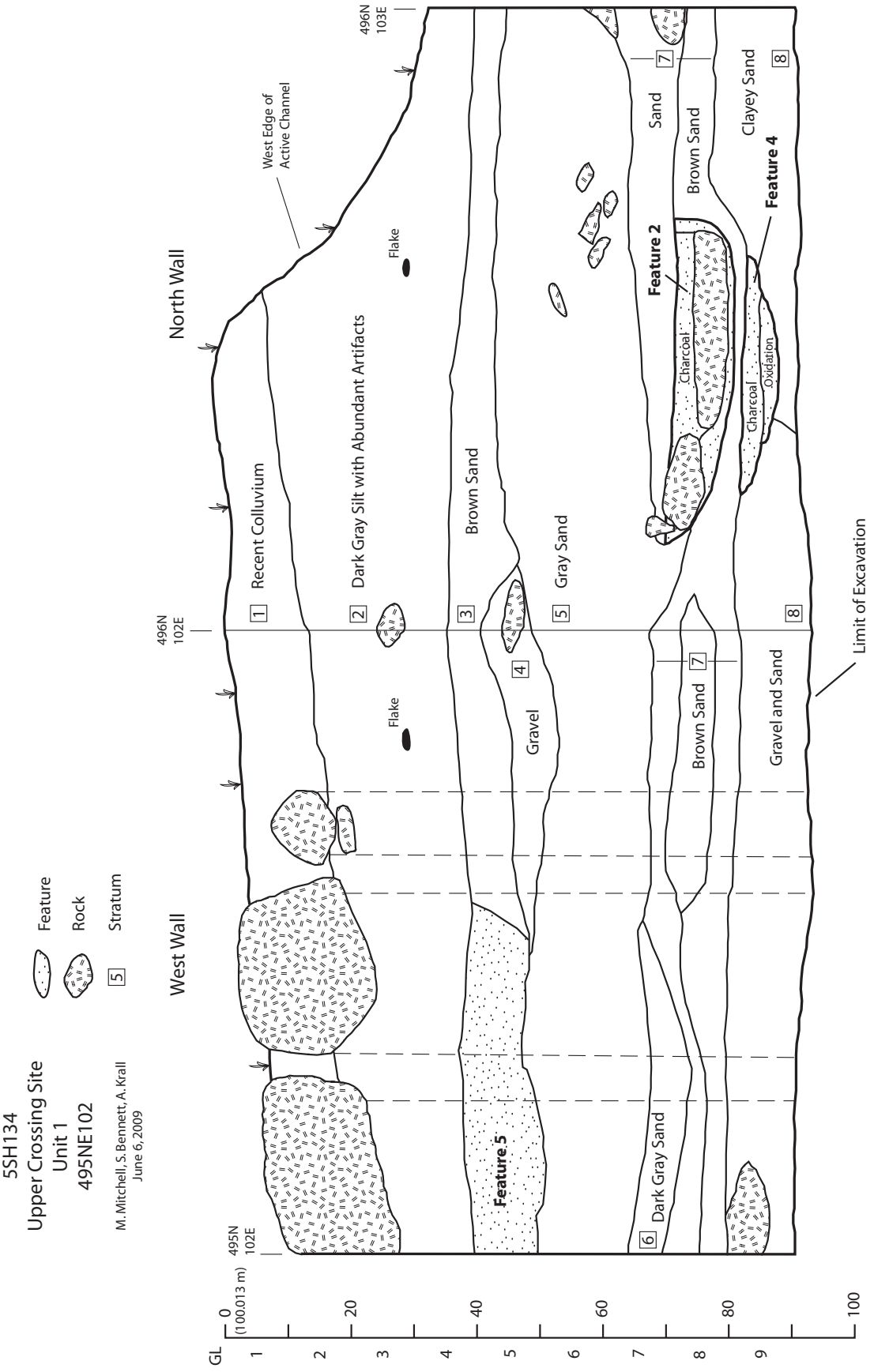


Figure 4.16. West and north profiles of EU1.

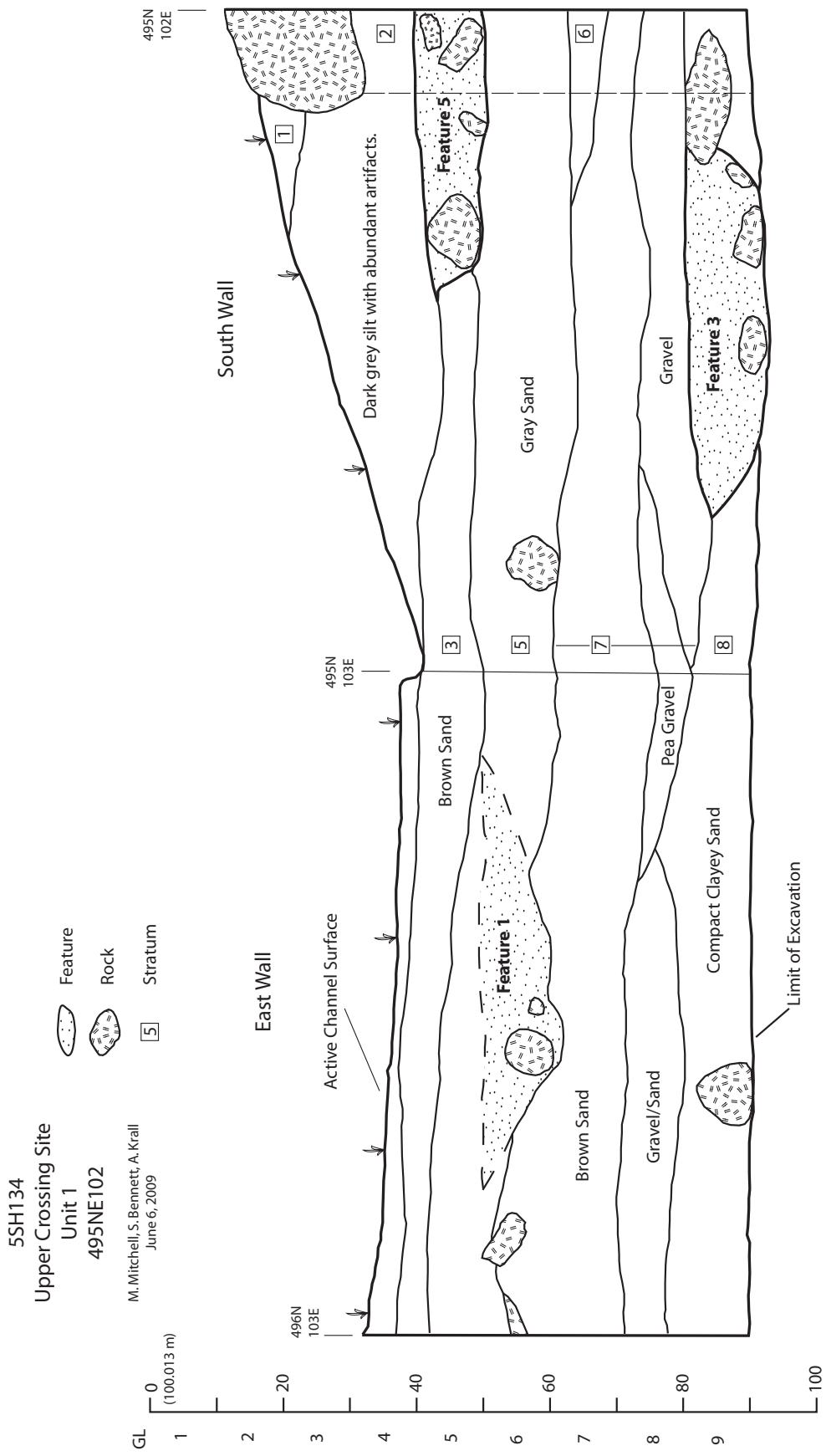


Figure 4.17. South and east profiles of EU1.

Figure 4.18. Photograph of the north profile of EU1.

forming the east side of the valley. A few artifacts are present in the lower part of Stratum 1 but charcoal and burned rocks are largely absent. Its upper surface dips slightly to the south-southwest and represents the oldest preserved surface of the fan; elsewhere, this layer, along with portions of one or more underlying strata, have been removed by erosion.

Stratum 2 is a very dark (10YR 2/1, dry) structureless sandy loam or loamy sand containing sparse pebbles and a few small cobbles. The contact with Stratum 1 is clear and smooth. The upper surface of Stratum 2 dips to the west and south, paralleling the modern ground surface, but the lower boundary is essentially flat, suggesting that a portion of Stratum 2 may have been removed before Stratum 1 was laid down. The maximum preserved thickness of Stratum 2 is 32 cm. Flaking debris, stone tools, and vertebrate faunal remains are abundant in this stratum, but only a moderate amount of burned rock is present. Artifacts, bones, and stones contained within it are generally flat-lying. A few krotovina are present. Two corner-notched dart points were recovered from general level contexts within Stratum 2, suggesting that it dates to the Late Archaic.

Stratum 3 is a mottled, compact brown loamy sand, containing subrounded to rounded pebbles, that varies in thickness from 4 to 10 cm. The contact with Stratum 2 is abrupt and smooth. Fewer artifacts are present in Stratum 3 than in Stratum 2. Charcoal is sparsely but uniformly distributed throughout. Feature 5 appears to have originated at the upper surface of Stratum 3.

In the northwest corner of the test unit Stratum 3 overlies a poorly sorted, wedge-shaped gravel lens 1 to 8 cm thick that is designated Stratum 4. Several larger, rounded cobbles are also present. The upper boundary of Stratum 4 is abrupt and undulating. Carbonate adheres to the rocks making up this layer. No artifacts were specifically plotted within it; however, sediment from Stratum 4 was not segregated from the surrounding strata during excavation.

Stratum 5 is a single-grained, mottled gray sand or loamy sand ranging in thickness from 10 to 24 cm. The contact with Stratum 3 is clear and smooth to wavy or undulating; the contact with Stratum 4 is abrupt and wavy. Fragments of charred wood are present throughout. Artifact density is lower than that of the more recent strata, especially Stratum 2. Carbonate-covered cobbles are distributed throughout the unit. No evidence of krotovina was observed. Feature 1 originates at the top of Stratum 5.

Beneath Stratum 5 in the southwest corner of the test unit is a discontinuous lens of gray sand designated Stratum 6. The maximum thickness of Stratum 6 is 6 cm. The contact with Stratum 5 is abrupt and smooth. This stratum was not recognized during the course of the excavation, but is evident in the west and south wall

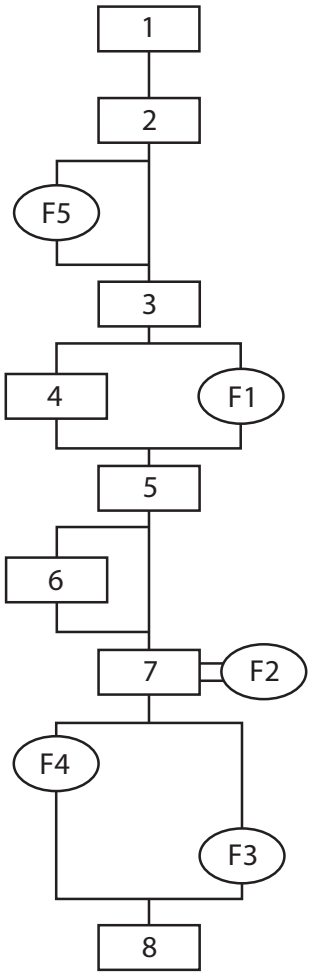


Figure 4.19. Harris diagram showing the relationships among strata and features encountered in EU1 .

profiles. It is differentiated from Stratum 5 by its higher darker color and by its lower gravel content. Too little is exposed in the test unit to assess its artifact content, but it appears to represent a natural deposit rather than a cultural feature.

Stratum 7 consists of a complex set of imbricated sand and gravel deposits up to 26 cm thick. These deposits range in color from tan to buff to light brown. They range in texture from angular gravel, to a mixture of sand and gravel, to well-sorted sand. This stratum is especially complex in the west half of the test unit. Charred wood fragments, along with a few artifacts, are scattered throughout. Given its complex character and coarse texture, it seems likely that Stratum 7 accumulated relatively rapidly during a period of higher sediment yield. The artifacts present in Stratum 7 may have been transported a short distance. However, the fact that Feature 2, a hearth constructed and used while Stratum 7 was accumulating, is well preserved suggests that any surface disturbance caused by on-going deposition was limited.

The oldest layer exposed in 2009, Stratum 8, consists of two distinct facies. On the west side of the excavation, Stratum 8 is a mixture of sand and gravel; in the northwest quadrant it is represented by a fine, well-sorted sand. On the east side of the excavation, Stratum 8 contains more silt and clay and is therefore noticeably more compact. A clear contact between these two facies runs roughly through the center of the test unit. Interestingly, large subangular stones are present in both facies. Features 3 and 4 were both excavated into Stratum 8, with Feature 3 probably slightly older. It is not clear which facies was deposited first, though there is some indication that the western gravel and sand deposit may be the more recent, filling a channel cut in the fine-grain deposits to the east. The fact that both cultural features straddle the contact between them may indicate that a portion of Stratum 8 was removed by erosion before they were constructed. In any case, Stratum 7 continuously overlies Stratum 8 and both features. The strong textural differences between Stratum 7 and Stratum 8 suggest that the local hydrologic regime shifted abruptly immediately after the features were abandoned. A re-worked dart point with side and base notches recovered from Feature 3 indicates that Stratum 8 was laid down at least by Middle Archaic times, or roughly 5000 to 3000 B.P. However, the fact that charcoal and at least a few artifacts are present throughout Stratum 8 indicates that Feature 3 post-dates the earliest occupation of the site.

Feature Descriptions

Portions of five features are present in EU 1, but two of the five (Feature 4 and Feature 5) were only recognized in profile, after excavation had ceased. A third feature (Feature 1) was too poorly defined in plan view to excavate under a separate catalog number. The remaining two (Feature 2 and Feature 3) were excavated separately. The fill of Feature 2 was screened through ¼-inch hardware cloth. The fill of Feature 3 was collected for fine-mesh screening and flotation in the lab.

Feature 1

Feature 1 is a circular or oval, rock-filled basin approximately 70 cm in diameter and up to 15 cm deep (figures 4.9 and 4.10). The top of the feature was first exposed at about 43 cm below the surface datum. Only the western half of the feature is exposed in the test unit. The margins of the feature are somewhat diffuse, suggesting that it may have been disturbed before it was buried. No evidence of recent or ancient krotovina was observed. The upper surface of the central portion of the feature is marked by a dense, slightly mounded accumulation of charcoal-stained sediment (figure 4.10). The base of the feature is marked by lightly oxidized sediment. The pit appears to originate at the contact between Stratum 3, the brown sand, and Stratum 5, the mottled gray sand. Given its position well below Stratum 2, Feature 1 must date at least to the Late Archaic period, or perhaps earlier.

The content of Feature 1 consists largely of burned rock. Individual stones range in size from 2 or 3 cm to more than 12 cm. Several flakes are present in the fill as well. Charcoal is abundant throughout, but is concentrated near the top of the feature; a plotted sample (CN1022) was collected from the base of the pit along its northern edge.

Feature 2

Feature 2 is a shallow, oval hearth about 60 cm wide and more than 40 cm long (figures 4.11 and 4.12). Only the southern portion of the feature is exposed in the test unit. Maximum thickness is about 9 cm. The central portion of the hearth consists of a large, flat-lying slab of burned rock that is entirely surrounded by a layer of relatively pure charcoal 0.5 to 1 cm thick. Several other large cobbles are clustered around the flat slab. The charcoal lens thins away from this central group of stones, suggesting that the observed edge of the feature in fact represents ash and charred wood scattered by wind from a small basin. If so, the hearth was originally no larger than 40 or 50 cm in diameter. Feature 2 is entirely contained within Stratum 7, a complex sequence of imbricated sand and gravel deposits.

After Feature 2 was mapped and described, a large, thin scatter of charcoal, underlain by a layer of bright, oxidized sediment, was discovered extending south from

the southern edge of Feature 2. Initially, the excavators believed that this scatter was part of Feature 2. However, when the profile was drawn it became clear that these layers of charcoal and oxidized sediment were separate from, and superimposed by, Feature 2. These layers, designated Feature 4, are described later in this section.

Feature 3

The earliest cultural feature encountered in 2009, designated Feature 3, is a shallow, circular, flat-bottomed hearth approximately 60 cm in diameter and 13 cm deep. The pit is symmetrical with gradually sloping walls. Most of Feature 3 is exposed in the test unit, though a sliver of the southern edge is visible in the south profile (figure 4.17). The pit originates at the contact between Stratum 7 and Stratum 8.

The fill of the pit is coarse and uncompacted and includes abundant burned rocks, the largest of which is 22 cm across. The rocks bear carbonate coating and blebs of calcium carbonate have accumulated in the bottom of the pit. A re-worked, tri-notched dart point (CN1033) was recovered from the northern edge of the pit near its base, indicating that Feature 3 is probably Middle Archaic in age. One other artifact, a chert flake (CN1034), and two fragments of charred wood (CN1030 and CN1035) were also plotted within the fill. A total to 7.6 kg of burned rock was recovered from the fill.

Feature 4

Feature 4 consists of a thin layer of charcoal underlain by a well-developed layer of oxidized sediment (figure 4.13). The maximum thickness of these two layers together is about 6 cm. At least one large rounded cobble and several smaller tabular and blocky stones are associated with these layers. Feature 4 originates at the contact between Stratum 7 and Stratum 8. Its southern edge appears to superimpose the northern edge of Feature 3, indicating that it is slightly younger. A layer of sand as thin as 1 cm, which is part of Stratum 7, lies between the upper surface of Feature 4 and the base of Feature 2. However, the fact that the two features seem to precisely superimpose one another suggests that only a little time elapsed between their uses. Given the size and position of the largest cobble associated with Feature 4 it is plausible that Feature 2 is in fact a rebuilt or reconfigured version of Feature 4. A fragment of burned bone was recovered from the oxidized sediment making up the lower part of Feature 4, but apart from charcoal no other cultural materials were observed.

Feature 5

Feature 5, a large basin filled with burned rock, is the most recent feature exposed by the excavation (figures 4.8, 4.16, and 4.17). Owing to its diffuse margins, this feature was not recognized during the course of the excavation, but is clearly evident in the west and south profiles. The numerous large rocks filling the feature were first exposed near the base of GL3 (figure 4.7). Many of them rest on a common surface, at about 42 to 45 cm below the unit surface datum and about 5 cm above the base of the feature. The hearth ranges in thickness from 8 to 12 cm. An unknown fraction of the basin is visible in the test unit; if the feature is approximately symmetrical, then its estimated diameter could be as much as 120 cm. However, any size estimate is complicated by the feature's diffuse edge, possibly a result of disturbance immediately subsequent to its use, as well as by the presence of a large burrow running through the center of the feature and along the east edge. Artifacts are abundant within the feature, though the single plotted item within the feature is a burned chert biface (CN1018). Feature 5 originates at the upper surface of Stratum 3, the brown sand. Given its overall similarity in color and texture to Stratum 2, it seems likely that Feature 5 represents one of the first Late Archaic uses of this part of the site.

Discussion

A series of diagnostic projectile points provides a rough chronological framework for the deposits encountered in EU1. A re-worked, tri-notched dart point is directly associated with the earliest documented cultural feature, the hearth designated Feature 3. Such points, commonly assigned to the Mallory type, are a minor constituent of Middle Archaic McKean complex assemblages (Davis and Keyser 1999; Zier 1999; see chapter 5 for additional discussion). Given the presence of flaking debris in Stratum 8, which pre-dates Feature 3, occupation of the Upper Crossing site must have begun at least by Middle Archaic times (5000 B.P.—3000 B.P.). Stratum 2, the dark gray to black silt containing abundant artifacts, produced several large corner-notched dart points likely indicative of a Late Archaic occupation. Hoefer (1999b) does not partition the Archaic stage into periods, but puts the end at 1450 B.P. or A.D. 500. Zier (1999) brackets the Late Archaic in the Arkansas River basin between 3000 B.P. and 1850 B.P. (1000 B.C—A.D. 100). Puebloan utility ware sherds, likely dating between the twelfth and fifteenth centuries, were recovered from the surface of the alluvial fan at Upper Crossing. Data from EU1 suggest that they are confined to Stratum 1, suggesting that deposition on the fan ceased at least by 1850 B.P. Thus, the fan deposits exposed in EU1 span the Middle

and Late Archaic. At present, the data are insufficient to determine where in the stratigraphic sequence the transition from the Middle to the Late Archaic falls, but it seems probable that Stratum 2 (and Feature 5) dates to the Late Archaic, while Stratum 3 through Stratum 8 (and Features 1 through 4) date to the Middle Archaic.

In any case, the occupation preserved in Stratum 2 differs markedly from earlier occupations. Flaking debris is far more abundant in Stratum 2. The aggregate flake density in GL3 and GL4, which together capture most of Stratum 2, is 4.3 flakes/l. For GL6 through GL9, the aggregate density is 0.1 flakes/l. On the whole, though, burned rock is more abundant in GL6 through GL9. Feature 5 (which falls mostly in GL5) appears to be associated with Stratum 2. However, numerous superimposed hearth features are present in Stratum 3 through Stratum 8. While animal bone is present in every level, it is most abundant in GL9 (where it primarily comes from Feature 3). Bone is also relatively common in Stratum 2.

The stratigraphic sequence also indicates shifts in local moisture regimes. Strata 3 through 8 represent a period of gradual but steady sediment accumulation, perhaps indicating wetter conditions. Accumulation was sufficiently rapid to preserve small pit features, but sufficiently gradual to do so without displacing their content. The origin of Stratum 2 is not known, but a different process clearly was responsible for its deposition. Surface inspection demonstrates that Stratum 2 is spatially restricted, suggesting an anthropogenic origin. The environmental regime promoting aggradation on the fan likely ceased during or perhaps before the Late Archaic occupation. Portions of the fan have eroded since that time; the presence of Puebloan pottery on the highest preserved fan surface suggests that the shift toward a local erosional regime post-dates 1100 A.D.

5

Analyses of Material Culture and Faunal Remains

Mark D. Mitchell and Carl R. Falk

This chapter describes and analyzes flaking debris, stone tools, pottery, and faunal remains. The collection comprises all materials recovered from the site, including specimens collected from the surface in 1977, 1989, 2006, 2007, and 2009, and those obtained during excavations in 1999 and 2009.

PCRG lab supervisor Chris Johnston analyzed the flaking debris. Mark Mitchell studied the stone tools and pottery. PCRG member Cody Newton collected metric and descriptive data on the projectile point assemblage. SLVPLC archaeologist Marvin Goad produced illustrations of selected arrowpoints from the 1999 excavations. PCRG member Carl Falk analyzed the modified and unmodified vertebrate remains and wrote the sections describing them. Mitchell wrote the balance of the chapter.

Analytic Units and Collection Chronology

To provide a framework for analysis and comparison, individual excavation proveniences (including general or feature levels as well as piece plots) are grouped into composite "analytic units." The proveniences making up each analytic unit share spatial, depositional, and temporal properties. Five analytic units are defined for the collection. A series of diagnostic projectile points anchors the analytic unit chronology. Figures 4.16 and 4.17 illustrate stratigraphic relationships among Archaic-stage analytic units.

Middle Archaic (2009 Excavation)

Features 1 through 4 and general levels 6 through 9 in EU1, all of which lie below 99.51 m, are assigned to the Middle Archaic analytic unit. A re-worked Mallory point, a style which is a minor constituent of McKean complex assemblages, was recovered from the base of Feature 3, the oldest hearth encountered in EU1. Most of Stratum 5 and all of strata 6 through 8 are included in this analytic unit. These strata consist primarily of sand-sized particles, with lesser but varying amounts of finer and coarser particles. These strata are indicative of a slowly aggrading alluvial fan.

Mixed Archaic Unit (2009 Excavation)

General level 5 (99.61 to 99.51 m) in EU1 lies below Stratum 2, which contains large, corner-notched dart points dating to the Late Archaic, but incorporates the fill of Feature 5, which is associated with Stratum 2. Thus, GL5 combines sediment laid down during the Middle Archaic with a cultural feature dating to the Late Archaic and is therefore assigned to a temporally mixed analytic unit. General level 5 includes the upper few cm of Stratum 5 and all of strata 3 and 4. Like the strata making up the Middle Archaic analytic unit, these strata consist primarily of sand and gravel and represent an aggrading fan surface.

Late Archaic Unit (2009 Excavation)

General levels 2 though 4 (99.91-99.61 m) in EU1 are essentially conterminous with Stratum 2, a black sandy loam containing very abundant artifacts, including two large, corner-notched dart points that likely are Late Archaic in age. A few cm of Stratum 1 (a more-recent colluvial and possibly eolian deposit) in the southwest corner of EU1 are incorporated into this analytic unit because the modern fan surface dips to the south but the base of Stratum 2 is essentially level. However, Stratum 1 contains few artifacts. Limited surface data suggest that Stratum 2 is anthropogenic and is inset into the Middle Archaic alluvial deposits exposed in GLs 5 through 9.

Late Prehistoric Unit (1999 Excavation)

All excavation levels in test squares 1 through 3, located in Cluster 1, are assigned to the Late Prehistoric analytic unit. Small, corner-notched arrow points, which date to between A.D. 100 and A.D 1050 in the Arkansas River basin to the east, were recovered from both Test Square 1 and Test Square 2. Side-notched arrow points, produced after A.D. 1050, do not occur in the collection. All three excavation units are located within or adjacent to stone enclosure features. Similar features were constructed in the Arkansas basin between about A.D. 500 and A.D. 1400. Thus, the Late Prehistoric component at Upper Crossing likely dates to between A.D. 500 and A.D.

1050. The strata exposed in these excavation units vary from primarily eolian silt to colluvial sand, gravel, and cobble deposits.

Surface Collection

All artifacts recovered from surface contexts, along with those from General Level 1 in EU1 (roughly conterminous with Stratum 1), are grouped together in a temporally mixed analytic unit. The majority of these are non-diagnostic stone artifacts that come from Cluster 1 and so likely are Late Prehistoric in age. Puebloan and other Late Prehistoric pottery types recovered from surface contexts also are assigned to this unit. However, the surface group also includes diagnostic projectile points ranging in age from about 8000 to 2000 B.P.

Modified Stone

The modified stone analysis first partitioned the assemblage into two classes: chipped stone flaking debris and stone tools. A tool is any intentionally shaped object, an item exhibiting use-wear, or a remnant nodule of raw material from which flakes were removed. Intentionally shaped objects range in complexity from simple flakes with retouched edges to items produced by flaking, pecking, grinding, or some combination of manufacturing techniques. Flakes, by contrast, are detached pieces discarded during lithic reduction, which therefore lack evidence of use or modification other than that produced by transport, tramping, or other post-depositional factors (Shott 2004).

The analysis developed in this chapter emphasizes the assemblage's technological, rather than functional, properties. Technological analysis of stone tools focuses mainly on how they were manufactured. The most important production variable is technological class. A tool's technological class is defined primarily by the dominant method used to manufacture it and secondarily by the initial form of the raw material blank (Ahler, Root, and Feiler 1994). Each class is defined by a sequence of production techniques. Sequences range from simple and expedient to complex and staged. For example, patterned large thin bifaces are produced by the staged application of soft-hammer percussion flaking and, to a lesser degree, pressure flaking to flake blanks or tabular pieces of stone. Unpatterned flake tools, by contrast, exhibit nothing more than simple edge modification, either through use or by marginal retouch.

Assessing tool technological class requires a series of interrelated judgments about the actual methods used to manufacture a tool as well as the intended outcome of the manufacturing process. Determinations about manufacturing stage and technological trajectory depend in part on the concept of "patternedness." Patterned tools exhibit bilateral symmetry. By contrast, unpatterned tools are asymmetrical, with their form dictated mainly by the shape of the original input blank. Use-wear traces, though not rigorously quantified in this analysis, provide additional information about whether the production process was complete when an artifact was lost or discarded.

The analysis uses two variables to capture data on raw material usage. The first is rock type. Eight types are present in the assemblage, four of which dominate: chert, chalcedony, quartzite, and rhyolite. Chert includes opaque cryptocrystalline toolstones in all colors, while chalcedony includes translucent to transparent cryptocrystalline materials, some of which contain amorphous white to red to light brown inclusions. Orthoquartzite is a metamorphic stone composed of cemented sand grains that occurs in a wide range of colors. Rhyolite or tuff is an opaque extrusive igneous rock containing distinctive crystals known as phenocrysts. Rhyolite in the Upper Crossing collection ranges in color from brown to tan to pink.

Minor toolstone types include basalt, silicified wood, obsidian, and sandstone. Toolstone quality basalt is a fine-grained, homogenous extrusive igneous rock that is opaque, black to dark gray in color, and may contain small crystals. Silicified wood in the Upper Crossing collection is highly variable in color, quality, and opacity, but is identified by traces of its original internal structure or by its characteristic rough cortex. Obsidian in the collection ranges from smooth and transparent to cloudy with small inclusions. The sandstone used to produce grinding tools is moderately well cemented and fine-grained.

The second variable used to characterize raw material usage is descriptive group. Groups were derived inductively, based on a preliminary examination of the 1999 and 2009 collections, as well as a rough sort of an unprovenienced comparative collection made up of flakes and tools picked up in the area around the confluence of Sheep and Saguache creeks in the 1970s or 1980s. Each descriptive group consists of specimens exhibiting a regular combination of distinctive properties, including color, texture, inclusions, cortex type, fracture quality, and so forth. The groups are rather narrowly defined and so 28 percent of the flaking debris collection and 59 percent of the stone tool collection are not assigned to one of the defined descriptive groups.

The descriptive groups may comprise materials derived from discrete quarry localities. However, it is certainly possible that other materials in the collection derive from the same or similar sources; in fact it seems quite likely that many of the toolstone sources the site's inhabitants exploited produced a range of materials

differing in color, nodule size, and quality. It is also likely that visually similar materials can and do derive from different source locations. Nevertheless, the descriptive groups defined for this analysis constitute a starting point for future source location surveys. They may also help identify shifts in raw material exploitation over time and help isolate potentially imported toolstone.

Tables 5.1 and 5.2 list the variables and attributes used in the flaking debris and stone tool analyses. Additional discussion of these variables and attributes are provided in Ahler, Root, and Feiler (1994) and Root and others (1999).

Collection Summary

The modified stone assemblage consists of 198 stone tools and 2,055 pieces of flaking debris weighing roughly 0.9 kg (table 5.3). Two of the stone tools exhibit two distinct technological processes, yielding a total of 200 stone tool cases.

Together, items assigned to the Late Archaic and Late Prehistoric analytic units make up 90 percent of the flaking debris assemblage and 59 percent of the stone tool assemblage. Unsurprisingly, 65 percent of the surface collection consists of tools, compared to just 6 percent of the excavated assemblage.

Table 5.1. Chipped stone flaking debris variables and attributes.

Raw Material Type	
1	chert
2	chalcedony
3	quartzite
4	rhyolite
5	basalt
6	silicified wood
7	obsidian
8	sandstone
9	unknown
Descriptive Group	
1	poor-quality dark red chert with fracture planes
2	grey chert with irregular fracture
3	Trickle Mountain quartzite
4	white to light brown to translucent mottled chalcedony
5	yellow chert with chalcedony inclusions
6	fibrous chalcedony with occasional white inclusions
7	dark red quartzite
8	maroon quartzite
9	opaque white chert
11	tuff
99	unspecified
Burning	
0	unburned
1	burned

Table 5.2. Stone tool variables and attributes.

Technological Class	
1	small patterned biface
2	large patterned biface
3	unpatterned biface
4	patterned flake tool (end scraper)
5	unpatterned flake tool
6	large, thick, bifacial core
7	nonbipolar core
8	bipolar core or core-tool
9	unpatterned pecked or ground tool
10	patterned pecked or ground tool
12	retouched plate tool
14	ground core
Raw Material Type (same as flaking debris codes)	
Descriptive Group (same as flaking debris codes)	
Burning (same as flaking debris codes)	

Table 5.3. Summary data on the Upper Crossing modified stone collection.

	Flaking Debris		Stone Tools	
Analytic Unit	Count	Weight (g)	Count	Weight (g)
Middle Archaic	125	21.67	7	23.60
Mixed Archaic	39	26.39	5	32.60
Late Archaic	907	359.11	36	217.80
Late Prehistoric	947	356.38	82	266.42
Surface	37	129.60	70	1502.90[a]
Total	2055	893.15	200	2043.32

[a] Excluding two large rhyolite millingstone fragments.

Flaking Debris

Seven raw materials are represented in the flaking debris collection (table 5.4). Chert and chalcedony together make up three-quarters of the assemblage. The balance consists of coarse materials, including quartzite, rhyolite, and basalt. Significant temporal shifts occurred in the use of different materials. Table 5.5 gives the distribution of the five most common raw materials used during three time periods. The Late Prehistoric inhabitants of the Cluster 1 stone enclosures made greater use of coarse materials (rhyolite and basalt) than their Archaic-stage predecessors. Late Archaic groups made the greatest use of various chalcedonies, the highest-quality raw materials available locally.

These patterns come into sharper focus in the distribution of different descriptive groups, which together include roughly 72 percent of the flakes in the total assemblage (table 5.6). The contrast is particularly

Table 5.4. Distribution of raw material types in the flaking debris assemblage, organized by analytic unit.

	Analytic Unit					Total	
Raw Material Type	Middle Archaic	Mixed Archaic	Late Archaic	Late Prehistoric	Surface	Count	Percent
chert	48.0%	15.4%	17.5%	40.7%	37.8%	624	30.4%
chalcedony	28.8%	56.4%	56.7%	34.3%	10.8%	901	43.8%
quartzite	18.4%	12.8%	23.4%	11.6%	32.4%	362	17.6%
rhyolite	4.0%	12.8%	1.0%	9.8%	10.8%	116	5.6%
basalt	.8%	2.6%	1.1%	3.2%	2.7%	43	2.1%
silicified wood			.1%	.2%		3	0.1%
obsidian				.1%	5.4%	3	0.1%
unknown			.2%	.1%		3	0.1%
Total (N)	125	39	907	947	37	2055	

Table 5.5. Distribution of common raw materials in the flaking debris assemblage among three analytic units. Cells with standard residual values > +2.0 are shaded.

	Analytic Unit			
Raw Material Type	Middle Archaic	Late Archaic	Late Prehistoric	Total (N)
chert	48.0%	17.6%	40.8%	604
chalcedony	28.8%	56.9%	34.5%	875
quartzite	18.4%	23.5%	11.7%	345
rhyolite	4.0%	1.0%	9.9%	107
basalt	.8%	1.1%	3.2%	41
Total (N)	125	904	943	1972

marked between the Late Archaic and Late Prehistoric assemblages, with Late Prehistoric flintknappers utilizing a variety of coarse materials exhibiting poor fracture, including low-quality red and gray cherts and rhyolite. Compared to Middle Archaic and Late Prehistoric groups, the site's Late Archaic occupants made little use of lower-quality materials, especially a distinctive red chert that may be available on-site. Instead, they made greater use of chalcedonies, in particular a translucent material known to occur in the Fish Canyon Tuff and possibly other formations.

Trickle Mountain quartzite was used during all time periods, but accounts for just 20 percent of the descriptive group assemblage. This is a surprising finding because the quarry is just 4.4 km to the northwest and surely is the single largest raw material source locality in the vicinity. However, with just two exceptions, all of the materials present in the assemblage, including high-quality cherts and chalcedonies, are thought to occur within 5 or 10 km of Upper Crossing. This suggests that the lower quality

Table 5.6. Distribution of descriptive groups among three analytic units. Cells with standardized residuals >+2.0 are shaded.

	Analytic Unit			
Descriptive Group	Middle Archaic	Late Archaic	Late Prehistoric	Total (N)
low-quality red chert	36.0%	6.5%	23.3%	232
low-quality gray chert	1.2%	1.1%	5.3%	44
Trickle Mountain quartzite	26.7%	23.9%	16.2%	290
white-light brown-translucent chalcedony	15.1%	24.9%	19.4%	309
yellow chert	9.3%	8.8%	13.7%	159
translucent chalcedony (fibrous silica)	4.7%	21.6%	5.7%	185
red quartzite		5.2%		34
maroon quartzite		3.2%		21
white chert	1.2%	3.5%	2.7%	42
rhyolite	5.8%	1.4%	13.7%	107
Total (N)	86	658	679	1423

of Trickle Mountain quartzite discouraged its use relative to stone from other nearby sources.

The two exceptions to local procurement are the red and maroon quartzites found exclusively in the Late Archaic assemblage. (One maroon quartzite flake occurs in the Mixed Archaic analytic unit). Each of these materials is fine-grained and homogeneous in color and texture. This contrasts with Trickle Mountain quartzite, which derives from coarse-grained and poorly sorted sandstone, is mottled and variable in color, and incorporates dark mineral flecks. Apart from the isolated patch of Morrison and Dakota formation rocks where Trickle Mountain quartzite occurs, no other source area likely to include bedrock orthoquartzite deposits is known from the Saguache Creek valley. However, numerous such sources were exploited in the Gunnison River basin to the west (Black 2000; Pitblado et al. 2008; Stiger 2001). It therefore seems highly probable that the maroon and red quartzites at Upper Crossing were brought over from the Western Slope. Figure 5.1 summarizes the main raw material usage patterns for each of the three primary analytic units.

Between one-eighth and one-quarter of flakes made from cryptocrystalline raw materials are burned (table 5.7). The highest frequencies of burned flakes occur in Middle Archaic and Late Prehistoric contexts.

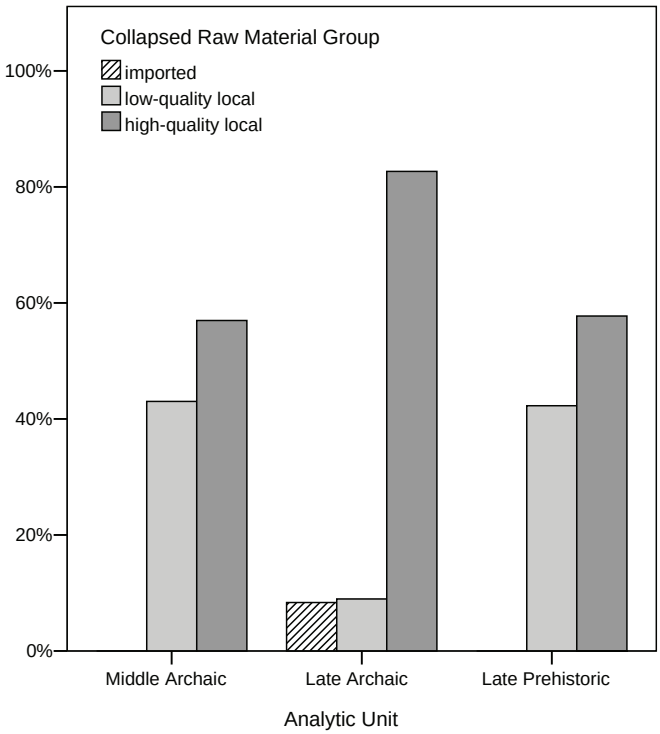


Figure 5.1. Comparison of collapsed raw material groups in three analytic units.

Table 5.7. Frequency of burned flaking debris, organized by analytic unit.

	Burning			
Analytic Unit	unburned	burned	undetermined[a]	Total (N)
Middle Archaic	50.4%	26.4%	23.2%	125
Mixed Archaic	59.0%	12.8%	28.2%	39
Late Archaic	59.6%	14.7%	25.7%	907
Late Prehistoric	50.6%	24.7%	24.7%	947
Surface	40.5%	13.5%	45.9%	37
Total (N)	1121	410	524	2055

[a] Includes non-cryptocrystalline materials such as quartzite, rhyolite, and basalt, as well as unknown materials.

Stone Tools

An identical suite of raw materials is represented in the stone tool assemblage, in relative proportions similar to those observed in the flaking debris assemblage (table 5.8). Chert and chalcedony are the most abundant materials, followed by quartzite and rhyolite. The Middle Archaic assemblage is too small to compare meaningfully, but both the Late Archaic and the Late Prehistoric assemblages exhibit proportionally similar usage patterns in tools and in flaking debris. This suggests that raw material nodules were transported to Upper Crossing from nearby quarries and tools were manufactured, used, and discarded on-site. This finding is consistent with the view that Upper Crossing served as a residential base camp during these periods.

However, the descriptive group data point to a somewhat more complex situation (table 5.9). Overall, the proportion of the tool assemblage assigned to a descriptive group is smaller than the proportion of the flaking debris assemblage (41 percent compare to 72 percent). This suggests that the inventory of materials present in the stone tool assemblage is more varied than in the flaking debris assemblage, a pattern further suggesting that a significant portion of the tools discarded at Upper Crossing were manufactured elsewhere. This can also be seen in the differing proportions of the yellow chert descriptive group. This material makes up roughly one-quarter to one-third of the tool collection, but just 9 to 14 percent of the flaking debris collection. A similar pattern can be seen in the white-light brown-translucent chalcedony group. These differences may also indicate that sources of these materials, which are among the highest-quality toolstones in the collection, are located some distance from Upper Crossing and therefore that initial reduction and early-stage manufacture took place elsewhere.

The opposite situation is also evident. Translucent chalcedony makes up more than one-fifth of the Late Archaic flaking debris, but just 12 percent of the tools. This may indicate that tools manufactured with this material at Upper Crossing were transported off-site and discarded elsewhere. It may also indicate that substantial deposits of this material are located close to Upper Crossing; a relatively small source is located about 1.5 km to the south.

Differences exist in the kinds of tools produced during different periods. Table 5.10 lists the tool technological class breakdown by analytic unit and figure 5.2 illustrates examples of several technological classes. Both the Late

Table 5.8. Stone tool raw material types, organized by analytic unit. Proportions represent within-analytic unit values.

	Analytic Unit					Total	
Raw Material	Middle Archaic	Mixed Archaic	Late Archaic	Late Prehistoric	Surface	Percent	Count
chert	71.4%	60.0%	27.8%	51.2%	37.1%	43.0%	86
chalcedony		20.0%	38.9%	29.3%	15.7%	25.0%	50
quartzite		20.0%	16.7%	8.5%	20.0%	14.0%	28
rhyolite	14.3%		8.3%	7.3%	14.3%	10.0%	20
basalt				1.2%	4.3%	2.0%	4
petrified wood	14.3%			2.4%	4.3%	3.0%	6
obsidian			2.8%			0.5%	1
sandstone			5.6%		4.3%	2.5%	5
Total	7	5	36	82	70	100.0%	200

Table 5.9. Stone tool descriptive groups, organized by three primary analytic units. Proportions represent within-analytic unit values

	Analytic Unit			
Descriptive Group	Middle Archaic	Late Archaic	Late Prehistoric	Total
low-quality red chert			9.7%	3
Trickle Mountain quartzite		11.8%	16.1%	7
white-light brown-translucent chalcedony		41.2%	38.7%	19
yellow chert	100.0%	23.5%	35.5%	18
translucent chalcedony		11.8%		2
red quartzite		11.8%		2
Total	3	17	31	51

Table 5.10. Distribution of 12 tool technological classes, organized by analytic unit. Proportions represent within-analytic unit values.

	Analytic Unit					Total	
Technological Class	Middle Archaic	Mixed Archaic	Late Archaic	Late Prehistoric	Surface	Percent	Count
small patterned biface			2.8%	31.7%	5.7%	15.5%	31
large patterned biface	42.9%	40.0%	27.8%	19.5%	20.0%	22.5%	45
unpatterned biface				7.3%	8.6%	6.0%	12
patterned uniface				6.1%	4.3%	4.0%	8
unpatterned flake tool	42.9%	60.0%	36.1%	19.5%	20.0%	24.5%	49
bifacial core-tool					1.4%	.5%	1
core			16.7%	13.4%	28.6%	18.5%	37
bipolar nodule				1.2%		.5%	1
unpatterned groundstone	14.3%		13.9%		7.1%	5.5%	11
patterned groundstone					1.4%	.5%	1
retouched plate tool				1.2%	1.4%	1.0%	2
ground core			2.8%		1.4%	1.0%	2
Total	7	5	36	82	70	100.0%	200

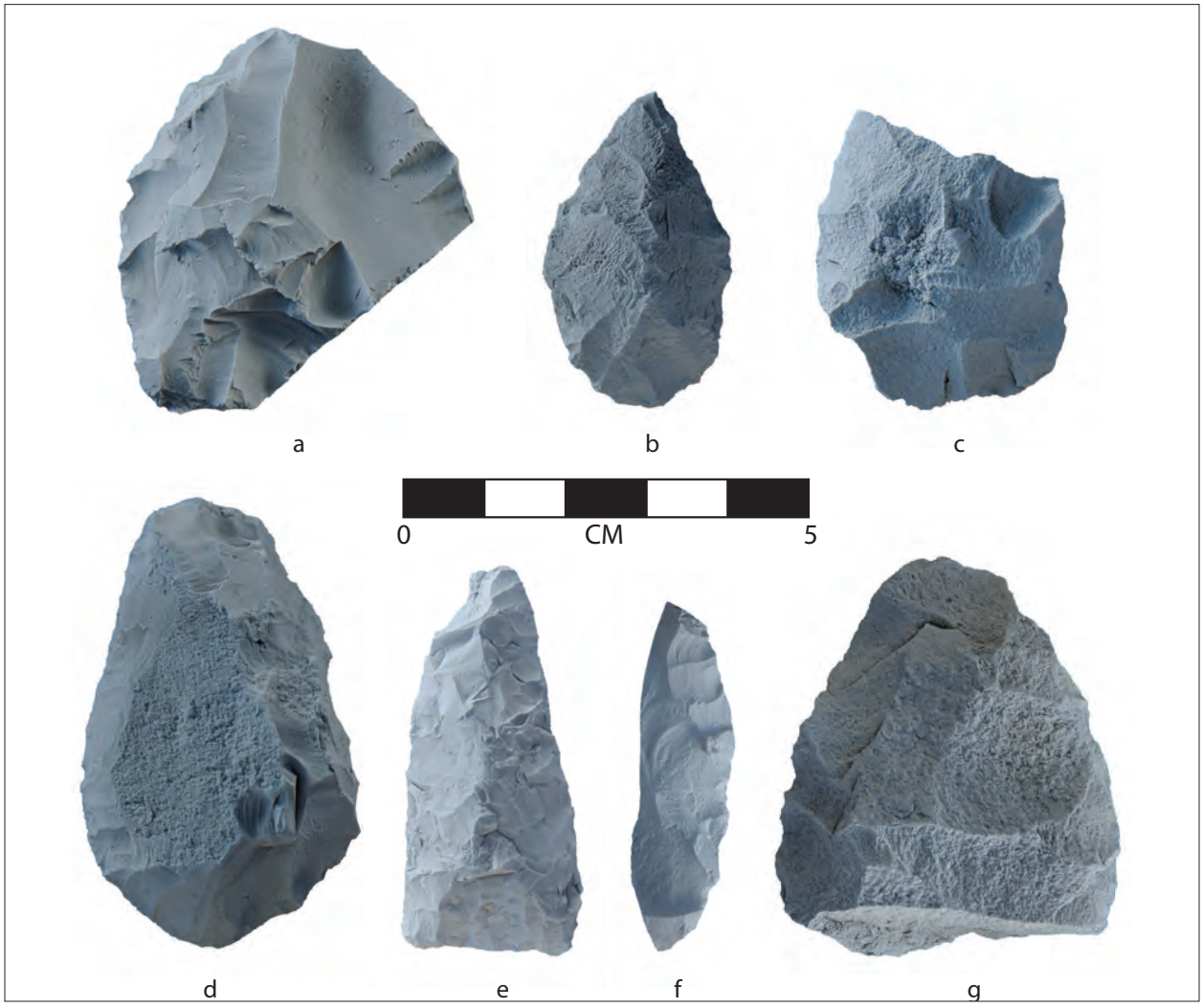


Figure 5.2. Stone tools. a, b, e, f, g: large patterned bifaces; c: unpatterned biface; d:patterned flake tool (scraper). f: Late Archaic AU; b, e: Mixed Archaic AU; c: Late Prehistoric AU; a, d, g: Surface AU.

Archaic and the Late Prehistoric assemblages feature a wide variety of tool types. Late Prehistoric tool diversity is somewhat greater, with unpatterned bifaces, end scrapers (patterned flake tools), retouched plate tools, and a bipolar core/wedge all present exclusively in that analytic unit. Overall, the make-up of the surface assemblage is similar to that of the Late Prehistoric assemblage, due mainly to the fact that the bulk of the surface assemblage comes from Cluster 1.

Unsurprisingly, small patterned bifaces (consisting mostly of arrowpoints) occur most commonly in the Late Prehistoric assemblage, while large patterned bifaces (a mixture of dart points and cutting tools) are more common in the Late Archaic. Unfinished arrowpoints also occur in the Late Prehistoric analytic unit (figure 5.3e, f).

Table 5.11 presents data on the most common technological classes present the Middle Archaic, Late Archaic, and Late Prehistoric analytic units. Flake tools and large patterned bifaces dominate all three assemblages. These tools undoubtedly were used for a variety of tasks, including animal butchery, weaponry maintenance, and craft production. Groundstone tools, commonly but not exclusively used for plant processing, occur in both of the Archaic stage analytic units. They are absent from the excavated Late Prehistoric assemblage, but they do occur in the surface collection, which includes two rhyolite millingstone fragments collected from Cluster 1. Ground stone tools were observed on the surface in 2009 near several stone enclosures in Cluster 1, including features 4, 5, and 9.

No cores are present in the Middle Archaic

Table 5.11. Distribution of major technological classes among three analytic units. Upper register lists counts, middle register lists percentages, and lower register lists standardized residuals. Cells with residual values ≥ +2.0 are shaded.

	Analytic Unit			
Technological Class	Middle Archaic	Late Archaic	Late Prehistoric	Total
small patterned biface		1	26	27
large patterned biface	3	10	16	29
unpatterned biface			6	6
patterned uniface			5	5
unpatterned flake tool	3	13	16	32
core		6	11	17
unpatterned groundstone	1	5		6
Total	7	35	80	122
small patterned biface		2.9%	32.5%	22.1%
large patterned biface	42.9%	28.6%	20.0%	23.8%
unpatterned biface			7.5%	4.9%
patterned uniface			6.3%	4.1%
unpatterned flake tool	42.9%	37.1%	20.0%	26.2%
core		17.1%	13.8%	13.9%
unpatterned groundstone	14.3%	14.3%		4.9%
small patterned biface	-1.2	-2.4	2.0	
large patterned biface	1.0	.6	-.7	
unpatterned biface	-.6	-1.3	1.0	
patterned uniface	-.5	-1.2	1.0	
unpatterned flake tool	.9	1.3	-1.1	
core	-1.0	.5	.0	
unpatterned groundstone	1.1	2.5	-2.0	

Table 5.12. Density of flaking debris in three analytic units.

Analytic Unit	Number of Flakes	Analytic Unit Volume (liters)	Density (flakes/liter)
Middle Archaic	125	380	0.33
Late Archaic	907	189	4.80
Late Prehistoric	947	725	1.31

assemblage. This may be due simply to sample size, but the very low flaking debris density in Middle Archaic deposits bolsters the view that only limited tool production occurred during that period (table 5.12).

Table 5.13 groups the raw materials present in the Late Archaic and Late Prehistoric assemblages into two fracture groups, coarse and fine, and gives the proportions of four technological classes falling into each group. Cores in both analytic units consist only of fine-grained materials (chert, chalcedony, silicified wood, and obsidian). By comparison, just under one-third of the large patterned bifaces and flake tools in both time periods were made from coarse materials (quartzite, rhyolite, and basalt). This consistent preference, spanning both occupations, likely reflects the functions to which a portion of these tools were put. The absence of coarse-material cores may indicate that initial reduction of quartzite, rhyolite, and basalt occurred off-site.

Burned stone tools occur in all analytic units, but Late Archaic and Late Prehistoric contexts have the highest frequencies (table 5.14). A similar pattern characterizes the flaking debris assemblage. Data were not collected systematically on raw material heat treatment. However, a small number of few tools from each analytic unit other than the Mixed Archaic were made from heated stone. The most commonly heated raw material descriptive groups are the white-light brown-translucent chalcedony group and the yellow chert group. The absence of heat-treated flaking debris in the collection suggests that treatment took place elsewhere, possibly at the quarries themselves. This bolsters the conclusions discussed previously that initial reduction of these particular materials occurred off-site and that their source localities are some distance from Upper Crossing.

Projectile Points

The Upper Crossing stone tool collection includes 14 projectile points or projectile point fragments sufficiently complete to provide chronological data (table 5.15). These items are illustrated in figures 5.3 and 5.4. Selected metric data are presented in table 5.16. Descriptions are grouped in this section according to spatial and stratigraphic context.

Middle Archaic

A single diagnostic projectile point is associated with the coarse alluvial fan deposits encountered in EU1 (figure 5.4b). This specimen (CN1033) is a side-notched dart point with a shallow basal notch and an irregular flaking pattern. It is made from gray and translucent silicified wood and is extensively re-worked, resulting in a short blade with a rounded tip. The form of the re-worked

Table 5.13. Comparison of raw material use among selected technological classes in two analytic units.

		Collapsed Raw Material Group		
Analytic Unit	Technological Class	Fine	Coarse	Total
Late Archaic	small patterned biface	100.0%		1
	large patterned biface	70.0%	30.0%	10
	unpatterned flake tool	76.9%	23.1%	13
	core	100.0%		6
	Subtotal	80.0%	20.0%	30
Late Prehistoric	small patterned biface	92.3%	7.7%	26
	large patterned biface	68.8%	31.3%	16
	unpatterned flake tool	68.8%	31.3%	16
	core	100.0%		11
	Subtotal	82.6%	17.4%	69

Table 5.14. Frequency of burned stone tools.

	Burned	
Analytic Unit	Percent	Count
Middle Archaic	14.3%	1
Mixed Archaic	20.0%	1
Late Archaic	36.1%	13
Late Prehistoric	24.4%	20
Surface	18.6%	13

Table 5.15. Counts of diagnostic projectile points or point fragments, organized by analytic unit.

Analytic Unit	Number of Projectile Points
Middle Archaic	1
Mixed Archaic	-
Late Archaic	2
Late Prehistoric	5
Surface	6
Total	14

Table 5.16. Projectile point metric data (measurements from Ahler 1971).

			Measurements (mm)					
Analytic Unit	Catalog Number	Figure Reference	Total Length	Base Width	Hafting Width	Hafting Length	Maximum Thickness	Weight (g)
Middle Archaic	1033	5.4b	22.8	17.9	11.2	12.0	3.6	1.7
Late Archaic	1004	5.3g	43.7	18.5	13.9	7.4	4.8	3.6
Late Archaic	1011	5.4g	41.6	18.3	14.7	8.4	6.7	7.8
Late Prehistoric	3007	5.3a	24.9	8.0	6.1	5.3	3.4	1.0
Late Prehistoric	3020	5.3c	20.0	10.8	6.7	4.9	2.6	0.7
Late Prehistoric	3042	5.3h	23.3		16.1	9.1	5.8	3.1
Late Prehistoric	3044	5.3d	17.0	8.1	5.4	5.5	3.3	0.6
Late Prehistoric	3047	5.4d	25.9	16.4	13.7	6.2	5.2	3.3
Surface	2008	5.4e	41.3		13.3	9.2	5.0	4.4
Surface	2014	5.3i	23.2	21.6	15.9	9.3	5.6	3.6
Surface	2037	5.4a	29.5	10.8	10.3	9.6	6.5	3.4
Surface	2040	5.4c	16.8	13.1	12.1	7.6	4.6	1.8
Surface	3012	5.3b	20.8		5.3	4.8	3.7	1.0
Surface	2062	5.4f	37.8	14.1	20.3	21.2	5.5	6.4

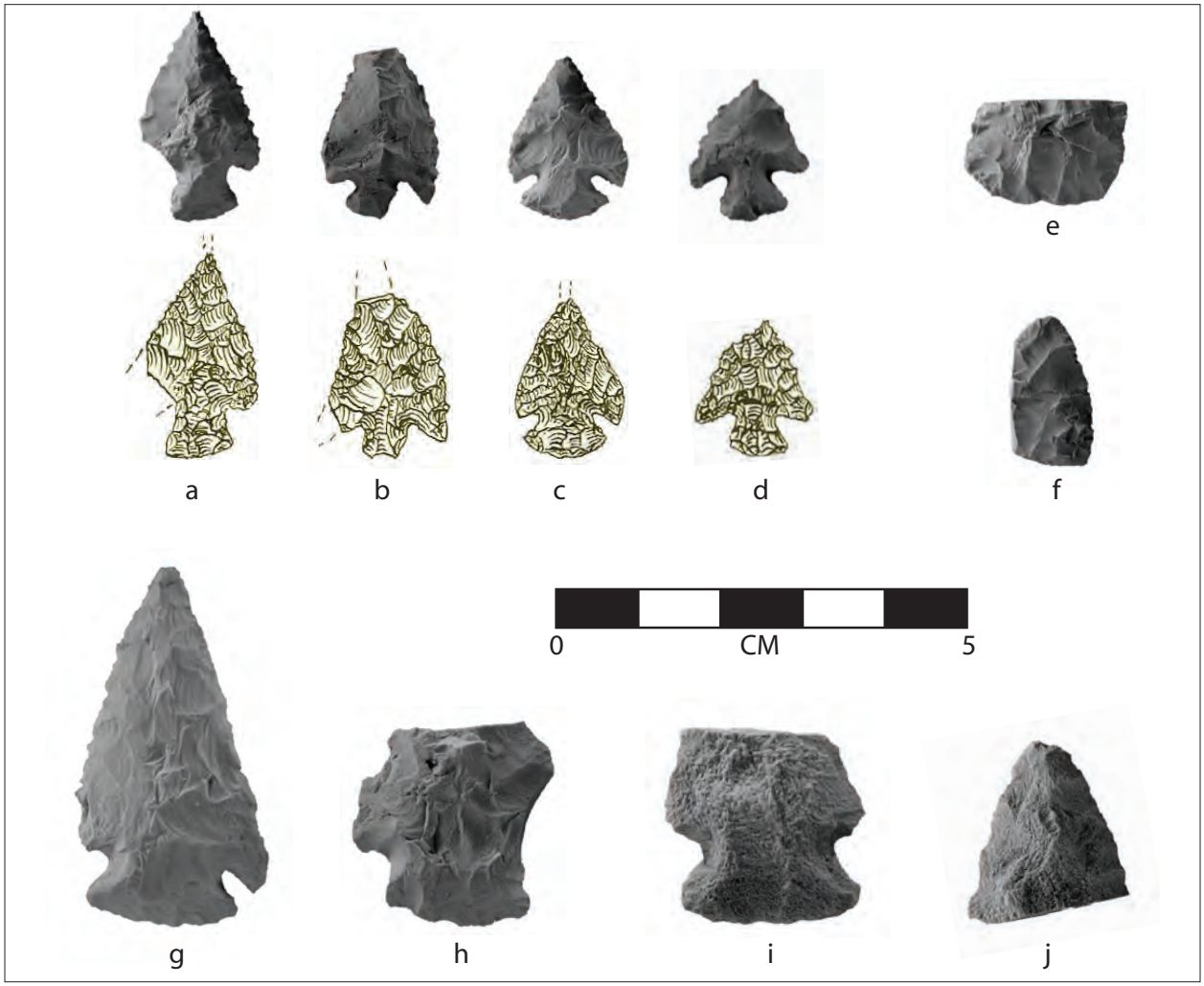


Figure 5.3. Projectile points. a, c-f, h: Late Prehistoric AU; g, j: Late Archaic AU; b, i: Surface AU. Line drawings by Marvin Goad.

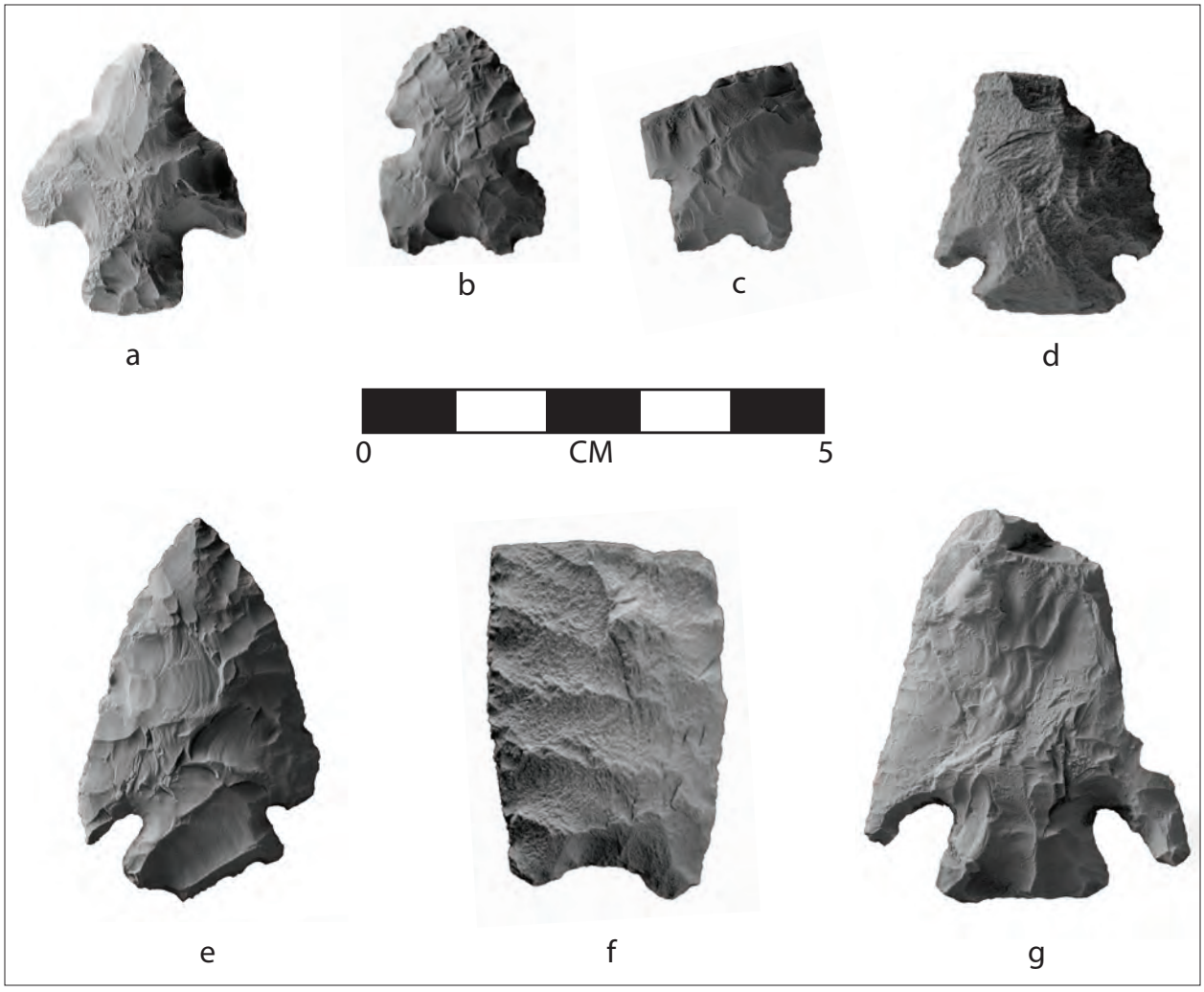


Figure 5.4. Projectile points. a, c, e, f: Surface AU; b: Middle Archaic AU; g: Late Archaic AU; d: Late Prehistoric AU.

blade suggests that this point was recycled into a small, possibly hafted, cutting tool. The cross-section is bi-convex and slightly asymmetrical.

Dart points exhibiting this general morphology commonly are called Mallory points. They occur intermittently in Middle Archaic McKean complex assemblages (Davis and Keyser 1999; Zier 1999), but their specific relationship to that complex is not entirely clear (Black 1991). They occur rarely in excavated contexts in Colorado. Benedict (1975) reports a relatively large assemblage of side notched points with broad basal notches from the Albion Boardinghouse site. Two different dates are associated: 2420±220 ^{14}C yr B.P. and 5730±145 ^{14}C yr B.P. Benedict (1975:5-6) prefers the latter, but either might apply. Buckles (1978) reports a similar point from the Dead of Winter site near Leadville, in a context dated to 4210±80 ^{14}C yr B.P. Black (1983) tentatively dates a Mallory point from 5GN 344 to 4065±380 ^{14}C yr B.P.

Mallory points also occur sporadically on the Plains-foothills ecotone. Gantt (2007) reports a single fragmentary specimen from the Hess site, in a context dating to 4170±110 ^{14}C yr B.P., along with a second undated specimen. However, they are absent from the extensive Middle Archaic deposits at the nearby East Plum Creek site, which yielded dates between 3860±80^{14}C yr B.P. and 3480±40 ^{14}C yr B.P. (Kalasz et al. 2003). Side-notched, indented-base points occur in small numbers in surface collections from the Pinon Canyon Maneuver Site in southeast Colorado (Large, Flange-stemmed Point Class [Category P45 points in Anderson (1989) and P47 points in Anderson (1990)]). Anderson (1990) suggests that they date between 3000 B.C. and 300 B.C.

Late Archaic

Two diagnostic points occur in the dark sandy loam deposit overlying the coarse sand and gravel strata in EU1. Both are corner-notched dart points. One (CN1004; figure 5.3g) is made from high-quality, white-light brown-translucent chalcedony, one of the most common raw materials in the Late Archaic assemblage. The point has an irregular flaking pattern, a convex base, and an asymmetrical cross-section, caused by step terminations on one face. Differences in flake-scar luster, and the presence of rough fractures on one face, indicate that the point is made from heat-treated stone. It has been slightly re-worked, mainly on one side, resulting in an asymmetrical blade. The reworked margin is slightly serrated.

The other specimen (CN1011; figure 5.4g) is very large and is made from yellow chert with wispy red mottling, transparent chalcedony banding, and darker brown inclusions of non-cryptocrystalline cortex-like material. The specimen's size suggests that it was used primarily as a hafted knife; however, the distal snap fracture and the large burination spall down one side of the blade, both caused by impact augmented by flaws in the stone, indicating that this item is in fact a projectile point. The flaking pattern is irregular and the straight base is lightly ground. The cross-section is asymmetrical owing to step terminations caused by irregularities in the stone. This specimen does not appear to have been reworked or recycled.

This analytic unit also includes a large patterned biface fragment that by its size and shape likely is the tip of a dart point (figure 5.3j).

Points of this general type commonly are lumped into a "Late Archaic Corner-Notched" category. However, specimens in this generalized class are morphologically quite variable and occur in a variety of temporal contexts. Blades range from straight to excurvate and bases range from concave to straight to convex. Notch width, depth, and orientation vary, resulting in shoulders that are barbed to strongly barbed. Across the Northern and Northwestern Plains, a comparatively well-defined style of corner-notched dart point known as Pelican Lake replaced the suite of McKean complex point styles beginning around 3000 or 3500 years ago (Frison et al. 1996; Kornfeld et al. 2010). However, the situation in Colorado and in the Central and Southern Plains is more complex because a wider variety of point styles occur in both Middle and Late Archaic contexts and because corner-notched dart points also occur in well-dated Late Prehistoric contexts (Hofman 1989, 1996; Reed and Metcalf 1999; Zier 1999). In northwest Colorado, points of this type (grouped under the term "Elko Corner-Notched") occur in contexts ranging in age from 5500 to 1000 years ago (Mullen 2009). In the Pinon Canyon Maneuver site typology they fall into the Large Expanding Stemmed Point class. Two of the dominant categories in this class (P26 and P27) are thought to date between about 3500 and 1500 years ago, but other corner-notched categories occur in contexts as recent as 900 or 1000 years ago (Anderson 1990). Similar points comprise the single largest class recovered from the surface in the Biedell Creek area, south of the Saguache Creek valley on the west side of the San Luis Valley (Wunderlich and Dominguez 2007).

Late Prehistoric

Five finished projectile points representing two different styles are associated with the Late Prehistoric stone enclosures in Cluster 1. The first style group consists of three small corner-notched arrowpoints (figure 5.3a, c, and d). A similar point was collected from the surface in 1999 close to Test Square 2 (figure 5.3b). Unfinished arrowpoints also occur in this analytic unit, two of which are illustrated in figure 5.3e and f, as do non-diagnostic fragments likely representing tips or blade margins of finished arrowpoints.

All three of the arrowpoints in the excavated assemblage are slightly asymmetrical, with excurvate to slightly incurvate blade margins. Their blades are moderately serrated and bases are convex. Notches range from narrow to relatively broad, with the latter imparting a somewhat stemmed appearance. All of them were produced on flake blanks and exhibit unpatterned flaking that ranges from minimally intrusive to extensive. One point is re-worked on both the blade and the base (CN3044, figure 5.3d). The base of another is re-worked (CN3007; figure 5.3a). Two specimens may be made from heat-treated stone (figure 5.3c and d).

Small corner-notched arrowpoints of this type occur commonly throughout Colorado. Specimens from the Pinon Canyon Maneuver Site fall into the Small Expanding Stemmed Point class, particularly categories P59, P60, and P61 (Anderson 1989, 1990). In the southern Plains similar points are sometimes called "Scallorn." Kalasz and others (1995:107-108) note that they are common throughout the Plains-foothills ecotone. Irwin-Williams and Irwin (1966) group points of this style at the Magic Mountain site into their types MM34 and MM35. Gilmore (1999:272) notes a degree of patterned variation in haft width among similar points from the Bayou Gulch site. In the Great Basin, similar small, corner-notched points are put into the morphologically variable Rosegate series (Holmer 1986; Thomas 1981). Rosegate-style points occur commonly in northwestern Colorado (Mullen 2009).

Arrowpoints of this type were made between

about A.D. 500 and A.D. 1200. Anderson (1990) dates Category P59, P60, and P61 points to that period, though she suggests they may also have been manufactured somewhat more recently (Anderson 1989). Gilmore (1999) proposes a date range between A.D. 450 and A.D. 1450 for Bayou Gulch Corner-notched points and between 220 B.C. and A.D. 1405 for Magic Mountain Corner-notched points. Points assigned to the Rosegate series in western Colorado most often date to between about A.D. 350 and A.D. 1400 (Mullen 2009).

The second style recovered from the Late Prehistoric stone enclosures at Upper Crossing consists of two hafted bifaces similar in size and morphology to the corner-notched dart points associated with the Late Archaic analytic unit. One is burned and most of the blade, the lateral portion of one side, and most of the other side are missing (CN3042; figure 5.3h). The other, made from red-brown quartzite that probably comes from the Trickle Mountain source, consists of a complete base and most of the blade (CN3047; figure 5.4d). Two other large patterned biface fragments in the Late Prehistoric assemblage (not illustrated) may also represent corner-notched dart points.

Both of these styles were recovered from the same occupation strata. Three logical possibilities could explain their co-occurrence. One is that the large corner-notched specimens actually are hafted knives rather than projectile points. Butler (1985) describes and illustrates a similar-sized, though unnotched, biface set in a bone handle from the Upper Plum Canyon Rockshelter I in southeast Colorado. The two Upper Crossing specimens have not been examined for microscopic use-wear traces that could reveal their function. Little of the blade is preserved on the burned specimen and the more-complete specimen is made from Trickle Mountain quartzite, a material unlikely to preserve use-wear traces. However, this latter specimen does exhibit an impact fracture, indicating that it was used as a projectile.

A second explanation is that atlatl technology and bow-and-arrow technology coexisted during the first millennium (Frison and Walker, eds. 2007). This seems a more likely possibility, given the frequency of large corner-notched bifaces and the impact fracture evidence (figure 5.4d). A third possible explanation is that the large corner-notched forms are found objects, picked up and recycled by later groups. However, this is really just a special case of the first two; unless they were retained simply as curiosities, they must have been used for some purpose, likely either as cutting tools or as projectiles. Because they are relatively common in first-millennium contexts they are unlikely to have been mere curiosities.

The conclusion that atlatl and bow-and-arrow technologies were used concurrently for some period of time between A.D. 500 and A.D. 1200 has implications for regional survey data. Because large corner-notched forms are associated with multiple cultural contexts—as well as multiple subsistence-settlement systems—their frequency cannot be used to infer demographic or land use changes.

Surface

Six diagnostic projectile points occur in the surface assemblage. The oldest of these is a lanceolate point made from gray Trickle Mountain quartzite that exhibits parallel-oblique flaking (figure 5.4f). The concave base is lightly ground, but the lateral margins are not. It has a bi-convex to plano-convex cross-section. A linear flaw in the stone runs the length of one side.

Jodry (1999a:102) assigns this specimen to the "Foothill-Mountain complex," which first appeared about 10,000 ^{14}C yr B.P. and persisted for about two millennia (Frison 1992; Kornfeld et al. 2010). Benedict (1996) suggests that parallel-oblique-flaked, indented-base lanceolate points continued to be used in the Colorado mountains until about 6000 B.P. Foothill-Mountain flintknappers apparently preferred quartzite or other tough stones (Bradley 2010; Reed and Metcalf 1999).

The Foothill-Mountain complex includes several distinctive projectile point styles, including both stemmed and lanceolate forms, that are contemporaneous with a number of Middle to Late Paleoindian complexes on the Plains. The main distinction between Foothill-Mountain points like the one from Upper Crossing and similar forms found on the Plains is geographical rather than morphological. For that reason, the Upper Crossing specimen is probably best characterized as a James Allen point.

Three other specimens in the surface collection are likely Archaic in age. One is a stemmed-indented base point made from local yellow chert with brown banded inclusions (figure 5.4c). The flaking pattern is irregular and the base and blade may have been reworked, resulting in an asymmetrical outline. However, the point's cross-section is bi-convex and symmetrical, suggesting that the outline asymmetry was intended.

Stemmed indented-base points are common in the mountains and on the Plains-foothills ecotone (Benedict 1990; Black 1991; Gantt 2007; Gilmore 2011; Kalasz et al. 2003; Metcalf and Black 1991; Reed and Metcalf 1999). Points of this type can co-occur with McKean points, but also are recovered from Early Plains Archaic and Late Plains Archaic (Yonkee) contexts (Kornfeld et al. 2010). They also occur in Middle Archaic Great Basin and Colorado Plateau assemblages where they are included in the Little Lake series (Pinto and Humboldt Concave Base points). Pinto points appeared in the Great

Basin earlier than McKean complex points appeared in the Northern Plains. Kalasz and others (2003) argue that the stemmed-indented base points at the East Plum Creek site on Colorado's Plains-foothills ecotone represents an eastward expansion of Great Basin groups rather than a southward expansion of McKean groups.

A second possible Archaic-stage specimen is a low side-notched dart point made from pink Trickle Mountain quartzite (figure 5.3i). This point is similar in form to Elko Side-notched points and to some Early Plains Archaic forms. In northwest Colorado, most Elko Side-notched points date between 5500 and 1000 B.P. (Mullen 2009). A similar point occurs in the fill of a Middle Archaic basin house at the Hess site on the Plains-foothills ecotone (Gantt 2007:337).

A third specimen that probably is Archaic in age is a straight-stemmed dart point made from brown to dark red chert (figure 5.4a). The blade has been heavily reworked, reducing both its length and width and transforming it into a large-bore drill or reaming tool. Such straight-stemmed points occur sporadically in the mountains and the Plains, but little is known about their age. The notable straightness of the Upper Crossing point's stem could partly be a result of recycling.

Two other projectile points in the surface collection are similar to specimens recovered from subsurface contexts. One is a large corner-notched dart point made from high-quality, heat-treated red chert (figure 5.4e). The irregular form of this specimen's base is not due to post-discard fracture, but instead may indicate that the point was lost before manufacture was complete. Points of this type occur both in the Late Archaic and Late Prehistoric contexts at Upper Crossing. The final point in the surface collection is a serrated, stemmed to corner-notched arrowpoint similar to specimens recovered from Late Prehistoric contexts in Cluster 1 (figure 5.3b).

Faunal Remains

Carl R. Falk

The Upper Crossing unmodified faunal assemblage consists of 1,101 specimens, weighing 187.5 g (table 5.17). Nearly four-fifths of the bone pieces fall in the size grade 4 fraction, which consists of items smaller than about 1/4 inch in size. Forty-three specimens were recovered individually by piece-plotting. The remaining pieces are from bulk sediment samples and general level lots.

Just less than 45 percent of the Late Prehistoric archaeofauna is burned. Two-thirds of the specimens in the Late Archaic assemblage exhibit some evidence for burning, while nearly 90 percent of the Middle Archaic bone assemblage is burned. Half of the total assemblage comes from Middle Archaic deposits. However, three-quarters of these were recovered from Feature 3, a large basin hearth that also produced a Mallory projectile point.

Table 5.17. Counts of recovered faunal specimens, organized by analytic unit and size grade.

	Size Grade				
Analytic Unit	2	3	4	Total	Percent Burned
Late Prehistoric	3	73	194	270	44.8%
Late Archaic	1	89	172	262	65.3%
Mixed Archaic	1	2	5	8	87.5%
Middle Archaic	1	69	491	561	89.7%
Total	6	233	862	1101	72.8%

Bone Distribution

Table 5.18 gives the distribution of 242 bone pieces among the test units opened up in Cluster 1 in 1999. No specimens were recovered from Test Square 3, a 50 cm x 1 m test in the Feature 6 stone enclosure, and just 10 specimens were recovered from Test Square 2, which is located in an open activity area between Feature 9 and Feature 16.

Seventy percent of the 232 bone pieces recovered from Test Square 1, a 1 x 1 m unit in Feature 2, fall into size grade 4. The majority were recovered from GL3, 20 to 30 cm below the modern ground surface. The base of a large stone thought to be resting on the structure's prepared floor is located at about 25 cm below the surface. Thus, the bulk of the faunal remains come from the floor zone.

Table 5.19 gives the number of bone pieces in each general level in Excavation Unit 1, opened in 2009. Most occur in GL3 and GL4, within the Late Archaic Stratum 2, and in the Middle Archaic Feature 3 in GL9.

Table 5.18. Frequency of recovered bone in 1999 excavation units. Intrusive specimens assigned to CN3145 are excluded, as is one specimen (CN3075) lacking a general level assignment.

Test Square	General Level	Percent Burned	Total
1	1	60.0%	5
	2	66.7%	36
	3	45.5%	191
Subtotal		49.1%	232
2	1	66.7%	6
	2	0.0%	3
	3	100.0%	1
Subtotal		50.0%	10

Table 5.19. Frequency of recovered bone specimens in Excavation Unit 1 (2009).

Analytic Unit	General Level	Percent Burned	Total
Unassigned	1	--	0
Late Archaic	2	2%	51
	3	96%	98
	4	67%	113
Mixed Archaic	5	88%	8
Middle Archaic	6	100%	2
	7	60%	5
	8	100%	7
	9	90%	547
Total		82%	831

Identifiable Remains

Fifty specimens are identifiable beyond the Class level. This number includes one piece of dental enamel and four long bone shaft fragments likely representing small artiodactyls. It also includes 12 identifiable bones from Test Square 1/Feature 2 representing a single cottontail (*Sylvilagus* sp.) that almost certainly post-dates the Late Prehistoric occupation of Cluster 1. Table 5.20 summarizes counts for identified specimens, organized by collapsed taxonomic groupings and analytic unit. The 12 recent cottontail bones are excluded. Data on the proportion of burned specimens are also given.

Large artiodactyls are represented by a single specimen, a fragment of a proximal (first) row phalange, recovered from Middle Archaic deposits. Large artiodactyls include elk (*Cervus elaphus*) and bison (*Bison bison*). Several unidentified size grade 2 long bone fragments from the Late Prehistoric analytic unit also are likely from large artiodactyls based on the thickness of the cortical bone (>6mm [CN3037 and CN3070]).

Smaller artiodactyls are well represented in the sample, primarily by fragments of metapodials and toe bones, but also by hyoid, vertebra and long bone pieces. Several small artiodactyl species are found today in the middle Saguache Creek valley, including mule or black-tailed deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*) and bighorn sheep (*Ovis canadensis*). However, the recovered specimens are too incomplete to permit confident genus or species identification.

Thirteen specimens are tentatively referred to the squirrel family (Sciuridae). At least nine sciurids are recorded for Saguache County, ranging in size from the least chipmunk (*Tamias minimus*) to Gunnison's prairie dog (*Cynomys gunnisoni*) and the yellow-bellied marmot (*Marmota flaviventris*). Morphologically and metrically, the Upper Crossing specimens compare well with black-tailed prairie dog (*Cynomys ludovicianus*) but the possibility that some of the specimens represent other members of this family that overlap Gunnison's prairie dog in body size cannot be excluded. Specific examples include Abert's squirrel (*Sciurus aberti*) and rock squirrel (*Spermophilus variegatus*), though the status of the latter in Saguache County is uncertain. Nearly all the sciurid materials are burned and this may have somewhat reduced them in size or slightly distorted their forms. For this reason, these specimens are referred only to the family.

Five specimens are very tentatively identified as Muridae, which includes mice, rats, and voles. The unburned elements appear to be from the same individual and likely represent a small mouse. This family identification is uncertain, however, since the bones could represent either of the two species of pocket mouse (*Perognathus* sp.) reported for Saguache County; pocket mice are members of the family Heteromyidae.

Modified Bone

The collection includes four pieces of modified bone, all of which were recovered from EU1 (table 5.21).

Table 5.20. Identified faunal specimens (NISP), organized by generalized taxonomic group, analytic unit, and burning.

		Taxonomic Group				
Analytic Unit	Burning	Micromammal	Small Mammal	Small Artiodactyl	Large Artiodactyl	Total
Late Prehistoric	unburned			33.3% (1)		1
	burned		100.0% (6)	66.7% (2)		8
Late Archaic	unburned			73.3% (11)		11
	burned		100.0% (2)	26.7% (4)		6
Middle Archaic	unburned	100.0% (5)	20.0% (1)		100.0% (1)	7
	burned		80.0% (4)	100.0% (1)		5
Total	unburned	5	1	12	1	19
	burned		12	7		19

Table 5.21. Modified bone from Excavation Unit 1 (2009).

General Level	Analytic Unit	Size Grade	Taxon	Skeletal Element	Tool Type	Burning
3	Late Archaic	3	Artiodactyla?	unknown	Patterned (awl)	yes
3	Late Archaic	3	Artiodactyla?	unknown	Expedient	yes
3	Late Archaic	4	?	unknown	Patterned?	yes (calcined)
9 (Fea. 3)	Middle Archaic	3	Artiodactyla?	dorsal spine/rib edge?	Patterned?	yes

These specimens are not included in the unidentified or identified collections, though three of the four may represent artiodactlys. Three are burned and one is calcined. One of the four is a size grade 3 distal fragment of an awl recovered from Stratum 2, the fill of the Late Archaic basin house (CN 1005). The tip is blunt and exhibits prominent transverse striations, indicative of rotary use. The calcined specimen was also recovered from the basin house. It is small (roughly 6 mm long and 4 mm wide) and may be a segment from a small patterned piece. The remaining two specimens show longitudinal striations and polish. One of these is a segment of an expedient, unpatterned tool from the basin house. The other was recovered from the Middle Archaic Feature 3 hearth and is possibly a segment of a patterned tool.

Discussion

This small faunal assemblage yields noteworthy insights into the uses people made of the Upper Crossing area over time. The most prominent pattern is the consistent exploitation of both small mammals and small artiodactyls from the Middle Archaic through the Late Prehistoric. The oldest documented feature, the Middle Archaic Feature 3 basin hearth, contained three burned sciurid bones. Four burned specimens occur in the floor fill of the Late Prehistoric Feature 2 stone enclosure and two more occur in room fill. Two burned sciurid bones were recovered from Stratum 2 in EU1, the fill of the Late Archaic basin house. Burned small artiodactyl bones also occur in each of these contexts.

The remains of elk or bison only occur in Middle Archaic deposits. However, the comparative scarcity of their bones may be somewhat misleading, because it is more likely that these animals were butchered away from the base camp at Upper Crossing. Nevertheless, it is likely that large herd animal hunting never was an important aspect of the local adaptation. Rather, the faunal remains point to smaller-scale hunting for local consumption.

Bone density differences among Late Prehistoric contexts in Cluster 1 corroborate other data pointing to functional differences among stone enclosure features. No bones and few artifacts were recovered from Test Square 3 in Feature 6, suggesting that it was used only briefly or for a limited range of activities. The high bone and artifact density observed in Test Square 1 in Feature 2 suggests that that structure was more substantial and was used for an wide range of activities over an extended period. The presence of numerous bone fragments in the Feature 2 floor fill may indicate indoor carcass processing, possibly pointing to a cool-season occupation.

The patterned bone tool fragments recovered from Stratum 2 in EU1 bolster the interpretation that the Late Archaic occupation was a residential base camp. A wide range of activities is represented by a variety of chipped stone tool types, unfinished stone tools, ground stone tools, and bone tools. The high density of both bone fragments and artifacts in Stratum 2 points to intensive, prolonged occupation.

The five identifiable micromammal bones in the assemblage were recovered from the fill of the Middle Archaic Feature 3 hearth; however, they are not burned and so probably do not represent a comestible resource. However, the near absence of recent rodent burrowing in the strata overlying Feature 3 suggests that the bones are roughly contemporaneous with the occupation.

Pottery

The ceramic assemblage currently comprises 71 sherds representing a minimum of eight vessels. (Notes accompanying the 1977 surface collection indicate that at least nine sherds were removed for analysis; these specimens apparently are now lost.) The collection includes two rim sherds, one handle fragment, and 68 body sherds. All specimens were recovered from the surface. Figures 5.5 and 5.6 illustrate sherds from each of the eight vessels and table 5.22 provides data on vessel wall thickness, exterior color and surface treatment, and decorative technique.

Gray Ware Vessels

Vessel 1

Two small body sherds recovered from the surface between stone enclosures Feature 4 and Feature 5 make up Vessel 1 (CN2001 [figure 5.5a] and CN2002 [figure 5.5b]). Exterior surface treatment ranges from plain to smooth but not burnished. Judging by its curvature and interior surface treatment, CN2002 likely is an upper

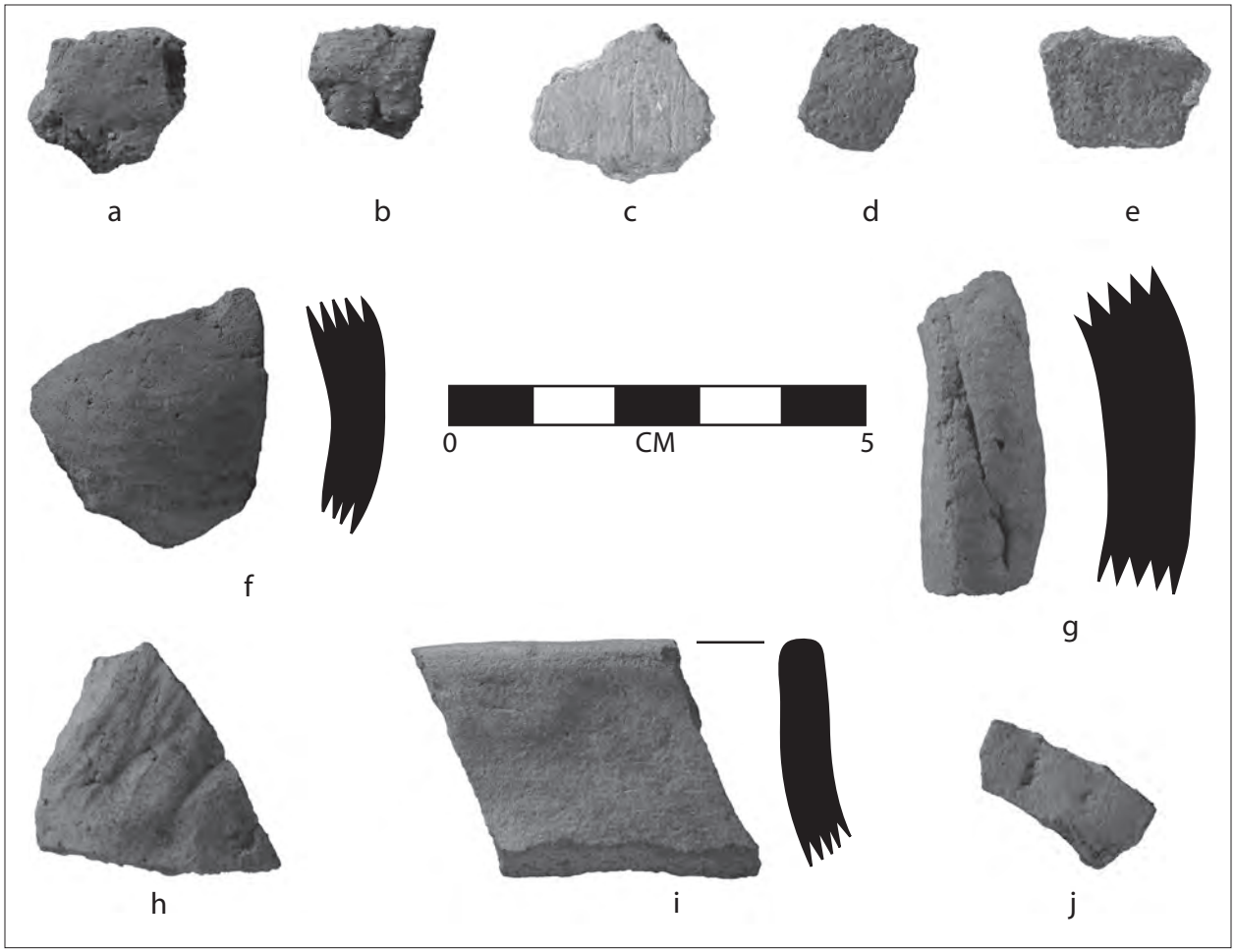


Figure 5.5. Pottery. a, b: Vessel 1; c: Vessel 8; d, e: Vessel 2; f: Vessel 3; g, h, j: Vessel 5; i: Vessel 4; sherd exteriors to right.

Table 5.22. Metric and other data on illustrated sherds.

Vessel Number	Catalog Number	Figure Number	Thickness (mm)	Exterior Color	Exterior Surface Treatment	Decorative Technique
1	2001	5.5a	4.41-5.35	7.5YR 4/1	smoothed	none
	2002	5.5b	4.62-4.94	7.5YR 4/1	plain	indented (?)
2	2004	5.5e	3.57-4.63	7.5YR 4/3	rough	none
	2005	5.5d	3.65-4.47	7.5YR 5/3	plain	none
3	2003	5.5f	5.42-7.58	10YR 6/2	burnished	none
4	2010	5.5i	5.27-6.84	7.5YR 5/3	plain	none
5	2011	5.5g	9.72-10.75	5YR5/3	smoothed	none (handle)
	2011	5.5h	4.61-5.27	7.5YR 5/2	smoothed	trailed
	2011	5.5j	4.52-5.17	7.5YR 5/2	smoothed	trailed
6	2007	5.6d	3.12-4.43	10YR 6/1	brushed (?)	none
	2035	5.6b	3.26-4.83	7.5YR 6/4 and 5/1	smoothed	none
	2035	5.6e	approx. 5.6 (lip)	7.5YR 5/1 (interior)	broken away	broken away
	2035	5.6c	2.43-3.92	5YR 6/4	brushed	none
7	2036	5.6a	3.64-3.97	10YR 6/3	smoothed	none
	2036	5.6f	3.91-4.71	10YR 6/2	brushed (?)	none
8	2036	5.5c	4.50-4.96	7.5YR 5/2	brushed	none

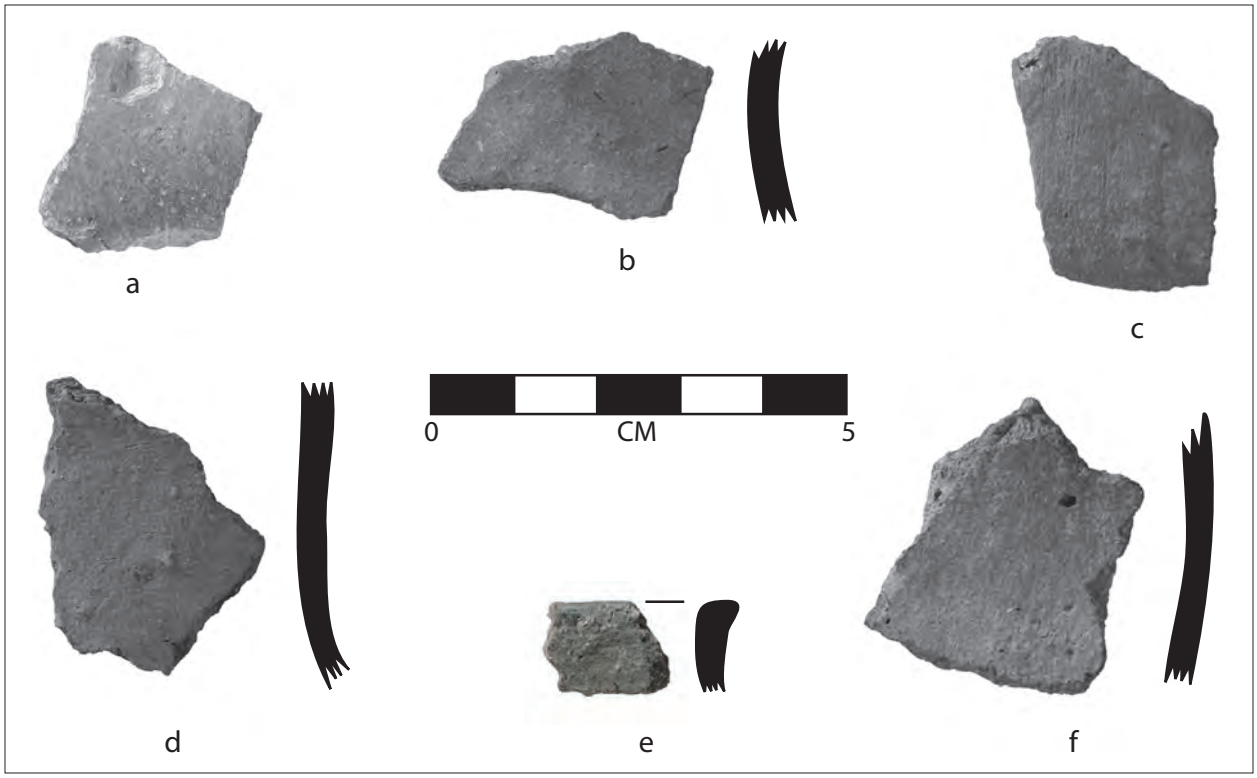


Figure 5.6. Pottery. a, f: Vessel 7; b-e: Vessel 6; sherd exteriors to right.

body sherd. Several indentations possibly representing fingertip impressions are present on the exterior, but the sherd is too small to determine their origin, orientation, or pattern. The interior surface of CN2001 exhibits use-wear and so likely is a lower body sherd.

Vessel Form: Jar (?)
Construction Method: Coil and scrape
Temper: Poorly sorted granite sand (quartz, feldspar, and unidentified dark mineral grains); maximum grain size is about 2 mm, or one-half the thickness of the vessel wall
Paste: Black to very dark gray and compact

Insufficient data are available to estimate the age or cultural affiliation of Vessel 1. However, it is technological similar to Vessel 2.

Vessel 2

Vessel 2 is represented by two small body sherds found together at the foot of the slope northwest of Cluster 1 (CN2004 [figure 5.5e] and CN2005 [figure 5.5d). Exterior surface treatment is rough (CN2004) to plain (CN2005). CN2004 is likely a lower rim sherd, from just above the zone 1-zone 2 inflection point, based on exterior curvature and wall thickness variation. CN2005 is a zone 1 sherd, but it is too small to determine its position on the vessel. Neither sherd exhibits exterior decoration.

Vessel Form: Jar (?)
Construction Method: Coil and scrape (?)
Temper: Abundant, fine, well-sorted granite sand (quartz, feldspar, and unidentified dark mineral grains); maximum grain size is about 1.0 mm
Paste: Reddish brown (5YR 5/4) and compact

Insufficient data are available to estimate the age or determine the cultural affiliation of Vessel 2. However, it is technological similar to Vessel 1.

Vessel 4

Vessel 4 is represented by a single rim sherd from the surface of the small alluvial fan, adjacent to Excavation Unit 1 (CN2010; figure 5.5i). The exterior is smoothed and the interior is burnished. The rim is slightly everted, with a squared to slightly outslanted lip. The rim is undecorated.

Vessel Form: Jar
Construction Method: Coil and scrape; the sherd's lower edge is a coil break

Temper: Fine, sparse, well-sorted crushed rock represented by quartz grains and unidentified dark and light mineral grains; maximum grain size is about 0.5 mm
Paste: Buff to light gray, well prepared, very compact

Vessel 4 is a Taos Gray jar. Taos Gray, including plain, incised, punctate, neck-banded, and corrugated varieties, was the utility ware produced by Ancestral Pueblo potters in the Taos area during the Valdez, Pot Creek, and Talpa phases, from A.D. 1100 to A.D. 1400 (Green 1976; Levine 1994; Wetherington 1968). Taos Gray Plain may persist until the mid-eighteenth century (Levine 1994:361).

Vessel 5

Three specimens, all recovered from the alluvial fan surface adjacent to Excavation Unit 1, make up Vessel 5. All three are illustrated in figure 5.5. Two are body sherds and one is a handle fragment. All three have smoothed surfaces. The larger of the two body sherds (figure 5.5h) exhibits a series of subparallel trailed lines. Judging by its curvature, this is probably an upper body sherd. The smaller body sherd does not refit with the larger, but its surface characteristics are similar. The handle was formed from two large coils.

Vessel Form: Jar
Construction Method: Coil and scrape; coil joins are visible in the wall of the larger sherd
Temper: Moderately abundant crushed rock represented by quartz grains and multiple unidentified mineral grains; maximum grain size is about 1.5 mm
Paste: Reddish brown to black and compact

Vessel 5 is a Taos Gray jar, which like Vessel 4, was produced in the Taos area between A.D. 1100 and 1400, or possibly later. The subparallel trailed lines on two body sherds suggest are wider and shallower that is typical of incised lines on Taos Incised variety pots; however, broader, shallower trailed lines occur on some Taos Gray vessels (e.g. Wetherington 1968:Figure 39). Handles of various kinds are common on Taos Gray vessels (Wetherington 1968:59).

Vessel 8

Vessel 8 is represented by eight sherds collected from the surface of Feature 1977-1, a small rockshelter on the east side of Cluster 1. One of the eight sherds is illustrated in figure 5.5c. Several parts of the vessel are represented, including the base and the upper body. Exterior surface texture is rough to plain; one probable base sherd has a rough, poorly finished exterior surface. Two upper body sherds, including the specimen illustrated in figure 5.5c, exhibit light vertical brushing. The vessel is otherwise undecorated.

Vessel Form: Unknown
Construction Method: Unknown; several sherds exhibit laminar structure, but interior surface and temper orientation suggest coiling
Temper: Coarse, poorly sorted, crushed granite (quartz, feldspar, and unidentified light and dark mineral grains); maximum grain size is about 2.5 mm, or about one-half the vessel wall thickness
Paste: Gray and moderately compact; some voids from combusted organic matter present

There are insufficient data to determine the age or cultural affiliation of Vessel 8. It is technologically distinct from any of the other gray ware vessels.

Micaceous Ware Vessels

Vessel 6

Vessel 6 is comprised of 51 sherds. Thirty-four were picked up by the Forest Service crew in 1977 in and around Feature 34. (This enclosure originally was recorded as Feature 2). The other 17 sherds were collected in 2009, from the surface inside the structure and from the slope below it. One of the 51 specimens is a rim sherd, but little can be said about it because it is small and the exterior surface below the lip has exfoliated (figure 5.6e). The lip is flat, square, undecorated, and approximately 5.6 mm thick. Pieces of the base, lower body, upper body, and lower rim also are represented.

Vessel Form: Jar
Construction Method: Mass modeled and paddled
Temper: Finely divided mica and moderately abundant, very coarse crushed quartz; quartz grains are as large as 3.5 to 4.0 mm long and often are longer than the vessel's wall thickness
Paste: Very friable and laminated; dark gray to black

Vessel 6 is similar to Sangre de Cristo Micaceous recovered from seventeenth- and eighteenth-century sites in the Taos area (Baugh and Eddy 1987; Woosley and Olinger 1990). Sangre de Cristo Micaceous is commonly attributed to Jicarilla potters, though contemporary Tiwa potters living at Taos Pueblo also made micaceous vessels and the Jicarilla likely learned to make micaceous pottery from Pueblo potters. However, the attributes of Vessel 6 are most similar to Cimarron Micaceous, a Jicarilla ware produced into the nineteenth century. The

lip, though fragmentary, clearly is not cut and sanded but instead is keeled or finger-grooved, suggesting that Vessel 6 is a short-necked olla or cooking vessel rather than a bowl.

Vessel 7

Three sherds recovered from Feature 1977-1, a small rockshelter on the east side of Cluster 1, make up Vessel 7 (figure 5.6a,f). Two are body sherds and one is a lower neck sherd. None are decorated.

Vessel Form: Jar
Construction Method: Mass modeled and paddled
Temper: Finely divided mica and moderately abundant, sparse crushed rock; mica is more abundant in Vessel 7 than Vessel 6
Paste: Very friable and laminated; dark gray to black

Vessel 7, like Vessel 6, is a Cimarron Micaceous pot, likely produced by a Jicarilla artisan in the 1700s or 1800s.

Other Vessels

Vessel 3

Vessel 3 is represented by a single base sherd recovered in 2009 from the foot of the colluvial slope south of Cluster 1 (figure 5.5f). Both the exterior and interior surfaces are burnished, suggesting that it represents a bowl. Though clearly an earthenware, the temper is fine and the paste is uniform. A sharp gray firing core is present.

Vessel Form: Bowl (?)
Construction Method: Unknown
Temper: Well-sorted quartz sand and abundant fine dark mineral fragments
Paste: Dense, compact; firing core

The technical properties of the single Vessel 3 sherd are unlike those of known native-made vessels from the San Luis Valley and adjoining regions. Vessel 3 could represent a Hispano vessel dating to the nineteenth century. If so, it may be associated with the use of the Old Spanish Trail, which passed close to the confluence of Sheep and Saguache creeks.

Because the Upper Crossing site pottery assemblage is small and fragmented, positive temporal or cultural determinations are difficult. However, at least four technological traditions appear to be represented: unidentified gray wares, Ancestral Pueblo gray wares, Jicarilla micaceous wares, and Hispano earthenwares. With the possible exception of the unidentified gray wares, which the builder's of the site's stone enclosures could have used, none of these are directly associated with documented archaeological features and deposits. The Taos Gray and Cimarron Micaceous vessels suggest intermittent use of the site by southern groups from the A.D. 1100s into the 1900s.

6

Summary and Recommendations

The Upper Crossing site preserves a robust record of American Indian use of the middle Saguache Creek valley spanning more than four millennia. The oldest cultural deposits identified, located on the western edge of the site, contain a series of superimposed basin hearths, which along with associated animal bones, flaking debris, and stone tools, represent multiple sequential short-term hunting camps dating to the Middle Archaic, between 5000 and 3000 years ago.

These Middle Archaic deposits are capped locally by a thick charcoal-rich stratum that contains numerous stone tools and faunal remains. The presence of large, corner-notched dart points in this layer indicates that it dates to the Late Archaic, between about 3000 and 1500 years ago. Judging by the density and diversity of associated artifacts and other remains, this stratum may represent a basin house that was occupied for an extended period by a family group. Spatially extensive buried cultural deposits, possibly representing additional Archaic-stage occupations, also occur on the east side of the site.

Intensive use of the site continued in the first millennium. This Late Prehistoric occupation is represented by at least 29 stone enclosures grouped into two separate clusters. Diagnostic artifacts recovered from subsurface contexts within the larger of the two clusters suggest that these features date to between A.D. 500 and A.D. 1200. Circumstantial evidence suggests that these structures were cool-season residences. Like the preceding Late Archaic occupation, the size and diversity of the tool kit associated with the Late Prehistoric occupation indicates that it was a residential base used for an extended period by one or more households.

American Indian groups continued using the Upper Crossing site after A.D. 1200, but less frequently and less intensively. The presence of Taos Plain and Taos Incised pottery vessel fragments recovered from surface contexts

Figure 6.1. Overview of the Upper Crossing site.

indicates brief occupations by ancestral Puebloan groups between A.D. 1100 and A.D. 1400. Micaceous pottery from the surface may represent intermittent use by Jicarilla or Pueblo people in the eighteenth or nineteenth centuries. A total of 15 culturally modified Ponderosa pine trees, along with three possible eagle-trapping pits, attest to brief, focused visits mde by Utes or other native peoples in the nineteenth century.

The most recent occupation is represented by the existing Forest Service guard station, which was built about 1920 (Hartley and Schneck 1994). The site was first used as a Federal administrative facility in 1908, when it was the supervisor's office of the Cochetopa Forest Reserve. The original structures were removed before 1938 and the site became part of the Rio Grande National Forest in 1944. The land was transferred to the newly formed Bureau of Land Management in 1946.

The Upper Crossing site is eligible for inclusion on the National Register of Historic Places under Criterion D. Thick, remarkably well-preserved cultural deposits dating to the Middle and Late Archaic are present on the west side of the site. Stratified Archaic-age deposits are rare in the Rio Grande basin and data from such contexts are acutely lacking (Hoefer 1999b). The deposits at Upper Crossing may also contain portions of a Late Archaic basin house, only a few examples of which are known from the Southern Rocky Mountains. Upper Crossing also contains the best-preserved examples of Late Prehistoric stone architecture in the Saguache Creek valley. Few other sites anywhere in the Rio Grande basin have as much potential to provide information on first millennium cultural groups or their connections to people living in adjacent regions. Finally, Upper Crossing's peeled Ponderosa pines—a fragile and fast-disappearing resource—constitute an important record of recent American Indian use of the Colorado High County. Together, data from these occupations can be used to study the changing uses native people made of a single locality over a span of more than four millennia.

Due to the extent and diversity of its well-preserved features and deposits, the Upper Crossing site may constitute a keystone resource that can anchor one or more national register districts or cultural landscapes. Upper Crossing is just one element of a broader distribution of similar sites located throughout the middle Saguache Creek valley. The many culturally modified trees in the middle Saguache Creek valley, including those at Upper Crossing, may form an ethnographic landscape. Stone enclosures at Upper Crossing could be incorporated into a prehistoric architecture district, along with other similar structures located at other nearby sites.

Recommendations for Further Work

Because Upper Crossing is among the best-preserved archaeological sites in the middle Saguache Creek valley, the Bureau of Land Management should institute a program of frequent monitoring. This could include establishing fixed photo points to regularly record changes in vegetation and the extent of surface erosion. The BLM should also develop a long-term preservation and interpretation plan for the site. Effective interpretation will require additional archaeological documentation. A research design for this work should emphasize at least five major themes:

1. Site Chronology
   When was the Upper Crossing site first occupied? When were the site's stone enclosure occupied and for how long? How many are contemporaneous? Are the structures in Cluster 2 archaeologically contemporaneous with the structures in Cluster 1? How old, and how extensive, are the cultural deposits located on the east side of the site?
2. Late Archaic Site Use
   Does the artifact-rich stratum exposed in 2009 represent a basin house? If so, when was it occupied and for how long? What activities occurred there?
3. Stone Enclosure Age and Function
   What combination of factors encouraged people to establish a residential base at Upper Crossing in the first millennium? What resources are available nearby and which were regularly exploited? What activities took place in and around the stone enclosures? How were the stone enclosures built and how do their properties compare to those at other nearby sites and in adjacent regions? Do variations exist in the functions of different enclosure features?
4. Use of Culturally Modified Trees
   How many modified trees are present in the area surrounding Upper Crossing? When were the trees peeled? Who peeled them? How was inner bark or wood removed from the trees used?
5. Subsistence Practices
   Do differences exist in the types of animal and plant foods harvested in the Middle Archaic, the Late Archaic, and the Late Prehistoric? What was the role of riverine resources during these periods?

References Cited

Ahler, Stanley A.
1971 *Projectile Point Form and Function at Rodgers Shelter, Missouri*. Research Series 8. Missouri Archaeological Society, Columbia.

Ahler, Stanley A., Matthew J. Root, and Eric Feiler
1994 Methods for Stone Tool Analysis. In *A Working Manual for Field and Laboratory Techniques and Methods for the 1992-1996 Lake Ilo Archaeological Project*, edited by Stanley A. Ahler, pp. 27-121. Quaternary Studies Program, Northern Arizona University, Flagstaff, Arizona. Submitted to the U. S. Department of the Interior, Fish and Wildlife Service, Denver, Colorado.

Anderson, Jane
1989 Projectile Points. In *Temporal Assessment of Diagnostic Materials from the Pinon Canyon Maneuver Site*, edited by Christopher Lintz and Jane L. Anderson, pp. 111-315. Memoirs No. 4. Colorado Archaeological Society, Denver.
1990 Hafted Biface Analysis. In *An Introduction to the Archaeology of Pinon Canyon, Southeastern Colorado, Volume II: Prehistory*, edited by William Andrefsky, Jr., pp. IX-8—IX-144. Larson-Tibesar Associated, Inc., Laramie, Wyoming, and Centennial Archaeology, Inc., Fort Collins, Colorado. Submitted to the National Park Service, Rocky Mountain Region, Denver, Colorado.

Andrews, Bradford A., Heather Mrzlack, Marilyn Martorano, Ted Hoefer III, and Wade Broadhead
2004 Modeling Late Archaic/Late Prehistoric Settlement and Subsistence in the San Luis Valley Colorado. *Southwestern Lore* 70(1):1-15.

Baugh, Timothy G., and Frank W. Eddy
1987 Rethinking Apachean Ceramics: The 1985 Southern Athapaskan Ceramics Conference. *American Antiquity* 52(4):793-799.

Bailey, Robert G., P. E. Avers, T. King, W. Henry McNab (editors)
1994 *Ecoregions and Subregions of the United States*. Map. USDA Forest Service, Washington, D. C.

Benedict, James B.
1975 The Albion Boardinghouse Site: Archaic Occupation of a High Mountain Valley. *Southwestern Lore* 41(3):1-12.
1990 *Archaeology of the Coney Creek Valley*. Research Report 5. Center for Mountain Archeology, Ward, Colorado.
1996 *The Game Drives of Rocky Mountain National Park*. Research Report 7. Center for Mountain Archeology, Ward, Colorado.

Bevilacqua, Chris
2011a Chronology and Demography. In *Draft Archeology of Great Sand Dunes National Park and Preserve Alamosa and Saguache Counties, Colorado*, edited by Chris M. Bevilacqua, Robert G. Wunderlich, Jr., Marilyn A. Martorano, and Eric M. Hendrickson, pp. 207-226. RMC Consultants, Inc., Wheat Ridge, Colorado. Submitted to the National Park Service, Denver.
2011b Ceramic Artifacts. In *Draft Archeology of Great Sand Dunes National Park and Preserve Alamosa and Saguache Counties, Colorado*, edited by Chris M. Bevilacqua, Robert G. Wunderlich, Jr., Marilyn A. Martorano, and Eric M. Hendrickson, pp. 127-143. RMC Consultants, Inc., Wheat Ridge, Colorado. Submitted to the National Park Service, Denver.

Bevilacqua, Chris, Steven Dominguez, and Dulaney Barclay
2008 *Final Report on the 2007 Archeological Inventory and Site Condition Assessments at Great Sand Dunes National Park and Preserve, Saguache and Alamosa Counties, Colorado*. RMC Consultants, Inc. Lakewood, Colorado. Submitted to History Colorado, State Historical Fund, Denver, and the National Park Service Intermountain Support Office, Denver.

Black, Kevin D.
1983 Shelter and Subsistence at 5GN344, A High Altitude Short-term Camp Near Almont, Colorado. *Southwestern Lore* 49(3):1-27.
1986 *Mitigative Archaeological Excavations at Two Sites for the Cottonwood Pass Project, Chaffee and Gunnison Counties, Colorado*. Metcalf Archaeological Consultants, Inc., Eagle, Colorado.

1990 *Archaic Period Architectural Sites in Colorado.* National Register of Historic Places Multiple Property Documentation Form. Colorado Historical Society, Office of Archaeology and Historic Preservation, Denver.

1991 Archaic Continuity in the Colorado Rockies: The Mountain Tradition. *Plains Anthropologist* 36(133):1-29.

2000 Lithic Sources in the Rocky Mountains of Colorado. In *Intermountain Archaeology*, edited by David B. Madsen and Michael D. Metcalf, pp. 132-147. Anthropological Papers 122. University of Utah Press, Salt Lake City.

Bradley, Bruce A.

2010 Paleoindian Flaked Stone Technology in the Plains and in the Rockies. In *Prehistoric Hunters of the High Plains and Rockies*, 3rd ed., edited by Marcel Kornfeld, George C. Frison, and Mary Lou Larson, pp. 463-497. Left Coast Press, Walnut Creek, California.

Buckles, William G.

1978 The Dead of Winter Site, 5LK159. In *Anthropological Investigations Near the Crest of the Continent*, edited by William G. Buckles, pp. 328-387. Submitted to the Bureau of Reclamation, Denver, Colorado.

Butler, William B.

1985 A Knife from Upper Plum Canyon Rockshelter I, Southeastern Colorado. *Plains Anthropologist* 30(107):51-57.

Campbell, Robert G.

1969 *Prehistoric Panhandle Culture on the Chaquaqua Plateau, Southeast Colorado.* Ph.D. dissertation, University of Colorado, Boulder. University Microfilms International, Ann Arbor, Michigan. [Document 69-13399]

Cole, Sally J.

2008 Archeological Documentation and Assessment of Lower and Upper Canyon Del Rancho Petroglyph Sites (5CN1021 and 5CN1022). In *Archeological Inventory and National Register Evaluation for the Baca Land Exchange La Jara Reservoir Parcels, Conejos County, Colorado*, edited by Susan J. Wells, pp. 85-108. Publications in Anthropology 101. National Park Service, Western Archeological and Conservation Center, Intermountain Region, Tucson, Arizona, and Fort Lewis College, Durango, Colorado. Submitted to the National Park Service, Intermountain Regional Office, Denver, Colorado, the Bureau of Land Management, Colorado State Office, Lakewood, Colorado, and the U.S. Fish and Wildlife Service, Lakewood, Colorado.

Colorado Division of Water Resources

2011 Data and Maps. Electronic resource, http://water.state.co.us/DataMaps/Pages/default.aspx, accessed October 31, 2011.

Crosser, Ian, Sean Larmore, and Kathy Croll

2008 Analysis of Ceramic Artifacts. In *Archeological Inventory and National Register Evaluation for the Baca Land Exchange La Jara Reservoir Parcels, Conejos County, Colorado*, edited by Susan J. Wells, pp. 159-179. Publications in Anthropology 101. National Park Service, Western Archeological and Conservation Center, Intermountain Region, Tucson, Arizona, and Fort Lewis College, Durango, Colorado. Submitted to the National Park Service, Intermountain Regional Office, Denver, Colorado, the Bureau of Land Management, Colorado State Office, Lakewood, Colorado, and the U.S. Fish and Wildlife Service, Lakewood, Colorado.

Davis, Carl M., and James D. Keyser

1999 McKean Complex Projectile Point Typology and Function in the Pine Parklands. *Plains Anthropologist* 44(169):251-270.

Dominguez, Steven R.

2009 *2008 Test Excavations in Great Sand Dunes National Park and Preserve, Saguache, Alamosa, and Huerfano Counties, Colorado*. RMC Consultants, Inc., Lakewood, Colorado. Submitted to the National Park Service Intermountain Support Office, Denver.

Eiselt, Sunday and J. Andrew Darling

2012 Vecino Economics: Gendered Economy and Micaceous Pottery Consumption in Nineteenth-Century Northern New Mexico. *American Antiquity* 77(3):424-448.

Farmer, T. Reid

1978 *Excavations of Sites 5AL78 and 5AL83 in the Blanca Wildlife Refuge*. Office of Public and Contract Archaeology, University of Northern Colorado, Greeley.

Ferguson, Jeffrey, and Craig E. Skinner

2003 Colorado Obsidian? Preliminary Results of a Statewide Database of Trace Element Analysis. *Southwestern Lore* 69(4):35-50.

Frison, George C.

1992 The Foothills-Mountains and the Open Plains: The Dichotomy in Paleoindian Subsistence Strategies Between Two Ecosystems. In *Ice Age Hunters of the Rockies*, edited by Dennis J. Stanford and Jane S. Day, pp. 323-342. University Press of Colorado, Boulder.

Frison, George C., David Schwab, L. Adrien Hannus, Peter Winham, David Walter, and Robert C. Mainfort

1996 Archeology of the Northwestern Plains. In

Archeological and Bioarcheological Resources of the Northern Plains, edited by George C. Frison and Robert C. Mainfort, pp. 8-40. Research Series 47. Arkansas Archaeological Survey, Fayetteville, Arkansas.

Frison, George C., and Danny N. Walker (editors)
2007 *Medicine Lodge Creek Site*. Clovis Press, Avondale, Colorado.

Gantt, Erik M.
2007 *Mitigative Excavations at the Hess (5DA1951), Oeskeso (5DA1957), and 5DA1936 Archaeological Sites at the Rueter-Hess Reservoir, Douglas County, Colorado, Volume 1*. Centennial Archaeology, Inc., Fort Collins, Colorado. Submitted to the States West Water Resources Corporation, Cheyenne, Wyoming, and Parker Water and Sanitation District, Parker, Colorado.

Gilmore, Kevin P.
1999 Late Prehistoric Stage. In *Colorado Prehistory: A Context for the Platte River Basin*, edited by Kevin P. Gilmore, Marcia Tate, Mark L. Chenault, Bonnie Clark, Terri McBride, and Margaret Wood, pp. 175-307. Colorado Council of Professional Archaeologists, Denver.
2011 Footprints in the Mud: A Holocene Drought Record from a Pocket Fen and the Implications for Middle Archaic Cultural Ecology on the Great Plains. *Colorado Archaeology.*

Green, Ernestine L.
1976 *Valdez Phase Occupation Near Taos, New Mexico*. Publication No. 10. Fort Burgwin Research Center, Southern Methodist University, Dallas, Texas.

Hagar, Ivol
1976 5CR1—Draper Cave Excavation and Research Report. *Southwestern Lore* 42(3):1-13.

Hand, OD, and Daniel A. Jepson
1996 *Archaeological Investigations at Wolf Spider Shelter (5LA6197), Las Animas County, Colorado*. Archaeological Research Series 5. Colorado Department of Transportation, Denver.

Hartley, Ralph, and James Schneck
1994 Historical Architectural Building/Structure Form for 5SH1469. History Colorado, Office of Archaeological and Historic Preservation, Denver.
1996 *Administering the National Forests of Colorado: An Assessment of the Architectural and Cultural Significance of Historical Administrative Properties*. U.S. Department of the Interior, National Park Service, Midwest Archaeological Center, Lincoln, Nebraska. Submitted to the U.S. Forest Service, Rocky Mountain Region, Lakewood, Colorado.

Hendrickson, Eric, Marilyn A. Martorano, Robert G. Wunderlich, Jr., and Susan East
2011 *A Class III Cultural Resource Inventory of Old Spanish National Historic Trail Segments, Baca Mountain Tract and Old Cochetopa Pass, Saguache County, Colorado*. Project C10.018.116. RMC Consultants, Inc., Wheat Ridge Colorado. Submitted to AECOM, Fort Collins, Colorado.

Hoefer, III, Ted
1999a Environment. In *Colorado Prehistory: A Context for the Rio Grande River Basin*, edited by Marilyn A. Martorano, Ted Hoefer III, Margaret A. Jodry, Vince Spero, and Melissa L. Taylor, pp. 6-11. Colorado Council of Professional Archaeologists, Denver.
1999b Archaic Stage. In *Colorado Prehistory: A Context for the Rio Grande River Basin*, edited by Marilyn A. Martorano, Ted Hoefer III, Margaret A. Jodry, Vince Spero, and Melissa L. Taylor, pp. 115-128. Colorado Council of Professional Archaeologists, Denver.
1999c Site Types and Site Distribution within the Rio Grande Basin. In *Colorado Prehistory: A Context for the Rio Grande River Basin*, edited by Marilyn A. Martorano, Ted Hoefer III, Margaret A. Jodry, Vince Spero, and Melissa L. Taylor, pp. 146-154. Colorado Council of Professional Archaeologists, Denver.

Hofman, Jack L.
1989 Prehistoric Culture History: Hunters and Gatherers in the Southern Great Plains. In *From Clovis to Comanchero: Archeological Overview of the Southern Great Plains*, edited by Jack L. Hofman, pp. 25-60. Research Series No. 35. Arkansas Archaeological Survey, Fayetteville, Arkansas.
1996 Early Hunter-Gatherers of the Central Great Plains: Paleoindian and Mesoindian (Archaic) Cultures. In *Archeology and Paleoecology of the Central Great Plains*, edited by Jack L. Hofman, pp. 41-100. Research Series 48. Arkansas Archaeological Survey, Fayetteville, Arkansas.

Holmer, Richard N.
1986 Common Projectile Points of the Intermountain West. In *Essays in Honor of Jesse D. Jennings*, edited by Carol J. Condie and Don D. Fowler, pp. 89-115. Anthropological Papers 110. University of Utah Press, Salt Lake City.

Huscher, Betty H., and Harold A. Huscher
1942 Athapaskan Migration via the Intermontane Region. *American Antiquity* 8(1):80-88.
1943 The Hogan Builders of Colorado. *Southwestern Lore* 9(2):1-92.

Irwin-Williams, Cynthia
1973 *The Oshara Tradition: Origins of Anasazi Culture*. Contributions in Anthropology 5(1). Paleoindian Institute, Eastern New Mexico University, Portales.

Irwin-Williams, Cynthia, and Henry J. Irwin
1966 *Excavations at Magic Mountain: A Diachronic Study of Plains-Southwest Relations*. Proceedings 12. Denver Museum of Natural History, Denver, Colorado.

Jodry, Margaret A.
1999a Paleoindian Stage. In *Colorado Prehistory: A Context for the Rio Grande Basin*, edited by Marilyn A. Martorano, Ted Hoefer, III, Margaret A. Jodry, Vince Spero, and Melissa L. Taylor, pp. 45-114. Colorado Council of Professional Archaeologists, Denver.
1999b Paleoindian Stage Paleoecological Records. In *Colorado Prehistory: A Context for the Rio Grande Basin*, edited by Marilyn A. Martorano, Ted Hoefer III, Margaret A. Jodry, Vince Spero, and Melissa L. Taylor, pp. 12-26. Colorado Council of Professional Archaeologists, Denver.
2002 *Draft Preliminary Report of Archeological Reconnaissance at Indian Spring, Little Spring, and Beyond, 2000-2001*. Colorado State Historical Fund Project No. 2001-P1-015. Paleoindian/ Paleoecology Program, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Jones, Kevin T.
1977 *Archaeological Test Excavations at the Blanca Wildlife Refuge in the San Luis Valley, Colorado*. Reports of the Laboratory of Public Archaeology 12. Colorado State University, Fort Collins.

Kalasz, Stephen M., Bridget M. Ambler, Linda Scott Cummings, Michael McFaul, Kathryn Puseman, Wm. Lane Shields, Grant D. Smith, Karen Lynn Traugh, and Christian J. Zier
1995 *Report of 1994 Archaeological Excavations at the Magic Mountain Site (5JF223) in Jefferson County, Colorado*. Centennial Archaeology, Inc., Fort Collins, Colorado. Submitted to the Colorado Historical Society, Denver.

Kalasz, Stephen M., Christopher C. Kinneer, John D. Kennedy, Michael D. McFaul, Jannifer W. Gish, and Mary E. Malainey
2003 *Mitigative Excavations at the East Plum Creek Site (5DA1008), in Castle Rock, Douglas County, Colorado.* Centennial Archaeology, Inc., Fort Collins, Colorado. Archaeological Research Series 9. Colorado Department of Transportation, Denver.

Kalasz, Stephen M., Mark D. Mitchell, and Christian J. Zier
1999 Late Prehistoric Stage. In *Colorado Prehistory: A Context for the Arkansas River Basin*, edited by Christian J. Zier and Stephen M. Kalasz, pp. 141-263. Colorado Council of Professional Archaeologists, Denver.

Kornfeld, Marcel, George C. Frison, and Mary Lou Larson
2010 *Prehistoric Hunter-Gatherers of the High Plains and Rockies*. 3rd ed. Left Coast Press, Walnut Creek, California.

Levine, Daisy F.
1994 Ceramic Analysis. In *Studying the Taos Frontier: The Pot Creek Data Recovery Project, Volume 2: Discussion and Interpretation*, edited by Jeffrey L. Boyer, James L. Moore, Daisy F. Levine, Linda Mick-O'Hara, and Mollie S. Toll, pp. 339-366. Archaeology Notes 68. Museum of New Mexico, Office of Archaeological Studies, Santa Fe.

Lyons, Ray D.
1993 Appendix: Floral Resources in the Vicinity of Old Agency Fortified Site. *Southwestern Lore* 59(2):19-22.

Lyons, Ray D., and Ann M. Johnson
1993 The Old Agency Fortified Site. *Southwestern Lore* 59(2):3-18.

Martorano, Marilyn A.
1999a Late Prehistoric/Ceramic Stage. In *Colorado Prehistory: A Context for the Rio Grande River Basin*, edited by Marilyn A. Martorano, Ted Hoefer III, Margaret A. Jodry, Vince Spero, and Melissa L. Taylor, pp. 129-137. Colorado Council of Professional Archaeologists, Denver.
1999b Protohistoric Stage. In *Colorado Prehistory: A Context for the Rio Grande River Basin*, edited by Marilyn A. Martorano, Ted Hoefer III, Margaret A. Jodry, Vince Spero, and Melissa L. Taylor, pp. 138-145. Colorado Council of Professional Archaeologists, Denver.
2011 Culturally Modified Trees. In *Draft Archeology of Great Sand Dunes National Park and Preserve Alamosa and Saguache Counties, Colorado*, edited by Chris M. Bevilacqua, Robert G. Wunderlich, Jr., Marilyn A. Martorano, and Eric M. Hendrickson, pp. 156-185. RMC Consultants, Inc., Wheat Ridge, Colorado. Submitted to the National Park Service, Denver.

Martorano, Marilyn A., Richard F. Madole, David R. M. White, Ted Hoefer III, Robert G. Wunderlich, Bradford A. Andrews, Danielle M. Hoefer, Wade H. Broadhead, Steven R. Dominguez, Kimberly A. Fariello, Heather S. Mrzlack, Laura L. Beuthel,

Kendra A. Elrod, Adrienne B. Anderson, and Fred L. Bunch.
2005 *Woodlands to Wetlands: Human Occupation and Use of the Great Sand Dunes Eolian System.* State Historical Fund Project 2001-02-069. Friends of the Dunes, Mosca, Colorado. Submitted to History Colorado, Denver.

McNab, W. Henry, David T. Cleland, Jerry A. Freehouf, James E. Keys, Jr., Gregory J. Nowacki, Constance A. Carpenter (Compilers)
2005 *Description of Ecological Subregions: Sections of the Conterminous United States*. USDA Forest Service, Washington, D. C.

Metcalf, Michael D.
2011a Projectile Point Analysis. In *Wyoming Interstate Company (WIC), LLC, Piceance Basin Expansion Project: Final Report of Excavations, Moffat and Rio Blanco Counties, Colorado, and Sweetwater County, Wyoming, Volume I: An Introduction*, edited by Michael D. Metcalf, pp. 55-140. Metcalf Archaeological Consultants, Inc. Submitted to Wyoming Interstate Company, LLC Colorado Springs, Colorado.
2011b Revised Model of the Archaic-Paleoindian Transition and the Archaic Era Occupation of the Pipeline Corridor. In *Synthesis of Archaeological Data Compiled for the Piceance Basin Expansion, Rockies Express Pipeline, and Uinta Basin Lateral Projects, Volume 2: Moffat and Rio Blanco Counties, Colorado, and Sweetwater County, Wyoming*, edited by Michael D. Metcalf and Alan D. Reed, pp. 123-166. Metcalf Archaeological Consultants, Inc. Submitted to Wyoming Interstate Company, LLC Colorado Springs, Colorado.

Metcalf, Michael D., and Kevin D. Black
1991 *Archaeological Excavations at the Yarmony Pit House Site, Eagle County, Colorado*. Cultural Resource Series 31. Bureau of Land Management, Lakewood, Colorado.

Mitchell, Mark D.
2012 *High-Altitude Archaeology in the Uncompahgre Wilderness*. Research Contribution 87. Paleocultural Research Group, Broomfield, Colorado. Submitted to History Colorado, State Historical Fund, Denver, and the Grand Mesa, Uncompahgre, and Gunnison National Forests, Delta, Colorado.

Mullen, Jaclyn
2009 The Chronological Implications of Conventional Projectile Point Types in Northwestern Colorado and South-Central Wyoming. In *Synthesis for Archaeological Data Compiled for the Piceance Basin Expansion, Rockies Express Pipeline, and Uinta Basin Lateral Projects, Moffat and Rio Blanco Counties, Colorado, and Sweetwater County, Wyoming*, edited by Alan D. Reed and Michael D. Metcalf, pp. 24-55. Alpine Archaeological Consultants, Inc., Montrose, Colorado, and Metcalf Archaeological Consultants, Inc., Eagle, Colorado. Submitted to the Bureau of Land Management, Lakewood, Colorado, and the Federal Energy Regulatory Commission, Washington, D.C.

Natural Diversity Information Source
2011 Saguache County Known or Likely Species Occurrence. Electronic document, http://ndis.nrel.colostate.edu/aspresponse/spxbycnty_res.asp, accessed June 1, 2011.

Nowak, Michael, and Kylie Crocket
2003 *5SH73(H): A Mapping Project*. Department of Anthropology, The Colorado College. Ms. on file, USDA Forest Service, Rio Grande National Forest, Monte Vista, Colorado.

Pitblado, Bonnie L.
1998 Peak to Peak in Paleoindian Time: Occupation of Southwest Colorado. *Plains Anthropologist* 43(166):333-348.
2003 *Late Paleoindian Occupation of the Southern Rocky Mountains: Early Holocene Projectile Points and Land Use in the High Country*. University Press of Colorado, Boulder.

Pitblado, Bonnie L., Carol Dehler, Hector Neff, and Stephen T. Nelson
2008 Pilot Study Experiments Sourcing Quartzite, Gunnison Basin, Colorado. *Geoarchaeology: An International Journal* 23(6):742-778.

Pool, Kelly J., and Summer Moore
2011 Archaic Architecture. In *Synthesis of Archaeological Data Compiled for the Piceance Basin Expansion, Rockies Express Pipeline, and Uinta Basin Lateral Projects, Volume 2: Moffat and Rio Blanco Counties, Colorado, and Sweetwater County, Wyoming*, edited by Michael D. Metcalf and Alan D. Reed, pp. 53-122. Metcalf Archaeological Consultants, Inc. Submitted to Wyoming Interstate Company, LLC Colorado Springs, Colorado.

Reed, Alan D.
1994 The Numic Occupation of Western Colorado and Eastern Utah during the Prehistoric and Protohistoric Periods. In *Across the West: Human Population Movement and the Expansion of the Numa*, edited by David B. Madsen and David Rhode, pp. 188-199. University of Utah Press, Salt Lake City.

Reed, Alan D., and Michael D. Metcalf (editors)
1999 *Colorado Prehistory: A Context for the Northern Colorado River Basin*. Colorado Council of Professional Archaeologists, Denver.

Renaud, Etienne B.
1935 *Archaeological Survey of Colorado, Fourth Report, Seasons 1933 and 1934*. Department of Anthropology, University of Denver, Denver, Colorado.
1942a *Indian Stone Enclosures of Colorado and New Mexico*. Archaeological Papers Series 2. Department of Anthropology, University of Denver, Denver.
1942b The Rio Grande Points. *Southwestern Lore* 8(3):33-36.
1944 The Upper Rio Grande Culture. *Southwestern Lore* 10(3):35-37.
1946 *Archaeology of the Upper Rio Grande Basin in Southern Colorado and Northern New Mexico.* Archaeological Series Sixth Paper. Department of Anthropology, University of Denver, Denver.

Rood, Ronald J.
1990 Archaeological Excavations at 5LA2190: Evidence for Late Archaic Architecture in Southern Colorado. *Southwestern Lore* 56(3):22-29.
1998 *Archaeological Investigations at 5GN2478: Elk Creek Village, Curecanti National Recreation Area, Gunnison County, Colorado*. Western State College, Gunnison, Colorado. Submitted to the Colorado Historical Society, State Historical Fund, Denver, and the National Park Service, Midwest Archeological Center, Lincoln, Nebraska.

Rood, Ronald J., and Mark Stiger
2001 Prehistoric Use of Fauna in the Upper Gunnison River Basin. In *Hunter-Gatherer Archaeology of the Colorado High Country*, by Mark Stiger, pp. 47-58. University Press of Colorado, Boulder.

Root, Matthew J., Stanley A. Ahler, Jerry D. William, and Alan J. Osborn
1999 Methods and Techniques of Stone Tool and Core Analysis. In *Field and Laboratory Methods and Techniques for the Lake Ilo Archaeological Project*, edited by Matthew J. Root, pp. 17-68. Contributions in Cultural Resource Management 60. Center for Northwest Anthropology, Department of Anthropology, Washington State University, Pullman. Submitted to the U. S. Department of the Interior, Fish and Wildlife Service, Denver, Colorado, and the University of North Dakota, Grand Forks.

San Luis Valley Public Lands Center
2009 *Middle Saguache Creek Ecosystem Analysis and Land Health Assessment*. Monte Vista, Colorado.

Shields, Wm. Lane
1980 Preliminary Investigations at the McEndree Ranch Site, 5BA30. *Southwestern Lore* 46(3):1-17.
1998 *Basin Houses in Colorado and Wyoming: Delineation of a Culture Area and Parsing Hunter-Gatherer Modeling.* Unpublished Master's thesis, Department of Anthropology, University of Colorado, Boulder.

Shott, Michael J.
2004 Aggregate Methods and the Future of Debitage Analysis. In *Aggregate Analysis in Chipped Stone*, edited by Christopher T. Hall and Mary Lou Larson, pp. 211-228. University of Utah Press, Salt Lake City.

Stiger, Mark
2001 *Hunter-Gatherer Archaeology of the Colorado High Country.* University Press of Colorado, Boulder.
2006 A Folsom Structure in the Colorado Mountains. *American Antiquity* 71(2):321-351.

Thomas, David H.
1981 How to Classify the Projectile Points from Monitor Valley, Nevada. *Journal of California and Great Basin Anthropology* 3(1):7-43.

Turner, Kenzie James
2004 *Age, Origin, and Geochemistry of the Tuff of Saguache Creek, Saguache County, Colorado*. Unpublished Master's thesis, Department of Geology and Geological Engineering, Colorado School of Mines, Golden.

Watkins, Erin, Monica Weimer, and Tarra Wixom
2012 *Data Recovery of Thermal Features at the Venado Enojado Site (5CF555)*. Report CR-RG-12-84 (P). Bureau of Land Management, Royal Gorge Field Office, Canon City, Colorado.

Western Regional Climate Center
2011 Western U.S. Climate Historical Summaries. Electronic document, http://www.wrcc.dri.edu/Climsum.html, accessed June 1, 2011.

Wetherington, Ronald K.
1968 *Excavations at Pot Creek Pueblo.* Publication 6. Fort Burgwin Research Center, Taos, New Mexico.

White, David R. M.
2005 *Seinanyeid: an Ethnographic Overview of Great Sand Dunes National Park and Preserve.* Manuscript on file at Great Sand Dunes National Park and Preserve, Mosca, Colorado, and RMC Consultants, Inc., Lakewood, Colorado.

Woosley, Anne I., and Bart Olinger
1990 Ethnicity and the Production of Micaceous Ware in the Taos Valley. In *Clues to the Past: Papers in Honor of William M. Sundt*, edited by Meliha D. Duran and David T. Kirkpatrick, pp. 351-373. Papers 16. Archaeological Society of New Mexico, Albuquerque.

Wunderlich, Robert, and Steven Dominguez R.
2007 Projectile Point Analysis Results. In *Final Report on the Archaeological Inventory and National Register Evaluation of the Baca Land Exchange BLM Parcels, Biedell Creek Project Area, Saguache County, Colorado: Volume II—Appendices*, edited by Chris Bevilacqua, Robert Wunderlich, and Steve Dominguez, pp. B-1—B-48. RMC Consultants, Inc., Lakewood, Colorado. Submitted to the National Park Service, Intermountain Support Office, Denver, Colorado, and the Bureau of Land Management, Colorado State Office, Lakewood, Colorado.

Zier, Christian J.
1999a Archaic Stage. In *Colorado Prehistory: A Context for the Arkansas River Basin*, edited by Christian J. Zier and Stephen M. Kalasz, pp. 100-140. Colorado Council of Professional Archaeologists, Denver.

Zier, Christian J.
1999b Paleoindian Stage. In *Colorado Prehistory: A Context for the Arkansas River Basin*, edited by Christian J. Zier and Stephen M. Kalasz, pp. 73-99. Colorado Council of Professional Archaeologists, Denver.

Zier, Christian J., and Stephen M. Kalasz
1991 Recon John Shelter and the Archaic-Woodland Transition in Southeastern Colorado. *Plains Anthropologist* 36(115):111-138.

Zier, Christian J., and Stephen M. Kalasz (editors)
1999 *Colorado Prehistory: A Context for the Arkansas River Basin*. Colorado Council of Professional Archaeologists, Denver.