UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

BEHAVIORAL REGION ANALYSIS OF THE POÑIL CANYON, COLFAX COUNTY, NEW MEXICO

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

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Norman, Oklahoma

2008

BEHAVIORAL REGION ANALYSIS OF THE POÑIL CANYON,
COLFAX COUNTY, NEW MEXICO

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF ANTHROPOLOGY

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ACKNOWLEDGMENTS

I offer my sincere gratitude to the members of my dissertation committee: Professors Susan Vehik, Richard Pailes, Lesley Rankin-Hill, Robert Brooks, Fred Shelley, and Neil Suneson, together with retired and former members Ross Hassig, Richard Nostrand, and Don Wyckoff. Your insights and comments were always appreciated.

From time to time there are people who come into our lives whose influence is so strong that it changes the way we see the world, irrevocably. They help us not only to see, but to observe. Professor Ross Hassig is one of those luminous figures. It was Ross who challenged me to keep theory at the center of my work, to see the broader patterns in human culture, to look beyond society's disposables and to search for evidence of meaningful culture, not just material culture. Thank you Ross.

Drs. James and Delores Gunnerson were instrumental in my research efforts in the Cimarron Country. Not only did they contact local ranchers to help me gain access to land, they supported my research by granting me access to reams of data that they collected over the years as part of their own research projects in the study area. They were a wonderful source of ideas, spent countless hours on the telephone with me to help me sort out the region's prehistory, graciously hosted my visits to Lincoln, Nebraska, and provided financial support as well. Thank you

for everything, Jim and Dee, especially for inspiring me to continue your legacy of research in the Cimarron Country.

During the summer of 2000, David Kirkpatrick introduced me to the North Poñil and the archaeology of that peaceful canyon. Christopher Lintz shared a considerable body of literature regarding prior research in the study area, for which I am very thankful. Finally, Steven Mack took time from his busy schedule to give me his impressions of the archaeology of the study area. To each of these professional archaeologists, I thank you.

Of course, without land on which to conduct archaeological research, there would be no data to discuss. One of the first landowners the Gunnersons contacted on my behalf was Gretchen Sammis, owner of the historic Chase Ranch. Gretchen Sammis and her ranch foreman, Ruby Gobble, are legends in the Cimarron Country, respected not only for cattle ranching, but also for their contributions to the community and to society generally. Gretchen graciously opened her ranch to my research interests and supported me materially by allowing me to stay at the Chase Cabin at Pippert Lake for extended periods. It was a tremendous honor for me to spend half a year writing on the very ranch where in circa 1879, Lew Wallace began writing the final chapter of the novel *Ben Hur*. It was an even greater honor when Gretchen allowed me to marry Linda Carol Golin on the small front porch of that same wonderful cabin.

The three sites excavated and reported on in this dissertation are on the Philmont Scout Ranch, and I am greatly indebted to the Ranch, its management

and staff for allowing me to conduct research there. But the Philmont Ranch went far beyond granting access; it provided substantial material and financial support, allowed me to bring students to the ranch to attend OU and PPCC field schools, provided lab space, lab supplies, cooking facilities, food, water, shelter, solar electric power, rock climbing and rappel equipment, safety training, and the list goes on and on. Moreover, Philmont Ranch provided a congenial atmosphere for research, opportunities for interaction between my students and Philmont's staff and participants, and opportunities for weekend recreation and field trips. It is inconceivable that one could find a better place to conduct field research in archaeology. Accordingly, I offer a heartfelt thanks to Keith Gallaway, Mark Anderson, Brian Gray, Doug Palmer, Jim Kutz, Dave Kenneke, Bob Ricklefs, Steve Zimmer, Pat Adams, Chuck Enloe, Rod Taylor, Fred Romero, Dave Ott, Mike Martinez, Nick Martinez, and the list of individuals could go on and on. I especially thank Mark Anderson for his interest in cultural resource management at the Ranch and for accommodating our needs throughout the years. Thank you also to the many people who worked at the Commissary, the Backcountry Warehouse, Merchandise Warehouse, Logistics, Administration, Security, Health Lodge, CHQ, and last but not least those fine people at Conservation who, with great skill and determination, built a "pilot-and-copilot" atop the mesa at I. W. I also offer a special thank you to Steve Zimmer, Jason Schubert, and Seth McFarland of the Philmont Museum. I am certain that I have left important figures off of this list, so to everyone at Philmont, I sincerely thank you all.

I am also grateful to the Vermejo Park Ranch for allowing me to examine several site localities in the Van Bremmer, Gachupin, and Ancho Canyon areas. Thank you, Doug Johnson, for making the visit possible and for transporting Steve Zimmer and myself around the ranch. Thank you also for our visit to the historic cow camp near Castle Rock.

Thank you Linda Davis, for granting me permission to visit the Crow Creek Unit on the CS Ranch, and thank you for inviting me to the wonderful Fourth of July gathering at the Old Mill. I am especially glad that you are a volunteer with the Cimarron Rescue Squad.

I was fortunate enough to meet a number of individuals within the Village of Cimarron who provided information, support, and friendship during the eight summers I spent in the Cimarron Country. These fine people include Valerie Kutz, Shari Zimmer, Katy Bryant (Miss Katy), Jeff and Meg Dissinger, Steve Boyce, Chip the Postmaster, and others. I am especially grateful to the Honorable Robert A. Burns, Cimarron Municipal Judge, for providing friendship, material support, conversation, and information about site MP-4, which he helped excavate in the 1960s. It was Judge Burns who helped me identify the source of the carnelian in the lithics assemblage, and it was he who performed my wedding ceremony on the Chase Ranch. I also thank the members of the Cimarron Maverick Club for inviting me to membership and for making my stay in the Cimarron Country more meaningful and enjoyable. To the entire Village of Cimarron, my home away from home, thank you!

I also recognize those of my fellow graduate students whose journeys paralleled my own, and with whom I shared some of the best times of my life. Among those notable and memorable figures are E. R. Jethro Gaede and Stance Hurst, both fellow members of the OU Diogenes Club. A special thanks also goes to Kenneth Kraft. I also thank all the current and former graduate students who helped with fieldwork: Stance Hurst, Brian Lizzo, Paul Gattis, Beau Schreiver, and Scott Lancaster. Current and former undergraduates who participated include Jeremy Williams, Mandy Young, Patrick Rivera, Michelle Barry, Ben Kamphaus, Scott Robinson, Debbie Michalke, Wendell Nelson, Lisa Springer, Liz Nichols, Katy Neilson, Sean Steffen, John Hughes, Kari-Anna Grant, Dorian Small, Jeremy Pye, Christine Clark, Holly Johanns, Nick Jarman, Lewis Hinnant, Erika Silvernale, Carolyn Engstrom, Cody Dornhecker, Anthony Neil, Molly Hardee, Eugene Everett, Daniel Jaramillo, and David Robertson. Lewis Hinnant deserves special thanks for his exhaustive research on the edible and medicinal plants of the Poñil drainage, many of which he subsisted upon for much of the summer of 2004. I also thank the volunteers who became involved in my research purely for the love of archaeology. These fine individuals include John Sutton (who traveled more than 1,600 miles each way to participate), Stephen Zimmer, and the Honorable Robert Burns.

Much of my research was made possible by material assistance from individuals and organizations. First, the Philmont Scout Ranch provided many thousands of dollars in monetary and logistical support for myself and field school

students during each field season. Second, Gretchen Sammis of the Chase Ranch provided support by allowing me to headquarter my research and to do much of my writing from the Chase Cabin. Thank you Gretchen. The New Mexico Archaeological Council awarded grant money for radiocarbon dating that was used to establish the occupation period at site MP-7. The American Philosophical Society, specifically the Philips Fund for Native American Research, provided substantial funding for ethnohistorical research into the seasonal movements of peoples during the early Contact Period. Drs. James and Delores Gunnerson donated funding for a radiocarbon assay that was used to date the hearth at site NP-69. Don Wyckoff, through the Oklahoma Museum of Natural History, provided funding for radiocarbon dating of soils along Poñil Creek, excavation equipment and supplies, lab space, cataloging supplies, labor, storage, and years of friendship and good times in the field. The University of Oklahoma Department of Anthropology provided funding for myself and assistants through two field schools. The University of Oklahoma Graduate College and the University of Oklahoma Graduate Student Senate provided research and travel funding, as did the OU Anthropology Graduate Student Association. To each individual and organization, I thank you.

Finally, I thank my wonderful wife, Linda C. Golin-Lail, for her patience and support during several years of sometimes difficult analysis and writing at a time when she was fighting (and winning) a different battle altogether. I love you Linda.

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ABSTRACT

All human behavior is patterned. We act in patterned ways because doing so helps us fulfill the material needs and desires of life, or because we are acting in concert with cultural expectations or beliefs about the world in which we live. Two objectives of modern archaeology are to recognize these patterns initially, and then to find meaning in them. Because archaeology is necessarily tied to the land and its resources, there is a tendency to overemphasize human-environmental interactions at the expense of a broader understanding of the nonmaterial factors that contribute to the creation of the archaeological record. In areas of relative resource abundance, environmental-functionalist approaches often leave us with conflicting explanations for essentially the same behaviors. This is especially true in studies of prehistoric hunters and gatherers where material remains are few. Combining elements of environmental functionalism, regional analysis, and practice theory, I examine archaeological data for evidence not of patterned behaviors only, but of patterned behaviors suggestive of the practices, beliefs, and worldviews of the people who produced them. By examining such data against the backdrop of the geographic region or regions within which patterned behaviors were generated, I demonstrate how the patterns form around centralizing mechanisms - resources, objects or people that attract people to certain places at specific times for specific reasons. Plotting centralizing mechanisms in relation to

archaeological sites allows me to examine human functional regions, or regions that exist because of repeated visits, whether economically or socially motivated, to those centralizing mechanisms. Plotting all the functional regions for a given period reveals a behavioral region. A behavioral region is a spatial reflection of the patterned behaviors of a group of people. Its shape, extent, and orientation are indicators of how far people will travel or otherwise project their social relations in order to meet the material and social needs of their lives. A behavioral region has a significant historical basis; it is a reflection of the perceptions, beliefs, practices, and interactions of the people whose behaviors create it.

Using archaeological data from several drainages in New Mexico's Park Plateau, I introduce the *behavioral regions approach,* a model intended to address issues not only of settlement and subsistence, but also of cultural ties, affiliations, and interactions. As with any model, its utility would be more apparent when applied in the context of a more complex society with a richer material record. However, even in the case of a marginal hunting and gathering society with a limited material record, I am able to infer that the Plateau phase inhabitants (A.D. 300-800) of the Poñil drainage on the southern Park Plateau had enduring ties to people and practices of the Southwest, and that their patterned behaviors and practices at the regional level are indicative of those ties.

Chapter I: Regions of Human Behavior

Introduction

Vertical stacking of natural resources on the southern Park Plateau (Figure 1.1) together with seasonal variations in the availability of certain plants and animals resulted in a complex pattern of land use and settlement among the region's early inhabitants. Or did it? Area researchers have investigated the archaeology of the region from a variety of environmental-functionalist approaches since the 1960s, and yet there is still no consensus as to the geographic or cultural origins, ties, or traditions of the people who inhabited the southern Park Plateau between A.D. 300 and A.D. 800. Environmental-functionalist approaches alone have proven insufficient to explain a broad range of human behaviors in this area of relative resource abundance. Hunting and gathering appears to have remained an important, if not primary, means of subsistence in New Mexico's Cimarron District well into the first millennium A.D., long after people in nearby regions adopted more sedentary, agriculturally based lifestyles. It is possible that these settlement-subsistence practices persisted, in part at least, because of reduced selective pressures in a relatively abundant environment, were thus largely shaped by many non-environmental factors such as group history, beliefs, values, social organization, culturally bound perceptions of space and resources, and/or by influences or pressures from outside the group.

The Problem

The Poñil study area is a place where little archaeological research has been undertaken and, consequently, where little is agreed upon regarding settlement, subsistence, cultural affiliations, ties, or influences. This project began as an investigation into the lives of the Vermejo phase (A.D. 400-700) occupants of the Poñil drainage system, a canyon-cut landform along the southern boundary of New Mexico's Park Plateau (Figure 1.1). The initial objective was to build upon the work of Glassow (1972a, 1980) and to add to our understanding of the people of this period by more fully describing and explaining their economy, technology, and history. It became quickly apparent, however, that basic questions regarding the initial peopling of the area, cultural affiliations, and cultural interactions were so far from being resolved that some method was needed that would provide what I call the "perspective of distance," or as Emerson (1841) called it, "intellectual altitude," to address these issues. Hence, the behavioral regions approach.

The Vermejo phase is part of a regional cultural sequence developed by Glassow (1972a, 1980) that is based upon a combination of survey data and limited excavation undertaken between 1961 and 1969. According to Glassow, Vermejo phase sites are on high terraces, typically 40 feet or more above modern streambeds. They are characterized by small circular structures that average about 5 m in diameter, the presence of diminutive corner-notched arrow points generally 16 mm or shorter, and the absence of pottery (Glassow 1972a, 1980). Considering these attributes and the ubiquity of Southwestern pottery and architectural styles in

Figure 1.1 The Poñil study area lies within the Cimarron Archaeological District.

the phases that follow, Glassow concluded that the Vermejo phase sites were examples of local variants of the San Juan Basketmaker tradition (Glassow 1972a), thus suggesting that the earliest people to live in the Poñil drainage possibly migrated into the area from the Rio Grande drainage after initially leaving the Four Corners region.

However, about 20 km to the northeast, researchers working in the Vermejo River drainage, including the Ancho, Gachupin, and York canyons, conclude that a very similar body of data, including similar site localities, architecture, arrow points, the near absence of pottery, all of which are associated with the same time period, are indicative of Plains cultures moving into the region during the Plains Woodland Period (A.D. 100 to 1000) (Dorshow et al. 2002).

Interpretative inconsistencies such as these exist possibly for several reasons. First, archaeological explanations are typically a combination of hard evidence and probabilistic conjecture. Though we may couch them in the language of our favorite archaeological paradigm, archaeological explanations remain a combined scientific and humanistic effort to give an accounting of the lives of people who lived in the past. Second, although archaeological explanations are ideally based upon recovered data, the data are never fully recovered, the record is always incomplete, and thus our explanations are always to some degree lacking. Finally, in all cases our explanations are reflections of our discipline's *socialized subjectivity*, which predisposes us to see and interpret the world in ways that are consistent with the dominant paradigm to which we are exposed during our training (see Bourdieu 1977, 1990, 1998). Because of this, it is not uncommon for archaeologists of different backgrounds and training to look at the same data and offer explanations that are diametrically opposed to one another. Such is the case regarding interpretations of the archaeological record on the southern Park Plateau, which is the focus of this body of work. My objective is to use these interpretive inconsistencies to test the utility of a model that I call the *behavioral regions approach*. Before discussing the details of this model, however, I first discuss the concept of environmental functionalism, including its strengths and weaknesses as applied in the Cimarron District, as the background against which the behavioral regions approach is presented.

Environmental Functionalism

The majority of studies conducted on the southern Park Plateau were either motivated by, or at least outgrowths of, the basic concept of what is generally termed *environmental functionalism*. The premise of environmental functionalism is that human beings must interact with their environments, and thus studies of those interactions may help explain the functions of those behaviors (for a full discussion see Trigger 1989). Heralded by the "New Archaeology" as a means of bringing scientific rigor to archaeological research, environmental-functionalist approaches place a heavy emphasis on quantifying human-environmental interactions (see Orcutt 1991). A central assumption is that people organize their landscapes in ways such as to maximize outcomes while minimizing costs (Kantner 2005:1208). Among studies of hunters and foragers, environmental-functionalists approaches are generally narrowly focused and research is often limited to questions of evolutionary ecology, optimal foraging, resource potential, and technology (Barnard 2004; Burch and Ellanna 1994; Ingold 1996; Kusimba

2003; Lee 1992). Although environmental-functionalist approaches generally produce reams of well-gathered data, because of their often narrow perspectives they tend to take an inward-looking view of people and environments, meaning that the social factors that also influence human behavior, including group history and inter-societal interactions, are often largely ignored (Schortman and Urban 1988).

Environmental-Functionalist Approaches on the Southern Park Plateau

Systems Theory and the Poñil Drainage

Michael Glassow was involved in the archaeological program at the Philmont Boy Scout Ranch from 1961 through 1969. Most of the Poñil drainage lies within the property boundaries of three very large ranches: the Philmont, the Chase, and the Vermejo Park (737,000 acres altogether). Glassow initially worked under the supervision of Galen Baker, the then director of the archaeological program at Philmont. Later, Glassow himself became the program's director, although his research carried him onto a number of properties within the region, including several of the ranches mentioned above.

Glassow's early field reports on file with the Philmont Museum do not indicate a strong theoretical orientation. However, his PhD dissertation (UCLA 1972a) puts much of his earlier work into perspective. Glassow was interested in *systems theory*, or the idea that variables in the archaeological record are but interacting parts of broader systems, and thus subject to rules that make it possible to describe and explain the system or systems under study. Glassow employed general systems theory to devise a model for culture change in prehistoric subsistence practices and in the technologies that facilitated them. A "facility," as Glassow used the term, was "an item of technology which prevents the dispersion of matter or energy" (Glassow 1972a:x). In this instance, Glassow's facilities included "various kinds of 'containers'; granaries, baskets, pottery vessels, and millingstones" (Glassow 1972a:5). Accordingly, Glassow sought to demonstrate that the rate of flow of subsistence resources through a facilities system could be measured to determine the nature of the system, which in turn could be examined for change through time. In his particular example, Glassow argued that an increase in the proportion of agricultural products when compared to wild seed resources would be evidence of a subsistence change that would require revisions in the facilities system (Glassow 1972a:xi). Conversely, if changes in facilities systems were observed, then they would likely indicate changes in subsistence practices.

Glassow applied this model as a method of identifying and explaining culture change in New Mexico's Cimarron District. He concluded that an increase in regional population density resulted in the increasing dependence upon agriculture as evidenced by the increasing use of the facilities systems (Glassow 1972a, 1972b, 1980, 1984).

The Landscape Paradigm and the Vermejo Drainage

Several contract firms conducted archaeological research on the Vermejo Park Ranch between 1984 and 2001 pursuant to coal mining operations there (see

Anschuetz et al. 2001; Biella and Dorshow 1997; Dorshow et al. 2000, 2002). Although the theoretical perspectives evolved over time and across the various projects, after the new millennium Southwest Archaeological Consultants (SWAC) personnel make a fairly consistent reference to "the regional design" and "the cultural landscape" perspective as suggested by Anschuetz and Scheick (1998) and Anschuetz et al. (2001). The *landscape paradigm*, advocated by Scheick (2000:163), recognizes cultural landscapes as "constructs fashioned from people's interaction with their environments as they go about their everyday lives." For Anschuetz et al. (2001), Crumley and Marquardt (1987, 1990), and Zube (1994), landscape is not a place, but the interaction of people with nature. Scheick (2000:163) suggests that the landscape approach provides context beyond the site-only approach, and thus forces archaeologists to consider how archaeological remains represent "a design with or an imposition on nature." The central idea is that through regular daily activities people transform the physical landscape in ways that are meaningful to them, and that there should be measurable linkages between the physical and archaeological landscapes (see also Dewar and McBride 1992; Wandsnider 1992). Overall, it is argued that because material culture "encodes information" in patterned ways, it can be decoded by using the landscape paradigm. Anschuetz et al. (2001:16) suggests that the landscape paradigm, when combined with the concepts of risk (see Weissner 1977) and evolutionary ecology as defined by Winterhalder and Smith (1992), presents a "synthetic, integrative, historical framework for evaluating human behavioral change." However, these interesting and potentially useful ideas, specifically including the regional perspective suggested in one report title (Anschuetz et al. 2001), seem to have been only marginally employed in practice. In only several of the otherwise excellent SWAC reports that I examined did it seem that research findings were discussed in terms of the stated theoretical perspectives. In the end, it appears that much of the SWAC research was informed by a combination of two perspectives: environmental functionalism (as evolutionary ecology) and culture-history.

Through environmental-functionalist approaches we learn how people adapt to the environment and how they use the landscape, although we often fail to understand in broader terms, why. With the landscape paradigm we look beyond the site at a regional level to understand human-environment interactions, but the focus is largely on the environment and whether it shapes, or is shaped, by human beings. Although both of these approaches focus on patterns of behavior, the regions of these behaviors are never illustrated, the roles of history, social organization, and intercultural interactions are not considered, and thus the opportunity for meaningful explanation is greatly diminished.

The Behavioral Regions Approach

Archaeology is now in a period of what I call *integrative-processualism.* When purely processual approaches consistently fail to provide answers, or leave us with conflicting explanations, then it is entirely reasonable, even responsible, to broaden our archaeological worldviews to consider complimentary or alternative explanatory devices. Analogous to the medical profession's new integrative approach to health care (Western scientific medicine combined with non-traditional, non-Western remedies and methods), integrative-processualist approaches in archaeology benefit from the rigorously scientific gathering and analysis of data, supplemented by reference to regional historical practices, beliefs, and traditions. The behavioral regions approach is one such example of integrative-processualism. It is a method of organizing and analyzing data that brings together environmental functionalism, regional analysis, and practice theory. It examines functional adaptations to local environments, draws upon the organizational strengths of regional analysis and, through the general principles of practice theory, explores the tangible expressions of human perceptions, interactions, and patterned behaviors that are motivated by social factors that may be wholly unrelated to the environment or to their efficacy within it. In essence, it is environmental-functionalism considered from a regional perspective, informed by practice theory. Like most theoretical or methodological approaches, the behavioral regions approach channels observation in such a way as to increase the likelihood that meaningful patterns will emerge (see Hassig 1981:11; Zubrow 1975:16). Accordingly, data that seem anomalous from another perspective may seem entirely intelligible when put in the context of a behavioral region.

What is a Behavioral Region?

Simply stated, a behavioral region is an area within which all of a group's economically and socially motivated behaviors take place. Its parameters are defined by the extent to which people will travel or otherwise project their range of social relations in order to conduct the business of their lives. This includes behaviors aimed at meeting subsistence needs, interacting with others, following cultural traditions or habits, or adhering to cultural beliefs. Behavioral regions are composed of *functional regions*. A functional region is an area within which a specific activity takes place with enough regularity to leave a pattern in the archaeological record. At the nucleus of each functional region is a *centralizing mechanism*. A centralizing mechanism is some type of resource, natural or social, that causes people to move about the same area or return to the same place repeatedly.

Behavioral regions and the functional regions that comprise them do not necessarily correspond to features of the geographic landscapes on which they are situated. This is because functional regions are likely to crosscut or overlap one another in many ways and at many different levels. Thus a behavioral region is amoeba-like; it has boundaries, but boundaries that are flexible and permeable that may shift across the landscape as people, materials, and ideas move between and across geographic regions (see discussion of regions in Dewar 1991; Dewar and McBride 1992; Kantner 2005; Wandsnider 1992). Moreover, it is expected that a behavioral region will extend across several geographic regions because significant centralizing mechanisms tend to be somewhat rare and more widely spaced (Smith 1976).

Behavioral regions exist because human behavior is necessarily patterned. The patterns we create and follow are products of the human cognitive process and human perceptions of space; they are how we recognize and interact with the social and physical environments within which we live (Garling and Golledge 1993; Golledge 1987; Kaplan and Kaplan 1982; Matthews 1995). Because of this, we know how to get to and from work, where to go for food or water, where to look for mates, where to worship, and where to vote, among other things. Without patterned behavior, we would simply wander aimlessly with only chance encounters with each other or the necessities of life. Our patterns are created by behaviors that are socially defined, thus grounding them in our personal and cultural histories. Although these behaviors are sometimes less than optimally adaptive or even possibly maladaptive, they are neither random nor experimental in nature.

One of the most important but often most challenging tasks faced by anthropologists is the identification of patterns initially. Observed too closely, patterns are difficult to see. Sometimes, only when data are viewed from a sufficient 'intellectual distance' will patterns appear. It is as though the patterns of human behavior are sometimes written in invisible ink; certain reagents may be required to reveal them. One such reagent I call upon is *regional analysis*. By examining archaeological data that are reasonably attributable to economically and socially motivated behaviors, I present a regional analytical model that will delimit and help explain a behavioral region. The data used to illustrate the model are derived from my own research and that of others, which has delved into the lives of the people who lived on the southern Park Plateau between about A.D. 300 and 800.

Regional Analysis

The principles underlying regional analysis are attributable to J. H. von Thünen, a German economist who devised a model to demonstrate how market processes determine land use (von Thünen 1826 [1966]). Later, Christaller (1933), Lösch (1954) and G. Skinner (1964, 1977) expanded upon von Thünen's model, reversed several of his assumptions, and developed central-place theory, a tool of economic geography that is applicable to studies of the spatial patterning of market economies (Hassig 1985). One of the underlying tenets of regional analysis is that central places are hierarchically organized and that they interrelate in patterned ways (Hassig 1985:69). Central-place patterns are based on the distances people will travel to obtain various goods or services. In essence, regional analysis and central-place theory are based upon patterns of human economic behavior in relationship to the landscape (Hassig 1985; Smith 1976).

Geographic and Functional Regions

In its broadest sense, a region is merely an area defined in such a way that it can be distinguished from other areas. The two most commonly studied regions in economic geography and economic anthropology are geographic and functional regions.

A *geographic region* is a region based upon observable and measurable similarities or differences in physical geography that allows us to distinguish mountains, plains, foothills, deserts, areas of comparable rainfall, plant communities, and natural resources. Plotting geographic regions allows us to delimit areas across the landscape with major and minor variations on, above, and beneath the ground, that in turn help us compare features between areas. Consequently, defining a behavioral region requires that we begin with a description and evaluation of the geographic regions rationally believed to underlie it, including the resources available there. This can be accomplished by conducting a resource analysis that may incorporate or extend across several catchment basins.

A *functional region* is a region that can be shown to exist specifically by reference to human interaction with others or with the environment. Functional regions may be defined by reference to dialects, diseases, markets, religions, technologies, ethnicities, politics, or any combination of economic or social factors (see Noronha and Goodchild 1992; Sangren 1987; Smith 1976). The behaviors that generate functional regions are, therefore, motivated either by economic or social interests. I define *economically motivated behaviors* as those behaviors that produce *economic functional regions* borne of human-environment and human-human interactions that take place a) in efforts to meet the material needs or desires of life or b) to solve the problems of life by technological means. Economic functional regions (often subsistence-based) tend to form around natural resources, which I categorize as either local, quasi-local, or non-local. I define *socially motivated behaviors* as those behaviors that result in *sociofunctional regions* that take shape as people follow accepted (or required) cultural norms, values, beliefs, or traditions within their own society, or through regular interactions with other groups. Social behaviors are thus tethered to group history and to interactions with outsiders. Moreover, these historically grounded social and cultural values, beliefs, and norms persist and continue to be transmitted from generation to generation possibly because they have adaptive value as well (see Bettinger 1991).

Centralizing Mechanisms

Economically and socially motivated behaviors share a common element; they both involve centralizing mechanisms. A *centralizing mechanism* is anything that attracts people to a certain place at a certain time for a specific reason. Centralizing mechanisms become the nuclei of human activities, whether economic or social in nature, and thus each centralizing mechanism represents the core, or basis, of a functional region.

For some geographers and economic anthropologists, centralizing mechanisms in market societies are those things, features, or people that cause certain places to rise to prominence in a hierarchy of marketing forms (e.g., Christaller, Hassig, Lösch, Skinner, Smith, and von Thünen, discussed above). A single significant centralizing mechanism, or a number of centralizing mechanisms taken together, will result in a pattern of activity as people move around, to, and from them. I categorize centralizing mechanisms as either related to economic behaviors or social behaviors. For economically motivated behaviors, centralizing mechanisms are natural resources. In this case, a centralizing mechanism might be compact and specific; a natural resource like a watering hole, a clay deposit, or a lithic quarry. Similarly, it may be more broad; a resource area like a hunting ground or gathering area for wild foods. Centralizing mechanisms related to social behaviors are more likely to be based on ethnicities, cultural ties or affiliations, styles, religions, technologies, politics, or any variety or combination of social factors, including pressures from neighboring groups. For example, the everyday realities of life foster gatherings based upon kinship, trade, or the acquisition of mates. Social alliances must be forged and maintained as safety mechanisms in times of war or famine; ties that are usually established in advance. Importantly, those ties will likely extend beyond the local geographic region, because in the case of drought, for instance, every group living in the same geographic region will face a similar situation. Individuals, too, can act as centralizing mechanisms, as with certain religious figures, political leaders, or healers. Centralizing mechanisms may also have a periodicity about them, such as seasonally available plants for food or fiber, migratory herds or waterfowl, or an annual pilgrimage to a sacred site to reinforce ties with tradition. Trade gatherings are another type of periodic centralizing mechanism where human mobility is related to the demand for certain items, such as preferred raw materials for the production of stone tools, salt for consumption, minerals or shells for jewelry, rare birds or feathers for ritual use, or certain plant or mineral pigments for body ornamentation. Periodic trade gatherings are also efficient; they reduce the amount of travel necessary for a group to obtain those things that are essential or desirable and they can be stacked, or combined, with other activities, including visits to other central places or for the purpose of exchanging marriage partners. Isolating centralizing mechanisms is important because they determine the shape of functional regions, and functional regions determine the shape, size, and spatial orientation of a behavioral region.

We can postulate those things that might have acted as centralizing mechanisms from an analysis of the archaeological record. Evidence of repeated visits to certain localities allows one to surmise the existence of a centralizing mechanism, whether of economic or social significance. Once we have done so, we can begin to delimit the functional regions for which these centralizing mechanisms may have served as the core. For example, by describing the range of lithic resources within a geographic region and then tracing stone artifacts back to them, we highlight a centralizing mechanism (the source of those specific materials) and delimit a functional region (an area that lies between the site and the source). Likewise, ceramic manufacturing methods, hearth construction methods, or house construction techniques that can be connected with other sites or cultures that share those technological attributes will allow us to depict functional regions specific to each category of artifact or feature. These functional regions may overlap or crosscut one another, but in each case they will make connections between archaeological sites and centralizing mechanisms that can be demonstrated graphically.

Practice Theory and the Behavioral Region

Economically motivated behaviors are those behaviors that we can surmise from an analysis of the archaeological record through a variety of environmental-functionalist approaches. However, environmental-functionalist explanations are unlikely to fully account for human behavior in any region, and this is especially so in resource-rich environments like those found in the Cimarron District. What is missing in a purely environmental-functionalist analysis is reference to the socially motivated behaviors that might have influenced the archaeological record. To gain possible insights into these behaviors, the behavioral regions approach incorporates principles of practice theory.

The patterns of behavior that eventually come to define a behavioral region are grounded in the perspectives and perceptions of individuals and groups of individuals looking out across their social and physical landscapes in ways that are shaped by personal and cultural histories. People perceive their environments, social and physical, in three, often overlapping or interconnected ways; through their senses, through the descriptions of others, and through their own beliefs. Stated differently, there are things we know to be true, things that others have told us to be true, and things we believe to be true. Human behavior thus is a reflection of the culture of which it is a part; it reflects the learned and shared knowledge, values, and beliefs of the society of which it originates.

Likewise, the regions within which people see themselves as being situated, individually and as groups – the home region, the hunting region, the trade region, and so on – are products of the way people think about space, how they are situated within it, and their relations with other groups (see Raitz and Ulack 1981). From this perspective, a region is a product of human cognition; it is a socially constructed reality that can be experienced, although parts of it may only be experienced intellectually. To use a modern example, there are few of us that have physically explored the fullest extent of the regions within which we live. Even though the friction of distance (see Hassig 1985) is reduced by our modern conveyances, it would take a considerable amount of time to fully explore the full spatial extent of our social regions even if we cared to. We nonetheless develop perceptions, thoughts, feelings, and even identities based upon these regions, including the generalized customs and habits of those with whom we share them. In this sense there are large portions of the regions within which people live that exist as mental constructs only. More importantly, people behave in ways consistent with how they perceive themselves to be socially or culturally situated, and in ways consistent with how they perceive their regions to be situated within a network of even larger regions. Thus human beings might be considered actors on an environmental stage, but whose culture and history largely dictate how they live their lives, and even how they think about them. If true, then it would be rare for a person to ever truly escape his or her own socially-constructed reality. When attempting to do something new, to act differently, to solve a problem in a novel way, or to venture into uncharted intellectual territory, people are unable to leave their ports of call without all of their historical baggage packed closely by their side. On those occasions when people leave their home region and move to a new one, whether in search of new opportunities or to escape social or environmental upheavals, the first thing they do when they arrive is to unpack the baggage of their personal and cultural histories. With preexisting worldviews intact, people build shelters the way they know how, fashion stone implements using the technology they understand into styles with which they are familiar, and view the landscape and use its natural resources in ways they already understand.   Accordingly, our actions and our behaviors – the daily practices of our lives – are reflections of our histories and worldviews (Bourdieu 1977, 1985, 1990; Lightfoot et. al 1998; Ortner 1984), and thus offer insights into the historical nature of our decision-making processes, our cultural influences, and our social histories, both at the local and regional levels. Our practices produce patterns that are historically grounded, and so the patterns of behavior that we see reflected in prehistoric contexts are content-laden, whether at the level of the functional region or the behavioral region.

This has important implications for archaeologists. First, we cannot discuss archaeological sites in isolation or simply in relation to their immediate environments. A site, or even a group of sites, is only the most obvious feature of a series of patterned behaviors that have a regional context. Second, although archaeological data should be evaluated from an environmental-functionalist perspective, this is only the first step in a thorough analysis. It is only by also examining archaeological sites and the artifacts they contain from a historical and regional perspective that we may determine how and why those sites came into existence and how they relate to other sites within the broader behavioral region.

Practice theory is not presented in opposition to environmental functionalism, but instead as ancillary to or as a logical extension thereof. Practice theory neither rejects or refutes materialists approaches (Morrison 2002). Instead, it depends upon carefully collected materialist data to make broader connections through time and across space (see Hodder 1991; Robb 1998; Roscoe 1993; Shanks and Tilley 1987). The behavioral regions approach advocated here specifically incorporates an environmental-functionalist perspective that is complimented by practice theory.

Reconstructing and Explaining a Behavioral Region

The first step in reconstructing and explaining a behavioral region is to describe the geographic region or regions upon which it is rationally believed to be situated. In so doing, we plot natural resources and consider resource availability consistent with the type of environmental-functionalist analysis we intend to employ. Second, archaeological data must be recovered and evaluated in such a way as to determine the extent, number, and types of likely centralizing mechanisms that are present, together with their proximity to the sites and their possible connections to one another. Centralizing mechanisms are always related to economic or social activities, or both, and so evidence of these activities can be gleaned from the recovered data, specifically including data indicative of technological organization. Third, the functional regions that form around these centralizing mechanisms must be plotted collectively to reveal the spatial parameters of the overall behavioral region. Finally, these data are examined by reference to the historical practices of known groups in neighboring regions. The reconstruction of a behavioral region is thus an ongoing, dynamic process, and its shape will change as new data are gathered and assimilated.

What A Behavioral Region Might Look Like

The shape of a behavioral region begins with the centralizing mechanisms around which functional regions form. The boundaries of a functional region are largely determined by the way people perceive and act within their own geographic region or regions, taking advantage of opportunities in one instance but not in another – based in large part on their own histories, or practice. Figure 1.2 depicts a simple, hypothetical geographic region on a featureless plain (circular) overlain by a number of randomly distributed features on the landscape, any of which could serve as centralizing mechanisms. People would be drawn to these mechanisms at specific times for specific purposes. Correspondingly, there should be evidence of repeated interactions with these centralizing mechanisms. Figure 1.3 depicts the same geographic region together the functional regions that would result if the hunter-gatherer group in question operated from a single dwelling and moved to and from individual centralizing mechanisms with some degree of regularity. Of course, in reality visits to nearby centralizing mechanisms would probably be combined for efficiency. Figure 1.4 depicts what functional regions might look like if a single hunter-gatherer group moved from dwelling to dwelling. Several

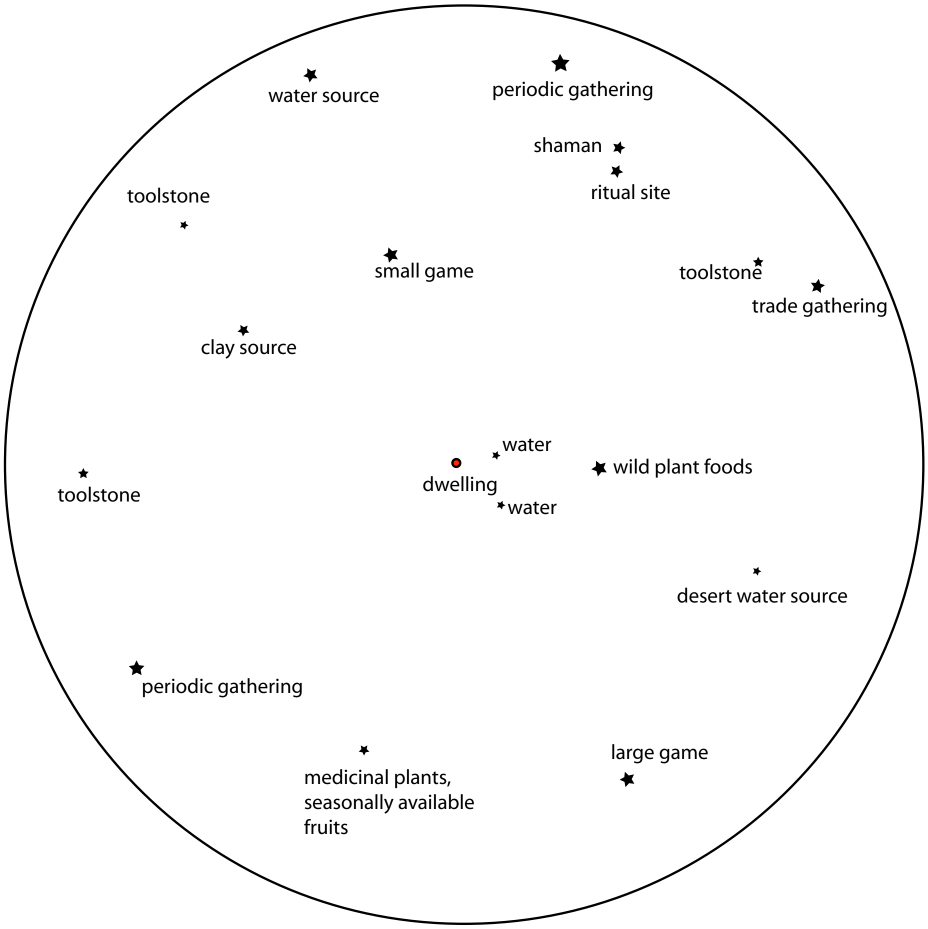

Figure 1.2 Typical centralizing mechanisms within a hypothetical geographic region. In this region, the boundaries are arbitrary and the centralizing mechanisms are randomly dispersed.

periodic centralizing mechanisms are depicted, including the location of a shaman, a ritual site, and several places for trade gatherings. From this illustration, we begin to see how the distribution of centralizing mechanisms influences the formation of functional regions, and how functional regions may overlap or crosscut one another. Although people normally tend to use those resources closest to them because of the reduced labor costs of acquiring them, they may also move about because of social mechanisms such as trade gatherings or visits to ritual spaces, and those trips may be made from any place within the geographic region.

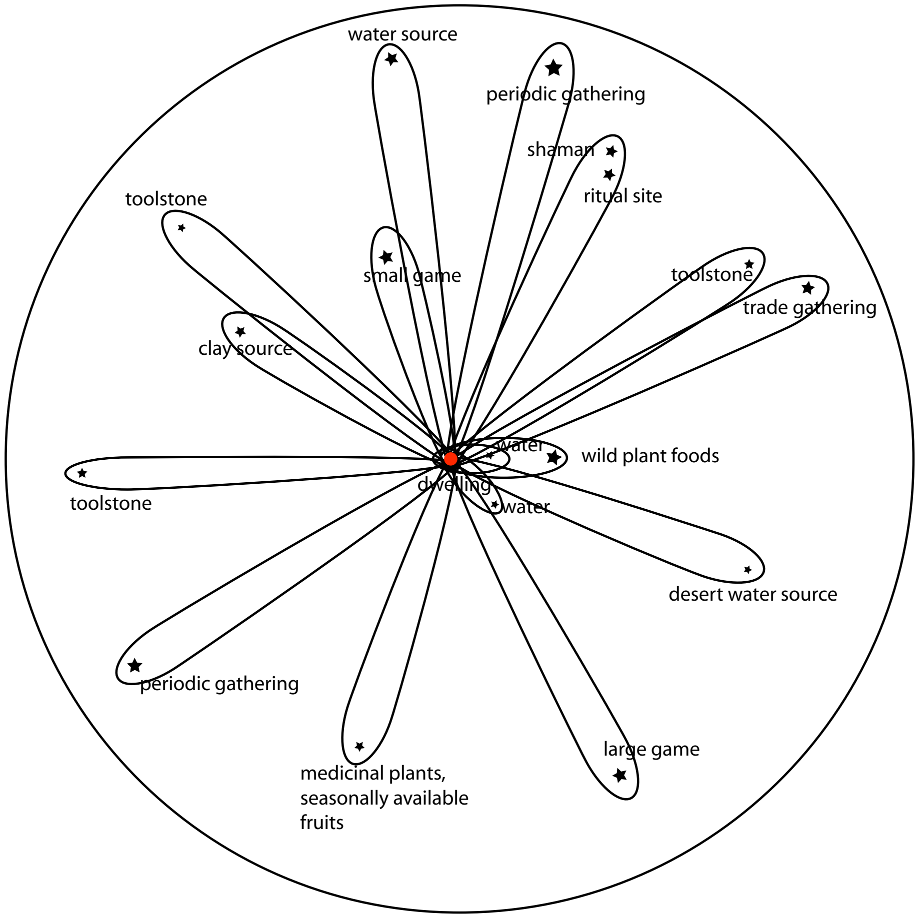

Figure 1.3 Functional regions form as people move to and from centralizing mechanisms. In this simplified example, only a central dwelling is used and trips to and from centralized mechanisms are not combined with other activities.

Figure 1.5 depicts what a behavioral region might look like based upon an analysis of natural resources, collected archaeological data, inferences regarding the location and nature of centralizing mechanisms, and reference to neighboring groups. As mentioned, a behavioral region is a collection of functional regions patterned against the background of one or more geographic regions within a given time frame. It is a bottom-up, behavior driven pattern of the movements of people, materials, and ideas across the landscape. Its shape will reflect not only their responses to available resources, but also the group's perceptions about what those resources are, how they ought to be used, their perceptions of the geographic

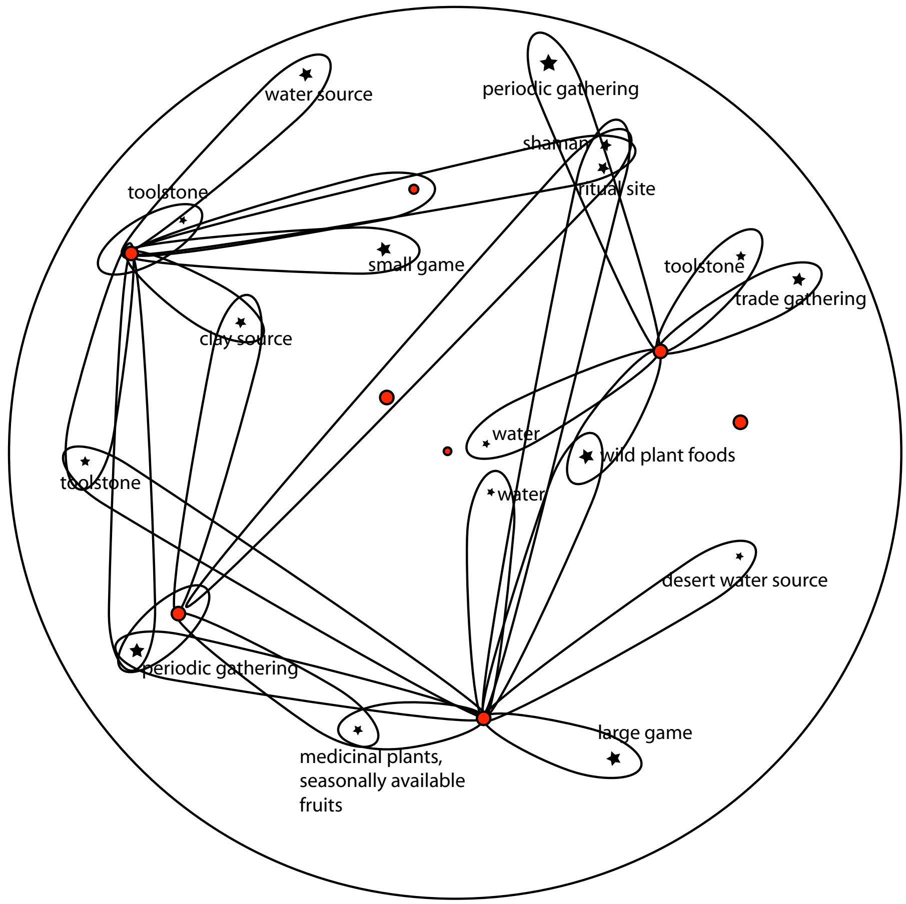

Figure 1.4 Functional regions overlap due to movements across the landscape and because of social obligations to attend certain periodic gatherings for trade or ritual purposes. The functional regions theoretically depict the known range of movements of the group.

extent of their region, and where the regions of "outsiders" begin. In other words, the shape of the behavioral region is dictated in part by behaviors that are wholly social, cultural, political, or religious in nature, which may have little, if anything, to do with resources.

Behavioral Regions and Other Spatial Approaches

The behavioral regions approach differs from other spatial approaches in that it is broader in scope and incorporates practice theory. Yet, at the same time it draws from and compliments other approaches. For example, the landscape paradigm advocated by SWAC in the Vermejo River drainage acknowledges that

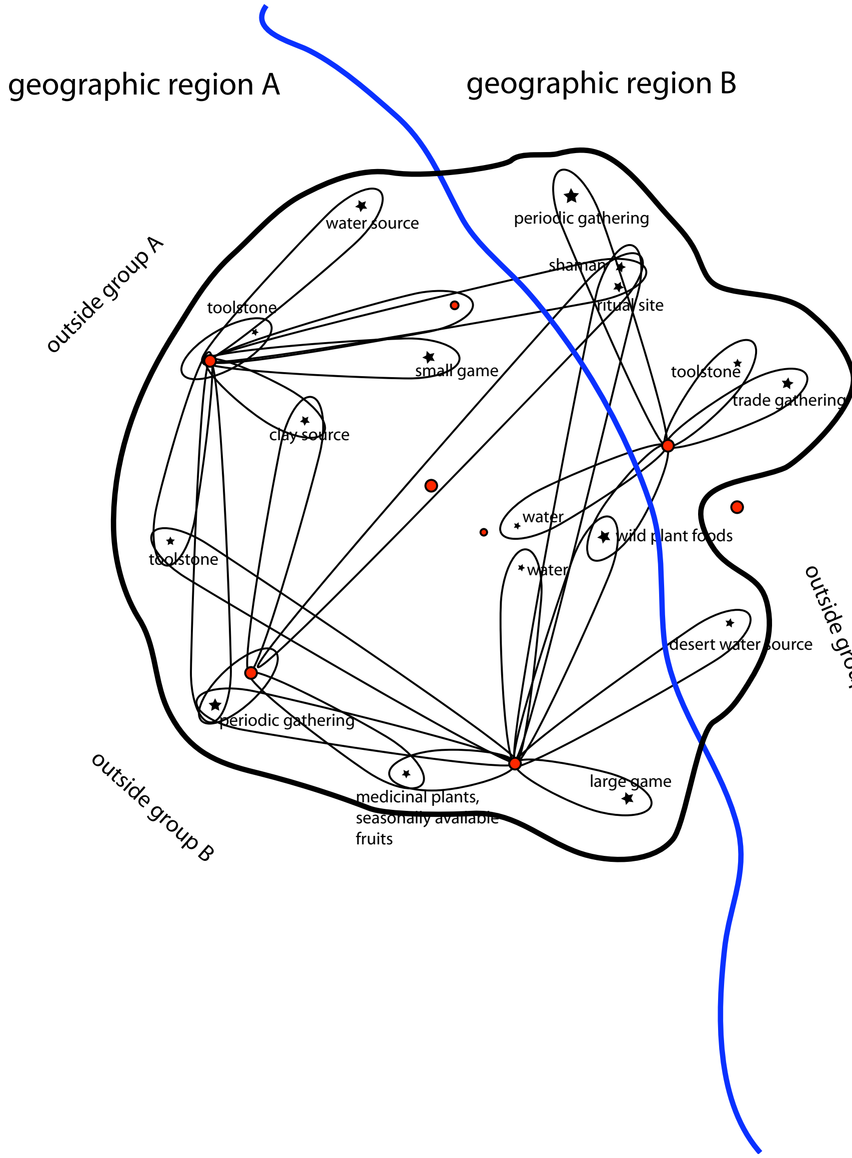

Figure 1.5 What a behavioral region might look like given available natural resources, the perceptions of how those resources might be used, the functional regions that form as people move to, from, and around them, and the strictures on the region imposed by the behavioral regions of neighboring groups.

through regular daily activities people transform the physical landscape in ways that are meaningful to them, and so there should be measurable linkages between the physical and archaeological landscapes. The landscape paradigm is presented as a "synthetic, integrative, historical framework for evaluating human behavioral change" (Anschuetz et al. 2001:16). In practice it was difficult to operationalize, in part at least, because it did not provide a mechanism for connecting people, ideas, and resources. Moreover, the physical and archaeological landscapes were never illustrated or depicted in relation to one another. As a result, one of the major conclusions drawn from SWAC's landscape paradigm analysis - that the Vermejo drainage's inhabitants were intruders from the Great Plains, is only weakly supported. Had the behavioral regions approach been employed using the same data, it would have depicted the patterns of behaviors graphically, and it would have considered the sources of some of those behaviors from the perspective of history, as the landscape paradigm approach originally lauded.

Another spatial approach to archaeological investigations is catchment analysis. Vita-Finzi and Higgs (1970:5) were the first to introduce the idea, which they define as "the study of the relationships between technology and those natural resources lying within the economic range of individual sites." More recently, it was described as an area of natural or human resources exploited by a group (Christopherson et al. 1999:1-2). Although the catchment model has evolved somewhat through the years, catchment studies continue to focus on natural resources and the energy required to utilize them. According to Roper (1979:120) catchment analyses emphasize "the availability, abundance, spacing, and seasonality of plant, animal, and mineral resources as important in determining site location." Most catchment studies are premised on the belief that a) human behavior is generally optimized, and b) that distance is equal to energy and therefore there is a point beyond which the energy required to obtain the resource exceeds its energy return, and so there is a measurable limit to which people will travel to obtain those resources (see Duncan 2002:98). Humans are not always rational actors, however, and energy expenditure in relation to return is not always the central driving force behind actual behaviors, nor should it be assumed to be so. In addition, catchment studies are generally, although not always (see Brooks 1986), top-down and arbitrary (Orcutt 1981:13). This is because it is the researcher who delimits a section of the landscape to measure its resource potential (see Hunt 1992; Tiffany and Abbott 1982). Indeed, the shape of an archaeological site catchment is determined by how the researcher intends to use the data. For example, catchment study areas may be square (Davidson and Green 1989; Gorenflo and Gale 1986; Nicholas et al. 1986), circular (Kintigh 1985; Pauketat 1989), or isochronic (Bailey and Davidson 1983; Jarman, et. al 1982; Stone 1991:343). Square catchment configurations are employed largely for analyses of regional marketing forms (Stone 1991:342). Circular catchment areas are useful on a relatively flat plain where distance and energy are the primary variables. In uneven terrain, however, the isochronic method is most fruitful because it considers time and energy instead of distance. As discussed in Chapter IV, several site catchment analyses were conducted in the present study to help assess resource potential and to compare the site catchments with the overall behavioral region.

The behavioral regions approach compliments both the landscape and catchment approaches because it is a bottom-up behavior-driven assessment of human activity that specifically examines the possible roles of social and cultural factors that might contribute to the ways in which catchment and extra-catchment resources are perceived and used. Any approach, spatial or otherwise, that overly emphasizes the role of natural resources and human adaptations to them will necessarily diminish our understanding of the human social systems that largely conditioned those activities in the first place. In areas of relative resource abundance, people do not live like squirrels scrambling to gather every nut and seed. Beyond the essentials - water, food, clothing, shelter, fuel, and medicine - the motivations for human behavior are many, varied, and complex, and in even these areas there are innumerable ways to satisfy them. If our objective is to understand human culture, then we simply cannot limit our research to a single dimension of the human experience. Instead, we must expand our research in every way possible to gain insights into meaningful culture, not just material culture.

Because it takes into account emergent properties[1], the behavioral regions approach offers a macro-level perspective derived from an examination of local-level processes. At the level of the behavioral region, the seemingly confusing, often crisscrossing patterns of individual functional regions dissolve into an integrated whole, revealing an overall pattern of human activities. In the end, the patterns reveal process.

Summary and Conclusion

A behavioral region is a complex, overlapping, often crosscutting group of functional regions that is a reflection of patterned economic and social activities

[1] Emergent properties are macro-level properties that come about through the interactions of a number of micro-level processes that produce behaviors or patterns of behavior that are neither attributable to, nor explainable by reference to, any single micro-level entity or process (see Cottrell 1977).

played out against one or more geographic regions. Its parameters are defined by the extent to which people will travel or otherwise project their range of social relations in order to satisfy the material and social needs of their lives. A behavioral region does not exist as a physical reality, but as a behavioral reality with material correlates. It is derived from our perceptions and interactions with the social and natural environments within which we live. It may expand or contract through time, and so it has a temporal as well as spatial character.

A behavioral region is composed of functional regions. Functional regions are products of human behavior that take shape around one or more centralizing mechanisms, which themselves may have a periodicity about them. Functional regions can be identified by reference to variables within two domains of human behavior, the economic and the social, set in their proper historical contexts. Activities that are economically motivated produce patterns of behavior as people go about the business of meeting the material needs and desires of life, often by solving problems by technological means. Activities that are socially motivated produce patterns of behavior consistent with history, experience, and how people see themselves situated on their physical and cultural landscapes. They manifest themselves in our patterned behaviors as we move between centralizing mechanisms of varying degrees of import and complexity.

An example of what I call integrative-processualism, the behavioral regions approach is a model for discerning human behavior that will give perspective to spatial data that relate to economic and social activities, strengthening inferences drawn from the data associated with those activities. It is a conceptual umbrella beneath which a number of theoretical and methodological approaches may be explored, and within which a variety of hypotheses tested.

That behavioral regions exist is not in doubt. How they form and on what basis they are constituted is the question. By pulling together data from two primary domains of the human condition (economy and society) and placing them in their proper historical contexts, it is expected that the extent, spatial and temporal, of the behavioral region can be approximated. Thus, a behavioral region is a reflection of the interplay of environment, culture, individual actors, and the daily practices of life. In then end, it is human process revealed.

Organizational Notes

In Chapter I, I introduced the behavioral regions approach and suggested ways in which it might be employed in an archaeological context. In Chapter II, I describe the geographic regions within which the behavioral region takes shape. Plant and animal communities are described together with soils, geology, and geographic regions. Chapter III presents an overview of prior research in the area and a discussion of regional chronology as it stands today. In Chapter IV, I describe field methods, lab methods, site descriptions, excavation strategies, and catchment resources. In Chapter V, I discuss expectations and findings. Chapter VI is where I present my interpretations and conclusions, together with suggestions for future research.

Chapter II: Geographic Regions

Introduction

The Poñil study area in northeastern New Mexico's Colfax County (see Figure 1.1) lies at the heart of what Glassow (1972a) describes as the Cimarron District, which, like the river, is named after the historic village of Cimarron. Cimarron was a waypoint, and a destination unto itself, along the Mountain Branch of the Santa Fe Trail as it brought settlers and itinerant merchants into the region. In Spanish, "Cimarron" means "untamed" (Smead 2004:63), a term that accurately describes the landscape and the people who once lived, and who continue to live in a place where land wars, outlaws, famous writers, adventurers, determined ranchers, and many honorable people of a variety of ethnicities have etched their respective places into the history of the region (Zimmer 1999; Zimmer and Walker 2000). To this day, many people refer to the region simply as "the Cimarron Country."

The Geographic Regions

New Mexico is comprised of four primary geographic regions: the Great Plains, the Rocky Mountains, the Basin and Range Region, and the Colorado Plateau. The two geographic regions pertinent to this study are the Great Plains, which cover roughly the eastern third of the state, and the Rocky Mountains that extend from Colorado southward into north-central New Mexico as far south as Santa Fe.

Situated along the southern terminus of the Park Plateau, which serves as a buffer zone between the plains and the mountains, the study area sits on the western margin of the Raton section of the Great Plains physiographic province (Figure 2.1). A physiographic province is a large region of land that exhibits relative uniformity in geology, landform, and vegetation. The Raton section is made up of three plateaus: the Park, the Chaquaqua, and the Las Vegas. The Chaquaqua and Las Vegas Plateaus abut the eastern and southern portion of the Park Plateau along the Trinidad Escarpment where together they form the Raton Basin. The Park Plateau is the highest of the three, rising in places up to 305 m (1000 ft) above its neighboring plateaus (Fenneman 1931; Robinson et al. 1964).

More specifically, the Park Plateau is a low, 64 km-wide (40 mi) upland landform that extends from Ute Park, New Mexico eastward to the Raton Mesa, and then northward more than 113 km (70 mi) into Colorado where it abuts Colorado's Spanish Peaks (Robinson et al. 1964). Near its eastern and southern boundaries, the Park Plateau gives way to the Great Plains via 150 m to 300 m (500 to 1000 ft) escarpments (Fenneman 1931), which are essentially canyonland interfluves. To the west, the Park Plateau drains the Cimarron and Sangré de Cristo Mountain ranges and spills out onto the Great Plains, where the Poñil, Gachupin, and Van Bremmer creeks, as well as the Cimarron[2] and Vermejo Rivers, all eventually become part of the waters of the Canadian River about 32 km (20

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2 The Cimarron River referred to here is not to be confused with Oklahoma's Cimarron River, which originates further northeast and is known in New Mexico as the "Dry Cimarron."

mi) to the east. The Canadian River then meanders in a southeasterly direction through Texas and Oklahoma before it finally empties into the Arkansas River.

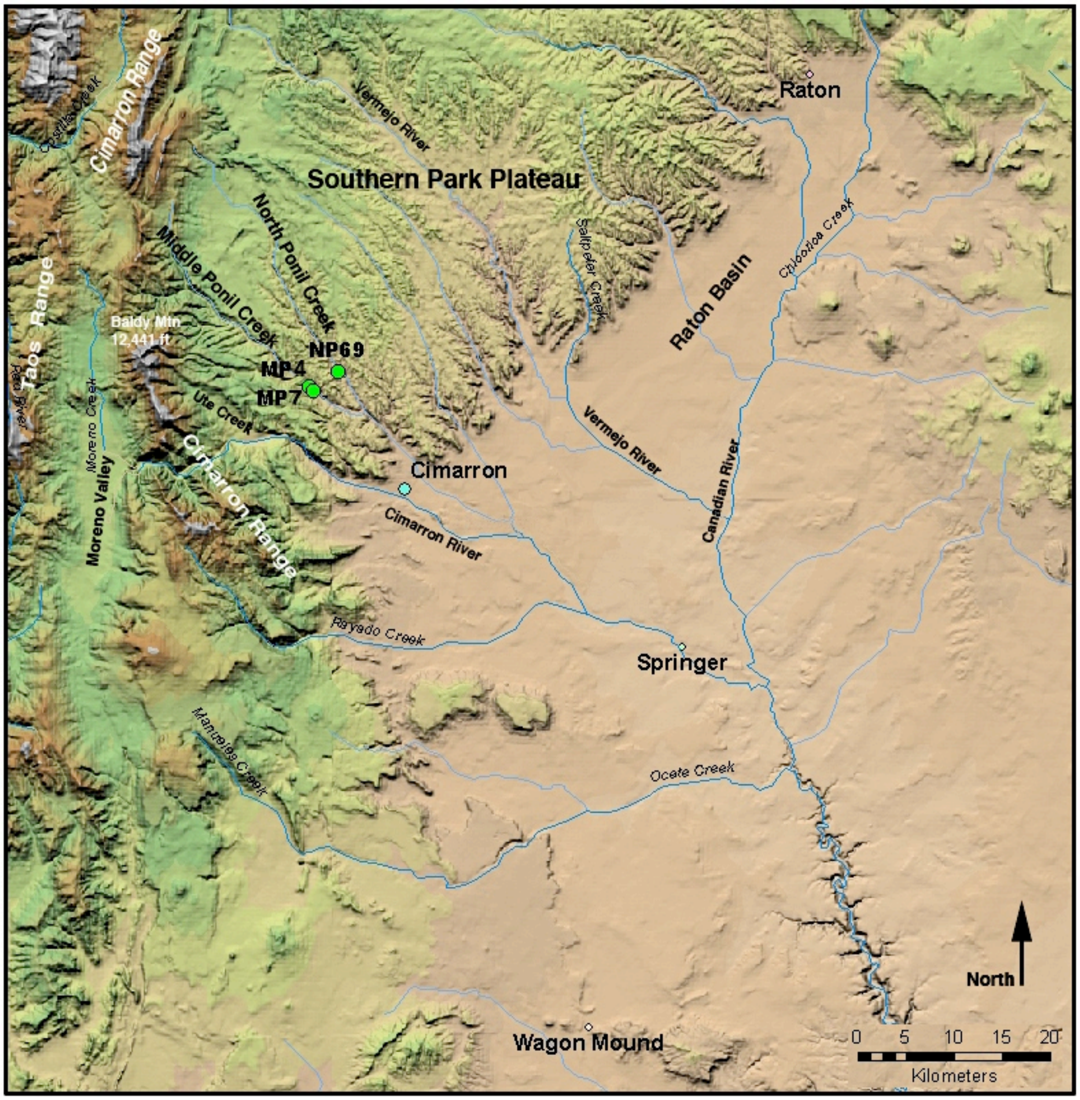

Figure 2.1 The Southern Park Plateau in relation to the three sites investigated (MP-4, MP-7, and NP-69. GIS base map obtained from the New Mexico State Office of the Bureau of Land Management, Albuquerque (used with permission).

Hydrology of the Poñil Drainage

The Poñil drainage is one of many deeply incised canyon systems etched into the Park Plateau. The Poñil drainage is made up of three separate creek systems: the South, Middle, and North Poñil (see Figure 2.1). The South Poñil originates on Baldy Mountain's (3,792 m; 12,441 ft) eastern flank, from which it tumbles rapidly East-Northeast across Cretaceous and Tertiary sandstones until it joins the Middle Poñil Creek near Philmont's Poñil Camp (Robinson et al. 1964). The Middle Poñil drains Bonita and Horse Canyons, which opens to the high country several miles to the northwest. About 8 km (5 mi) east of Poñil Camp, the Middle Poñil is joined by the North Poñil Creek, which drains a portion of the Carson National Forest's Valle Vidal Unit and the North Poñil Canyon. At least one portion of this alluvial system is perennial; the combined waters of the South and Middle Poñil always flow, although flow was severely diminished during the drought of 2002. When only 1.27 cm (0.5 in) of rain fell during a six month period during 2002, the North Poñil Creek ran dry. However, shallow pockets dug experimentally into the streambed filled within minutes, suggesting that even during a severe drought the North Poñil Canyon was habitable, provided that other resources were available. A tributary of Poñil Creek, Chase Canyon, which enters the stream system about 1.6 km (1 mi) southeast of the North Poñil, is intermittent even during normal periods of rainfall, although the narrow canyon is subject to severe flash flooding. From the point where all three creeks combine, they are known simply as Poñil Creek, which flows onto the broad lower valley where the slowing waters deposit their rich sediments onto the historic Chase Ranch. Exiting the Chase Ranch at US Highway 64, Poñil Creek leaves the Park Plateau and moves onto the Las Vegas Plateau and into the Raton Basin. Several miles further southeast, the Poñil joins the Cimarron River near the headquarters of the historic CS Ranch.

The Poñil study area is situated so closely along the western margin of the Great Plains physiographic province that local landforms, climate, and vegetation are more strongly influenced by the neighboring Southern Rocky Mountain physiographic province. The Southern Rocky Mountain province is represented largely by the Sangré de Cristo Mountains that extend into New Mexico from Colorado as two high ranges; the easternmost the Cimarron Range and the westernmost the Taos Range (Hawley 1986:24). The two ranges are separated by the Moreno Valley, a high, broad, gently sloping watershed perched more than 2,438 m (8,000 ft) above sea level. The Cimarron River, the major waterway in the immediate study area, emerges from the Moreno Valley and plunges sharply eastward through Cimarron Canyon. About 16 km (10 mi) west of the Village of Cimarron, the Cimarron River is joined by the waters of Ute Creek, which drains a large area of the eastern flank of the Cimarron Range. The archaeological significance of this immediate proximity to the Southern Rocky Mountain province is that the early inhabitants of the area would have access to a considerable variety of natural resources relatively close at hand, including lithic resources carried into the region by the Cimarron River.

Overall, the landscape changes dramatically in the study area as it transitions in a step-like fashion over about a 16 km (10 mi) span. Approaching from the east, the Plains gradually rise to approximately 1,950 m (6,400 ft) in the

Village of Cimarron, which sits on the edge of the Las Vegas Plateau. Just 1.6 km (1 mi) north of town, the Las Vegas Plateau gives way abruptly to the Park Plateau, where it rises to about 2,195 m (7,200 ft). About 16 km (10 mi) to the west, the Park Plateau abuts the Cimarron Range, rising to more than 3,657 m (12,000 ft). As one approaches the study area from the east, the abruptness of the elevation change combined with the significant changes in environment and geology make it strikingly obvious that this landscape would have provided enormous diversity for its early inhabitants.

Regional Geology

Geology in the region is complex due to variations in both tectonic and erosional processes. Accordingly, one encounters significant geologic diversity among the three main components of the local landscape (mountains, plateau, and plains).

The Sangré de Cristo Mountains, including the Cimarron Range, were formed approximately 25 million years ago. Created during the development of the Rio Grande Rift, they formed mostly as fault block structures (Muehlberger and Muehlberger 1982). This range includes some of the oldest rocks in the area, including Precambrian schists, quartzites, and granites. Today, sheet-like bodies of sedimentary and igneous rocks stand upended, or tilted, as a result of the uplift that formed the range.

Baldy Mountain (3,792 m; 12,441 ft) (see Figure 2.1) is covered by stream-laid sediments of Late Cretaceous and early Tertiary origin, including the Poison

Canyon and Raton Formations. Several Tertiary igneous intrusions, comprised mostly of dacite porphyry, porphyritic andesite and lamprophyre, cut into the Baldy landscape as sills and dikes. Underlying Baldy's modern surface are more sedimentary rocks, mostly marine in origin, of the Mesozoic era. These include the Vermejo, Trinidad, Pierre, Niobrara, Carlisle, Dakota, Morrison, and Entrada Formations, all underlain by the Dockum Group (Robinson et al. 1964).

Although sitting atop the same Mesozoic formations as Baldy Mountain, neighboring Touch-Me-Not Mountain's (3,671 m; 12,045 ft) modern surface differs considerably. Touch-Me-Not lacks the Late Cretaceous and early Tertiary sandstones. Instead, it is largely covered by Tertiary igneous rocks mostly in the form of sheet-laid dacite porphyry.

To the south of Touch-Me-Not Mountain lies Clear Creek Mountain (3,452 m; 11,326 ft). However, a deep v-shaped canyon cut through the Cimarron Range by the Cimarron River separates the two. Clear Creek Mountain is almost wholly comprised of Precambrian metamorphic rocks; mostly gneiss and schist.

As one travels east and south of the study area, the same sedimentary rock types that make up much of the Cimarron Range are also found on and beneath the Raton Basin. However, the surficial geologic variation among the mountains, plateau, and plains is considerable. This has important archeological significance and will be addressed in a subsequent chapter.

Geology of the Poñil Drainage

The landscape more specific to the Poñil study area is dominated by the Poison Canyon and Raton Formations, which in some places are graded and other places distinctly bedded. Raton Formation sandstone is fine-grained and yellow in color. Fossilized imprints of ferns, evergreens, and flowering trees are occasionally visible within the Raton Formation sandstones. Poison Canyon sandstone is coarse-grained and generally light yellow to gray in color and includes a considerable amount of conglomerate (Robinson et al. 1964). At the mouth of Chase Canyon, light gray Trinidad sandstone, once ocean bed, is now visible along the cliff faces. In places, the Poison Canyon and Raton sandstones have become so indurated, or hardened, that they resemble true metaquartzites. These materials are visible in outcrops above the high terraces, are somewhat knappable, and have been used prehistorically for toolmaking, albeit to a limited extent. Sediments from both the Poison Canyon and Raton Formations are washed into the Poñil drainage system and thus contribute to the soil formation along the Lower Poñil and further onto the Raton Basin.

Intermingled with the sandstone formations is the Pierre Shale Group. Pierre shale is a black marine shale containing lenses of orange-stained limestone and several thin layers of orange shale composed of altered volcanic ash (Robinson et al. 1964). Marine fossils are regularly visible within many areas of the Pierre Shale Group. On Baldy Mountain's eastern flank, Pierre shale was thermally altered by several Tertiary dacite intrusions. Once thermally altered, the shale is known as “hornfels,” and is one of the only sources of good knappable materials found within the study area. Through several streambed surveys, I established that hornfels does not occur naturally in the South, Middle, or North Poñil Creeks, although I found it in abundance on the southeastern slopes of Baldy Mountain and all along the bottom and banks of Ute Creek. The highest bedrock source recorded was at 3,139 m (10,300 ft) (Figure 2.2), although large cobbles and boulders, all

Figure 2.2 A bedrock source of Cimarron hornfels at 3,139 m (10,300 ft) on Baldy Mountain, discovered during the 2000 survey. This biotite hornfels formed in a number of places where dacite intruded into the Pierre Shale Group.

bearing their distinctive 120˚/60˚ fracture planes, were recorded as high as 3,749 m (12,300 ft) on Baldy Mountain. Hornfels is transported from the flanks of Baldy Mountain to the Cimarron River via Ute Creek in the form of cobbles and boulders (Figure 2.3). A second source of hornfels was recorded during the summer of 2005 near Ute Gulch, presumably formed by dacite intrusions similar to those that created the hornfels on Baldy Mountain. Because this material would likely form anyplace within the immediate region where dacite contacted shale, I now refer to all the regional shale-based hornfels as "Cimarron hornfels."

Hornfels is a geologic designation for rocks that have been thermally altered and, through that process, transformed from their original soft and platy character into a hard, splintery, tough, and durable stone (Sinkankas 1970). Hornfels is typically fine-grained and often shows banding from the original bedding planes. However, the properties of hornfels are such that in a well-altered specimen the banding is not likely to impair the fracture process, i.e., it is as likely to fracture across the banding as it is along it. Thus, the consistency and knappability of Cimarron hornfels is unpredictable from its outward appearance. Flintknapping experiments confirmed the highly variable quality of the stone, making it likely that prehistoric peoples would have tested cobbles at the source before transporting them to distant sites in the Middle and North Poñil Canyons. Although Cimarron hornfels is the most commonly used raw material in the study area, from the North Poñil access to a bedrock source requires a trek of about 18 km (11.1 mi) over difficult terrain.

Most of the hornfels in the study area are biotite hornfels derived from shale, and they range in color from light gray to black. The black variety, particularly when made into the very diminutive Vermejo Phase arrow points,

Figure 2.3. A large boulder of Cimarron hornfels collected from Ute Creek, south of Baldy Mountain. Note the weathering, distinctive banding, and cleavage planes.

strongly resembles basalt. However, an examination under a low power microscope makes distinguishing the two a relatively simple task.

The same dacite intrusions that altered the Pierre Shale also altered the overlying sandstones, often baking them sufficiently hard so that at two sites along the Middle Poñil (MP-4 and MP-7) these thermally altered sandstones (Figure 2.4) were used quite extensively for the production of crude flake tools. I distinguish these materials by referring to them as "thermally-altered sandstone" or "TaS."

Soils

Soils form through the combined forces of mechanical and chemical weathering of sediments. Mechanical weathering involves the physical disintegration of parent materials, but does not result in chemical changes to the

Figure 2.4 Thermally-altered sandstone from Middle Poñil Creek. This material was formed by the same dacite intrusions that converted Pierre Shale into Cimarron hornfels.

sediments. On the other hand, chemical weathering alters chemical composition of sediments making the formation of new soil products possible (Ritter 2006). Five primary variables are involved in the formation of soils: the nature of the parent material, topography, flora and faunal assemblages, climatic conditions, and time (Waters 1996).

The most common soils of the Cimarron District are mollisols and alfisols (Anderson et al. 1982). Mollisol A horizons tend to be thick, have a high organic content, and are thus suitable for dry farming. In the study area, mollisols overlay clay-rich B horizons and are found mostly in the lower valleys and plains under grassland vegetation (Anderson et al. 1982; Ritter 2006). Alfisols in the study area typically have a thin A horizon overlying an E horizon. Alfisols are more commonly found in the forested higher elevations of the study area. Alfisols have an argillic, a kandic, or a natric horizon and a base saturation of 35% or greater (Ritter 2006).

Researchers have identified a number of soils and soil variants in the neighboring Vermejo River drainage. They have found that local soil types co-vary with associated landform, with percentage of slope being an important determinative factor both in the formation of soils and the types of vegetation supported thereon (Dorshow et al. 2002) (Table 1). As in the Vermejo River drainage (see Dorshow et al. 2002), three important soil types are found in the Poñil drainage. La Brier Variant soils that occur on 0 to 5 % slopes and support blue grama, western wheatgrass, fringed sagewort, buffalograss, and three-awn. As expected, these soils are excellent for irrigated and dry farming, as well as for range animals along the Lower Poñil on the Chase Ranch. Rombo soils occur on 25 to 50 % slopes and support piñon pine, one-seed juniper, Rocky Mountain juniper, Gambel's oak, blue grama, sideoats grama, big bluestem, and mountain mahogany. Soils of this type are found on steep slopes beneath the high terraces in the Poñil drainage where southern and western facing slopes support a variety of plant species, including most of those mentioned. Northern and eastern facing slopes of 25 to 50 % grade support ponderosa pine, piñon, and Gambel's oak. Finally, Stout-Rock Complex soils occur on mesas and ridges throughout the Poñil drainage, are derived from sandstone and shale, are very permeable, and support Ponderosa, piñon, juniper, Gambel's oak, and prickly pear.

Soil Type	Description	Percent Slope	Vegetation Supported
Manzano loam	Deep, well-drained soils on valley floors and alluvial fans and swales, formed from mixed alluvium. Soils are moderately permeable.	0 to 3	Blue grama, sand dropseed, western wheatgrass, vine-mesquite, and galleta.
La Brier Variant silt loam and silty clay loam	Silty clay loam surface layer with dark grayish silty clay loam underneath. Derived from shale and sandstone. Permeability is slow with high available water capacity. Forms on flats, uplands, and depressions.	0 to 5	Non-saline: blue grama, western wheatgrass, fringed sagewort, buffalograss, and three-awn. Saline: alkalai sacaton, inland saltgrass.
Brycan loam	Deep, well-drained soils on alluvial fans and in valleys, derived from intrusive rocks, sandstone, and shale.	0 to 7	Blue grama, wolftail, prairie junegrass, bottlebrush squirreltail, western wheatgrass, Kentucky bluegrass.
Rombo-Poñil Complex	Moderately deep and well-drained on moderately steep foothills. Formed in colluvium and residuum from shale and sandstone. Permeability is slow, runoff is rapid, and hazard of erosion is high.	15 to 25	Piñon pine, ponderosa pine, Gambel's oak, Rocky Mountain juniper, little bluestem, sideoats grama, blue grama, and wolftail.
Poñil and Midnight-Poñil Complex	Deep, well-drained soils on mountainsides. Formed form alluvium, colluvium, and residuum derived from shale.	10 to 35	Piñon pine, one-seed juniper, Rocky Mountain juniper, mountain mahogany, blue grama, little bluestem, mountain muhly, and western wheatgrass.
Poñil-Rombo Complex	Deep, well-drained soils on slopes, formed on alluvium, colluvium, derived from shale, very permeable.	5 to 45	Piñon pine, juniper, mountain mahogany, blue grama, little bluestem, mountain muhly, western wheatgrass.
Rombo soils	Moderately deep, well-drained soils on mountainsides. Alluvial and colluvial soils derived from sandstone and shale. Soils are slowly permeable.	25 to 50	Gambel's oak, mountain mahogany, piñon pine, one-seed juniper, Rocky Mountain juniper, blue grama, sideoats grama, big bluestem, and little bluestem.
Midnight-Stout Complex	Very shallow to shallow, well-drained soils on mountainsides. Derived from colluvium and alluvium with sandstone and shale parent material.	25 to 65	Gambel's oak, mountain mahogany, piñon pine, one-seed juniper, little bluestem, sideoats grama.
Rombo-Rock outcrop complex	Found on extremely steep mountain slopes, formed in colluvium from shale and sandstone. Moderately deep an well-drained, permeability is slow, runoff is rapid, and hazard of erosion high.	45 to 60	Ponderosa pine, piñon pine, juniper, Rocky Mountain juniper, Gambel oak, blue grama, sideoats grama.
Stout-Rock Complex	Shallow to very shallow, well-drained soils on mesas and ridges, derived from sandstone, rapidly permeable.	3 to 45	Ponderosa pine, piñon, juniper, Gambel's oak, mountain mahogany, mountain muhly, pine dropseed, little bluestem.

Table 1. Soil types in the study area. Adapted from Dorshow et al. 2002).

During the course of my investigations in the Poñil drainage, several soil exposures were profiled and examined. Soil Profile #1 (Figure 2.5) is near Pippert Lake on the Chase Ranch, which includes a low, broad, bottomland that comprises the lower portion of Poñil Canyon. Soil profile #1 is in an arroyo incised into a slope near the base of Gretchen's Mesa. It sits in an area where, although the slope is slight, sheet runoff is significant. Profile #1 was composed of a mollisol with a strong, clay-rich B horizon. Gravel content was very low. Calcic filaments were visible on strong, columnar peds from 40 to 60 cm, and a weak to moderate reaction was observed when subjected to a 15% solution of hydrochloric acid,

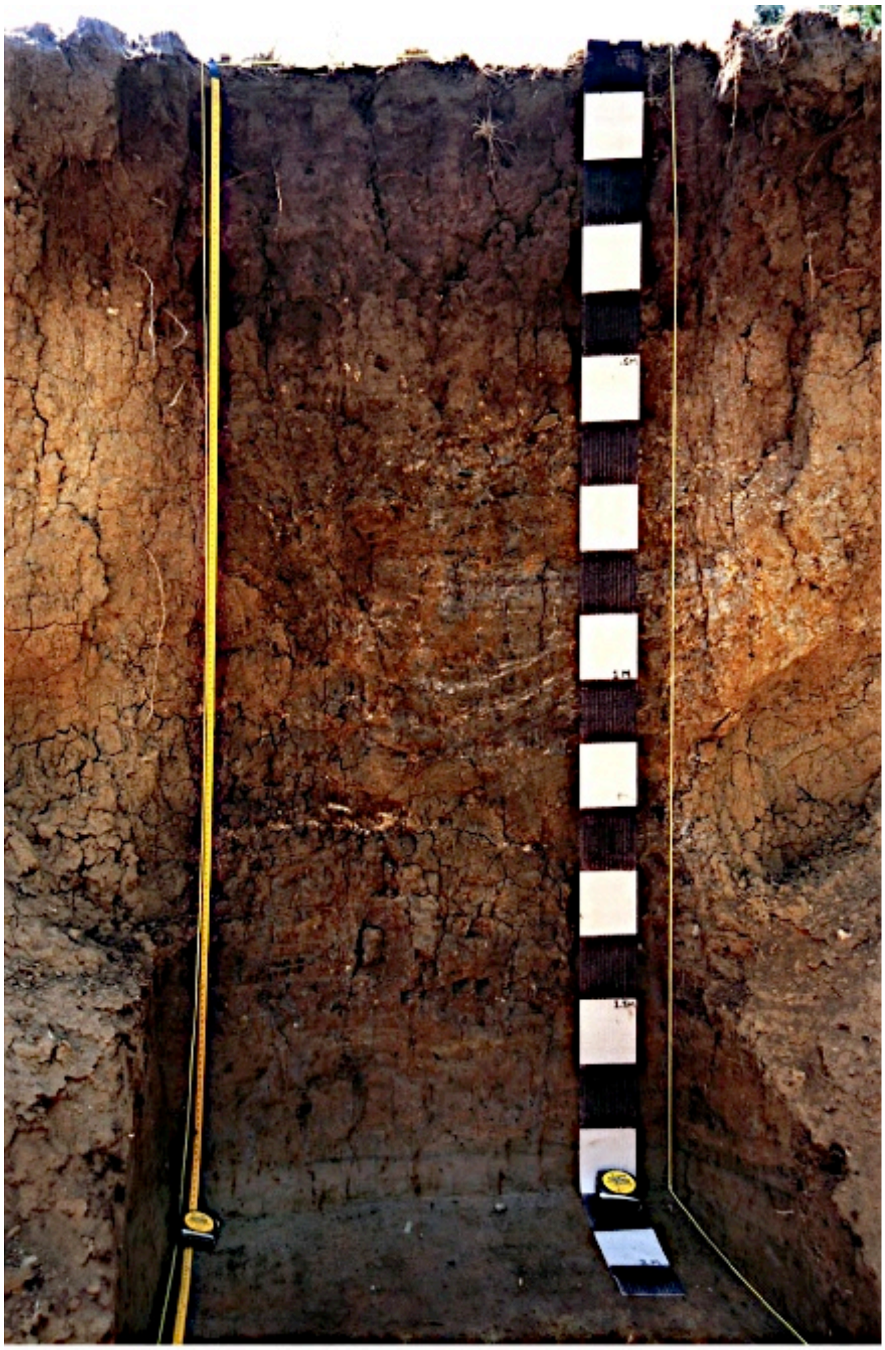

Figure 2.5 Soil Profile #1, a mollisol with a strong clay-rich B horizon near Pippert Lake on the Chase Ranch, Colfax County, New Mexico.

consistent with other calcic horizons in the regions (see Machette 1985). At 1.1 m beneath the modern surface a lens of charred wood was visible, extending for several meters in either direction. Radiometric dating put the lens at about 40,000 years BP. Due south, also on the Chase Ranch, a second profile, Profile #2, was exposed in a deep cut along the banks of the lower Poñil Creek. Like Profile #1, the modern surface above Profile #2 was a mollisol sitting atop a clay-rich B horizon. A buried A-horizon was sampled from 3 m beneath the modern surface. Radiometric dating placed the soil at about 7,000 years BP. I expected a great deal of erosion and depositional activity near Poñil Creek where seasonal flash floods often move a tremendous amount of soil and where its swollen waters can cut new channels. What was surprising, however, was that the soils on the slope near the base of Gretchen's Mesa seem to indicate that despite the runoff from the mesa there seems to be a great deal of stability. No cut and fill sequences were observed.

The relationship between soils and humans is a complex one. That certain soils can support certain cultigens does not mean that they were used for that purpose. Only archaeological evidence can determine which areas near sites were used prehistorically, and only then by reference to canals, cultivation ridges, or in the case of buried soils, plow marks (Thomas 1990). In the immediate study area, although the North Poñil drainage has soils that could support the production of maize, the growing season is very short and dry farming would be difficult. Although Kirkpatrick (1976) suggests that corn could have been grown in the mouths of side canyons along the North Poñil, to date no evidence of canals or cultivation ridges has been found. Moreover, the summer growing season corresponds with the monsoon season, meaning that frequent flash flooding clears out many of the side canyons together with their contents, burying and/or eroding soils and vegetation at the mouths of those canyons. It would be a very risky business to invest time, labor, and seed to grow crops at 2,194 m (7,200 ft) in this dry upland environment.

Regional Climate and Precipitation

On the nearby plains and lower mesa terraces the climate is semi-desert (Robinson et al. 1964). Total annual precipitation for the study area averages about 36.8 cm (14.5 in) per year. However, the rainfall regimen varies considerably from year to year, so the typical range is from as little as 22.9 cm (9 in) to as many as 63.5 cm (25 in) total precipitation. During the severe drought of 2001-2002, however, Cimarron received only 1.27 cm (½ in) of precipitation between Christmas and the Fourth of July. On average, however, northeastern New Mexico receives more moisture than most of the rest of the state. Approximately three quarters of the total precipitation falls in the spring and summer, with localized heavy rainfall possible during monsoon season thunderstorms (July and August) (Tuan et al. 1973:18, 30-33).

Mean annual temperatures vary considerably, but extremes are rare. January lows range from -17.8˚ to -11.1˚C (0º to 12º F) with January highs from 0˚ to 6.6˚C (32º to 44º F). July lows range from 4.4˚ to 6.6˚ C (40º to 44º F), whereas

July highs average between 26.7˚ to 28.9˚ C (80º and 84º F). The lowest temperature ever recorded in the village of Cimarron is -30˚ C (-22º F), whereas the highest recorded temperature is 37.8˚C (100º F).

Because of its proximity to the Sangré de Cristo Mountains, the study area experiences lower mean annual temperatures and receives more rainfall than the neighboring Las Vegas Plateau, which is also lower in elevation. During the summer months, it is possible to leave the hot, windy plains, climb onto the Park Plateau where the temperature can be as much as 15 degrees cooler, and then trek to Baldy Mountain (3,792 m; 12,441 ft) or Little Costilla Peak (3,835 m; 12,584 ft) where snowfall is possible even in mid-July. In the North Poñil Canyon, summer nighttime temperatures regularly dip so low that in the late evenings and early mornings some form of warm clothing is required. In the wintertime the North Poñil Canyon, due to its southeastern orientation, receives more solar energy than nearby canyons, and is also protected from the driving winds that roll across the nearby plains. Accordingly, the Park Plateau's canyons and interfluves, formed by alluvial and fault processes, provide unique and diverse habitats that offer not only a cool retreat in summer, but shelter from the winter winds of the plains and from the heavy snow loads of the Rockies.

Vegetation

Vegetation in northeastern New Mexico reflects the diversity of climatic patterns that accompany the great variety of local landforms. Truly in a transition zone, the climate of the Park Plateau is warmer than the high altitude environments of the Rocky Mountains to the north and west, mostly protected from the winds of the Great Plains to the east, and cooler than the scorching deserts to the south. The Rocky Mountains have a greater climatic influence on the immediate study area than the Great Plains because cold air, water, rocks, and sediments all flow down and across the study area to the lowlands to the east and south. This, in turn, affects vegetative communities in the region and accounts for many of the observed difference in the flora (and fauna) found between the Las Vegas and Park plateaus. The Poñil drainage, and the southern Park Plateau generally, represent a vegetative transition zone between the grasslands of the Great Plains and the mixed woodlands to the west (see Mack et al. 2001).

The eastern high slopes of the Cimarron Range are well above tree line. For example, Baldy Mountain stands at 3,792 m (12,441 ft), Touch-Me-Not Mountain at 3,671 m (12,045 ft), and Little Costilla at 3836 m (12,584 ft). Only short stubby grasses and rocky balds extend beyond 3,627 m (11,900 ft). Further down slope, mountain vegetation includes Aspen (*Populus tremuloides*), fir (*Pseudotsuga menziesii*), spruce (*Picea engelmannii*), mountain mahogany (*Cercocarpus ledifolius*), and ponderosa pine (*Pinus ponderosa*). Below 2,438 m (8000 ft), one continues to find ponderosa pine and mountain mahogany, but also begins to see Gambel's oak (*Quercus gambelii*) and piñon pine (*Pinus edulis*). As one descends onto the plateau, ponderosa pine, piñon pine, one-seed juniper (*Juniperus monosperma*), and Gambel's oak are common, along with several species of cacti, including yucca (*Yucca bacata*) and prickly pear (*Opuntia* *polycantha* and *Opuntia macrorhiza*) and cholla (*Opuntia spinosior*). Cottonwood trees (*Populus deltoides*) and Chokecherry (*Prunus virginiana*) are common along creeks and creek bottoms. Most of the plants in the study area occur in distinct vegetation communities (summarized from Dorshow et al 2002): Grassy Tops (GT) (2,195 m to 2,256 m; 7,200 to 7,400 ft), Grassy Bottoms (GB) (2,179 m to 2,256 m; 7,150 to 7,400 ft), Piñon-Grass (PG) (2,179 m to 2,301 m; 7,150 to 7,550 ft), Piñon-Blue Grama (PBG) (2,164 m to 2,271 m; 7,100 to 7,450 ft), Piñon-Oak-Grass (POG) (2,164 m to 2,187 m; 7,100 to 7,175 ft), Piñon-Ponderosa (PP) (2,173 m to 2,263 m; 7,130 to 7,425 ft), and Oak-Shrub (OS) (2,195 m to 2,248 m; 7,200 to 7,375 ft) (Table 2).

Common Name	**Genus and Species**	**Family**	**Type of Habitat**
Arizona coryphantha	*Coryphantha vivipara*	Cactaceae	PBG, GW
Arizona fescue	*Festuca arizonica*	Poaceae	PBG
Arizona three awn	*Aristida arizonica*	Poaceae	GT, PBG, GW
bahia	*Bahia neomexicana*	Asteraceae	GB
barnyard grass	*Echinochloa crusgalli*	Poaceae	GB
beggarticks	*Bidens tenuisecta*	Asteraceae	GB, GW
Belvedere summercypress	*Kochia scoparta*	Chenopodiaceae	GB, GW
big bluestem	*Andropogon gerardii*	Poaceae	PBG
Bigelow gentiana	*Gentiana bigelovii*	Gentianaceae	GT
bitterweed	*Hymenoxys acaulis*	Asteraceae	GT
bitterweed	*Hymenoxys richardsonii*	Asteraceae	GT, GW
blue grama	*Bouteloua gracilis*	Poaceae	GB, PBG, GW
blue verbena	*Verbena macdougalii*	Verbenaceae	GT, GB
bluestem wheatgrass	*Agropyron smithii*	Poaceae	GT, GB, PBG, GW
bottlebrush squirreltail	*Sitanion hystrix*	Poaceae	GB, PBG, GW
brome	*Bromus spp.*	Poaceae	GB, PBG
broom snakeweed	*Guttierrezia sarothrae*	Asteraceae	GT, GB, PBG, GW
buffalograss	*Buchloe dactyloides*	Poaceae	GW
centaurea	*Centaurea picris*	Asteraceae	GT, GB, GW
Chokecherry	*Prunus virginiana*	Rosaceae	GB
Colorado four o'clock	*Mirabilis multiflora*	Nyctaginaceae	GW
commandra	*Commandra pallida*	Asteraceae	GT

Common Name	Genus and Species	Family	Type of Habitat
common purslane	*Portulaca oleraceae*	Portulacaceae	GT, GB
common sunflower	*Helianthus annuus*	Asteraceae	GW
cosmos	*Cosmos parviflorus*	Asteraceae	GB
dotted gayfeather	*Liatris punctata*	Asteraceae	GT, GB, GW
Douglas chaenactis	*Chaenactis douglasii*	Asteraceae	GB
echinocereus	*Echinocereus coccineus*	Cactaceae	GT, GB, PBG
elegant cinquefoil	*Potentilla concinna*	Rosaceae	GB, GW
European glorybird	*Convolvulus arvensis*	Convolvulaceae	GW
evening primrose	*Oenothera coronopifolia*	Onagraceae	GB
false tarragon	*Artemisia dracunculus*	Asteraceae	GB
Fendler aster	*Aster fendleri*	Asteraceae	GT, GB, GW
Fendler sandwort	*Arenaria fendleri*	Caryophyllaceae	GW
fleabane	*Erigeron vetensis*	Asteraceae	GW
four o'clock	*Oxybaphus diffuses*	Onagraceae	GB
four o'clock	*Oxybaphus linearis*	Onagraceae	GB
fourwing saltbush	*Atriplex canescens*	Chenopodiaceae	GT, GB, PBG, GW
foxtail barley	*Hordeum jubatum*	Poaceae	GB
fringed brome	*Bromus ciliatus*	Poaceae	GW
fringed sagebrush	*Artemisia frigida*	Asteraceae	GT
galleta grass	*Hilaria jamesii*	Poaceae	GB, PBG
golden crownhead	*Verbesina encelioides*	Asteraceae	GB
goosefoot	*Chenopodium pratericola*	Chenopodiaceae	GW
goosefoot	*Chenopodium spp.*	Chenopodiaceae	GT, GB, GW
greenpitaya echinocereus	*Echinocereus viridiflorus*	Cactaceae	GT, GB, PBG, GW
greenthread	*Thelesperma megapotamicum*	Asteraceae	GT, GB
hairy *aster*	*Chrysopsis villosa*	Asteraceae	GW
hoary fleabane	*Erigeron canus*	Asteraceae	GB
horseweed fleabane	*Gonya Canadensis*	Asteraceae	GT
James eriogonum	*Eriogonum jamesii*	Asteraceae	GT, GB, GW
little bluestem	*Andropogon scoparius*	Poaceae	GT, GB, PBG, GW
littleseed ricegrass	*Oryzopsis micrantha*	Poaceae	PBG
longleaf goldeneye	*Viguiera longifolia*	Asteraceae	GB
Louisiana sagebrush	*Artemisia ludoviciana*	Asteraceae	GT
mallow	*Sphaeralcea spp.*	Malvaceae	GB
mat muhly	*Muhlenbergia richardsonis*	Poaceae	GB
milkweed	*Asclepias capricornu*	Asclepiadaceae	GB
mountain mahogany	*Cercocarpus montanus*	Rosaceae	GT, PBG
mountain muhly	*Muhlenbergia Montana*	Poaceae	GT, PBG
nodding onion	*Allium cernuum*	Liliaceae	GT, GB, GW
one-seed juniper	*Juniperus monosperma*	Cupressaceae	PBG
Parry oatgrass	*Danthonia parryi*	Poaceae	GW

Common Name	Genus and Species	Family	Type of Habitat
penstemon	*Penstemon jamesii*	Scrophulariaceae	GT, GB, GW
pine dropseed	*Blepharoneuron tricholepis*	Poaceae	PBG
piñon pine	*Pinus edulis*	Pinaceae	PBG
plains pricklypear	*Opuntia polycantha*	Cactaceae	GT, GB, PBG, GW
ponderosa pine	*Pinus ct. ponderosa*	Pinaceae	PBG
prairie coneflower	*Ratibida columnifera*	Asteraceae	GW
prairie flameflower	*Talinum parviflorum*	Portulaceae	GT, GB
prarie dogweed	*Dyssodia papposa*	Asteraceae	GT, GB, GW
prickly pear	*Opuntia macrorhiza*	Cactaceae	GB
prickly rose	*Rosa acicularis*	Rosaceae	GB
rabbitbrush	*Chrysothamnus nauseosus*	Asteraceae	GW
red root amaranth	*Amaranthus retroflexus*	Amaranthaceae	GW
red three awn	*Aristida longiseta*	Poaceae	PBG
Ricegrass	*Achnatherum hymenoides*	Poaceae	PBG
ring muhly	*Muhlenbergia torreyi*	Poaceae	GB, PBG
Rocky Mountain juniper	*Juniperus scopulorum*	Cupressaceae	PBG
rush skeletonplant	*Lygodesmia juncea*	Asteraceae	GB
Russian thistle	*Salsola kali*	Chenopodiaceae	GT, GB
sand dropseed	*Sporobolus cryptandrus*	Poaceae	PBG, GW
scarlet gaura	*Gaura coccinea*	Onagraceae	GT, GB, GW
scarlet globemallow	*Sphaeralcea coccinea*	Malvaceae	GT
Scribner needlegrass	*Stipa scribneri*	Poaceae	PBG
showy milkweed	*Asclepias speciosa*	Asclepiadaceae	GB
sideoats grama	*Bouteloua curtipendula*	Poaceae	GT, GB, PBG
skunkbush sumac	*Rhus trilobata*	Anacardiaceae	GT, PBG
skyrocket gilia	*Ipomopsis aggregata*	Polemoniaceae	GW
sleepygrass	*Stipa robusta*	Poaceae	GT, GB, PBG, GW
slender wheatgrass	*Agropyron trachycaulum*	Poaceae	GW
smooth brome	*Bromus inermis*	Poaceae	GW
spreading fleabane	*Erigeron divergens*	Asteraceae	GW
stickseed	*Hackelia floribunda*	Boraginaceae	GW
stickseed	*Lappula redowskii*	Boraginaceae	GW
sunflower	*Helianthella parryi*	Asteraceae	GT, GB, GW
tanseyleaf aster	*Machaeranthera tanacetifolia*	Asteraceae	GB
trailing fleabane	*Erigeron flagellaris*	Asteraceae	GW
tumblegrass	*Schedonnardus paniculatus*	Poaceae	GB
tumblemustard	*Sisymbrium linearifolium*	Brassicaceae	GT
violet woodsorrel	*Oxalis violacea*	Oxalidaceae	GW
viscid fleabane	*Erigeron formossisimus*	Asteraceae	GW
wavyleaf oak	*Quercus undulata*	Fagaceae	PBG, GW
wavyleaf thistle	*Cirsium undulatum*	Asteraceae	GT, GB, GW

Common Name	Genus and Species	Family	Type of Habitat
western ragweed	*Ambrosia psilostachya*	Asteraceae	GT, GB
wholeleaf paintbrush	*Castilleja integra*	Scrophulariaceae	GT, GB, GW
wing eriogonum	*Eriogonum alarum*	Asteraceae	GT
winterfat	*Eurotia lanata*	Chenopodiaceae	GB, GW
wolf tail	*Lycurus phleoides*	Poaceae	GT, PBG, GW
Woods rose	*Rosa woodsii*	Rosaceae	GW
yellow sweet clover	*Melilotus officinalis*	Fabaceae	GW

Table 2. Common plants in the study area. Adapted from Dorshow et al. 2002.

Each plant community is associated with certain landscape features and soil types. In the immediate study area, plants associated with Grassy Tops (saltbush, mountain mahogany, prickly pear, bluestem wheatgrass [also known as western wheatgrass], goosefoot and purslane), Grassy Bottoms (fourwing saltbush, mountain mahogany, prickly pear and skunkbush, bluestem wheatgrass, little bluestem, Arizona three-awn, sideoats grama, nodding onion, goosefoot, and purslane), and Piñon-Blue Grama (mesatops and low slopes with one-seed juniper, Rocky Mountain juniper, piñon pine, and some ponderosa pine, prickly pear, mountain mahogany, yucca, and Gambel's oak) are most common.

Ethnohistoric, ethnobotanical, and archaeological findings suggest that many of the wild species found in the area today were used prehistorically as food, fuel, building materials, tools, and medicine (Ford 1974; Kirkpatrick and Ford 1977). When available, piñon nuts are one of the more important wild food sources in the study area. Eaten raw or cooked, they provide more than 3000 calories per pound (Dorshow et al. 2002). Piñon nuts have been used for food, pottery paint, glue, antiseptic, and gum (Dunmire and Tierney 1995). However, yields vary significantly from year to year. Juniper berries were also used prehistorically and they, too, can be eaten raw or cooked, as can the bright red fruits of the prickly pear cactus. Several Puebloan groups as well as the Jicarilla are known to have used tea from juniper berries to treat colds, stomach disorders, and constipation, among other things (Dunmire and Tierney 1995). In addition, the Jicarilla used ash from burned juniper branches to add a blue-grey color to corn meal mush (Opler 1938). Ponderosa pine was not only exploited for wood, but also for its needles from which a medicinal tea was made. Gambel's oak and wavy-leaf oak provided edible acorns, mountain mahogany was used for making arrow shafts, while the bark of mountain mahogany was used to make dye for clothing. Yucca and skunkbush also provide edible fruits. Flowers from rabbitbrush (*Chrysothamnus nauseosus*) were boiled to make yellow dye for clothing (Robbins et al. 1916). Grassy plants were used prehistorically for food and utilitarian uses. These include bluestem, wheatgrass, sideoats grama, blue grama, nodding onion, goosefoot, pigweed, and wild potato. Nodding onion (*Allium cernuum*) is a wild onion that can be eaten raw, cooked, or dried (Dunmire and Tierney 1995). Goosefoot (*Chenopodium sp.*) produces an important and edible seed, but its leaves are also edible. Goosefoot, together with ricegrass (*Achnatherum hymenoides*), combined to provide an important source of protein for the early inhabitants of the study area. In addition, chokecherry berries were made into meal and the chokecherry wood into bows (Robbins et al. 1916). Few of these wild foods, however, were perennially available. According to one of

Opler's (1971:320) Jicarilla Apache informants, Native Americans "might go for years without having a good crop of berries."

Kirkpatrick and Ford (1977) suggest that at two sites excavated in the immediate study area, MP-4 and NP-1, a variety of wild foods were used prehistorically. These include Rocky Mountain juniper, yucca, squawbush, goosefoot, sunflower, piñon, and chokecherry. Kirkpatrick's early testing at NP-69 yielded evidence of a single cultigen; corn (*Zea mays*) (Kirkpatrick and Ford 1977). Reliance on cultigens in the North Poñil Canyon, specifically corn (*Zea mays*) and beans (*Phaseolus vulgaris*), would have been risky at best due to the short growing season and significant variations in annual rainfall patterns.

Hinnant (2005) conducted an intensive investigation into the edible and medicinal plants in the study area. His carefully recorded findings, many from firsthand experience, support archaeological data that suggest how local botanical specimens could have figured into the diets of the area's prehistoric populations. According to Hinnant, 32 native plant species in the Poñil study area have either subsistence or medicinal value, or both (Table 3).

Common Name	**Genus and Species**	**Uses and Comments**
yarrow	*Achillea millefolium*	pain-reliever, fever-reducer, made into a sweet, although somewhat bitter tea
nodding onion	*Allium cernuum*	diuretic, stimulant, expectorant, antiseptic; bulbs edible raw or cooked
western mugwort (white sage)	*Artemesia ludoviciana*	astringent, especially useful for upset stomach, sore throat, and diarrhea; prepared as a leaf tea that has a deep, fresh, bitter flavor
showy milkweed	*Asclepias speciosa*	shoots, leaves, and flower pods are edible
Indian paintbrush	*Castilleja sp.*	flowers edible raw, very sweet

Common Name	Genus and Species	Uses and Comments
goosefoot	*Chenopodium spp.*	leaves edible raw or cooked; seeds edible after cooking; high in protein and a variety of vitamins
bull thistle	*Cirsium sp.*	roots edible raw or cooked, although they tend to be woody and hard; stems and leaves edible after spines are removed
purple prairie clover	*Dalea purpurea*	used to treat heart problems, measles, pneumonia; has a high antibacterial function; young needle-like leaves are edible and very pungent; roots edible raw although very chewy
wild strawberry	*Fragaria sp*	small fruits edible; leave tea is sweet and fruity as well as astringent; high in vitamin C
gumweed	*Grindelia aphanactis*	leaves chewed or made into tea; anti-spasmodic and expectorant
sunflower	*Helianthus annus*	seeds and flower petals edible raw or cooked, leaves and immature receptacles edible when cooked; seeds contain vitamins B1, B2, niacin, lecithin, choline, tannin, and protein
stemless hymenoxys	*Hymenoxys acaulis*	pain reliever, sedative, and yet mentally stimulating; makes a good tasting tea
juniper	*Juniperus monosperma*	berry or leaf tea is diuretic, tonic, stomachic and anti-septic; berries edible, although strongly flavored; best used as flavoring
hooker’s evening primrose	*Oenothera hookeri*	used for obesity, bowel pain, bruises; roots edible in first year of growth
prickly pear	*Opuntia macrorhiza*	pads can be poulticed for wounds, warts and rheumatism; young pads edible cooked (once spines removed); slimy texture, hearty flavor; red fruits edible raw; flowers edible cooked
cholla	*Opuntia imbricate*	seeds edible when ground into flower; flower buds and fruits edible
piñon pine	*Pinus edulis*	pine nuts edible raw or cooked and can be ground into flower; needles can be made into an astringent tea; high in vitamin C
cottonwood	*Populus augustifolia*	tea from inner bark reduces fever and is a pain reliever due to salicin content; sap drinkable raw; inner bark edible raw or cooked
chokecherry	*Prunus virginiana*	used to stimulate appetite and treat diarrhea; berries edible, although very sour; berries may be crushed into a flour to make a fruity bread
Douglas fir	*Pseudotsuga menziesii*	needle tea is an astringent and high in vitamin C; young shoots are edible raw and have a citrus-like flavor

Common Name	Genus and Species	Uses and Comments
Gambel's oak	*Quercus gambelli*	boiled into a decoction any part of the plant can be used to treat rashes and burns; acorns are edible raw in small quantities only; acorns are best when boiled to remove tannins, then they may be eaten plain or ground into a flour or pressed into cakes
three-leaf sumac	*Rhus trilobata*	juice is diuretic; small tart fruits edible but with a sour lemon-like taste; fruits can also be made into a lemonade-like beverage (only three-leaf sumac is edible; other sumacs are poisonous)
currant	*Ribes sp*	fruits have a laxative effect while leaves make an aromatic, digestive tea high in vitamin C; fruits edible raw, cooked, or dried
wild rose	*Rosa woodsii*	rose hips high in vitamin C, are tonic, astringent, and cleansing; flower tea is very deep and rich in flavor; rose hips edible but best after a frost; flower petals edible
thimbleberry (purple flowering raspberry)	*Rubus odoratus*	leaves high in vitamin C, acts as astringent and blood-sugar reducer; berries edible although more tart than true raspberries; leaf tea is fruity tasting
coyote willow	*Salix exigua*	bark tea is a fever-reducer and pain reliever; inner bark edible cooked, but remains very bitter; young shoots and leaves are edible
scarlet globemallow	*Sphaeralcea coccinea*	flowers strengthen respiratory system, eases coughing, congestion and sore throat; can be made into a tea or simply chewed; made into a poultice the flowers can be used to treat burns
Indian tea (Cota)	*Theslesperma megapotamicum*	leaves and flowers used to make tea that is somewhat sweet in flavor
yellow salsify	*Tragopogon dubius*	whole plant is stomachic, diuretic and blood cleansing; flower buds edible raw or cooked; roots edible when plan is young
mullein	*Verbascum thapsus*	leaf tea is an expectorant, soothing to throat and airways, anti-spasmodic, diuretic, bronchial-dilator; anti-viral and anti-inflammatory; relieves coughing
New Mexico vervain	*Verbenamacdougalii*	leaves and flowers break fever, promote sweating, expectorant, pain-relieving, digestive aid, anti-spasmodic; may be made into a poultice for healing external wounds
yucca	*Yucca sp.*	roots made into poultice for sores, sprains, and skin problems; flower stalk edible young when boiled or roasted; fruits edible raw or cooked, flowers edible raw but may irritate throat

Table 3. Edible and medicinal plants in the Poñil drainage (Hinnant 2005).

Fauna

The study area supports a number of animal species that are common to both the mountains and plains, including elk (*Cervus elaphus nelsoni*), mule deer (*Odocoileus hemionu*), black bear (*Ursus americanus*), cottontail rabbit (*Sylvilagus auduboni*), jackrabbit (*Lepus californicus*), badger (*Taxidea taxus*), bobcat (*Felis rufus*), mountain lion (*Felis concolor*), coyote (*Canis latrans*), and weasel (*Mustela nivalis*). In the immediate study area, elk, bear, mule deer, wild turkey, and cottontail rabbits are the most common of what today would be considered game animals. Birds include wild turkey (*Meleagris gallopavo*), mourning dove (*Zenaida macroura*), goose (*Branta canadensis*), quail (*Callipepla squamata*), blue grouse (*Dendragapus obscurus*), red-tailed hawk (*Buteo jamaicensis*), wild duck (*Anas platyrhynchos*), marsh hawk (*Circus cyaneus*), raven (*Corvus corax*), roadrunner (*Geococcyx californicus*), and eagle (*Haliaeetus leucocephalus*).

Reptiles in the study area include snakes and lizards, including the collared lizard (*Crotaphytus collaris*) and a modern abundance of western rattlesnakes (*Crotalus viridis*). Fishes include cutthroat trout (*Oncorhynchus clarki*), stone roller (*Campostoma anomalum*), flathead chub (*Platygobio gracilis*), fathead minnow (*Pimephales promelus*), longnose dace (*Rhinichthys cataractae*), creek chub (*Semotilus atromaculatus*), and white sucker (*Catostomus commersoni*), but it is likely that only the cutthroat were a reliable food source prehistorically (Campbell 1984).

Bison (*Bison bison*) are reported to have been hunted by Puebloan peoples from Taos and Picuris, and by the Jicarilla (Opler 1971). Of course, after the 1540 arrival of the Spanish the horse was available to Puebloan groups, making the transport of meat from the Great Plains back to the Rio Grande Valley feasible, i.e., the transport cost (e.g., Hassig 1985:27) was reduced dramatically by the introduction of the horse. Although the Poñil drainage and environs have been studied for more than 60 years, no bison remains have been found in association with any archaeological site in the drainage, regardless of time period under study.

Summary and Conclusion

The Poñil study area is at the southern terminus of New Mexico's Park Plateau, a canyon-incised border area between two significant geographic regions; the Great Plains and the Rocky Mountains. The Poñil drainage itself is made up of a three-fork creek system: the South, Middle, and North Poñil, all of which join to form the Poñil Creek. The study area is situated so closely along the western edge of the Great Plains province that local climate, landforms, and vegetation are probably as strongly influenced by the Rocky Mountain province as the Great Plains province of which it is a part.

The geology of the Poñil drainage is fairly straightforward; the Poison Canyon and Raton sandstone formations predominate, but both are underlain by the Pierre Shale Group. Although no good tool stone is available in the Poñil drainage itself, Tertiary-age dacite intrusions into the Pierre Shale on Baldy Mountain and at Ute Gulch baked the shale and formed hornfels, now called

Cimarron hornfels, which is a hard, splintery rock that is the most commonly used tool stone in the study area. Being derived from shale, Cimarron hornfels ranges in color from light gray to black.

The climate in the study area is semi-desert. Although total annual precipitation averages 36.8 cm (14.5 in), it can vary considerably from as little as 22.9 cm (9 in) to as much as 63.5 cm (25 in), three quarters of which falls during the spring and summer months. Temperatures generally range from -17.8˚C (0˚F) in deepest winter to 29˚C (84˚F) in midsummer, but extremes at both ends have been recorded. However, the canyon country itself is cooler and less windy than the neighboring Great Plains in summer and warmer and drier than the snow covered Rockies in winter.

The soils in the area are rich. However, uneven and unpredictable rainfall, combined with a short growing season, makes farming, and in particular dry farming in the high North Poñil canyon, risky at best. The lower elevation and warmer temperatures along the broad valley of the lower Poñil Creek make farming more feasible and less risky. However, the study area contains an abundance of wild edible and medicinal plants and it is home to a number of species of animals known to have been hunted and consumed prehistorically. Overall, the canyon country of the southern Park Plateau would make an ideal home range for hunter-gatherer societies.

Chapter III: Archaeological Overview and Regional Chronology

Introduction

The archaeology of the southern Park Plateau is poorly understood. Although some very good research has been conducted in the area, the methodologies employed by many early researchers would be found lacking by modern standards. Moreover, much early research was undertaken during the cultural-historical "descriptive" period in American archaeology, and so explanations for the behaviors that created the archaeological record are few. Several recent projects have concentrated around pipeline and mining operations that are known sometimes, but certainly not always, to create research environments that result in expediency in fieldwork, analysis, and interpretation, primarily because of budget and time constraints. Moreover, most CRM projects are limited geographically to those immediate areas that might be affected by the modern proposed land use (Kantner 2005:1183). Some of the early research projects on the Philmont Boy Scout Ranch were exemplary, not only in planning but in execution as well. It is fair to say that only a handful of academic, research-driven, carefully controlled archaeological investigations have been conducted in the immediate study area. It is not surprising, then, that there exists little consensus among those doing research in the area regarding origins, adaptations, social organization, cultural influences, technology, and raw materials acquired and used.

Prior Research and Regional Chronology

Over the years, a number of people have contributed to what we know today of the regional archaeological record, examining sites and artifacts from Paleo-Indian to historic times. Important figures include J. D. Figgins, A. V. Kidder, E. B. Renaud, H. P. Mera, Samuel Bogan, Robert Lister, Herbert Dick, Charles Steen, Eugene Lutes, Fred Wendorf, James and Delores Gunnerson, Michael Glassow, Alan Skinner, David Kirkpatrick, Meliha Duran, Jeffrey Eighmy, Robert Campbell, Timothy Baugh, Christopher Lintz, Regge Wiseman, Robert Mishler, John Campbell, Wetherbee Dorshow, Jan Biella, Steven Mack, Judith Habicht-Mauche, Cherie Scheick, and others.

Paleo-Indian Stage

Perhaps the most significant early archaeological discovery in North America was made in northeastern New Mexico at what is today known as the Folsom site. While mending fence following a devastating flood in 1908, cowboy George McJunkin observed animal bones eroding from the wall of a deep erosional feature in the Wildhorse Arroyo adjacent to the Dry Cimarron River. McJunkin relayed information about his find to the owner of the Crowfoot Ranch, who in turn, notified others. Finally, J. D. Figgins, archaeologist at the Colorado Museum of Natural History, came to Folsom and began excavating the site in 1926 (Meltzer et al. 2002:8). Intermingled with a bone bed approximately eight feet beneath the then modern surface, three fluted projectile points were recovered, one of which was found in association with the bones of an extinct species of bison (*Bison* *antiquus*). In 1927, five additional fluted points were recovered, one of which was *in situ* and clearly associated with the bison bones. Archaeologists Frank H. H. Roberts and A. V. Kidder observed the points in context, confirming at last that the antiquity of early humans in North America reached back into the Pleistocene (Wormington 1957). Overall, 19 Folsom points were recovered in context with 23 bison of an extinct species (Wormington 1957).

Most Paleo-Indian finds in the region are east of the study area near the western edge of the Great Plains (Stuart and Gauthier 1988). It is reported that regional Paleo-Indian sites occur in two distinct north-south geographic bands; one paralleling the Canadian Escarpment and the other along the foothills of the Sangré de Cristos (Stuart and Gauthier 1988), although specialized hunting points (San Jon, Firstview, Scottsbluff, and Eden) are typically only found along the Canadian Escarpment. Researchers working in the Ancho Mine Complex along the Vermejo River report two probable Paleo-Indian projectiles; a Cody preform (Campbell and Higgins 1982) and a Jimmy Allen type (Harper and Wheelbarger 1983). Clovis-like projectiles have been reported at the Carrizo Creek Site No. 1 in northeastern New Mexico's Union County (Baker and Campbell 1960). Finally, a local Cimarron resident is reported to have found a single Folsom point along the banks of Van Bremmer Creek (Glassow 1972a). The Vermejo River and Van Bremmer Creek localities are within 10 miles of the village of Cimarron and about 50 miles southwest of the Folsom site.

Additional evidence of Paleo-Indian occupation of the southern Park Plateau may someday be found, but it is possible that Paleo-Indian hunters seldom entered the canyon country if they subsisted largely on bison. Thus far, after more than 60 years of archaeological research, the Poñil drainage has yet to yield a single clearly identified bison bone. Likewise, after conducting a review of the literature in the nearby Vermejo River-Ancho Canyon area it appears that no bison bones have been reported there.

The Archaic (6000 B.C. to A.D. 200)

In many areas of the Southwest, as elsewhere, climate change and the extinction of a number of species of megafauna resulted in a transition from subsistence focused primarily on large game to one of broad-spectrum hunting and foraging. This is known as the Archaic, a term used a) to describe changes in hunting and gathering practices, and b) to serve as a time marker ending the Paleo-Indian period and continuing until sedentary agricultural practices came to predominate (Vierra 1994). Smaller game, fish, fowl, and wild plants likely assumed a more central role in the diets of many Archaic stage groups. The shift to mixed hunting and foraging was also accompanied by changes in technology and refinements in food procurement and processing, including the introduction of groundstone. It has been suggested that the transition began to take place sometime before the end of the Paleo-Indian stage and became the dominant subsistence pattern during the ensuing 7000 years (Agogino and Egan 1972; Stuart and Gauthier 1988; Thoms 1976; Wendorf and Hester 1962).

A tight chronological sequence for the region's Archaic occupation is lacking, but a number of sites have been reported. One of the earliest and most active researchers in the broader study area was E. B. Renaud (1929, 1930, 1931, 1932, 1937, 1942, 1946) who worked in northern and northeastern New Mexico, southern and southeastern Colorado, and into the Oklahoma panhandle. While working along the Dry Cimarron River, Renaud (1930, 1937) described a "Fumaroles People" who took up seasonal residences in rock shelters and large volcanic vents known as fumaroles. Renaud recorded 10 sites between Raton, Springer, and Cimarron, but did not provide specific descriptions of those sites (Kirkpatrick 1976). Renaud suggested that the Fumaroles People were hunters and gatherers, with the bones of deer and rabbits being more common than those of bison. However, he did find woven basketry, sandals, and cordage reminiscent of Basketmaker cultures, but he believed these sites to represent earlier occupations, possibly between 2000 and 1500 B.C. (Renaud 1930:148). Hall (1938) excavated several shallow caves, or rock shelters, east of Wagon Mound, New Mexico, where he found a number of large projectile points that he attributed to the Archaic stage (Campbell 1969). During the construction of the Ute Dam and Reservoir near the confluence of Ute Creek and the Canadian River, late-Archaic projectile points were recovered and described showing similarities with Ellis, Edgewood, and Williams points found in Texas (Hammack 1965). Wendorf and Miller (1959) conducted archaeological survey in the Sangré de Cristo Mountains, at elevations as high as 11,000 feet, and reported large projectiles they attribute to the Archaic which they believe to have been brought to the region by hunters from the Rio Grande Valley. In the 1950s, Charlie Steen excavated the Pigeon Cliffs site on a high terrace above Cieneguilla Creek near Clayton, New Mexico. Working through stratified deposits, Steen (1955, 1976) recovered large stemmed and tanged projectile points from a hearth that was radiocarbon dated to 7840 ± 150 years, which he designated the Clayton Horizon. In a nearby creek bank, Steen also found a mano and metate similar to those from the Sulfur Springs stage of the Cochise Culture. Some years later, Glassow (1972a) recovered Archaic materials from sites in the Cimarron Canyon (CI-42) and along the banks of Middle Poñil Creek (MP-17). His finds included hornfels and basalt projectile points and a single Alibates "teardrop" end scraper. Glassow believed the points to be similar to those straight-stemmed, indented-based points described by Irwin-Williams (1967) for the northern southwest (Glassow 1972a).

Researchers working in the York Canyon Mining Complex recovered a single Yarbrough-like point from a "lithic raw material processing and tool maintenance site," (Campbell 1984:45) and 30 Ellis-style points, both suggesting Late Archaic utilization of the area. Southwest Archaeological Consultants (SWAC), working in the Ancho Mine West Half (Vermejo Park Ranch), obtained six radiocarbon dates that fell within the range of the Late Archaic period (850 B.C. to A.D. 200) (Dorshow et al. 2002). Although suggesting an increase in interest in the York Canyon area by Plains-affiliated groups, Scheick and Dorshow

(2002) acknowledge that the presence of Oshara and Oshara-like projectile points raise questions as to population origins and regional interactions.

Between 1964 and 1967, Glassow (1984) conducted a series of surveys over a large section of the Vermejo River drainage, recording 173 sites in the process. Although he observed 22 sites with chipped stone artifacts only, which he believed could have been associated with Archaic occupation, none of the distinctive large corner-notched projectiles associated with the Archaic were observed.

My own research supports an argument for a fairly robust Archaic occupation of the Poñil drainage as a whole. A number of large projectiles, ranging from 4 to 6 cm in length and made almost exclusively of Cimarron hornfels, were found in surface contexts throughout the Lower, Middle, and North Poñil Creek drainages (Figures 3.1 and 3.2). These presumably Archaic sites, recorded during seven seasons of fieldwork, are on high terraces above the drainages, usually on sandy soils, and present no surface evidence of structures or pottery. All but one of the projectiles was recovered at open sites. In addition, a number of open sites were recorded which, although they lacked diagnostic projectiles, were littered with manufacturing debris suggestive of the production of large bifacial tools consistent with Archaic occupations. Now, because the Basketmaker sequence has been pushed back to at least 1000 B.C. (Lipe 1999), it is possible that these sites are Archaic, Early Basketmaker, or both.

Figure 3.1 A rock shelter high atop Sammis Bench near Chase Canyon, Colfax County, New Mexico. A large, heavily patinated dart point (inset) made of Cimarron hornfels was found near the entrance.

Figure 3.2 Dart point made of Cimarron hornfels found off the eastern edge of Gretchen's Mesa, Chase Ranch, Colfax County, New Mexico. The way in which the tip is broken suggests an impact fracture.

Post-Archaic

As mentioned, there is little upon which archaeologists working in the area agree regarding the transition from hunting-foraging to mixed farming-foraging to sedentary farming. Indeed, there is little agreement regarding who lived in the study area, when they lived there, how they lived, where they traveled, with whom they traded, with whom they affiliated, or by whom they were influenced. Consequently, a discussion of the period following the Archaic is problematic.

The first problem arises with a divergence of views as to when the Archaic ended on the southern Park Plateau. Wendorf (1960) argues that the Archaic ended as late as A.D. 1000, whereas Glassow (1972a) suggests that the Archaic mode of subsistence ended at around A.D. 1. Stuart and Gauthier (1988) set the end of the Archaic at around A.D. 200. The problem is exacerbated by the way the Archaic and subsequent stages are defined. It has been argued that the appearance of corn, the bow and arrow, and sometimes pottery mark the end of the Archaic and the beginning of the Basketmaker/Plains Woodland/Late Archaic/Neo-Indian stage, depending upon the investigator (Campbell 1976; Glassow 1980; Lang 1978; Stuart and Gauthier 1988; Thoms 1976). Now that cultigens have been associated with Basketmaker occupations on the Colorado Plateau, the Archaic could have ended as early as 1000 B.C. (Lipe 1999), making the transition from dart to arrow a less important indicator of developmental stage. On this issue it seems that many researchers run into the same problem; data that refuse to fit neatly into a well-delineated temporal scheme. Moreover, there are two distinct perspectives generally applied to explain the post-Archaic in the study area; a Plains perspective and a Southwest perspective.

Some of the earliest archaeological research along the southern Park Plateau was conducted on the Philmont Boy Scout Ranch. Headquartered four miles south of the village of Cimarron, Philmont is a sprawling, 138,000-acre high adventure camp that was donated to the Boy Scouts by Waite Phillips, a wealthy oil baron from Oklahoma. Philmont stretches from the Rayado River in the south to Carson National Forest's Valle Vidal Unit in the north. The first formal archaeological excavations were undertaken at Philmont during the summer of 1941 by Samuel Bogan (Bogan 1946). Bogan excavated Box Canyon Cave (NP-4) (Figure 3.3), a two-room rock shelter nestled beneath the southeastern lip of the nick point of Box Canyon. The high vertical walls of Box Canyon, a tributary canyon that directs runoff from Hart Peak into the North Poñil Creek, make access to the rock shelter difficult from any direction other than the sandstone nick point itself. The site is secluded, secure, and completely shaded year-round, suggesting a summer occupation. Digging through stratified floor deposits, Bogan excavated a variety of cultural materials that attest to a distinct southwestern influence. These artifacts included round and square-toe sandals made of yucca; plain, incised, basket-pressed and Taos Black-on-White pottery; grass matting; corn husks tied in knots; a rodent-skin seed bag filled with beans and squash seeds, likely *Cucurbita pepo*. Based upon recovered remains, particularly pottery styles, the site has been dated to between A.D. 1150 and 1250, a period known as the

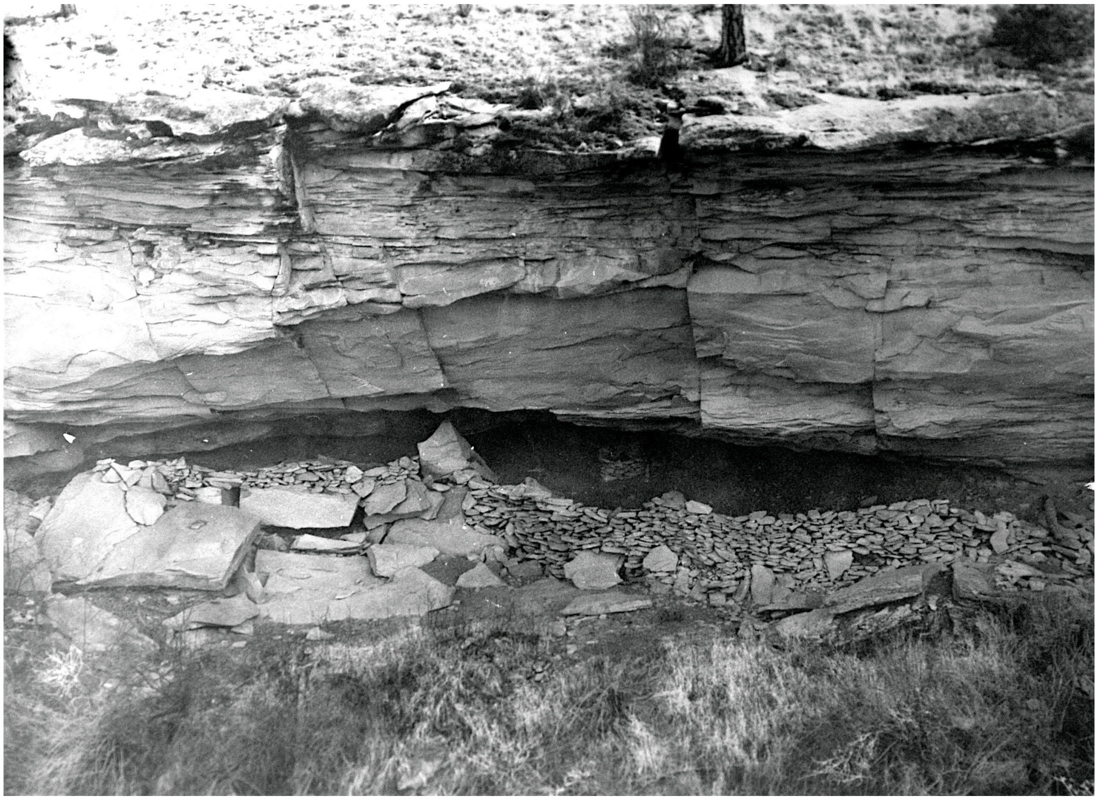

Figure 3.3 Box Canyon Cave in the North Poñil Canyon, Philmont Scout Ranch, Colfax County, New Mexico. Photo courtesy of the Philmont Museum.

Poñil phase (Baker 1964). Bogan's work at Philmont began a tradition of archaeology there that continues to this day.

In 1956 and 1957, additional excavations were undertaken in the North Poñil by Eugene Lutes. Lutes (1959) unearthed what is now called the Slab House (NP-1), a three-room structure whose overall dimensions approximate 8 X 10 m. The structure was built with vertically oriented sandstone slab walls, jacal-style, and the floor contained grinding stones, adobe-lined fire pits, utilitarian and painted pottery. Painted pottery was believed to have been imported from the Rio Grande Valley and included Kwahe'e Black-on-White and Taos Black-on-White. The majority of sherds were unpainted, sand-tempered, soft, friable, and either blackish or reddish in appearance, apparently locally made, and considered inferior to the Rio Grande wares (Lutes 1959:63). In addition, a variety of bone tools, shell ornaments and beads, and several smoking pipes were found. The stone artifacts and pottery sherds were similar to those found by Bogan (1946) on the lowest level of Box Canyon Cave (Lutes 1959).

Assisted by Michael Glassow and S. Alan Skinner, Galen Baker undertook a series of excavations in the North Poñil Canyon between 1961 and 1962, continuing the excavations of Box Canyon Cave, opening excavations at Salt Lake Cave and at Lizard Cave (NP-2). Lizard Cave is a long, low rock shelter in the North Poñil Canyon near Philmont Scout Ranch's Indian Writings Camp (Figure 3.4). Believed to be a multi-component site, Lizard Cave contained artifacts suggestive of occupation by prehistoric Pueblo peoples as well as Jicarilla Apache or Ute (Skinner 1964). The pottery, early Taos Gray and Kwahe'e Black-on White date the early occupation of Lizard Cave to between A.D. 1115-1200 (Skinner 1964).

Baker and Glassow then excavated NP-17, a large circular structure approximately 9 m in diameter (63.5 m^2 interior surface area), situated on a north side mesa. Several globular rooms were attached to the north and west, and Glassow (1972a) assigned the site to the Vermejo phase (A.D. 400-700), even though radiocarbon dating suggested otherwise (1095 A.D [855 ± 50 B.P., UCLA 1369c]). Between 1963 and 1969, Glassow's continued research in the study area included the excavation of MP-4, the Vermejo phase type-site.

Figure 3.4 Lizard Cave, a multi-component rock shelter in the North Poñil Canyon, Philmont Scout Ranch, Colfax County, New Mexico. Excavated by Baker, Glassow, and Skinner between 1961 and 1962, the site produced evidence of Pueblo, Jicarilla Apache, and Ute occupations.

Wiseman (1975) excavated eight of 12 circular structures at a site called Sítio Crestón, near Las Vegas, New Mexico. He concluded from the way the stones were piled or stacked that they served primarily as windbreaks. Finding a large number of stone tools, Wiseman suggests that these sites were used primarily for hunting and processing of meats and hides, although several small manos and metates were also recovered. In the Southwest, basin metates and one hand manos are normally associated with wild plant processing, and so Wiseman concludes that horticulture was not practiced by the people who occupied Sítio Crestón. Unlike Glassow's Vermejo phase sites, the Sítio Crestón site contained pottery, specifically Taos Gray and Taos Incised wares. Wiseman believes that Sítio

Crestón should be considered an Early Panhandle site (A.D. 1000-1400). This interpretation is somewhat problematic because evidence of horticulture was absent, projectile points were corner-notched instead of side-notched, there were no Plains snub-nose scrapers, and the pottery was Taos Gray and Taos Incised instead of cord-marked as we would expect.

Beginning in 1979, John Campbell and Howard Higgins began the York Canyon Archaeological Project (YCAP) as part of a contract with Kaiser Steel's York Canyon Mine, located on the Vermejo Park Ranch. Over the course of five years, YCAP investigators recorded hundreds of archaeological sites (Dorshow et al. 2002). With the expansion of the mining project, the Pittsburg and Midway Coal Mining Company contracted with Southwest Archaeological Consultants (SWAC) who began survey, testing, and eventually excavating a number of sites on the Vermejo Park Ranch, including many sites previously recorded by YCAP. SWAC reported occupation of the area from Late Archaic to the Historic periods, "with Plains Woodland and Pueblo remains well represented" (Dorshow et al. 2002:3.7). In the Post-Archaic, SWAC assigned 52 sites to the period between A.D. 200 and A.D. 1000, concluding that during this period the associated sites were part of the Plains Woodland tradition (Dorshow et al. 2002)

Glassow's Regional Chronology

Glassow (1972a) developed a regional chronology that began with the Vermejo phase, which he suggests represents the first documented inhabitants of the study area.

Vermejo Phase

Based upon findings at the MP-4 type-site, Glassow's Vermejo phase (A.D. 400-700) was essentially a Basketmaker II cultural manifestation distinguished by a circular stone structure made of horizontal sandstone slab masonry, corner-notched projectile points 16 mm or shorter, evidence of domesticated corn, and the absence of pottery (Glassow 1972a; 1980). Upright roof supports were found within the house structure, but no clear evidence of roof construction was found. Shallow midden deposits near structures, Glassow believed, were indicative of seasonal occupations. Artifacts from MP-4 included charred corn and a corn cob, a variety of stone tools and lithic debris, and a large number of baked adobe nodules presumably used in wall construction (Figure 3.5). Glassow obtained a calibrated radiocarbon date of A.D. 510 (1460 ± 50, UCLA 1407). Considering his findings at MP-4 and the apparent surface similarities of a number of other sites in the area, Glassow (1980) assigned 21 sites to this phase, 17 of which he called "definite."

Pedregoso Phase

Following the Vermejo phase was what Glassow called the Pedregoso phase (A.D. 700-900), which is known from a single site in the area (the E component of NP-1) that dated to A.D. 750 (1200 ± 50 BP, UCLA 1369a). Beans, corn, and thick, oxidized pottery were found at the site, together with underground bottle-shaped storage pits, roasting ovens, dense scatters of fist-sized fire-cracked rock, and at least two shallow pithouses (Duran 1973; Kirkpatrick 1976).

Figure 3.5 One of several hundred adobe nodules recovered by Glassow from MP-4, the Vermejo phase type-site. Bearing wood and pine needle impressions, these nodules were presumably used in wall construction.

Escritores Phase

The Escritores phase, believed to date from A.D. 900-1100, is characterized by a pithouse, which Glassow believed to be similar to those found for this period near Albuquerque. Escritores phase pottery includes Kiatuthlanna Black-on-White, Red Mesa Black-on-White, and Kana'a Neck-banded (Glassow 1980).

Poñil Phase

The Poñil phase (A.D. 1100-1250), based upon cross-dated ceramics, is characterized by above-ground, multi-room houses. Poñil phase pottery includes Taos Gray (punctate and incised), Taos Black-on-White, and Kwahe'e Black-on-White (Glassow 1980; Gunnerson 2007).

Cimarron Phase

The final Pueblo period in the Cimarron area is described as the Cimarron phase (A.D. 1200-1300), in which large multi-room pueblos are constructed of adobe and masonry and sites display Cimarron Plain and Santa Fe (Pecos) Black-on-White pottery. J. Gunnerson (2007) excavated several small Pueblo hamlets on the Chase Ranch from which he recovered Taos Gray, Taos Incised, and Taos Black-on-White pottery, as well as locally manufactured ceramic wares. These Pueblo hamlets date to between A.D. 1100 and 1200. After the Cimarron phase, there appears to have been a hiatus in occupation between the end of this phase and the Cojo phase, discussed below.

Proto-Historic and Historic Stages

Gunnerson (1959) undertook a series of archaeological surveys within the Cimarron District and beyond. Conducting research on the Chase Ranch in the Lower Poñil, Gunnerson (1969) reported a number of Apache sites, including two that he excavated; the Sammis and Chase Bench sites. One contained nine tipi rings and what is now known as Cimarron Micaceous pottery. D. Gunnerson (1956) and J. Gunnerson (1969) suggest that several Athapaskan groups (the Querecho or Vaquero as the Spanish called them) arrived in the study area around A.D. 1500, although more recent studies suggest that the date could be as early as the beginning of the fifteenth century (Habicht-Mauche 1988). However, Gunnerson (1974) contends that the A.D. 1500 date is more accurate because some Puebloans reported to the Spanish that their territory had been invaded by the

Southern Athapaskans around 1525. Some suggest that the Querecho or Vaquero Apache roamed widely on the southern Plains, eventually surpassing the Caddoan-Pueblo local trade network by moving goods and information between Taos and Pecos (Dorshow and Baugh 2000).

The Historic Stage began with the appearance of Spanish when, in 1541, Coronado and his men passed through northeastern New Mexico and recorded their findings. Although they spent much time in the Rio Grande Valley with the Puebloan sedentary agriculturalists, the Spanish described nomadic hunter-gatherer groups north and east of there (Deyloff 2000) in what is believed to be the present day Cimarron District. The Spanish did not become heavily involved in Indian affairs in northeastern New Mexico until the mid-eighteenth century.

Glassow's *Cojo phase*, based upon excavations at NP-12 in the North Poñil Canyon, also represents a non-Puebloan occupation of the area between A.D. 1550 and 1750. Glassow observed wikiup-like structures, a bottle-shaped roasting pit, patterned rock scatter, and groundstone (Glassow 1972a). One of the key diagnostics for this period is the thin, paddle-and-anvil micaceous pottery known as Ocate Micaceous (Glassow 1972a; Gunnerson 1969). Pottery likely made at Pecos Pueblo, Pecos Glaze-polychrome and Kotyiti Glaze-on-red, date the site to about A.D. 1600. Sites with similar diagnostics were also reported by Gunnerson (1969) on the Chase Ranch in the Lower Poñil. Cojo phase sites have also been recorded along the Cimarron River, Cimarroncito Creek, and the Rayado River (Glassow 1972a). Known Cojo phase sites in the region fit closely with Ulibarri and Valverde's descriptions (in the 1700s) of Jicarilla occupations (Glassow 1972a).

The *Jicarilla phase* (1750-1900) saw the full occupation of the area by Jicarilla Apache. This represents a return to the area for the Jicarilla, because they were earlier pushed westward by Comanches and Utes shortly after 1700 (Glassow 1972a; Schroeder 1958). It appears that the Jicarilla were only minimally involved in farming, because most sites attributed to this phase are associated with tipi rings. One site, the Chase Bench site (LP-51A), contained four tipi rings and pottery associated with this period; Cimarron Micaceous (Glassow 1972a).

In 1841, a large tract of land was granted by the Mexican government to Carlos Beaubien and Guadalupe Miranda, known as the Beaubien and Miranda Grant. Beaubien's son-in-law, Lucien Maxwell, brought settlers into the area after New Mexico became a U.S. Territory in 1848. In May 1850, the U.S. Army established a post at Rayado, near the mouth of the Rayado River, to keep the Santa Fe Trail open and free of raids by the Jicarilla, Comanche, and Ute (Deyloff 2000; Zimmer and Walker 2000).

By 1864, Maxwell had acquired not only Miranda's share of the land, he began to buy up the claims of heirs as well, giving him the largest privately held estate in the United States. The grant thereafter became known as the Maxwell Land Grant. Originally believed by Beaubien and Miranda to be 79,000 acres in size, the grant was eventually determined to be 1.7 million acres.

Summary and Conclusion

Although a tight chronology for the study area is lacking, a significant body of data now exists and our understanding of the various stages of human occupation in the study area continues to improve. Although the study area lacks a clearly defined, well-dated Paleo-Indian site, reports of several Paleo-Indian projectiles with substantial evidence of Paleo-Indian occupation of nearby regions makes it likely that such remains are present in the study area, but as yet unearthed. It is also possible, however, that Paleo-Indian hunters, if in pursuit of bison, seldom entered the study area because no bison bones have been identified at any site within the area.

Better represented than the Paleo-Indian period, Archaic sites have been reported in all the major drainages in the immediate study area, including the Cimarron River, Poñil Creek, and the Vermejo River drainage. Through pedestrian surveys conducted between 2000 and 2005, I documented additional Archaic sites within the Poñil drainage, including several in the Chase and Juan Barilla Canyons, and well as along Zastrow Creek, near the Rayado River. Within the broader region, Archaic sites are reported by Renaud (1930, 1937), Hall (1938), Hammack (1965), Steen (1955, 1976), Wendorf and Miller (1959), and others.

The Post-Archaic occupation of the region, although better documented, is still poorly understood. Not only is there a lack of consensus as to when the Archaic ends and the Post-Archaic begins, by whatever nomenclature used, but also a significant uncertainty exists as to the cultural affiliation of the people who occupied the area between A.D. 200 and the beginning of the Escritores phase (A.D. 900-1100), although after this period occupation is reasonably well documented. Certainly during the Escritores phase a distinct Southwestern influence is present as evidenced by Kiatuthlanna Black-on-White, Red Mesa Black-on-White, and Kana'a Neck-banded pottery styles. Likewise, during the Poñil phase (A.D. 1100-1250), Taos Gray (punctate and incised), Taos Black-on-White, and Kwahe'e Black-on-White also point either to a Southwestern occupation or influence, or both.

The Historic phase is well-documented. Spanish explorers entered the region in 1541, although until the mid-1700s their presence in the immediate study area was limited. The 1841 Beaubien and Miranda Land Grant, later to become the Maxwell Land Grant, set the stage for the introduction of American settlers, farmers, and ranchers, many of whose descendants continue to live in the study area today.

Chapter IV: Field Methods, Site Descriptions, Excavation Strategies, Excavation Summaries, and Resource Assessments

Introduction

Field research began during the summer of 2000 with a six-week systematic survey of selected portions of the Lower, Middle, and North Poñil drainages. Headquartered at the Chase Ranch, the initial objective was to locate all 17 of Glassow's (1972a) "definite" Vermejo phase (A.D. 400-700) sites, and to record any newly discovered sites. Glassow recorded and plotted the sites on 15-minute USGS topographic quad maps (7.5-minute maps of the study area were not available at that time) and so few of them were exactly where we expected them to be. Several sites were never found. In some places where several separately recorded sites were near one another, it was often impossible to distinguish among them. Accordingly, we recorded anew all archaeological sites observed during the 2000 survey, whether thought to be Vermejo phase or otherwise.

Survey Methods

Although we recovered some surface diagnostics, the survey was essentially a noninvasive, systematic, pedestrian survey. However, maintaining a strict side-by-side surface examination in all areas was difficult, and it proved impossible in some areas. In heavily wooded areas, for example, crew members stayed near each other, walked a straight line insofar as possible to maintain survey integrity, examined the ground surface as thoroughly as possible, but pin-flags were not used to mark transects. In non-wooded areas we followed the parallel transect method, marking our progress using pin-flags to allow for a more exacting coverage of the survey area.

Once we located a site, its extent was determined and marked with pin-flags at the furthest point at which surface artifacts were visible. After we determined the outer boundaries of a site, we recorded site coordinates from the approximate center of the site with the aid of a GPS (Garmin, 12-channel, non-degraded signal). Each site was then mapped and diagnostic artifacts collected from the surface. As with all artifacts collected as part of this research project, we assigned each item its own specific field specimen (FS) number and bagged it separately. Survey boundaries and site coordinate data were then downloaded and plotted onto digitized 7.5 minute USGS topographic quadrangle maps.

Areas Surveyed

Work began near Pippert Lake on the Chase Ranch (Figure 4.1). We surveyed the first and second east-side terraces above Poñil Creek, particularly those just beneath Sunrise and Gretchen's Mesas. Thereafter, we moved to the west of Poñil Creek and examined portions along the creek itself and, as before, the first and second terraces above it. Our crew then moved to Chase Canyon where we surveyed the Sammis Bench, several terraces within Chase Canyon, as well as several side canyons, including X-Horse Billy Canyon and Juan Barilla Canyon (Figure 4.2). We recorded a number of sites in the Chase Canyon area, including an intriguing Archaic site in Juan Barilla Canyon. We later extended the survey to the north and east side of Poñil Canyon from its mouth at Six-Mile Gate

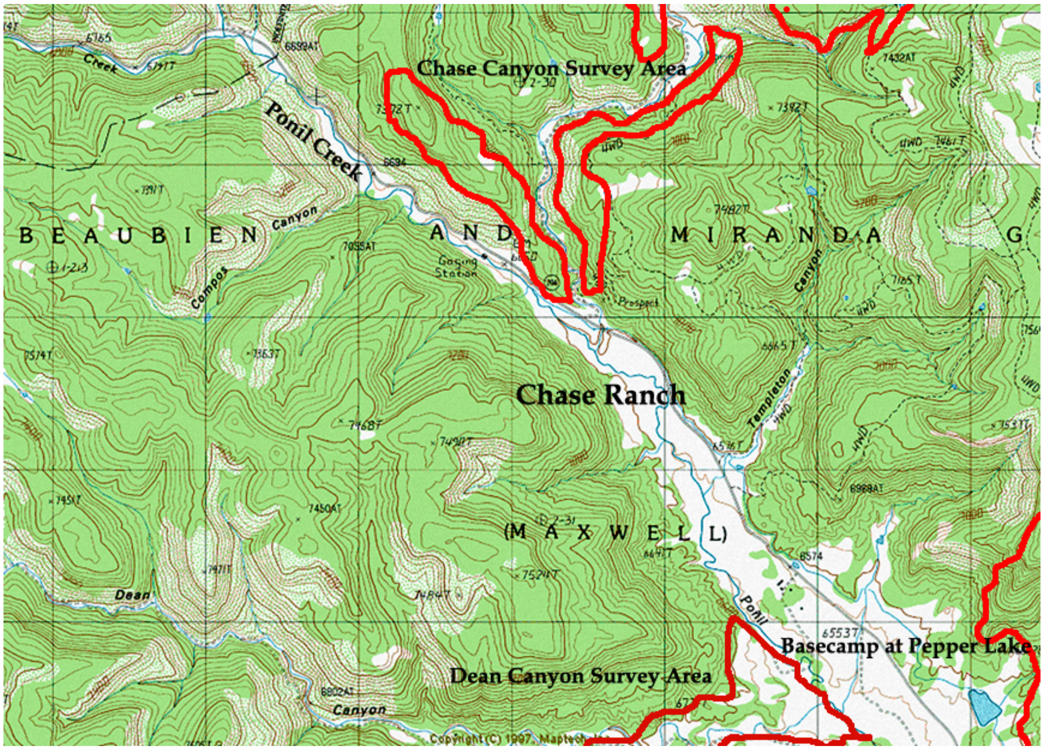

Figure 4.1 Portions of the 2000 pedestrian survey (areas outlined) on the Chase Ranch.

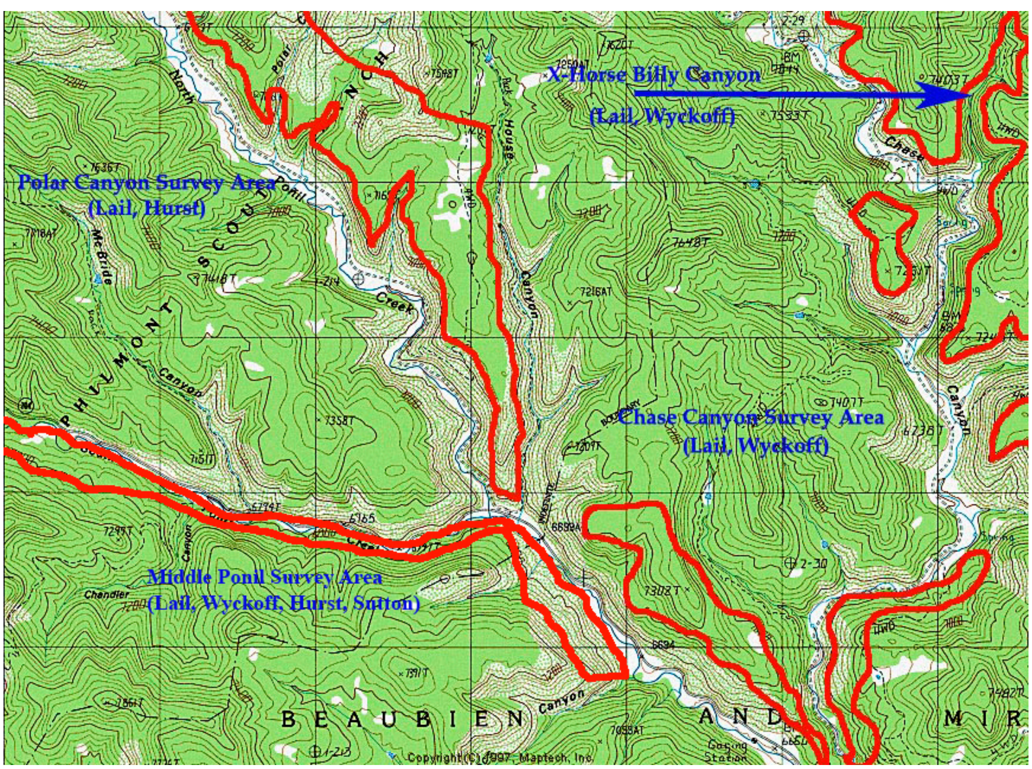

Figure 4.2 Portions of the 2000 pedestrian survey (outlined) on the Chase and Philmont Ranches.

as far northwest as the Philmont Scout Ranch property line. Thereafter, we surveyed several second terraces west of Lower Poñil Creek, as well as a lower portion of Dean Canyon near its convergence with Poñil Creek. Later, we continued the survey in the North Poñil Canyon on the south and west side of the North Poñil Creek, again as far as the Philmont property boundary. Finally, we examined the first terrace on the west side of Middle Poñil Creek in search of the Vermejo phase type-site, MP-4, as well as Vermejo phase sites MP-5, MP-6, and MP-7. All those sites were eventually located and plotted (Figure 4.3). During the survey, we recorded 46 separate and distinct archaeological sites, documenting

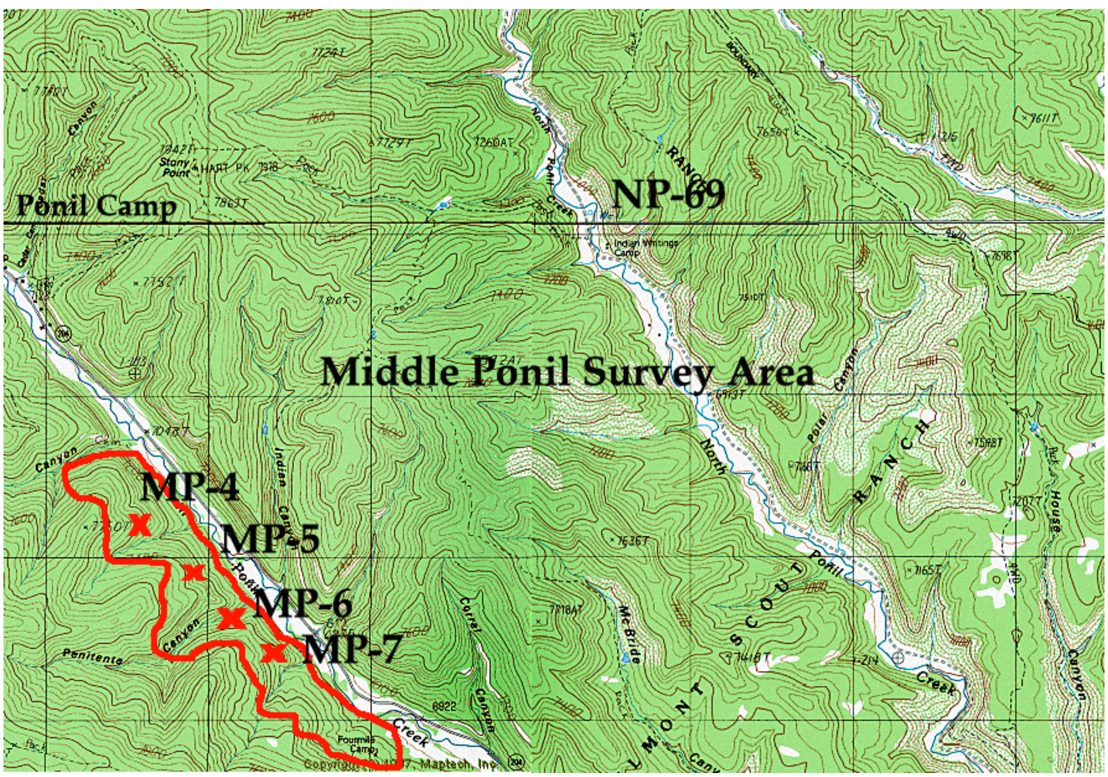

Figure 4.3 Survey area (outlined) along the Middle Poñil Creek, Philmont Scout Ranch, Colfax County, New Mexico. The Vermejo phase type-site, MP-4, is on the first rock terrace above Middle Poñil Creek. Three additional Vermejo phase sites were also found, including MP-7, which was excavated in 2001. NP-69, the third Vermejo phase site we excavated, is marked for reference.

human occupation from the Archaic to Historic periods. No Paleo-Indian artifacts were observed during the survey.

Standard Field Methods, Collection, and Classification Procedures

Unless otherwise noted, the following field methods, collection procedures, and classification systems were used at each site.

An arbitrary datum was established for horizontal control. A total mapping station was then used to establish a 1 m^2 grid system to cover each site in its entirety, although we pulled mason's twine only across those grids where we were actively working. Structures were always gridded entirely with mason's twine, including areas several meters beyond the structure's boundary. At each site, the grid alignment was oriented to magnetic north. Elevations at each site were determined using a laser beacon and several receivers. The laser beacon level was established at exactly 1 m above the modern ground surface and the tripod was not removed until all excavations were complete, i.e., only the head unit was removed at the end of each day.

Once a datum was established and the grid set up, we drew a detailed, scaled surface map of each site before removing anything. In addition, overall site photographs were made as well as photographs of each individual 1 m^2 unit. Following mapping and photography, we carefully collected artifacts from the surface, piece-plotting each of them using the total mapping station. On those days when the total mapping station being used for general topographic mapping, we piece-plotted artifacts using a Cartesian system (e.g., N101.56, E103.21, as measured from the southwest corner of each unit).

Following surface cleaning and screening, each 1 m^2 unit was excavated in arbitrary 10 cm levels. Stones were left on pedestals until it could be determined whether they were isolated in the fill or related to other artifacts or features. At the bottom of each level, a scaled map of each excavation unit was drawn by the person in charge of that particular unit. When feasible, I personally inspected each Level Record and bottom-of-level map for accuracy before allowing work on the next level to begin.

Once a cultural level or feature was observed or suspected, we then departed from the arbitrary 10 cm level system and followed the cultural level or feature instead. Features were assigned sequential feature numbers (beginning with Feature #1) and were investigated separately. Excavation Level Records, or Feature Records where appropriate, were completed by each person in charge of a unit. To serve as a cross-reference, individual artifact Field Specimen (FS) numbers were recorded not only on the master FS log, but also on the Excavation Level Record itself.

Artifacts were categorized into classes, which included lithics, ceramics, botanical, faunal, groundstone, adobe nodules, charred wood, and other (which included historic period artifacts, if present). We maintained a Master Field Specimen Log and each artifact, including individual pressure flakes and bits of micro-debitage, received a separate FS number and was placed in its own archival

2 or 4-mil zip-seal bag, along with a label denoting the FS number. On the Master FS Log we made a notation that identified the unit from which the artifact was retrieved along with point provenience data if available, together with a brief description of the artifact.

Charred botanical remains were gathered and assigned an FS number. Soil samples, later subjected to flotation, were also collected from each unit and assigned an FS number. Flotation procedures were adopted from Pearsall (1989). Seeds were identified by reference to Martin and Barkley (1961). Charred wood samples were gathered and wrapped in foil and assigned an FS number and, if appropriate, a reference to the feature from which came.

Features were assigned sequential feature numbers and investigated separately. The boundaries of features were first established using a total mapping station. One hundred percent of the fill of all subsurface or wall features was bagged, assigned FS numbers, and later floated. Features were then sketched, mapped in relation to the grid system, and photographed.

It was important to locate activity areas outside the structures themselves. Thus, we not only excavated inside the established walls but outside as well. Moreover, we excavated several units well beyond the structure's visible boundary, sometimes some meters away, in areas that we thought may produce extramural features, including lithic reduction areas.

Where appropriate, we drew grid elevation profiles, usually of a north or west wall of an excavation unit. In addition, bulk soil samples were collected from each level within each unit, and then plotted, bagged, and assigned FS numbers.

At the bottom of each level, a photograph was made using either a Nikon F100 camera using Fuji Velvia ISO 50 or ISO 100 slide film, or Nikon D100 digital camera. The photograph number was recorded on a Master Photo Log and, for cross-reference, on the Excavation Level Record for the unit involved.

Architecture and Features

Because Glassow (1972a, 1980) based the Vermejo phase in part upon a particular type or architecture - round, horizontally-laid sandstone structures approximately 5 m in diameter - particular emphasis is given to architectural details. It was, in fact, the architectural features that drew us to the three examined sites (NP-69, MP-4, and MP-7).

For each structure examined, we first removed loose sand and debris from the surface. Thereafter, fallen wall stones were removed only after it was ascertained that they were not still intact or part of a subsurface feature. Wall rocks were left in place only if we could be reasonably certain that they were still intact. In other words, if there was loose sand beneath them, we removed them. Accordingly, the final wall segments depicted in photographs and plan view drawings are known to be accurate.

Each structure was roughly circular in form. Measurements of diameter and standing wall height were made. Walls were examined for evidence of chinking or fill with adobe mud. Adobe “wall melt” was recorded in field notes when it was observed. Floors were examined for compactness or plaster, or both, as well as overall shape (flat, saucer-shaped, sloping, etc.).

Features inside structures were recorded separately on Feature Records, photographed, and drawn to scale. Internal features include hearths, a wall pocket, and a plastered bench.

Standard Lab Methods

During each field season we set up a field laboratory where, at the end of each day, artifacts were washed, screen dried, re-bagged, and organized into lots (Figure 4.4). At the end of each season, artifacts were transported from the field to the Oklahoma Museum of Natural History, Norman, Oklahoma, for further

Figure 4.4 Historic cabin in the North Poñil Canyon that was used as the archaeological field laboratory. Electricity was supplied by an array of portable solar electric panels provided by the Philmont Scout Ranch.

processing and analysis. Most work, other than flotation of soil samples, was carried out in the museum's archaeological laboratory. However, during the 2004 field season a large number of artifacts were analyzed in the field laboratory in the North Poñil Canyon. Regardless of the laboratory in use, each individual artifact was examined, metrical data were recorded and then entered into a spreadsheet for analysis. Many of the artifacts were then photographed. Details of features, including architecture, were recorded in the field and supported with drawings and photographs.

Lithics Analysis

One of Glassow's (1972a, 1980) Vermejo phase diagnostic indicators was an abundance of corner-notched arrow points, generally 16 mm or shorter. Not much more was made of lithics in that early study, but in this study stone tools and manufacturing debris take on a central role. This is because of the total artifacts recovered from three sites (MP-4, MP-7, and NP-69), 93.7 % were lithics. For that reason, this body of data is of the utmost importance in understanding the people, their approaches to problem solving, their history, the foods they consumed, and the parameters of their territory. In other words, lithics and the technological strategies they represent are key indicators of the functional regions of the Poñil residents circa A.D. 300-800, and thus will contribute to the definition of the behavioral region for that period.

The objective of the lithics analysis was to learn as much as possible about the technological strategy employed by the occupants of the sites under investigation and the extent to which they were willing to travel to obtain certain materials. This, in turn, would make it possible to draw inferences regarding subsistence, mobility, cultural ties or affiliations, and would thus help to define the overall behavioral region (see discussion, Chapter I).

Lithic Metrical Data Gathered

Each specimen was examined, most with a 10X-30X stereo-microscope, first to determine whether it was indeed an artifact, and then to document attributes and gather metrical data, which would help us understand the technological strategies employed by the Poñil flintknappers. Variability in the length, width, and thickness of flakes are believed to be direct indicators of tool size, core size, and stage of reduction, making it also possible to infer the nature of the fabricator, generally indicating whether the striking tool was another stone or a softer item like antler or wood.

The following metrical data were collected to help determine the technological strategies involved in the production of the lithic artifacts (see Teltser 1991, but cf Morrow 1997). Once a specimen was determined to be an artifact (student crew members were asked to err on the side of collection, resulting in a number of bits of stone that were not artifacts) the next step was to assign it to an attribute class. Attribute classes included Primary Flakes, Secondary Flakes, Tertiary Flakes, Retouch Flakes, Unmodified Flake Tools, Modified Flake Tools, Cores, and Angular Debris (see definitions, Table 4). In order for an artifact to be categorized as a flake, it had to possess traits associated with flake morphology

Class	Definition
Primary flake	A flake whose dorsal side is wholly covered in cortex and whose ventral face displays a bulb of force or other recognizable flake attribute.
Secondary flake	A flake that has at least some cortex remaining on the dorsal side and whose ventral face displays a bulb of force or other recognizable flake attribute.
Tertiary flake	A flake larger than 6.5 mm in length and which lacks cortex and whose ventral face displays a bulb of force or other recognizable flake attribute. Some cortex may remain on the striking platform.
Retouch flake	A flake smaller than 6.5 mm in length that appears to have been pressed from a larger flake or tool, i.e., a pressure flake, and whose ventral face displays a bulb of force or other recognizable flake attribute.
Unmodified flake tool	A flake that shows edge damage or wear presumably from usage, but otherwise does not appear to have been intentionally modified. May be a primary, secondary, or tertiary flake.
Modified flake tool	Bears patterned flake scar evidence of having been modified. May have been produced from a primary, secondary, or tertiary flake.
Core	Amorphous or polyhedral shaped tool stone from which large flakes have been removed for the purpose of making other tools, formal or informal.
Angular debris	A non-tool, non-core piece of knappable stone that lacks any formal flake attribute and is angular or blocky in appearance.

Table 4. Definitions.

that would allow for the proper orientation of the flake (proximal end up) (see Whittaker 1994; Figure 4.5). As expected, some of the artifacts were broken, so at least one of the following traits had to be present and observable before an artifact was designated a flake: 1) a striking platform (point of force application); 2) a bulb of force; 3) an erailleur scar (a distinctive scar often visible on the bulb of force); 4) undulations of force (result from the dynamic nature of force application); or 5) a recognizable termination (occurs on the distal end, and is of one of the following types: feather, hinge, outrepassé, or step). Any artifact, other than a tool, core, or projectile point, which did not possess at least one of these recognizable flake attributes was designated simply ‘angular debris.’

After the artifact was classed it was then examined to determine the raw material from which it was made (Table 5). Once the raw material was noted,

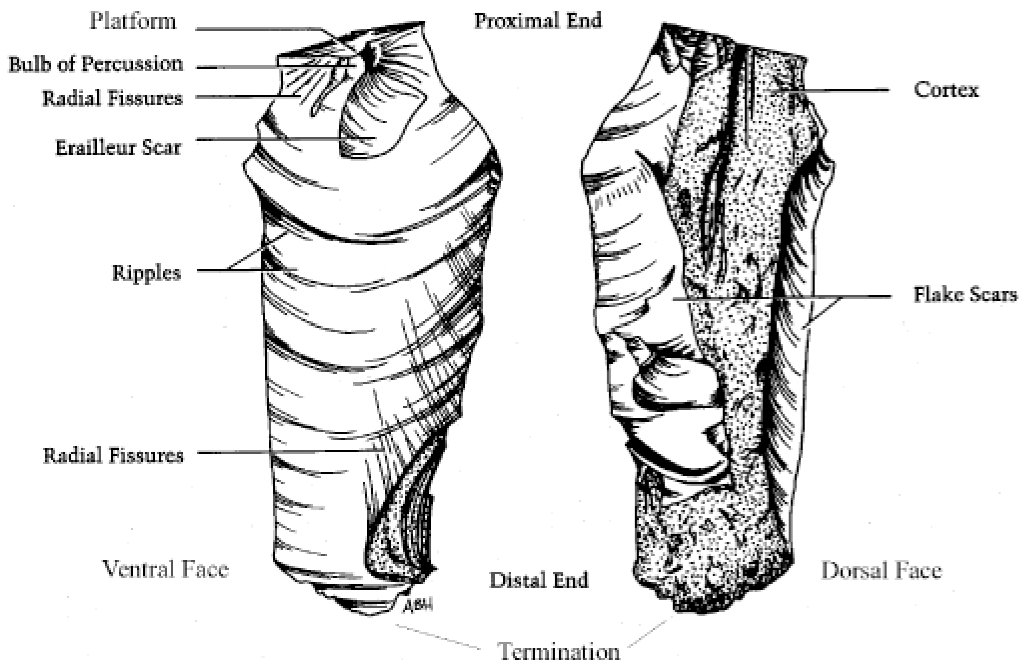

Figure 4.5. Typical anatomy of a flake. Adapted from Whittaker (1994).

metrical data were recorded. For flakes, this included measures of length, width, and thickness (in mm) and weight (in grams, to the nearest tenth). Flake length was always measured with the platform horizontal to the plane of measure. Platforms were recorded as present or absent and the number of facets noted. Dorsal scars were counted to determine how an individual flake stood in relation to the overall reduction sequence; it follows logically that late stage flakes should have more dorsal scars than early stage flakes. Platform lipping was recorded as present or absent. Because so many flakes were extraordinarily small, a 10X-30X stereo-microscope was used to evaluate all flakes shorter than 6.5 mm in length. As with larger artifacts, a full examination was made and all the foregoing data were recorded on the micro-flakes as well, with a single modification. Using a scale etched into the microscope's platform, a size grading system was employed.

Raw Material	Description	Sources
Cimarron Hornfels	Cimarron hornfels is the most common tool stone in the study area. In the study area hornfels has a specific definition; it is the stone that is derived from the intrusive baking of Pierre shales by sills and dikes of intrusive igneous rocks, most commonly porphyritic dacite. The end result of this process is the formation of biotite-hornfels, a fine-grained, hard and splintery stone that often, although not always, shows banding from the bedding planes found in the parent material. Much of the hornfels found in the study area is knappable, although the fracture properties of individual specimens vary widely. In many instances hornfels shears along the bedding planes of the parent material, although in the more indurated varieties the bedding planes do not interfere with the fracture process. To the naked eye, some of the dark, non-banded varieties of hornfels appear to be, and are often confused with, basalt.	Several bedrock sources of Cimarron hornfels are located on Baldy Mountain. Boulders and cobbles occur throughout the Ute Creek drainage where, near the source, they may be as large as several cubic feet in volume and weigh as much as 22.7 kg (50 lb). From Ute Creek, hornfels makes its way into the Cimarron River. A second source of large cobbles of Cimarron hornfels occurs in the Ute Gulch area on the Philmont Scout Ranch. Although the survey is ongoing, to date no sources of hornfels have been observed on the nearby Great Plains.
Thermally-altered sandstone (TaS)	Indurated, coarse-grained sandstone that was baked by the same intrusions that formed hornfels, described above. Its coarse-grain makes knapping difficult and results in rough edges, but this material was used frequently at sites along the Middle Poñil Creek for the production of crude flake tools.	Thermally-altered sandstone occurs in the Middle Poñil Creek as boulders and cobbles. To date, no bedrock sources have been observed in the study area.
Chalcedony	A form of opal that is derived from non-crystalline amorphous masses of silica which contain variable quantities of water (Pirsson 1957:67). Forms primarily as deposited liquids containing colloidal silica in a gelatinous state. As the opal dehydrates it may crystallize, forming what is commonly referred to as chalcedony (Pirsson 1957:67). Chalcedony is therefore a fibrous and microfibrous form of quartz "in which fibers have grown in the direction of the lateral crystallographic axes instead of the vertical axis as in normal quartz" (Pirsson 1957:67-68). Chalcedony is usually waxy in appearance, is generally spherulitic, and occurs in botryodoial and mammillary masses, demonstrating its colloform ancestry when it was deposited as gelatinous silica (Pirsson 1957:68).	Common chalcedony occurs as pebbles and cobbles in the Poñil drainage.
Corrumpa Creek Carnelian	A form of chalcedony distinguished from Alibates "flint" only by its mottled brown appearance. It formed from the same Ogallala gravels in the same fashion, and thus could be considered a lateral equivalent of Alibates.	Occurs in the Corrumpa Creek area near Clayton, New Mexico, about 140 km (87 mi) east of the study area.

Raw Material	Description	Sources
Siltstone	A common fine-grained silica-rich sedimentary stone formed from silt-sized particles. Much of the worked siltstone may be thermally-altered – very likely a form of hornfels. A number of projectile points in the study area are manufactured from this material.	Occurs in the streambeds in the North, Middle and South Poñil Creeks, as well as the Cimarron River. Less common on the upper slopes of Baldy Mountain.
Obsidian	Volcanic glass, formed when magma is ejected onto the earth's surface which cools so rapidly that ion migration is retarded and mineral crystals do not have sufficient time to form (Sinkankas 1970).	Although a Cimarron resident has suggested that a source of obsidian exists near the Rayado River, several intensive surveys of the area have failed to produce any evidence of local obsidian. The closest known source is in the Jemez Mountains, approximately 160 km (100 mi) to the west of the study area. A number of specimens have been subjected to x-ray fluorescence examination and, based upon that analysis, all of them originated in Valles Caldera area of the Jemez Mountains.
Quartzite	A tough, hard, sugar-textured sedimentary rock that, in some areas of the Poñil drainage, is so indurated that it was used for toolmaking, albeit rarely.	Can be found as outcrops on high mesas, typically overlaying the Poison Canyon and Raton Formation sandstones. One known outcrop is about 100 m north and west of site NP-69, although it was seldom used for toolmaking at that site.
Dacite Porphyry	Dacite is the extrusive equivalent of granodiorite. Dacites are typically porphyritic, exhibiting phenocrysts of quartz, orthoclase or sanidine and plagioclase (Huang 1962:123). Though sometimes present, phenocrysts of pyroxene, biotite and hornblende are relatively rare in dacite. Dacite groundmass is usually glassy or felsitic, and often contains mafic inclusions. Although dacite is relatively unsuitable for toolmaking, several crudely worked pieces were recovered, and cobbles of this stream-rolled, unworked, but fire-reddened material were observed at a number of mesa top sites where it was presumably used as boiling stones.	Occurs as sills and dikes mostly west of the Poñil drainage, although substantial quantities occur in pediment gravels and in the streambeds in the Middle Poñil area. Sills radiate northward from the Baldy Mountain – Touch-Me-Not area far into southern Colorado. Dacite is abundant in the Valle Vidal Unit of the Carson National Forest, which is drained by the Poñil Creek system.
Pedernal Chert	A mottled gray chert. Rare in the study area.	Occurs west of the study area, near Chama, NM.

Table 5. Raw material descriptions.

Micro-flakes and micro-debitage were graded as follows: <2.5 mm; 2.5-3.5 mm; 3.6-4.5 mm; 4.6-5.5 mm; 5.6-6.5 mm, and > 6.5 mm. For flakes greater than

6.5 mm in length, digital calipers were used to record metrical data. All of the micro-flakes and micro-debitage weighed less than 0.1 g.

Projectile points were evaluated as above, including measures of length, width (maximum), thickness, and weight, together with raw material data and notching pattern. Finally, angular debris was simply weighed and the raw material noted.

Ceramics

One of the key "negative" indicators of Glassow's Vermejo phase was the absence of pottery. We did, however, recover pottery sherds from one site, MP-7. Sherds were examined for surface markings, type of temper, and general metrical data were gathered.

Botanical Remains

Soil samples were recovered from each site, typically from arbitrary soil columns within each 1 m^2 unit. However, 100% of the soil found in a feature was collected and floated. Soil samples were usually 2 liters in volume, although some 1 liter samples were taken from shallow soils just above bedrock. All soil samples were floated in 5 gallon buckets, with each sample being immersed in fresh water to avoid cross-contamination. After removing the larger organics with a strainer, the water was then poured through a fine-mesh polyester fabric to capture small seeds. The samples were then allowed to air dry, weighed to the nearest 0.1 g, and then sorted and identified using a 10X-30X stereo-microscope. Large samples were quartered using a splitter. In those cases, only one quarter of the individual sample was evaluated. Only charred seeds were evaluated, and some of them appeared to be recently charred either from the large forest fire of 2002 or possibly earlier. Because of the devastating fire of 2002 and the shallow character of the soils at NP-69, charred wild plant materials recovered from any but the buried hearth and wall feature were considered suspect.

Macro-sized pieces of sub-surface charred wood were gathered in the field and typically wrapped in foil, although some were placed in 4-mil plastic zipper bags. Such samples were later examined to determine species.

Faunal Remains

A single, modern artiodactyl tooth was recovered from site NP-69. It was found outside the structure in loose sand during surface cleaning. No other faunal materials were recovered from any of the sites, even though 3 mm or 6 mm mesh was used for screening, and the contents of all features were floated. The three sites investigated were near cliffs, so it is postulated that animal remains were disposed of by simply tossing them over the edge. Such behavior would remove decaying carcasses from living areas and reduce the likelihood of attracting scavenging animals, including bears and mountain lions.

Sites Investigated

Following the survey, I determined that to fulfill research objectives I would need to recover data from two typical Vermejo phase sites. I chose MP-7 in the Middle Poñil Canyon and NP-69 in the North Poñil Canyon. I would reopen MP-4, the Vermejo phase type-site, to determine if more could be learned from a reexamination of this important site. During the summers of 2001, 2002, and 2003, leading a group of students from the University of Oklahoma and elsewhere, I reexamined MP-4 and fully excavated MP-7 and NP-69.

MP-4

Site Description

The first site we opened was MP-4, the Vermejo phase type-site. This was the site originally excavated by Glassow in 1966 (Glassow 1972a, 1980). My objectives for re-opening MP-4 were threefold; to search for additional post impressions that might be suggestive of roof construction, to gain a better understanding of wall construction, and to use the site to instruct students in excavation techniques.

MP-4 is in the Middle Poñil Canyon, a northwest-southeast trending stone-terraced canyon that drains Middle Poñil Creek (see Figure 4.3). South of the creek, on the first terrace about 10 m above the modern stream bed, MP-4 sits on a gentle slope, surrounded by piñon, juniper, and a light undergrowth of Gambel's oak. In open areas, the surface was largely covered with light grasses growing in sandy soils. The original stone walls were plainly visible (Figure 4.6). Sparse field notes and few photographs made our original investigation of the site somewhat difficult, but we soon arrived at a strategy for the investigation.

Excavation Strategy

At MP-4, we established a datum just southwest of the structure by driving a 3/4 x 30 inch piece of steel re-bar into the ground, and then gave it the designation 100N/100E. By so designating the datum, we avoided the possibility

Figure 4.6 MP-4, the Vermejo phase type-site as it appeared before our 2001 reinvestigation. MP-4 was originally radiocarbon dated to A.D. 510, but a second date from a kernel of corn placed occupation near A.D. 665.

of negatively numbered units. Using 12-inch steel spikes, we staked out 36 1 m^2 units and, using mason's twine, set up the grid over the entire structure, extending it in all direction several meters beyond the stone walls of the structure itself. Each 1 m^2 unit was then assigned a unit address by the relation of its southwest corner to the site datum, i.e., 101N/103E.

Although we did not expect to find many artifacts at this previously excavated site, a number of them were plainly visible on the surface. It became clear to us then that although the site had been excavated, much of the fill had not been screened.

Screening

Once all the artifacts visible on the surface were plotted and collected, we cleared the surface of each unit of grasses and loose sand, which was approximately 2 cm deep over most of the site. All the surface materials were then screened. We were prepared to screen all materials through 3 mm mesh but, other than the sandy surface, we found that the soil contained so much clay that it took about 45 minutes to screen a single 10 liter bucket of fill. Finding this untenable, we switched to 6 mm mesh screen and continued to use it throughout the excavation. One hundred percent of the excavated material was thus screened. Each artifact found during screening was also assigned an FS number and the unit/level from which it was originated was recorded.

Excavation Summary

Because we were investigating a site that had been previously excavated, we were working largely in backfill. We opened 25 1 m^2 units, both inside and outside the structure, and excavated them in 10 cm levels until we reached either sterile soil (outside the structure) or the floor. The foundation stones of the walls were intact and several courses high. The sandstone slabs used to build the walls were not sitting merely on the ground surface, but instead incised slightly beneath it. The floor was somewhat saucer shaped and did not appear to have been plastered, but instead compacted from use. The amount of rock removed and stacked nearby from the 1966 excavations, combined with those wall rocks still in place, lead me to believe that Glassow (1980) was correct in surmising that the stone portions of the walls were about 1 m above the ground surface.

Glassow recovered a number of baked adobe nodules which came from the walls, and possibly from the roof (see Figure 3.5). Impressions in the adobe indicate that the walls were covered with adobe plaster inside and out and that small piñon saplings were used in constructing the wall and roof area.

After we completed testing of MP-4, we excavated a north-south trench across the structure to about 50 cm beneath the modern surface to determine whether there was an earlier occupation. Immediately beneath the floor of MP-4 we hit sterile soil. No additional post impressions were found, although we did observe several post impressions originally recorded by Glassow.

Three hundred sixty stone artifacts were recovered from MP-4 during the 1966 excavations (Appendix A). During the 2001 field season, we recovered an additional 140 stone artifacts, all of which, we must presume, were in backfill. We did not recover, nor did Glassow report, any artifacts inconsistent with assigning this site to a single component of occupation. Glassow's single radiocarbon date placed occupation at about A.D. 510 (UCLA 1407). I had one kernel of corn from the original excavations AMS dated and it put occupation at A.D. 665 (Beta 166358, 2 sigma calibrated A.D. 630 to 710).

Because of provenience concerns, the 2001 data are of limited utility. However, they will help with a general understanding of lithic raw material usage at the site. Although Glassow recovered corn and corn kernels from the site, no additional cultigens were observed during the 2001 excavations.

MP-7

Site Description

MP-7 was the second site investigated. It was selected because it was expected to be a typical Vermejo phase site and it would provide additional data to help with the reconstruction of the behavioral region. MP-7 was on the same rock terrace as the type-site, just 600 m southeast (see Figure 4.3). MP-7 is on the south side of Middle Poñil Creek on a gentle slope, on the first stone terrace about 10 m above the modern stream bed. Glassow assigned this site to the Vermejo phase based upon what appeared to him to be evidence of a circular stone structure similar to that found at MP-4, small corner-notched projectile points visible upon the surface, and the apparent absence of pottery. Although somewhat more heavily overgrown with grasses, piñon, juniper, and Gambel's oak than MP4, the site was nonetheless in a relatively open area next to an old road-cut, which did not intrude into the site (Figure 4.7).

Approximately 43 m northwest of MP-7 we observed a very dense lithic scatter that included a number of small, corner-notched projectile points. Originally, we believed this to be site MP-6, another of Glassow's Vermejo phase sites, but we were unable to find any evidence of a structure associated with the artifacts. We did eventually locate MP-6, which was several hundred meters northwest of the immediate scatter (see Figure 4.3). We determined the scatter to

Figure 4.7 View looking NNE of site MP-7 on the first rock terrace above Middle Poñil Creek, Philmont Scout Ranch, Colfax County, New Mexico. The structure associated with MP-7 is visible as a slight rock dome in the near background, just beyond the laser level.

be an activity area associated with MP-7, and all artifacts recovered from this area were later designated as being from MP-7a.

Excavation Strategy

As with MP-4, we determined that for ideal spatial control it would be best to establish a 1 m^2 grid system to cover the main portion of MP-7. However, we did not extend the grid to the MP-7 activity area, MP-7a, because of the heavy undergrowth of Gambel's oak that separated the two areas of the site. We established a mapping datum just southwest of the structure by driving a 12 inch steel spike into the ground, and then gave it the designation 100N/100E. Using additional 12-inch steel spikes, we staked off 60 units, each 1 m^2 and, using mason's twine, set up the grid over the entire structure, extending it in all directions several meters beyond the stone walls of the structure itself (Figure 4.8). Each 1 m^2 unit was then assigned a unit address by the relation of its southwest corner to the mapping datum. A poured concrete marker, up-slope and to the south of the site, indicates the actual site datum, which was shot in separately using the total mapping station.

Figure 4.8 NE view of MP-7 prior to excavations.

Once the datum was established and the grid set up, we drew a detailed, scaled surface map before any artifacts were removed. In addition, overall site photographs were made as well as photographs of each individual 1 m^2 unit. Altogether, 331 artifacts were recovered from the surface of MP-7 (Appendix B).

Screening

After all surface artifacts were plotted and collected, we cleared the surface of each unit of grasses and loose sand, which was between 1 and 2 cm deep over most of the site (Figure 4.9). All the surface materials were then screened. Similar to our experience at MP-4, we found that we could not realistically use the 3 mm mesh, and so we used 6 mm mesh instead. One hundred percent of the excavated materials were then screened in this manner.

Figure 4.9 View of the structure at MP-7 after loose sand and vegetation were removed from the surface. Note the well-defined fallen wall section in the lower-right corner of the photograph.

Excavation Summary

MP-7 was intensively excavated by hand. We opened 41 1 m^2 units within and immediately outside the structure, all of which were taken down to sterile soil, except for the floor of the structure itself (Figure 4.10). A "window" was opened

Figure 4.10 View of MP-7 following excavation. Note the "window" in the lower-right portion of the photograph. We excavated beneath the floor to determine whether there was evidence of an earlier occupation, but there was not. Ashy, reddened areas are barely visible in the photograph, but charred wood samples were collected from these areas.

in the saucer-shaped floor to determine whether an earlier occupation might be found, but none was. In addition, we opened 6 1 m^2 units to the west and northwest of the structure to test for extramural activity areas. A burned rock concentration was recorded near a large boulder just northwest of the structure. The main activity area associated with MP-7 lies 43 m west of the structure, where surface artifacts were piece plotted and collected. No midden was observed, nor was one expected given that the site was next to a low cliff above Middle Poñil Creek, where the easiest way to deal with refuse would be to simply throw it over the cliff.

A total of 568 artifacts were recovered from the excavated units. This total includes 32 brown, sand-tempered potsherds, two of which were incised, and several of which were found on the floor of the structure. The sherds were thin (average 5.3 mm). Context for the sherds is questionable. Most of them appear to have come from a single pot break and they were found in an area of significant bioturbation.

Four features were recorded, one of which was the masonry structure itself and three of which were ash pits on the floor (see Figure 4.10). No formal hearth was observed, but charred wood from Feature # 2 dates the site's occupation to A.D. 780 (Beta 164974, 2 sigma calibrated A.D. 690 to 890). A second date obtained from a piece of charred wood from the area of bioturbation was dated to A.D. 1260 (Beta 166359, 2 sigma calibrated A.D. 1180 to 1290), both of which are after Glassow's (1972a, 1980) Vermejo phase.

NP-69

Site Description

Site NP-69 sits on the top of a mesa approximately 95 m (312 ft) above North Poñil Creek (Figures 4.11, 4.12). It is surrounded a number of piñon and juniper trees as well as several robust thickets of Gambel's oak. Prickly pear cacti grow in abundance across the site, and small barrel cacti grow in or near partially shaded areas. Yucca grows in small quantities across the mesa, but it is more abundant on the rocky ledges and slopes below the site. Several small trees were growing near the walls of the structure (Figure 4.13), but in only two places were

Figure 4.11 NP-69 sits at the top of the mesa about 4 m from the cliff's edge. The site is 95 m (312 ft) above the valley floor. There are no sources of fresh water on the mesa, meaning that the site's occupants would have to descend the mesa for that purpose.

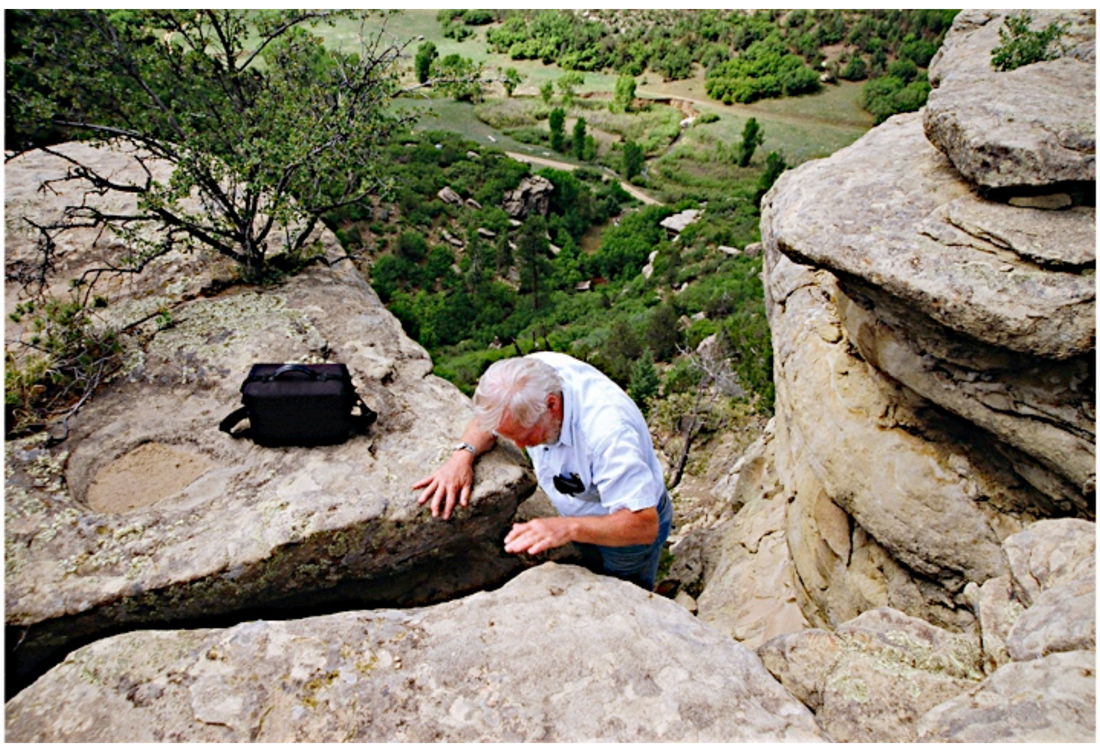

Figure 4.12 View of the ascent from the valley floor to the mesa on which NP-69 is located. Dr. Richard Pailes pictured topping out on the last few feet of the climb.

Figure 4.13 View SW of the cliffside structure at NP-69 prior to excavation. Note the sandy soils that allowed us to use 3 mm mesh screen exclusively.

the walls somewhat displaced by vegetation. Elk droppings, bear scat, and mountain lion feces were visible when we first arrived, and several Western Rattlesnakes had taken up residence at the site.

At the southern, western, and eastern edges of the site, about 4 m from the structure, a sheer cliff drops away to the canyon below (Figure 4.14). East of the structure, the rocky cliff bends northward for approximately 500 m (1,650 ft) until it merges with the mountain slope that feeds a side canyon that empties into the North Poñil Creek. To the west of the site, the sandstone cliff edge continues for approximately 1 km before it gives way to a deep drainage just west of NP-17, another of Glassow's (1972a) Vermejo phase sites. North-northwest of the site, another low mesa is encountered some 100 m away, as are several additional,

Figure 4.14 View of Poñil Canyon from east edge of NP-69 with rappel rope in foreground.

small, step-like rock pitches as one nears the pinnacle of the mountain some 600 m to the northwest. Except for a small shelf of exposed orthoquartzite on the second mesa, the entire area is underlain by, and the rocky cliff itself composed of, Raton and Poison Canyon Formation sandstones, which overlap and inter-tongue in this area. The North Poñil Canyon is a deeper, narrower canyon than the Middle Poñil. The only watercourse near the site is the North Poñil Creek that lies some 95 m (312 ft) below, a trip to which requires an arduous descent to reach and an exposed rock climb to return.

Like MP-7, Glassow (1972a) assigned this site to the Vermejo phase (A.D. 400-700) based upon evidence of a circular structure constructed of horizontally-laid sandstone slabs, small corner-notched projectile points visible on the surface, and the apparent absence of pottery. Along with the structure, a black, sandy midden was visible beginning about 5 m north of the structure. The entire site surface was littered with artifacts.

Excavation Strategy

Using 12-inch spikes, we staked off 162 units, each 1 m^2 and, using mason's twine, set up the grid over the entire structure, extending it in all directions several meters beyond the stone walls of the structure itself. To the north, we extended the grid to cover much of the suspected midden. Each 1 m^2 unit was then assigned a unit address by the relation of its southwest corner to the site datum. Once the datum was established and the grid set up, we drew a detailed, scaled surface map before any artifacts were removed (Figure 4.15). In addition,

Figure 4.15 A grid of 162 1x1 m units was established, the site was mapped, and surface artifacts were piece-plotted and collected. The screen is from Kirkpatrick's (1972) testing at the site.

overall site photographs were made as well as photographs of each individual 1 m^2 unit. Following mapping and photography, we used pin-flags to mark artifact locations across the site. During the next two days, we carefully collected surface artifacts and piece-plotted each of them using the total mapping station. Five hundred ninety-one (591) artifacts were recovered from the surface of NP-69.

Screening

Once all the artifacts visible on the surface were plotted and collected, we cleared the surface of each unit of grasses and loose sand, which was between 1 and 2 cm deep over most of the site. The sandy soils made it possible for us to use 3 mm mesh to screen 100% of the materials removed from NP-69.

Excavation Summary

Altogether, 94 1 m^2 units were fully hand-excavated at NP-69 (Figure 4.16). We opened 68 1 m^2 units within and immediately outside the structure, all of which were taken down to bedrock. As we neared the floor of the structure, we met with a dense layer of charred wood and ash, indicating that the structure had burned at some time in the past. In addition, we opened 11 1 m^2 units to directly north of the structure, and an additional 15 1 m^2 units in the suspected midden area. Four features were recorded: a formal hearth inside the structure (Feature #1) (Figure 4.17), a pocket, or void, built within the wall on the north side of the structure (Feature #2) (Figure 4.18), a burned rock midden in the suspected "midden area" (Feature #3), and a second formal hearth sitting on bedrock just north of the structure (Feature #4).

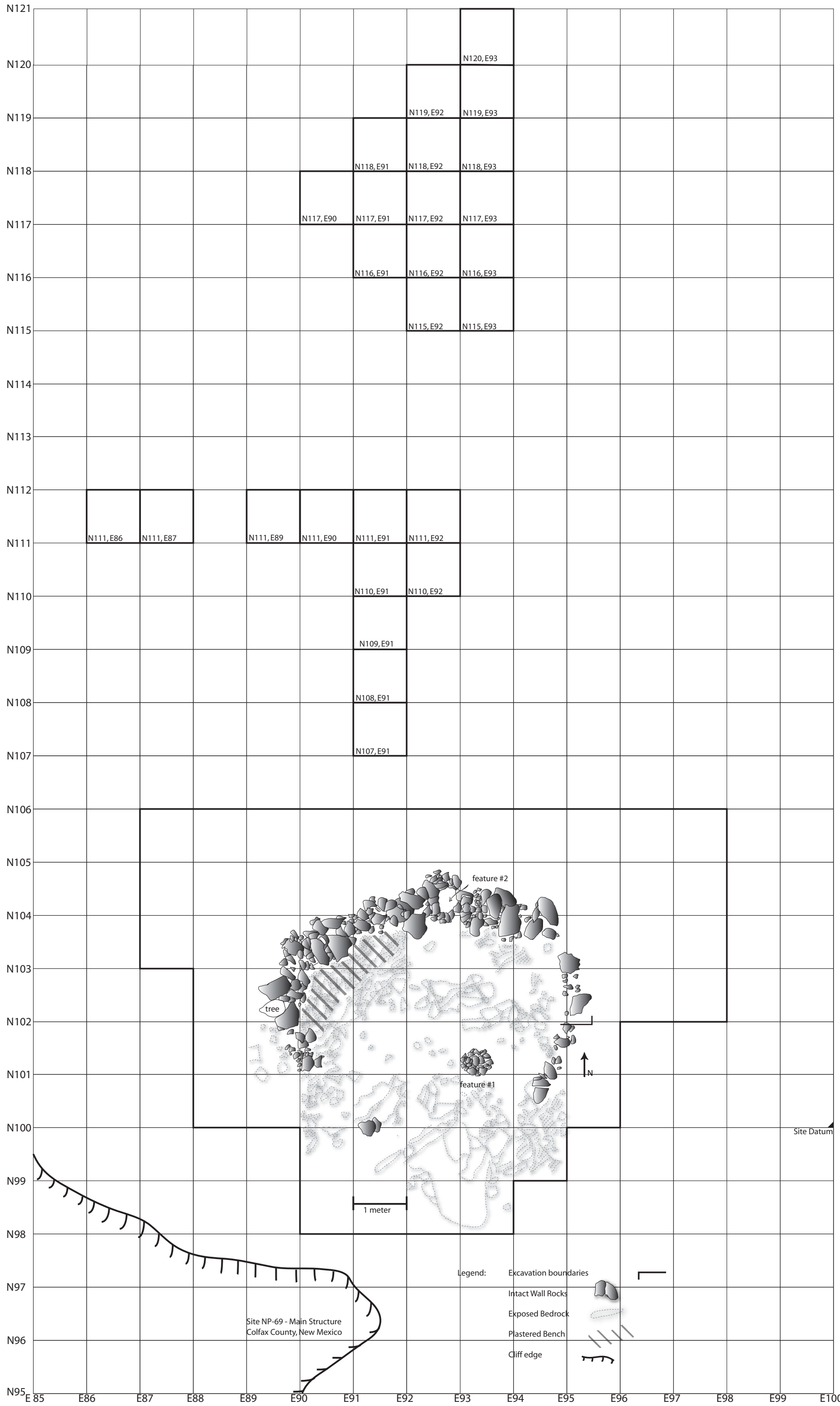

Figure 4.16 Plan view rendering of NP-69 depicting the structure and excavated units (outlined). A burned rock midden makes up a large part of the 15 northernmost units, which will be the subject of future investigations.

Figure 4.17 Feature #1, a hearth inside the structure at NP-69, is approximately 50 cm in diameter and lined with tabular sandstone. A projectile point (inset), several corn cupules, and a variety of charred seeds were also found in the fill.

Figure 4.18 Feature #2, a pocket or void in the northern wall of the structure at NP-69 could have served as storage.

A total of 3,556 artifacts were recovered from NP-69. Charred material recovered from the wall feature (Feature #2) was radiocarbon dated to A.D. 550 (Beta 205652, 2 sigma calibrated to A.D. 430 to 630), which suggests that the structure was built no later than this date. The contents of the formal hearth inside the structure date to A.D. 680 (Beta 205651, 2 sigma calibrated to A.D. 650 to 780). These two dates give us a good indication of the use-life of the structure itself. A kernel of charred corn was recovered from inside the east wall of the structure, meaning that the site was built, or at least maintained, after this cultigen was introduced into the area. Radiocarbon dating of the second, extramural hearth, place it at A.D. 330 (Beta 205653, 2 sigma calibrated to A.D. 230 to 410), an occupation date that presumably pre-dates the structure by up to several hundred years.

Resource Assessment

Along with survey, excavation, and artifact analysis, several resource assessments were conducted during the summer of 2007 to better understand the natural resources available to the residents of the Poñil drainage and to determine whether (and how) the behavioral region and the catchment areas correlate.

For mobile hunters and gatherers, local catchment resources are typically defined as those resources that are within a two hour walking distance, usually up to 10 km (6.2 mi) from the immediate encampment (Dennell 1980:2; Green 1982:147; Ingbar 1994:51; Kelly 1995:127; Lee 1969:61; Orcutt 1981:73; Parry

1987:23). Resources more than two hours distant are traditionally considered "non-local."

Travel in the Poñil study area is difficult in an east-west orientation because of the steep canyon walls, but relatively little effort is required to travel within the canyons themselves. In such a varied terrain a circular catchment would not accurately reflect energy expenditure. On the other hand, the isochronic (time/ energy) method (see Stone 1991:343) should provide a more accurate assessment of resources and should depict the catchment with more accuracy. During the summer of 2007, I and a crew of volunteers walked transects within the canyons and across them, for two hours each, radiating from the centers of NP-69 and the MP4-7 cluster of sites, to record local resources that could have served as centralizing mechanisms. The contrast between the time and energy expenditure traveling lengthwise versus crosswise through the canyon country yielded site catchment areas that are highly skewed in the longitudinal axis (Figure 4.19).

Based upon the catchment surveys, local resources in the Poñil drainage are relatively abundant (Table 6). Resources vary little within the canyons (longitudinal axis), and the same may be said for those resources found on top of the mesas. Assuming that resources have remained somewhat stable through time, the catchment areas of NP-69 and MP-4/MP-7 should provide for most human essentials during the study period (water, food, fuel, shelter, clothing, and medicine), meaning that the strategies that brought people into this region were adaptive insofar as their environmental-functionalist needs are concerned.

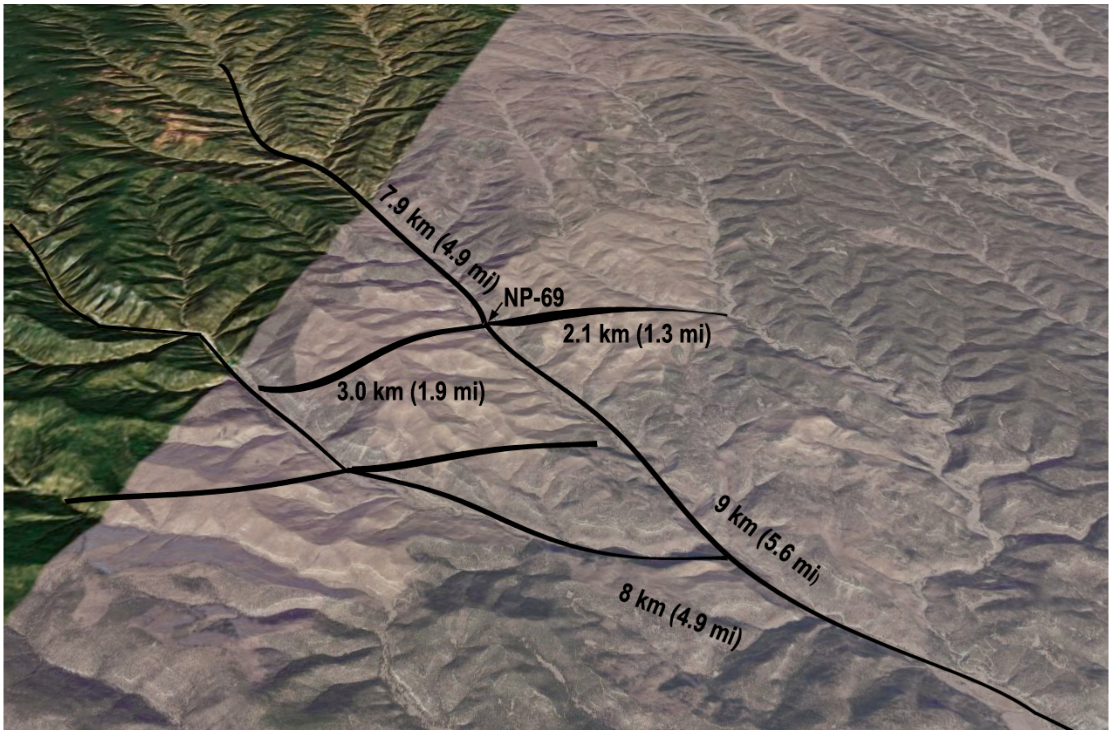

Figure 4.19 These Poñil drainage catchment areas are heavily skewed along the longitudinal axis because of the differences in energy expenditure required for traversing the canyons crosswise when compared to lengthwise. Most lithic resources were obtained from well beyond these traditional catchment areas. Google Earth image (public domain).

Water is one resource that must be found in proximity to a site, making it a critical centralizing mechanism. The Middle and North Poñil Creeks run perennially, and most sites recorded to date are within several minutes walking distance of a stream. Only during the most severe drought on record (2002) has the North Poñil lost its surface waters. Even then, I was able to reach water by digging test holes into the sandy streambed no deeper than 25 cm (9.8 in). Conversely, water is not available on the mesa tops other than small quantities that may be found in natural tinajas; pockets in the sandstone that trap rainwater. During the catchment survey, we observed several sites, mostly lithic scatters, that were more than an hour from the nearest source of water, but no habitation structures were observed so remotely situated. And although from sites NP-69 and

Common Name	Genus and Species	Time and Distance from Sites NP-69 / MP4-7
water	n/a	15 min, .16 km / 1 min, 20 m
showy milkweed	*Asclepias speciosa*	15 min, .16 km / 3 min, .10 km
Indian paintbrush	*Castilleja sp.*	3 min, .10 km / 3 min, .10 km
goosefoot	*Chenopodium spp.*	15 min, .16 km / 3 min, .10 km
wild strawberry	*Fragaria sp.*	15 min, .16 km / 3 min, .10 km
sunflower	*Helianthus annus*	15 min, .16 km / 5 min, .20 km
juniper	*Juniperus monosperma*	on site / on site
prickly pear	*Opuntia macrorhiza*	on site / on site
cholla	*Opuntia imbricate*	none observed / 15 min, 1.0 km
piñon pine	*Pinus edulis*	on site / on site
cottonwood	*Populus augustifolia*	none observed / 3 min, .10 km
Gambel's oak	*Quercus gambelli*	on site / on site
wild rose	*Rosa woodsii*	60 min, 4.2 km / 35 min, 3.1 km
yucca	*Yucca sp.*	3 min, .10 km / 6 min, .20 km
nodding onion	*Allium cernuum*	15 min, .16 km / 3 min, .10 km
mule deer	*Odocoileus hemionus*	25 min, .20 km / 8 min, .30 km
black bear (scat)	*Ursus americanus*	3 min, .10 km / none observed
elk (droppings)	*Cervus canadensis nelsoni*	3 min, .10 km / 3 min, .10 km
beaver	*Castor canadensis*	45 min, 2.1 km / none observed
mountain cottontail (droppings)	*Sylvilagus nuttalli*	15 min, .16 km / 6 min, .20 km
jackrabbit	*Lepus sp.*	none observed / 100 min, 8.0 km
mountain lion (scat)	*Puma concolor cougua*	15 min, .16 km / none observed

Table 6. Natural resources found within the NP-69 and MP4-7 catchment areas.

NP-17 the North Poñil Creek is visible 95 m (312 ft) below, their position on the mesa makes getting to the water somewhat tedious, given that it requires considerable effort and a minimum of 30 minutes to travel to the creek and back (see Figure 4.11).

Although a number of important natural resources are available within the catchment areas, good supplies of tool stone are not among them. Cimarron hornfels, an isotropic, thermally-altered shale, is the most readily available tool stone in the study area. However, the closest known bedrock source is on the flanks of Baldy Mountain (see Chapter II), which requires an 18 km (11.2 mi) one-way crosswise traverse of difficult terrain. Cimarron hornfels is also reasonably abundant in the Cimarron River, which also lies about 18 km (11.2 mi) from sites located in the Middle or North Poñil drainages (Figure 4.20). Located well beyond the catchment areas, these two sources of tool stone are but one indicator that the behavioral region during the period A.D. 300 to 800 is far more extensive than the boundaries of a traditional site catchment (see discussion in Chapter VI).

Impact of the Poñil Complex Fire

During the 2002 field season, record dryness (less than 0.5 inch of rain between January and July) and a forest fire sparked by an electrical storm radically changed the landscape in the Poñil drainage. On the night of June 1, 2002, our crew spent the first night of the season in the field. An electrical storm raged throughout much of the night. On June 2, 2002, we returned to the Philmont Headquarters to pick up more equipment, at which time we learned that the storm had sparked seven individual forest fires. Later to be known as the Poñil Complex Fire, it became the largest in New Mexico's history and eventually scorched 93,000 acres, all within the study area. Twenty-three days passed before federal officials allowed us to return to the North Poñil Canyon to resume work at NP-69.

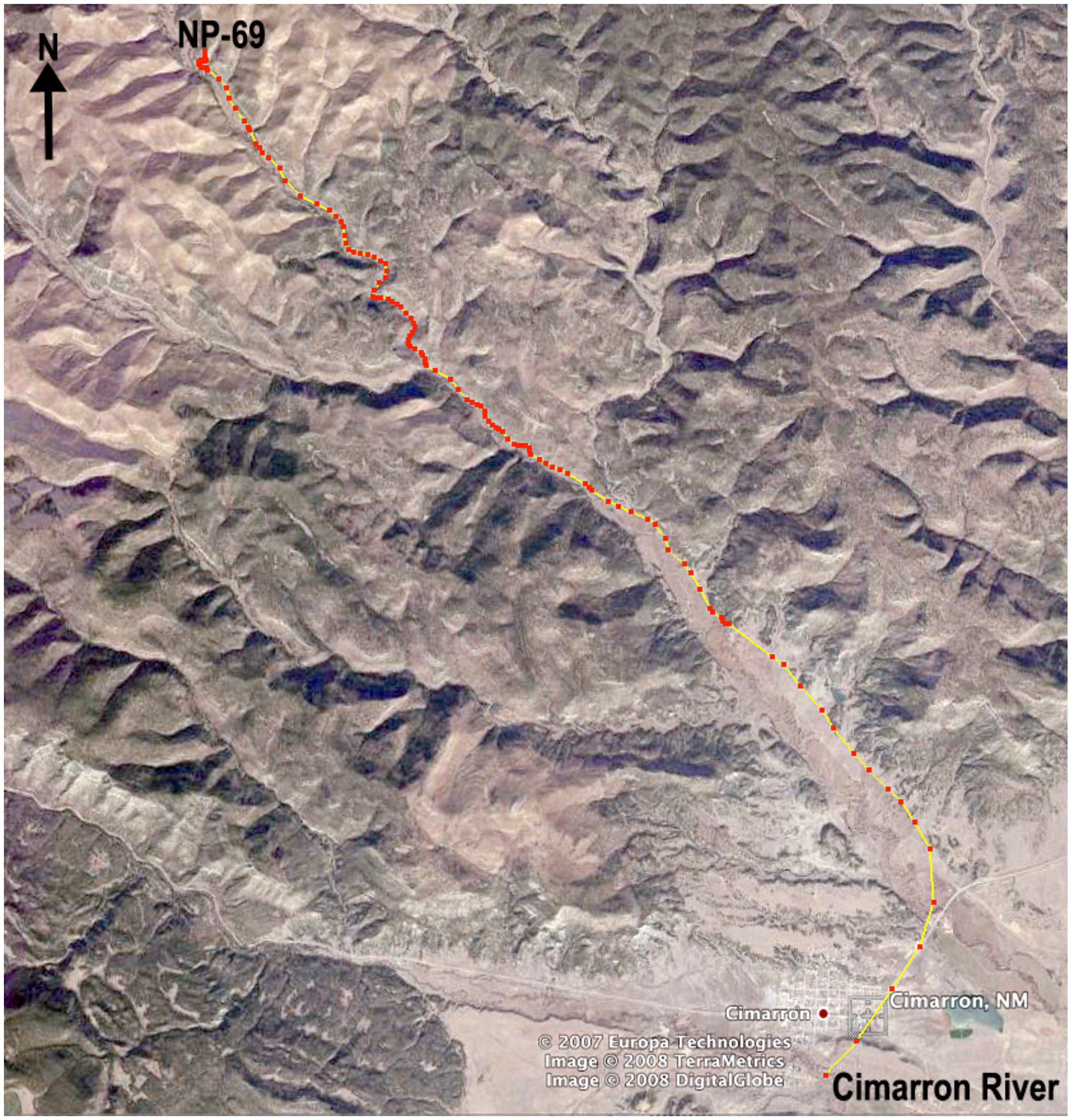

Figure 4.20 Google Earth image (public domain) of Poñil Canyon with path/distance from site NP-69 to the Cimarron River (18 km [11.2 mi] each way) to a known source of Cimarron hornfels, the most common material in the three site combined assemblages.

In the interim, we conducted additional pedestrian surveys along Zastrow Creek, about 24 km (15 mi) south of the Poñil drainage.

The first impact of the fire on the archaeological investigations in the North Poñil was immediate. Upon our return, we found that many thousands of acres of land surrounding the site had been reduced to ash. Thousands of acres of Ponderosa pines were completely consumed by the fire; many were burned to the very tips of their roots, leaving gaping, cave-like holes in the ground, some large enough for a human to crawl into (this lends credibility to Glassow's [1972a] suggestion that an inconsistent radiocarbon date at site NP-17 might have been attributable to intrusive roots burned in a forest fire). The smell of smoke and charred vegetation lingered in the air for weeks. Ash, more than 30 cm (12 in) deep in places, was picked up by the winds and deposited everywhere, including across the access roads and trails. This, combined with monsoon rainfall and numerous flash floods made access to the site problematic and thus altered our field plans for the 2002 season. Once it became apparent that the work could not be completed in the time allotted for student involvement, we draped the open portion of the site with 2-mil plastic sheeting and backfilled it. It was the summer of 2003 when, with the help of a new class of field school students, we were able to complete our excavations of the main structure and a large portion of the suspected midden area.

Summary and Conclusion

Research began during the summer of 2000 with a series of pedestrian surveys in selected areas of the Poñil Drainage. My objective was to re-locate all 17 of the known Vermejo phase sites. However, we recorded every site we observed; 46 archaeological sites in total, many of which had been previously recorded. Using GPS technology we were able to pinpoint site locations with a high degree of accuracy, correcting old site locational data in the process.

Two sites were selected for investigation: MP-7 and NP-69. In addition, MP-4, the Vermejo phase type-site, was reexamined. All sites were approached with essentially the same field methods; only the high clay content of soils at MP-4 and MP-7 prohibited us from using 3 mm screen mesh for the entire project. For each site we established a datum, erected a 1 m^2 grid to cover the site's structure, and beyond. Maps were drawn and surface artifacts were piece-plotted and collected.

Before excavations were begun, crew members received a week of intensive training. When artifacts were recovered from the site, each specimen was assigned its own field specimen (FS) number and bagged separately. A master field specimen log was maintained and cross-referenced on individual level forms. Soil samples were collected from each excavation unit and visible botanical remains, as well as large samples of charred wood, were collected separately. All soils were floated to extract the organics for further examination.

A number of wall rocks were intact at all three sites, and a floor was found in each of them, although only NP-69 retained evidence of floor plaster. Charred materials were recovered and dated from each site. Two dates from MP-4, the Vermejo phase type-site, put occupation at between A.D. 510 and A.D. 665. Two dates at MP-7 (A.D. 780 and A.D. 1260) suggest that either it was a multiple component site or, more likely, that charred wood and pottery found their way into the site through an area of heavy bioturbation on the east side of the structure. Three dates at NP-69 put occupation between A.D. 330 (B component) and A.D.

680 (A component), although the structure itself appears to have been constructed and used between A.D. 550 and 680. No pottery was recovered at NP-69.

Several catchment surveys were conducted during the summer of 2007, and natural resources were recorded in terms of time, effort, and distance from sites NP-69 and the MP4-7 cluster of sites. It is believed that there are sufficient local resources available to meet most human needs, including water, food, fuel, shelter, clothing, and medicine. One significant resource, tool stone, is lacking in the catchment areas, indicating that the functional regions extend beyond traditional catchment boundaries.

A large forest fire impeded our investigations during the summer of 2002 when much of the study area burned. However, the site on which we were working at the time (NP-69) was spared, although the forest was scorched to within 30 m (100 ft) of the site boundary.

Chapter V: Expectations and Findings

Introduction

To test the utility of the behavioral regions approach, I gathered environmental-functionalist data, used it in its traditional sense in trying to assess adaptations to local environments, including adaptive technological strategies, and then examined the data for evidence of centralizing mechanisms. It was expected that by plotting the functional regions that formed around these centralizing mechanisms would collectively reveal a behavioral region. Once the behavioral region was plotted, I then turned to practice theory as an aid to explain, or to possibly suggest alternative explanations for, the overall shape of the behavioral region together with those behaviors that created it.

One of the premises of the behavioral regions approach is that human behavior is not only directed at overcoming the economic and technological problems of life, but that many of our behaviors are purely expressions of culture – they are products of the learned, shared knowledge and beliefs that make a people who they are. These practices - the way people approach problem solving, building homes, selecting site locations, toolmaking, hunting and gathering, and so on - are not only responses to environmental challenges, but also reflective of their worldviews and histories. When people move into a new region, it is expected that they will attempt to reestablish their livelihoods in ways that are familiar to them. They will prefer materials with which they are familiar and they will continue to interact, if possible, with people with whom they share a heritage. Accordingly, I have suggested that if the Vermejo phase occupants of the Poñil drainage were still truly hunters and gatherers, that such behavior was as likely attributable to group history, social organization, and influences from outsiders as it was to efficient use of natural resources, and that the behavioral regions approach could be used to test this hypothesis. Moreover, I have suggested that the behavioral regions approach might help resolve issues of cultural affiliation, ties, or influences.

So the questions are these: first, what was the primary subsistence regimen of the people within the study area during the period A.D. 300 to A.D. 800? Were they hunters and gatherers only, did they practice a mixed foraging-farming economy, or were they sedentary farmers? Second, what resources are available within the study area and how were they used prehistorically? Third, can we explain the subsistence regimen or resource utilization satisfactorily in purely environmental-functionalist terms? In other words, were the Poñil inhabitants' economically motivated behaviors purely, or at least largely, borne of human-environment or human-human interactions that took place a) for the purpose of meeting the material needs or desires of life or b) for the purpose of solving the problems of life by technological means? If not, can these behaviors be explained by examining them as integrated components of a larger behavioral region, calling upon the aid of practice theory, or the idea that functional regions form as people follow accepted (or required) cultural norms, values, beliefs, or traditions within their own society, or through regular interactions with other groups? What were the practices of these people and how to they compare to the practices of others who created the archaeological record beyond the southern Park Plateau? Can we determine whom the inhabitants of the Poñil drainage were affiliated with, influenced by, or culturally tied to during the period A.D. 300 to 800? Moreover, what were the group sizes of those that occupied the small circular dwellings? Were they used by nuclear families, extended families, or multi-family groups? Were the structures occupied seasonally or rotationally within seasons by hunters and gatherers, or were they possibly used on a seasonal basis by people who made their more permanent residences elsewhere?

To address these questions, seven seasons of field and lab work were undertaken. Several large-scale systematic pedestrian surveys were conducted and 46 sites were recorded. Two of those sites, MP-7 and NP-69, were fully excavated, and data were analyzed anew from MP-4, a site originally excavated in the 1960s.

Expectations

I began with a number of expectations, many of which were addressed through a study of technological organization. If the A.D. 300 to A.D. 800 inhabitants of the Poñil drainage were mobile hunters and gatherers, then I expected to see a high proportion of formal tools, including bifacial tools, together with evidence of formal tool production (bifacial cores, tertiary flakes, biface-thinning flakes, and retouch flakes) (Andrefsky 1994; Parry and Kelly 1987; Teltser 1991). Correspondingly, I expected that the proportion of tertiary-to-primary flakes would be higher at the sites of mobile foragers when compared to sedentary horticulturists (see Lail 1999). In addition, there ought to be proportionally large numbers of fine-grained knappable materials within the assemblage (Andrefsky 1994; Lail 1999; Roth 1995). I also expected to find a high proportion of materials from quasi-local and non-local sources when compared to local materials, particularly if local materials were ill-suited for the production of formal tools (Lail 1999). Accordingly, centralizing mechanisms in this regard would include sources of raw materials suitable for the production of formal tools. Therefore I expected that, given the paucity of fine-grained knappable materials in the study area (see Chapter II), these are possibly distant sources. Moreover, I expected that a functional region would have formed between the site and the sources of these materials. Finally, if these people were processing wild plant materials, then manos ought to be of the one-hand variety (see Wiseman 1975).

Conversely, if the subsistence economy was primarily one of farming or even mixed foraging-farming, then I expected to see indicators of increased sedentism (see Lail 1999). From a technological perspective, those indicators would include a higher proportion of informal tools, or those tools that require less effort or skill in production, produced from unstandardized cores (Parry and Kelly 1987) made from local materials. Moreover, I expected to see a general shift from the use of fine-grain raw materials to coarse-grain materials because of decreased mobility (see Goodyear 1989) and as agricultural dependence increased (Lail 1999). Roth (1995) suggests that coarser materials may be used to manufacture expedient tools that could be made, used and discarded on site, possibly because coarser materials are more durable. Typically, farming requires more durable raw materials

(Gilman 1995; Nelson 1981). Angular debris and primary flakes were expected to increase as a proportion of the assemblage because tool manufacture and use should have occurred at or near the same locality (Larson 1994; Nelson 1991; Parry and Kelly 1987). Sites evidencing more sedentism should have yielded cores showing different stages of reduction, which, because they were not part of the transportable toolkit, should have been discarded where produced (Nelson 1991:81). Generalized (unsystematic) core reduction sites should contain a considerable quantity of debitage and decortication flakes (Teltser 1991:373). If these people were farmers, then I also expected to see a higher percentage of amorphous cores consistent with Nelson's (1991) concept of stockpiling, thought to indicate increasing sedentism. Most centralizing mechanisms in this instance ought to be close to the site, about an hour's walking distance, because sedentary farmers do not travel as far from their residences as do more mobile hunters and gatherers (Dennell 1980:3). One centralizing mechanism should include a source or sources of coarse-grained materials used for groundstone, the frequency of use of which should have increased through time. Moreover, manos should tend to be of a larger two-handed variety typically used or the processing of maize.

There should be a correlation between the quantity of discarded stone artifacts and group size. However, small groups using a site repeatedly over time might generate stone tool and debris assemblages that appear similar to larger groups using a site more infrequently and thus skew the record somewhat.

Landscape use and site locations were also expected to differ. If the A.D. 300 to A.D. 800 inhabitants of the Poñil drainage were hunters and gatherers, I expected to find their sites near abundant natural resources, particularly wild plant and animal resources, which in the immediate study area are located in the uplands. Because farmers require access to arable land combined with a relatively long growing season, farming sites should be found at lower elevations, primarily along creek bottoms near the mouths of the larger canyons. In this situation, the centralizing mechanisms are evident - the site locations with their rich soils, water, and long growing season are themselves places that people remained at or returned to repeatedly.

I expected that structures would also differ. Mobile hunters and gatherers tend to build small circular structures that exhibit reduced effort in construction (McGuire and Schiffer 1983), and so if these were hunters and gatherers, then I expected to see evidence of these small structures across the landscape. Group sizes should have been small, typically no more than two families, and so a finding of small isolated structures would support this expectation. Ethnographic studies suggest that it is not uncommon for hunters and gatherers to occupy single and multi-family dwellings of between 12 m^2 and 24 m^2 (Gron et al. 1987:304; Radcliffe-Brown 1964:412), although such groups may be of the extended family variety instead of multi-family (see Flannery 2002). Conversely, I expected that sedentary people with larger populations would build structures that were larger, more likely square or rectangular than circular, and which demonstrate a higher investment of labor. This is true because square or rectangular structures, although more time consuming to build, are easier to maintain and it is easier to make additions or modifications to them (see McGuire and Schiffer 1983) to support increasing populations.

Insofar as site features are concerned, the dwellings of sedentary peoples were expected to have formal hearths, often slab-lined, because fires in such hearths are easier to control and the hearths themselves easier to maintain (Diehl 1997). Although the investment of labor in constructing a shallow basin formal hearth is low in relation to the effort required to build even the simplest of stone structures, formal hearths require more labor if they are large or surrounded by an adobe collar. On the other hand, dwellings used by mobile foragers were expected to demonstrate a lower investment of labor in hearths unless, that is, they intended to return to a site with some degree of regularity. They would then be inclined to construct a formal hearth for the same reasons as long-term dwellers, i.e., to control ash and smoke. While the structures of mobile foragers were unlikely to possess facilities for the storage of grains, such facilities were expected to be found in or near the structures of sedentary populations (see Diehl 1997; Kent 1991).

The technological analysis (below) allows me to make some general statements regarding human-environmental interactions in the Poñil drainage and to discern some of the details of life there during the A.D. 300 to A.D. 800 period.

To answer the broader questions of who these people were, from where they came, with whom they affiliated, and how they lived their lives beyond subsistence, I examined the data in such a way as to reveal a human behavioral region for the period A.D. 300 to A.D. 800. Irrespective of my findings regarding subsistence, from the perspective of practice, I expected stone tools to be made in a manner and style reflective of the historical and technological traditions of the people who settled the region. People should have preferred raw materials with which they were familiar because they already knew their working characteristics. Moreover, if they maintained ties with the regions from which they came, I expected that they would return to those areas from time to time, and on those return visits they would procure raw materials or other items of material culture. If not returning all the way to their home region, then it is likely that they would have met with people from the “homeland” from time to time at trade or social gatherings to perpetuate ties and traditions.

I also expected that houses would be built in a form or style similar to those of their home region using construction materials and techniques with which they were familiar. Moreover, if the subsistence regimen was changed, then those houses should have been found in environmental settings reminiscent of historical settings, with the season or seasons of use being similar. Features, too, should reflect historical design and function. Hearths should have been built as they were in the ‘homeland,’ and should have been used in similar ways. Storage facilities, if any, should be similar in design and location relative to the residential structure.

Findings

Altogether, three structures were examined, 168 1 m^2 units excavated, nine features excavated including three formal hearths, and 4,261 artifacts recovered and analyzed. All three sites contained small circular structures. Two of the structures had internal formal hearths built into their floors. Broad data categories include architecture and features, lithics, ceramics, botanical remains, and faunal remains.

MP-4 (A.D. 510; A.D. 665)

Architecture and Features

One of Glassow's (1972a, 1980) key indicators of Vermejo phase sites was architectural form and construction. Vermejo phase sites are characterized by round sandstone masonry structures approximately 5 m in diameter. MP-4 was is the type-site for this phase.

The structure at MP-4 is on the first stone terrace on the west side of Middle Poñil Creek approximately 10 m (33 ft) above the modern streambed. It is approximately 5 m in diameter (approximately 19 m^2 in surface area), somewhat irregularly circular or globular in plan view (Figure 5.1). Glassow reported a number of post holes that he believed to have held roof supports. The floor itself was slightly incised beneath the ground's surface and compacted from use. The walls were made of tabular sandstone coated with what must have been a thick adobe plaster, because Glassow recovered several hundred adobe nodules that bear clear impressions of the limbs around which the mud was packed, one of which bears the clear impression of a cob of maize (Figure 5.2). From the impressions in the adobe nodules, one might postulate that the walls and roof were covered in

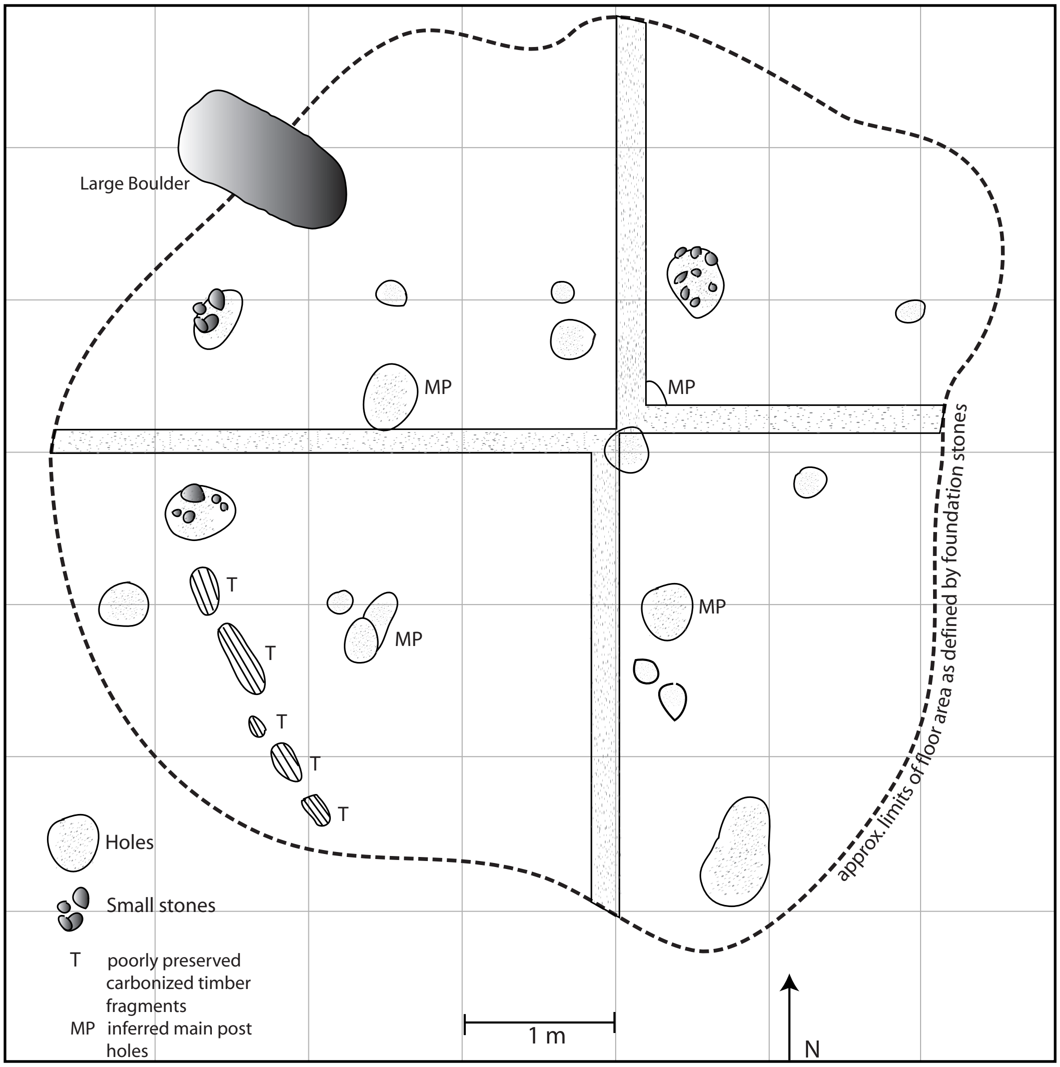

Figure 5.1 Plan view of MP-4, the Vermejo phase type-site, excavated by Michael Glassow in 1966. Illustration adapted from Glassow (1980).

flexible limbs or brush possibly affixed at the top and muddied over jacal or wattle-and-daub style.

A formal hearth was found inside the structure, although details of hearth construction are unavailable. Charred wood was recovered from the hearth and radiocarbon dated to A.D. 510 (UCLA 1407). The hearth also contained a charred corn cob with kernels still attached. With the permission of the Philmont Museum, I removed a single kernel and submitted it for a radiocarbon assay. The kernel

Figure 5.2 Adobe nodule from MP-4 (1966 excavations) with cob impression. Several hundred wood-impressed nodules were recovered from MP-4, the Vermejo phase type-site.

dated to A.D. 665 (Beta 166358; 2 sigma calibrated A.D. 630 to 710). Together, these dates firmly place the occupation of MP-4 to a period between A.D. 510 and A.D. 665.

Lithics Data

From the original excavations Glassow recovered 360 lithic specimens from MP-4 (Appendix A). When we re-examined the site during the 2001 field season, another 140 specimens were collected. A number of the artifacts we recovered from the 2001 reinvestigation of MP-4 came from the surface, which suggests that they were either in the backfill or washed down onto the site from the wooded slopes above. Accordingly, context for the 2001 materials is poor and, other than adding insights into the raw materials used at the site, data from those materials are not used in this analysis.

Glassow's grid system was set up in quarters over the structure itself, designated NE, NW, SE, SW, with the base orientation being magnetic north. All artifacts were cataloged based upon the quadrant from which they came, with an additional notation as to whether they were recovered within or outside the structure. Level data are absent.

Raw Materials

As with other sites in the area, at MP-4 Cimarron hornfels is the most common material among primary flakes at 57.1 %, followed by thermally-altered sandstone at 28.6 % and quartzite at 14.3 % (Figure 5.3). Among secondary flakes, Cimarron hornfels makes up 68.5 %, thermally-altered sandstone 18.75 %, and siltstone (available in the creek) 12.5 % (Figure 5.4). Tertiary flakes are heavily skewed towards hornfels at 81 %, with thermally-altered sandstone at 18.25 %. Carnelian, quartzite, and dacite make up the balance (Figure 5.5). Angular debris percentages largely parallel the secondary and tertiary distributions, with hornfels at 81.1 % and thermally-altered sandstone at 14.5 % (Figure 5.6). Again, carnelian, siltstone, and dacite are present, but poorly represented.

Raw material distribution among flake tools almost mirrors its usage among flakes generally with hornfels and thermally-altered sandstone at 75.9 % and 24.1 %, respectively (Figure 5.7). Projectile points were produced from hornfels (57.1 %), siltstone (14.3 %) and now notably chalcedony (28.6 %) (Figure

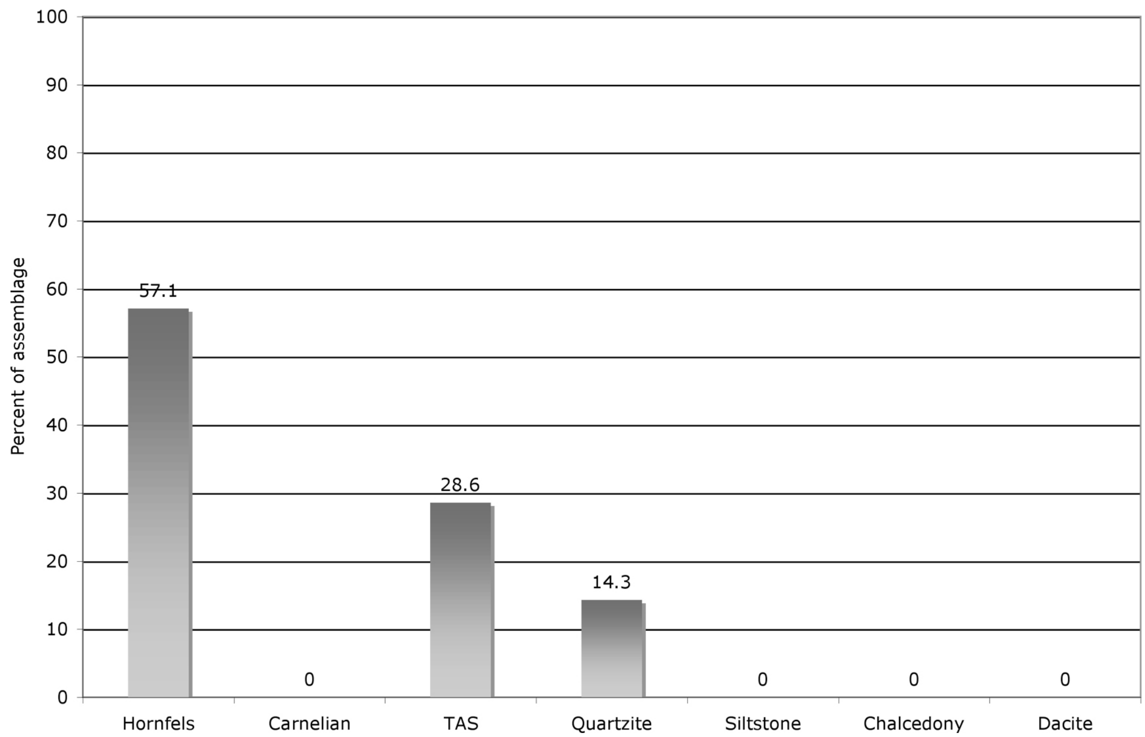

Figure 5.3. Raw material distribution among primary flakes, MP-4.

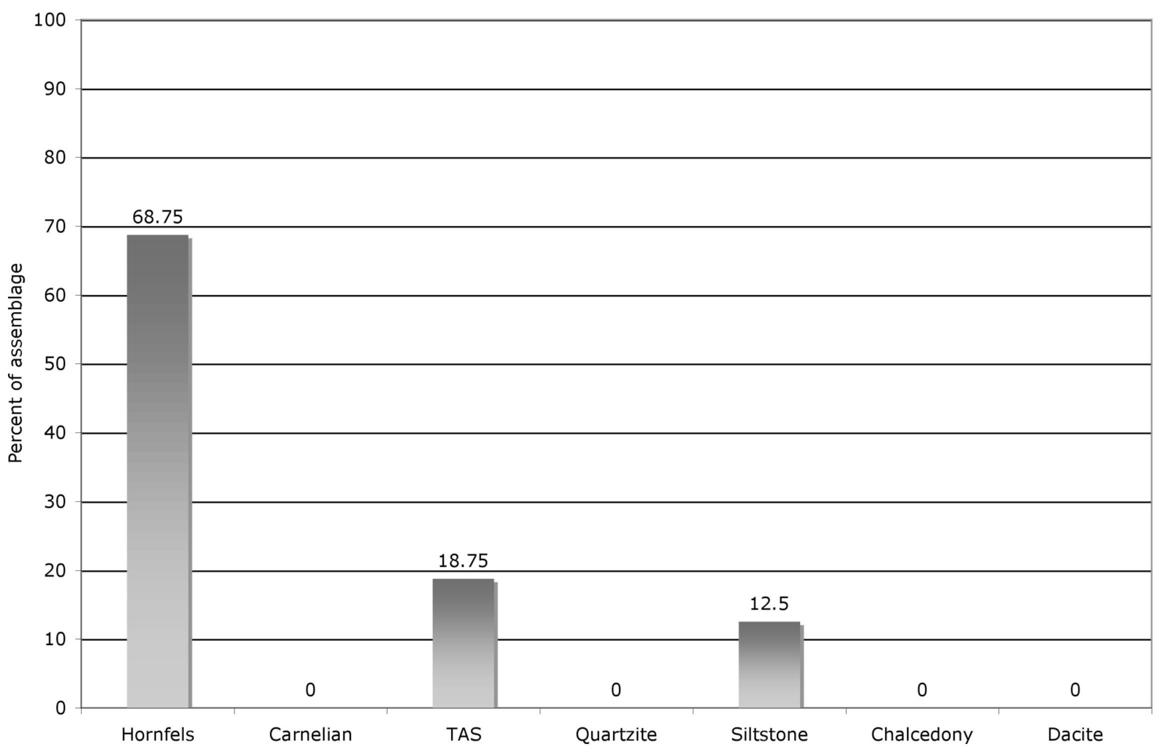

Figure 5.4. Raw material distribution among secondary flakes, MP-4.

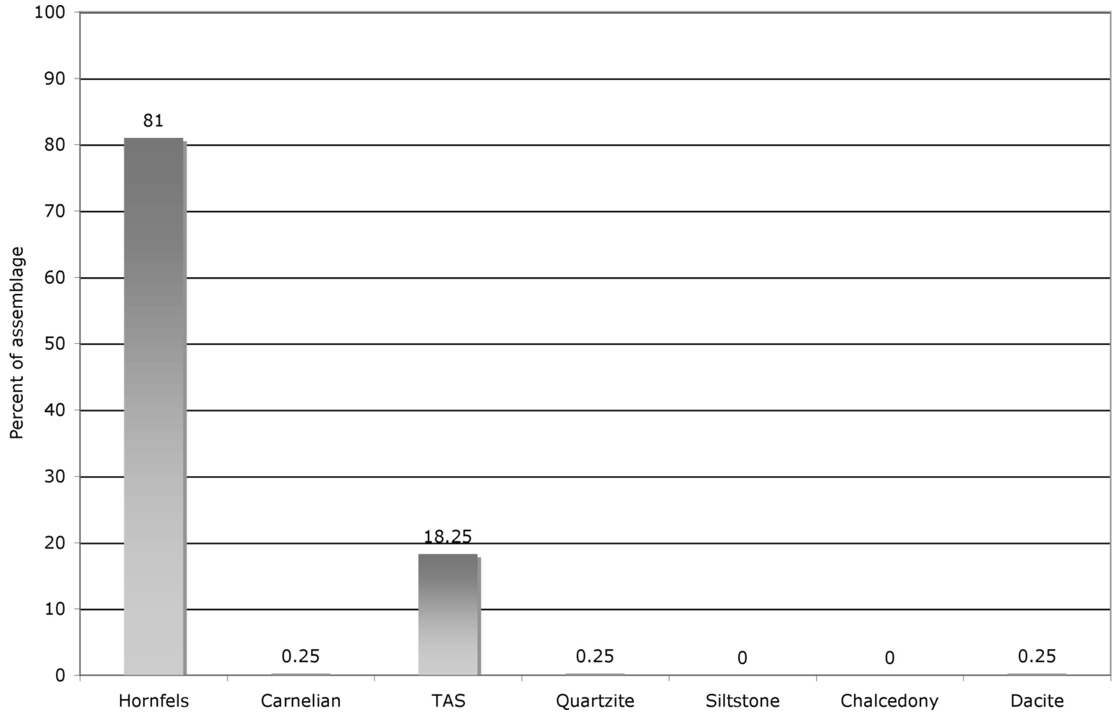

Figure 5.5. Raw material distribution among tertiary flakes, MP-4.

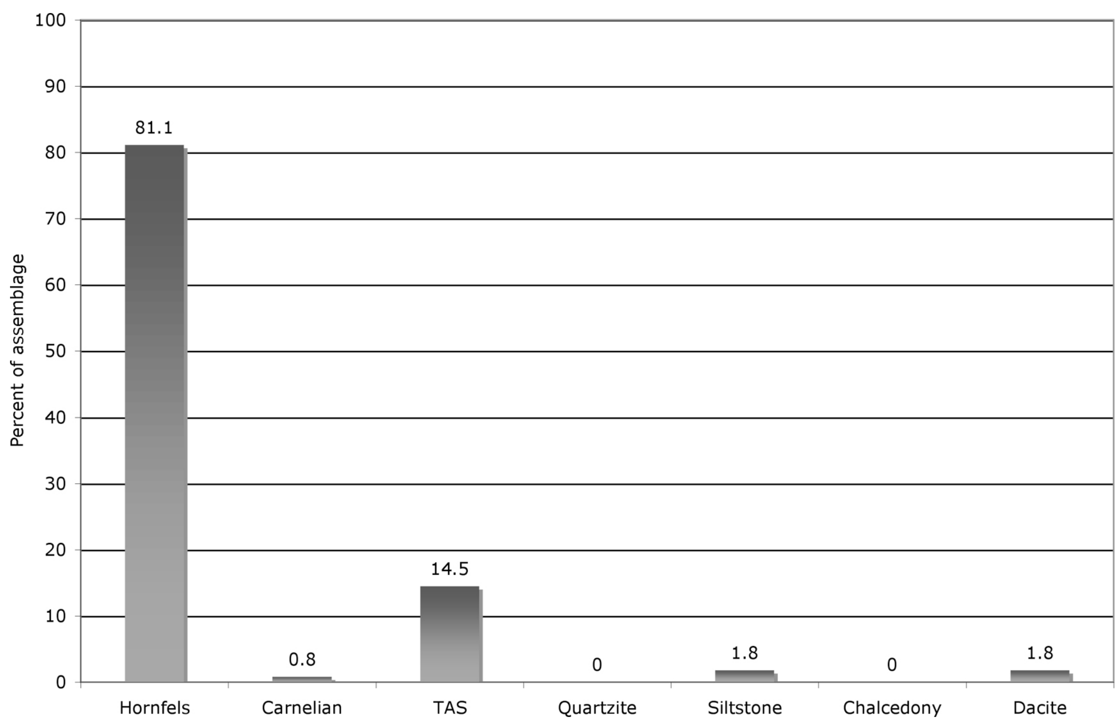

Figure 5.6. Raw material distribution among angular debris, MP-4.

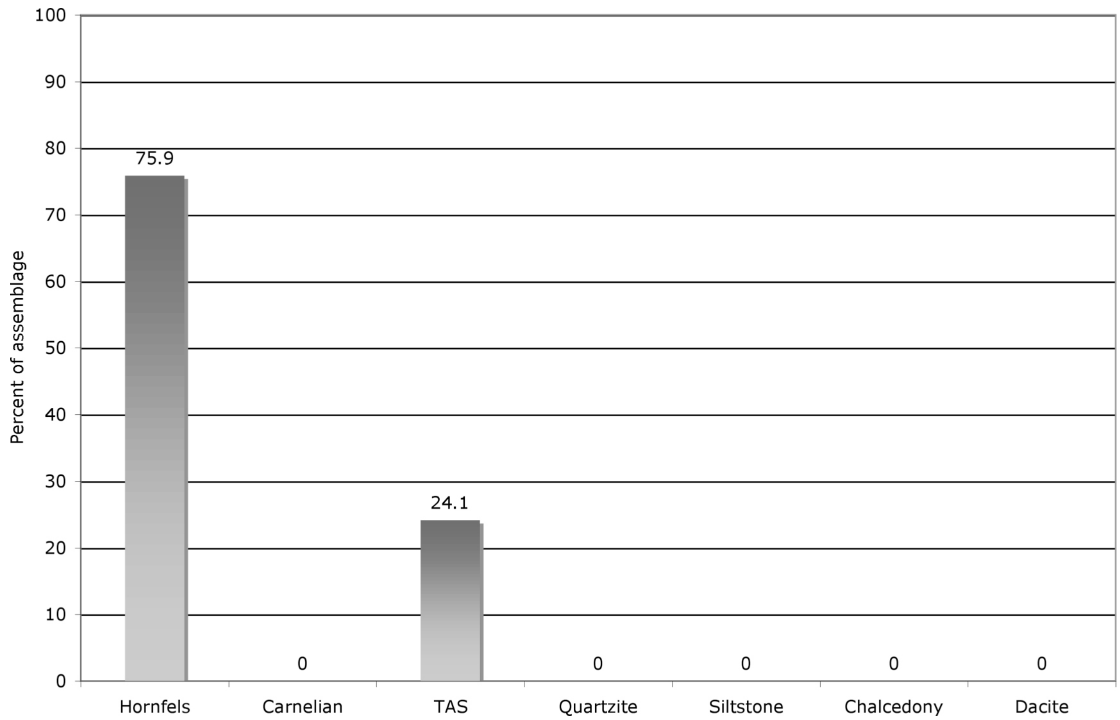

Figure 5.7. Raw material distribution among flake tools, MP-4

5.8). Only one drill was present in the assemblage and it was made of hornfels. Likewise, three cores were all made of hornfels (Figure 5.9). The groundstone assemblage was composed of 50 % thermally-altered sandstone and 50 % dacite, both of which are available within meters of the site. Hornfels was used for hammerstones as well, but only 25 % of the assemblage was of this material. Fully half were made of thermally-altered sandstone and another quarter of siltstone. Fire-cracked rock were largely dacite at 67 %, followed by siltstone at 33 %.

Flakes

Primary flakes had a mean length of 33.8 mm, a mean width of 35.9 mm, and a mean thickness of 7.4 mm. Secondary flakes had a mean length of 28.1 mm, a mean width of 28.4 mm, and a mean thickness of 6.2 mm (Figure 5.10).

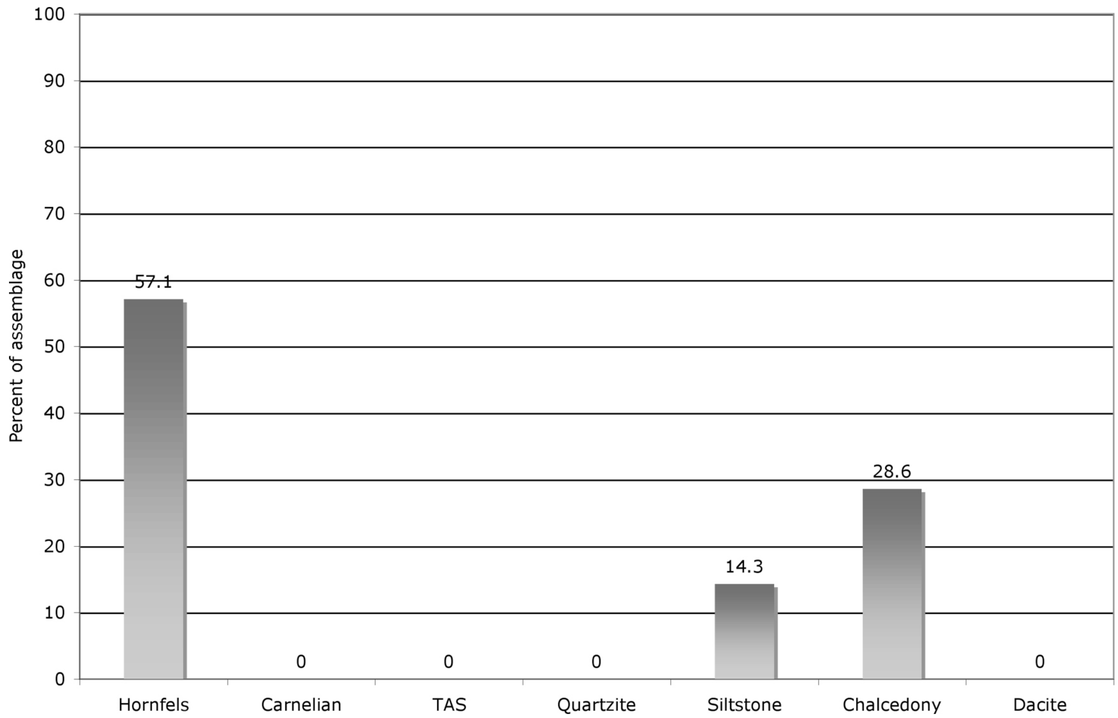

Figure 5.8. Raw material distribution among projectile points, MP-4.

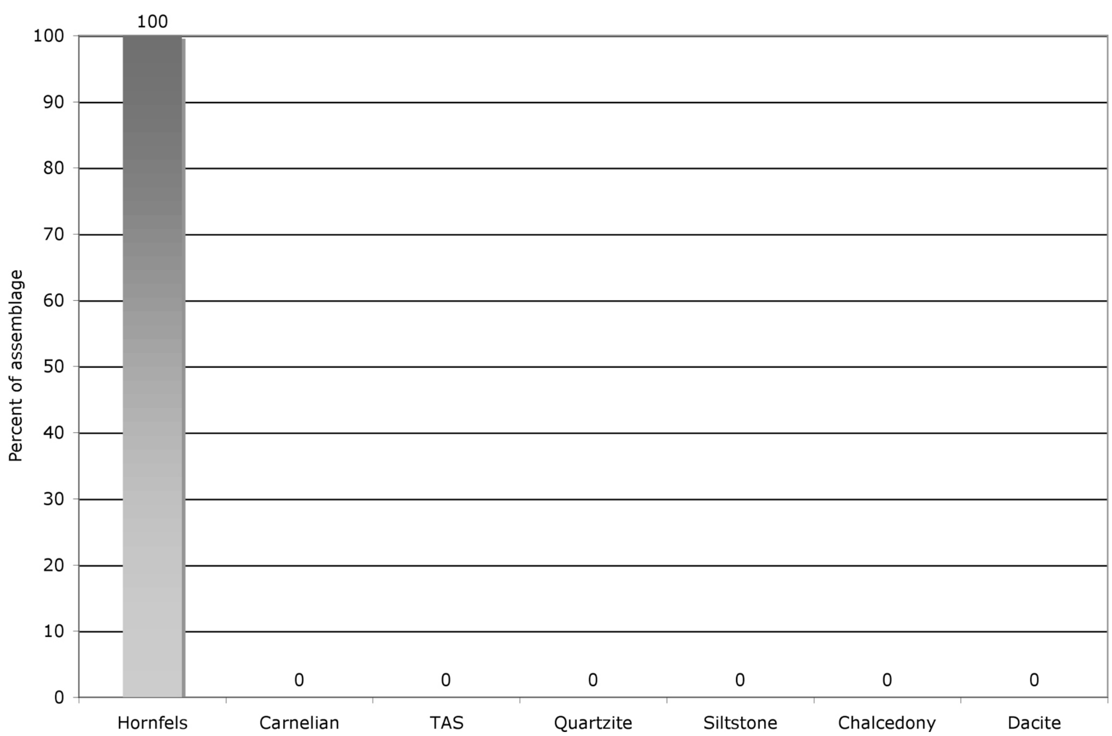

Figure 5.9. Raw material distribution among cores, MP-4.

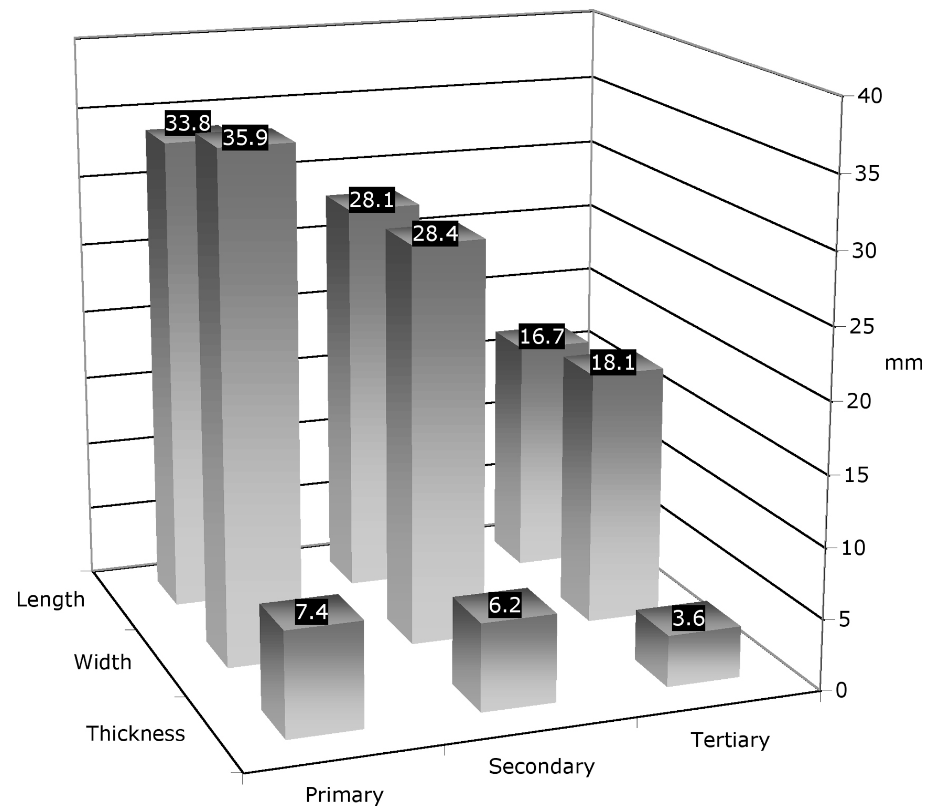

Figure 5.10 Mean flake metrical data, MP-4.

Angular Debris

As with the other sites, angular debris was sized and weighed. However, the size range was probably heavily skewed by collection procedures from the original excavations. No angular debris was smaller than 4.6 mm, and a full 90 % of the angular debris was between 5.6 and 6.5 mm in length (Figure 5.11).

Projectile Points

Projectile points had a mean length of 15.4 mm, a mean width of 12.8 mm, a mean thickness of 2.25 mm, and a mean weight of 0.9 g (Figure 5.12). Of the flake tools, the mean length was 45.5 mm, width 35.9 mm, thickness 8.9 mm, and weight 27.2 g (Figure 5.13). Interestingly, informal tools (flake tools) were

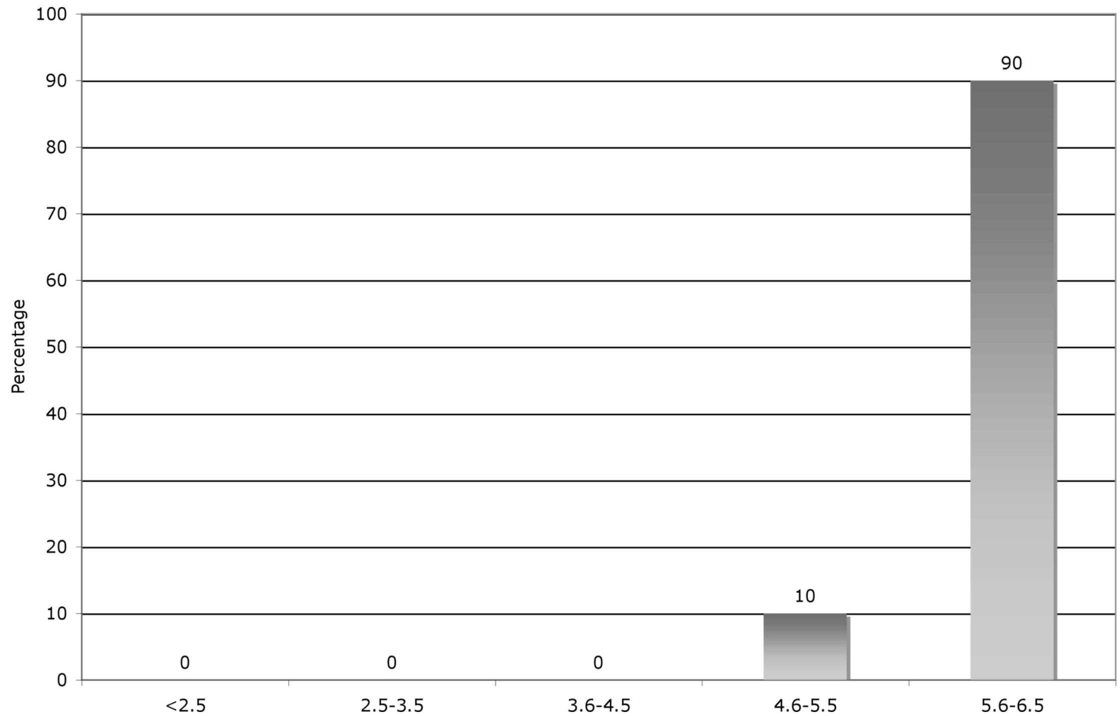

Figure 5.11. Angular debris size ranges, MP-4.

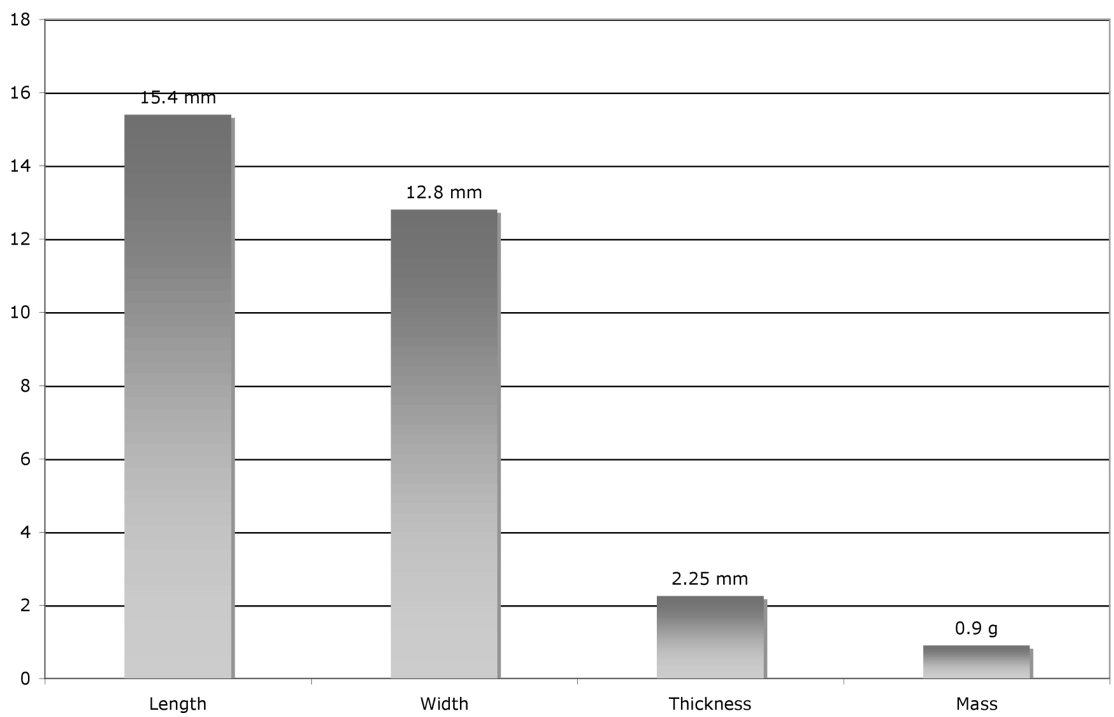

Figure 5.12 Mean projectile point data, MP-4.

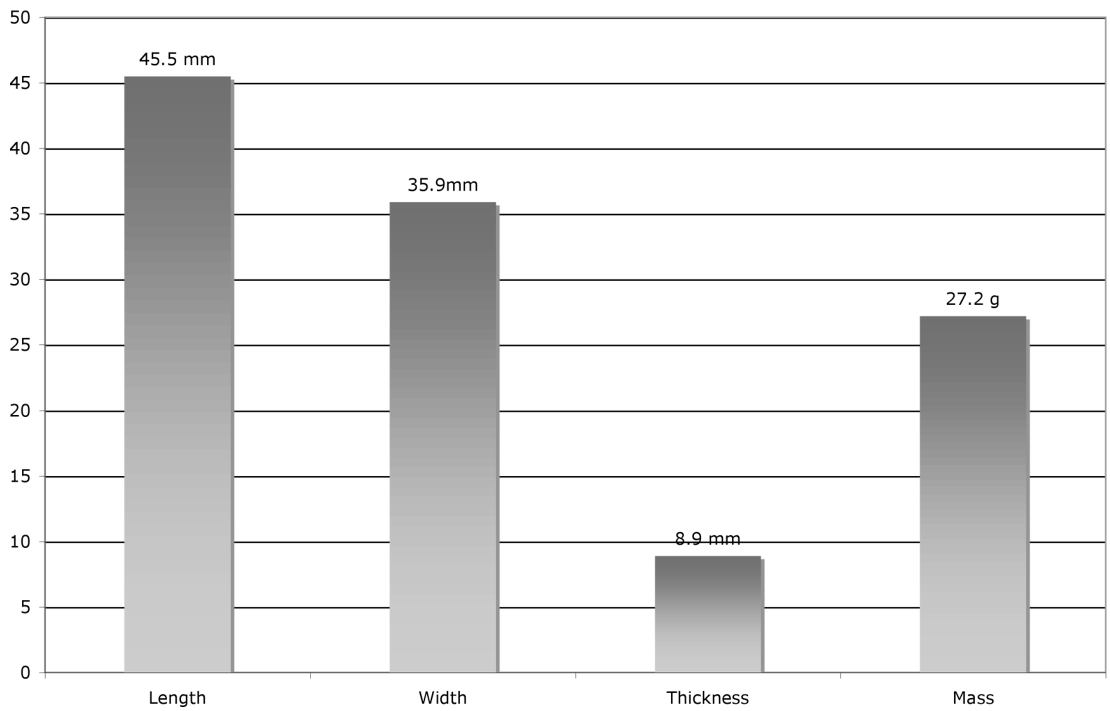

Figure 5.13. Mean flake tool data, MP-4.

considerably more common than formal tools (projectiles and drills) at MP-4, with a ratio of formal to informal of 1:3.7 (Figure 5.14). Cores were on average 76.1 mm in length, 39.8 mm in width, 26.2 mm in thickness, and 124.8 g in weight (Figure 5.15).

Provenience

Overall, 82.4 % of the total artifact count came from within the structure itself, whereas only 17.6 % artifacts were recovered from outside the structure. This is likely attributable to the intense focus on the structure itself, because at the time Glassow was concerned with understanding how the structure was built, including roof construction techniques. When examined by quad, the NE quad contained 28.9 % of the specimens, the SE quad 27.7, the SW 22.6, and the NW 19.1 (Figure 5.16).

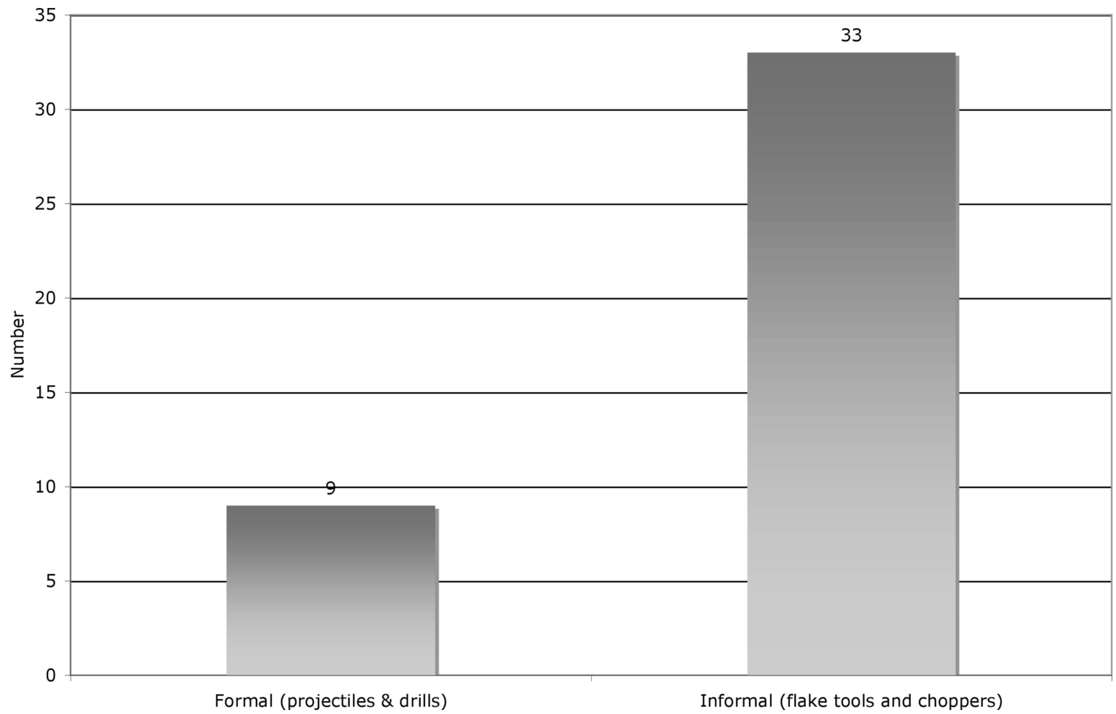

Figure 5.14 Formal vs. Informal tools at MP-4.

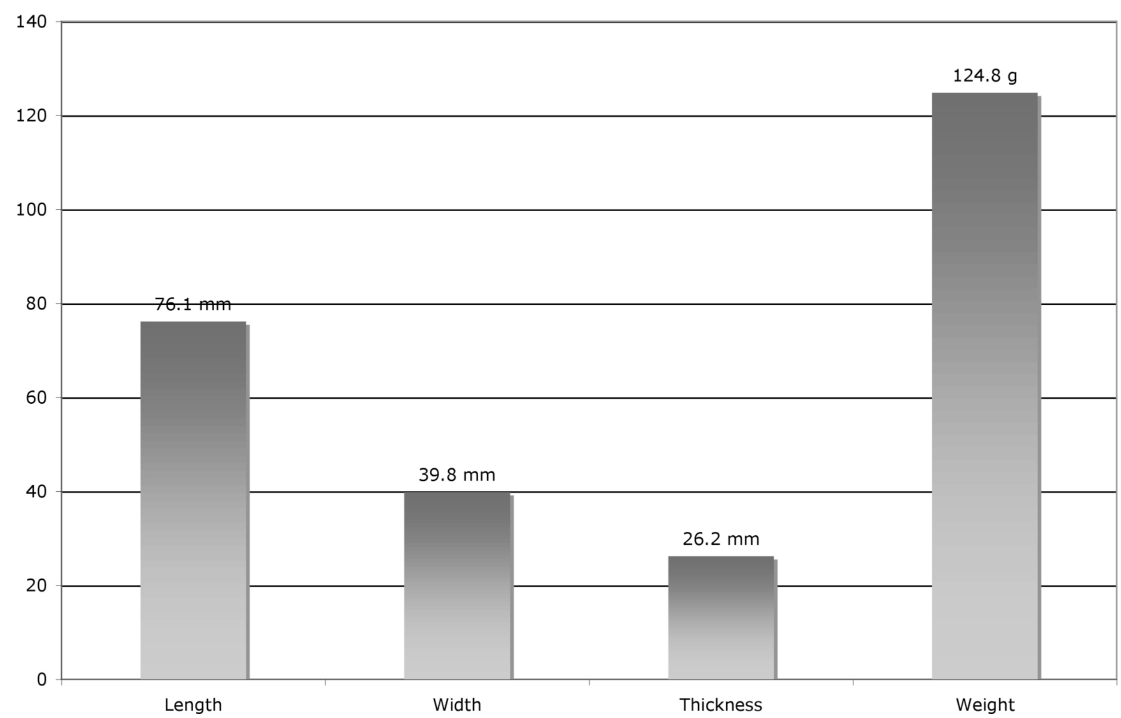

Figure 5.15. Mean core data, MP-4.

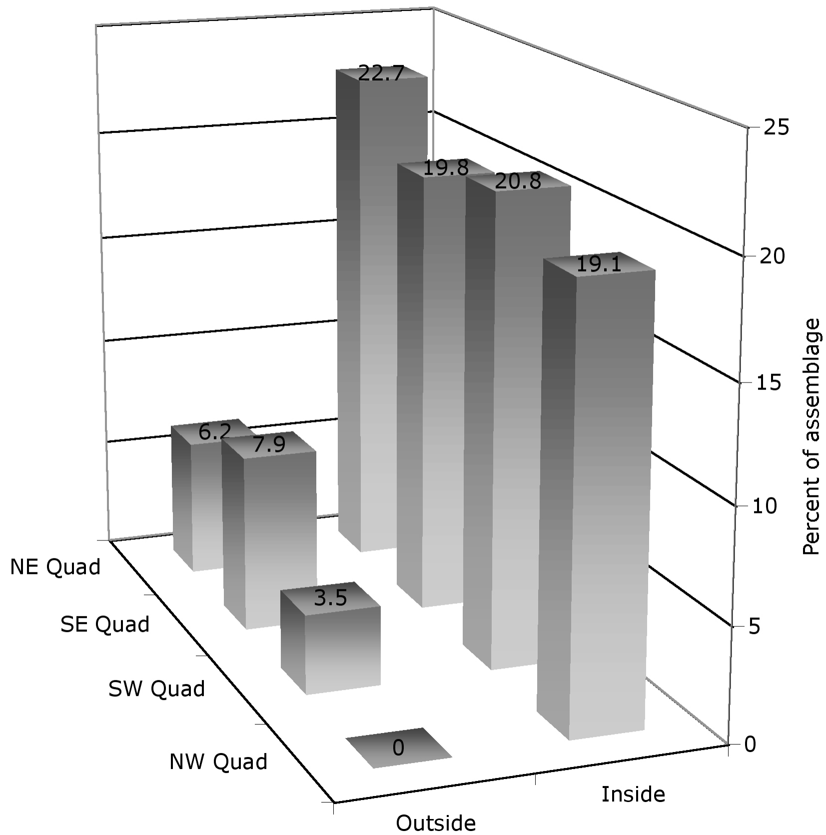

Figure 5.16 Artifacts recovered by quad from the 1966 excavations.

Ceramics

Neither Glassow's 1966 excavations nor our 2001 reinvestigation of MP-4 resulted in the recovery of ceramics in any form.

Botanical Remains

Corn (*Zea mays*), a corn cob, and a bean (*Phaseolus vulgaris*) were recovered from MP-4, as were a variety of wild plant remains. Kirkpatrick (1975) and Kirkpatrick and Ford (1977) reported on domesticated and wild plants, many presumably used as foods, from the MP-4 Vermejo phase type-site and from a site (NP-1) in the North Poñil. Sixty carbonized kernels of corn, a single corn cob, three corn cupules, and a single *Phaseolus vulgaris* cotyledon were recovered through flotation of soil and feature samples from the 1966 excavations of MP-4. A variety of carbonized wild plant species were also present in the sample, including *Amaranthus sp*., *Bouteloua sp*., *Chenopodium album*, *Chenopodium ambrosioides*, *Juniperus scopulorum*, *Pinus edulis*, *Prunus americana*, *Prunus virginiana*, and *Yucca bacatta*. Prehistorically, many of these wild plants would have grown in disturbed areas, such as areas of tilled soil, and near houses (Kirkpatrick and Ford 1977:264), and many have been used historically and prehistorically as foods. It is unlikely, however, that the maize was grown near MP-4 because of the short growing season at the 2,170 m (7120 ft) elevation of the site.

MP-7 (A.D. 780; A.D. 1260)

Architecture and Features

In a setting similar to MP-4, MP-7 is on the south side of Middle Poñil Creek on a gentle slope on the first stone terrace 10 m (33 ft) above, and about 20 m (66 ft) west of the modern streambed. It is about 600 m southeast of MP-4 (see Figure 4.3). Glassow assigned this site to the Vermejo phase based upon what appeared to him to be evidence of a circular stone structure similar to that found at MP-4, small corner-notched projectiles visible upon the surface, and the apparent absence of pottery. Although somewhat more heavily overgrown with grasses, piñon, juniper, and Gambel's oak than MP4, the site was nonetheless in a relatively open area adjacent to an old road-cut, which did not intrude into the site (see Figure 4.5).

The structure at MP-7 was a circular one about 5 m in diameter with a floor surface area of approximately 19.6 m^2 (Figure 5.17). The walls were made of tabular sandstone slabs, chinked with small stones. The entire area was awash with adobe melt flecked with charred bits of wood and ash.

At the opening in the southeastern edge of the wall there was a slightly ramped entryway, which was lined with sandstone slabs extending out and down the slope. To the immediate right of the entryway, a section of wall had fallen in a distinct pattern that made it relatively easy to estimate wall height by measuring the thickness of the stones (Figure 5.18). Allowing for mortar, the wall appeared to be between 90 and 100 cm in height, roughly consistent with our estimates at other Vermejo phase sites, including NP-69.

Notably, the walls of MP-7 were generally about 25 to 30 cm in thickness. No adobe nodules were recovered, possibly because of many decades of "adobe melt," the evidence of which (clay-and-charcoal-flecked rock-hard surface near walls) was present all around the structure.

The slightly dish-shaped floor did not appear to have been plastered, although it appeared to have become smooth from use. No formal hearth was found within the structure. Three burned, ashy, and reddened areas were observed on the floor (Features #1, #2, #3) (see Figure 5.17). However, neither of them was excised into the surface nor lined with stone. Charred wood samples from Feature #1 were submitted for radiocarbon assay and returned a date of A.D. 780 (Beta 164974, 2 sigma calibrated A.D. 690 to 890). A loose piece of charred wood

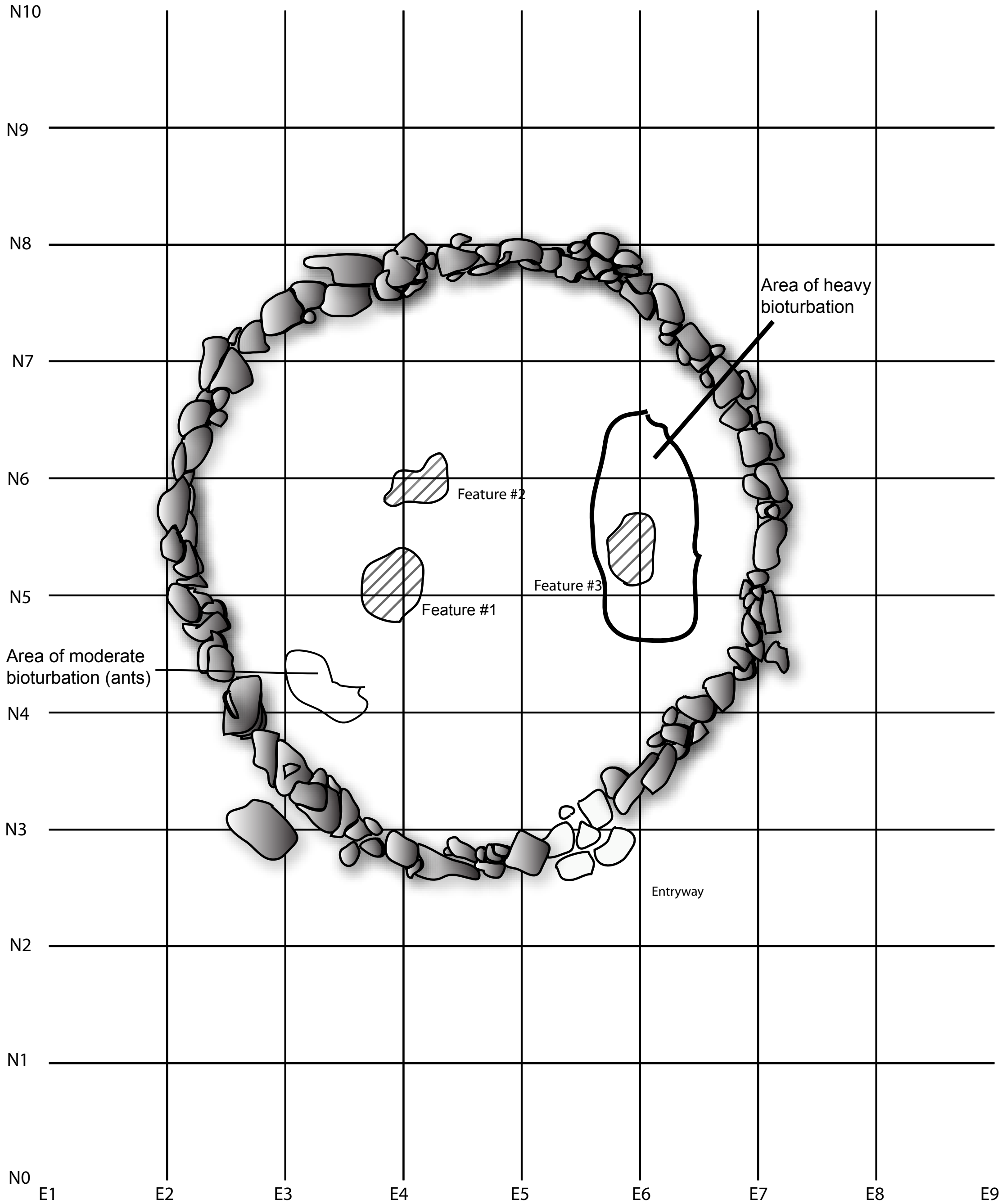

Figure 5.17 Plan view of the structure at MP-7, approximately 5 m in diameter.

Figure 5.18 Portion of a fallen wall at MP-7.

recovered from the vicinity of Feature #3 (in the NW corner of N4, E6), within the area of bioturbation on the east side of the structure, was also submitted for radiocarbon dating, yielding a result of A.D. 1260 (Beta 166359, 2 sigma calibrated A.D. 1180 to 1290).

Lithics Data

MP-7 was intensively excavated using hand tools. Sixty 1 m^2 units were staked off, 40 of which were excavated. Four hundred eighty-seven lithic specimens were recovered from MP-7 (Appendix B). Two hundred eighty of them were from the structure area. Of the 287, 65.4% were from between Levels 2 and the floor of the structure, making vertical context good for much of the data

(Figure 5.19). Two hundred seven artifacts, all from surface contexts, were recovered from the MP-7a activity area, which is some 43 m west of the structure itself.

Raw Materials

Raw material distribution differed between sites on the Middle Poñil versus the North Poñil. Among primary flakes, hornfels made up 50 % of the assemblage, whereas thermally-altered sandstone (TaS) made up 28.5 % (Figure 5.20). As mentioned previously, thermally-altered sandstone is a coarse-grained material that has been hardened by contact with sills or dikes of dacite porphyry (see Table 5). Thermally-altered sandstone occurs in abundance in the streambed of the Middle Poñil Creek, which is only about 20 m from the site. Likewise, quartzite is available in the stream gravels. Among secondary flakes, the same three materials are present, although the proportion of hornfels increases from 50 % to 68.5 % (Figure 5.21). Interestingly, among tertiary flakes, other materials begin to appear, such as chalcedony and obsidian (Figure 5.22). Recovered angular debris show similar raw material proportions to primary and secondary flakes (Figure 5.23). Continuing with the consistency at this site, of the flake tools, 81 % were made of hornfels, 14 % of thermally-altered sandstone, and 5 % from quartzite (Figure 5.24).

Among projectiles, 33 % were made from obsidian, but hornfels was an important raw material for this task (60 %). Thermally-altered sandstone was unused likely due to its unusually coarse nature and its non-isotropic character

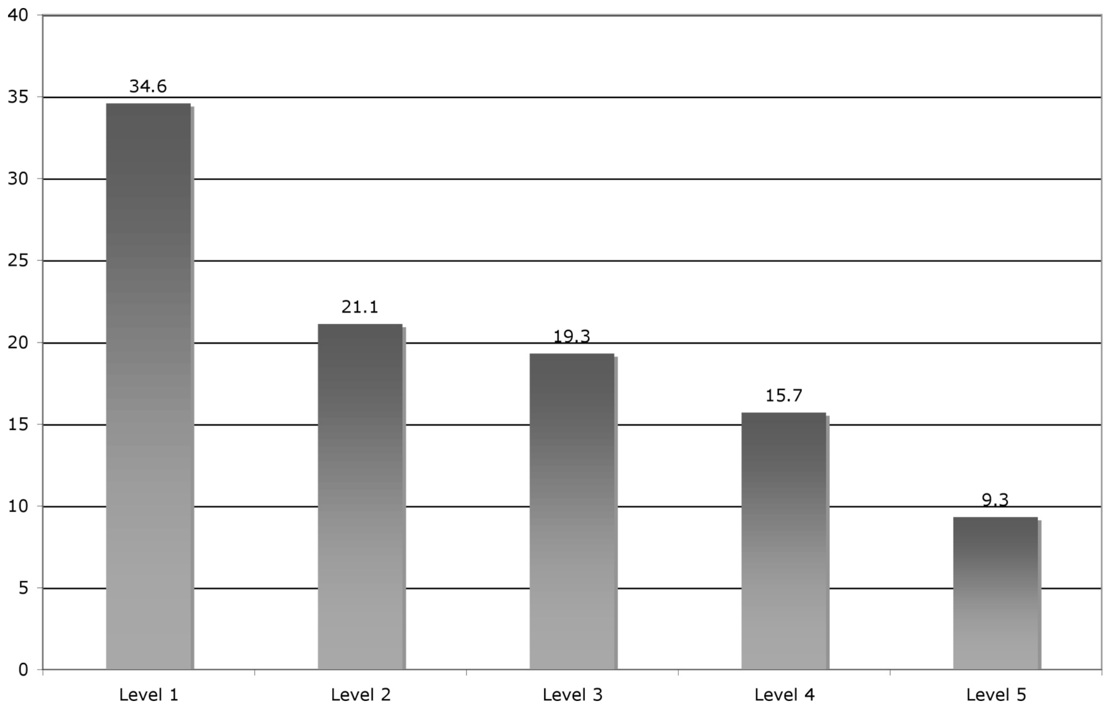

Figure 5.19 Artifacts recovered by level of excavation, MP-7.

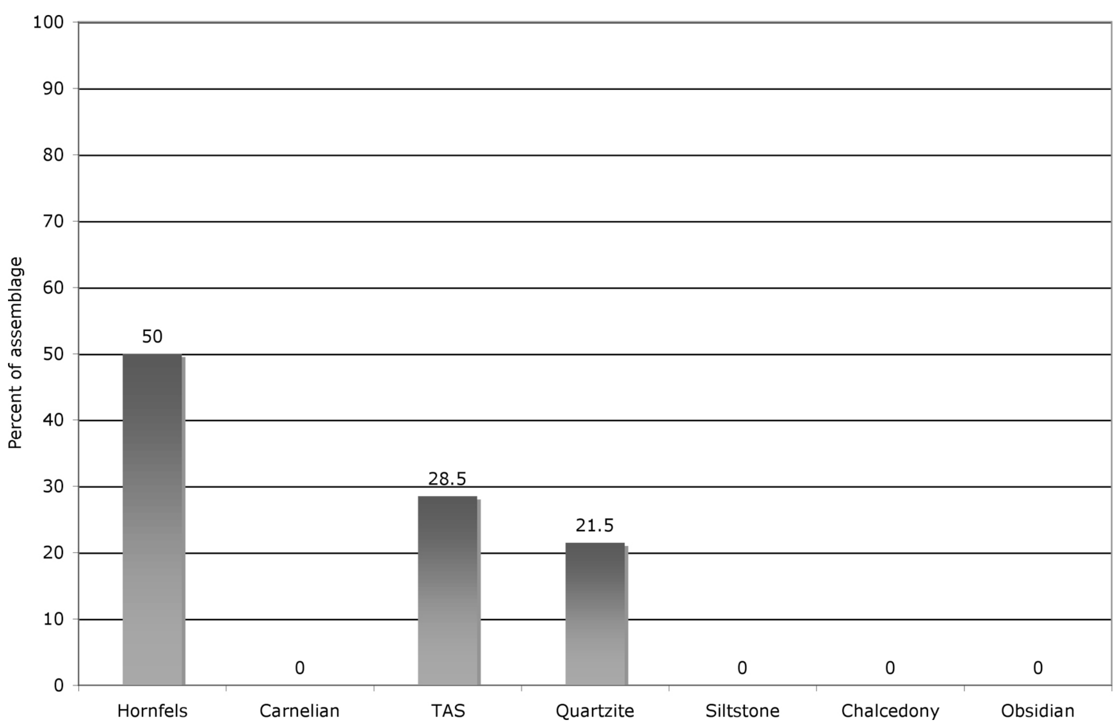

Figure 5.20 Raw material distribution among primary flakes, MP-7.

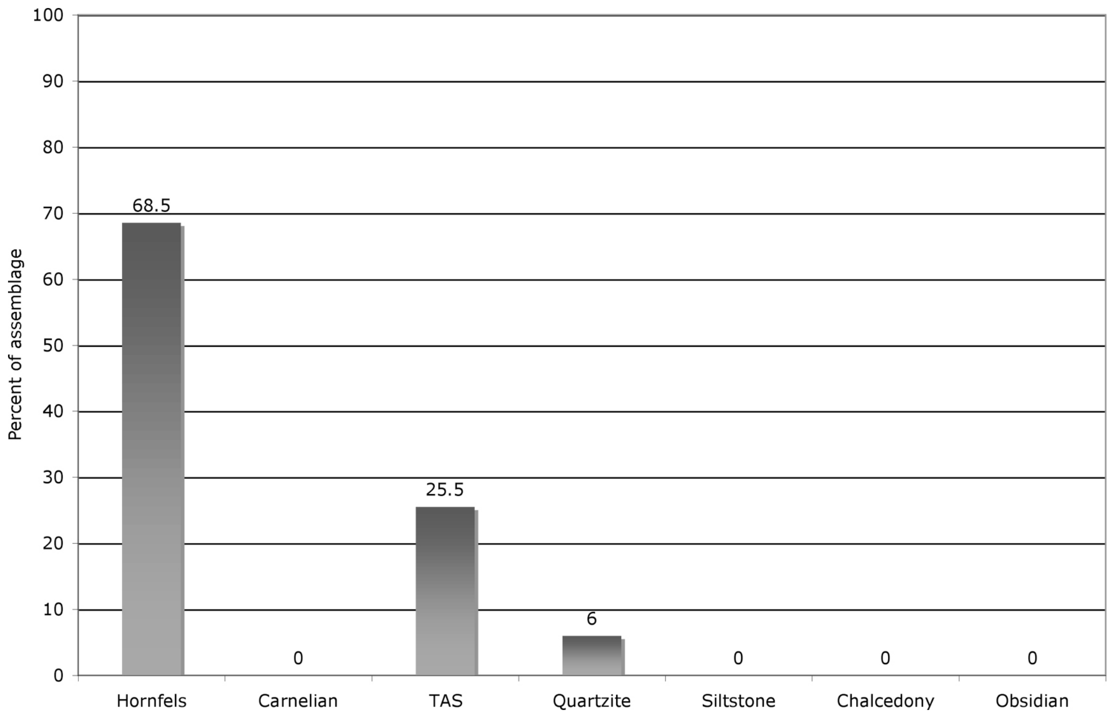

Figure 5.21 Raw material distribution among secondary flakes, MP-7.

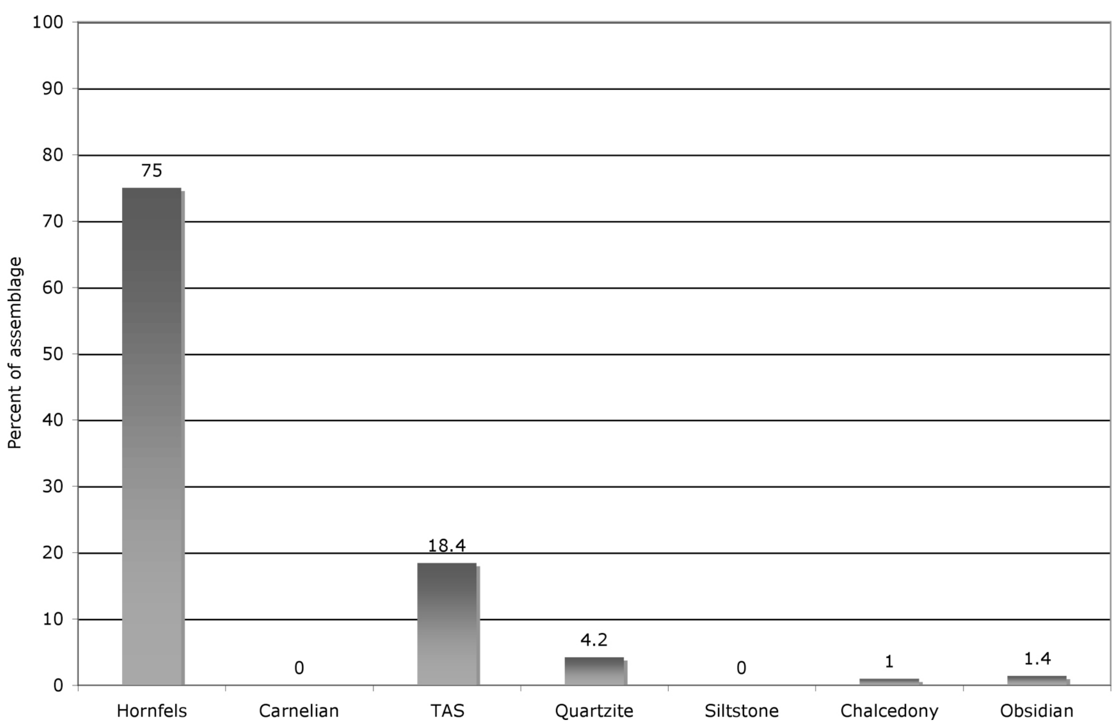

Figure 5.22. Raw material distribution among tertiary flakes, MP-7.

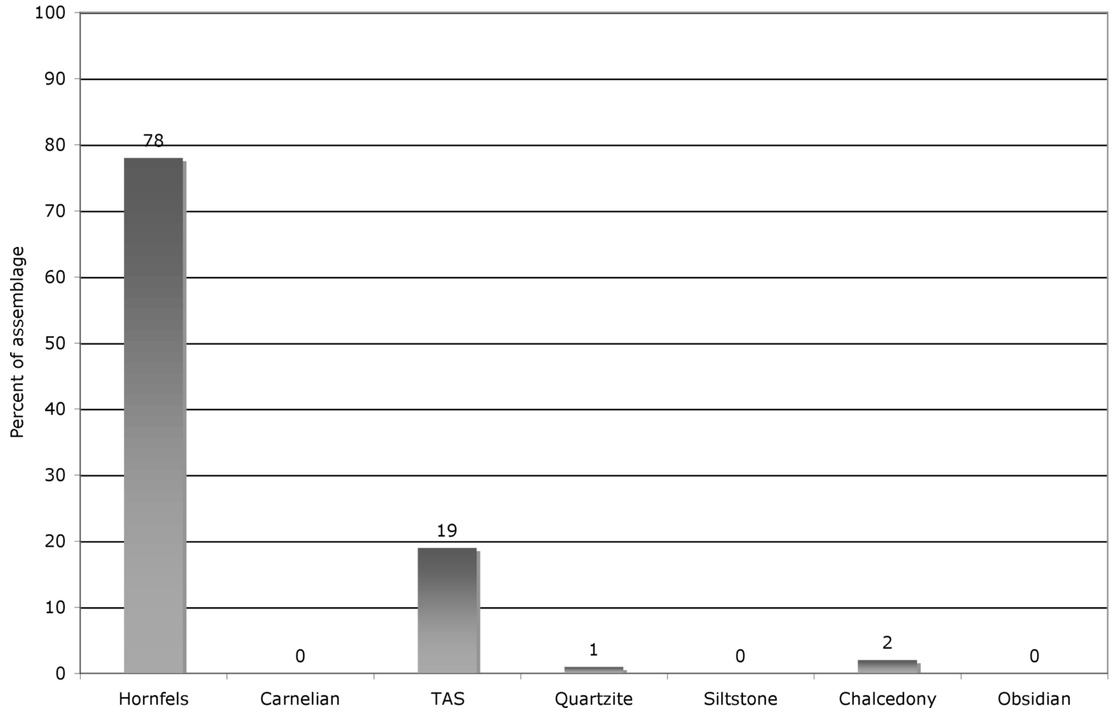

Figure 5.23. Raw material distribution among angular debris, MP-7.

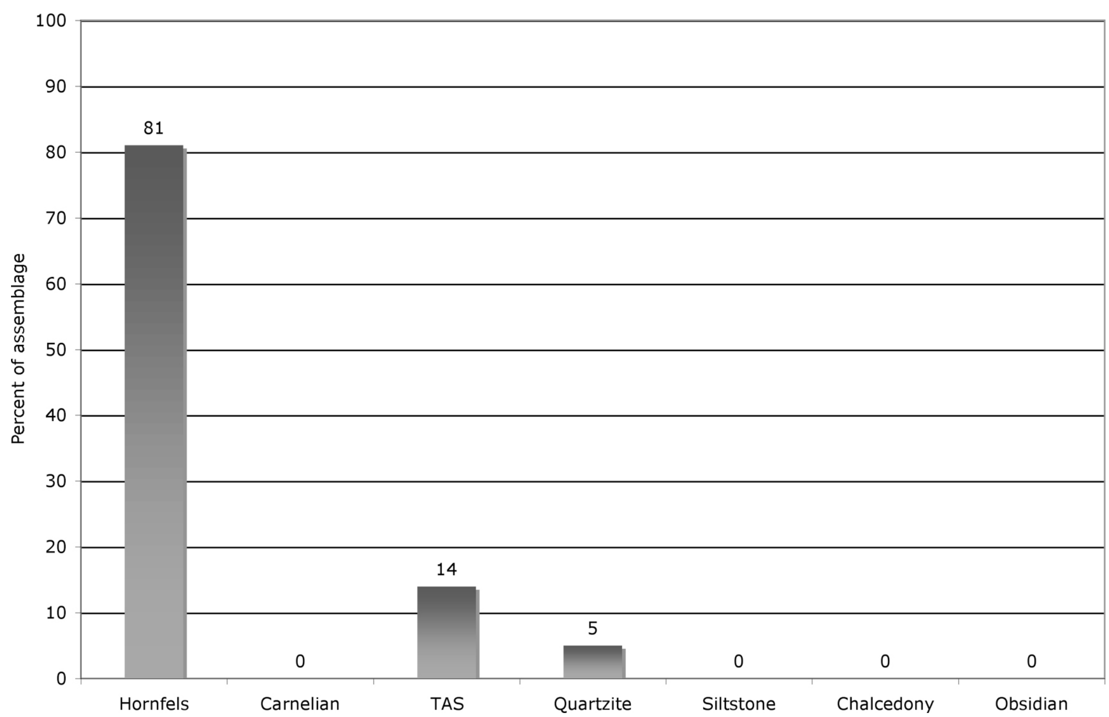

Figure 5.24. Raw material distribution among flake tools, MP-7.

(Figures 5.25, 5.26). Among cores, hornfels comprised 64.3 %, whereas thermally-altered sandstone made up 35.7 % (Figure 5.27). One hundred percent of the drills were made of hornfels, whereas 100 % of the hammerstones were made of quartzite. Twelve specimens of groundstone were recovered. Of those, 50 % were quartzite, 33.3 % quartz monzonite (available as cobbles and boulders in the Cimarron River some 14 km south of the site), and 16.7 % granodiorite (source unknown).

Flakes and Flake Tools

Metrical data show that the mean length, width, and thickness of primary flakes are 23.6 mm, 24.8 mm, and 5.4 mm, respectively (Figure 5.28). Secondary flakes were, on average, larger in every dimension than primary or tertiary flakes, with a mean length of 25.2 mm, mean width of 27.2 mm, and mean thickness of

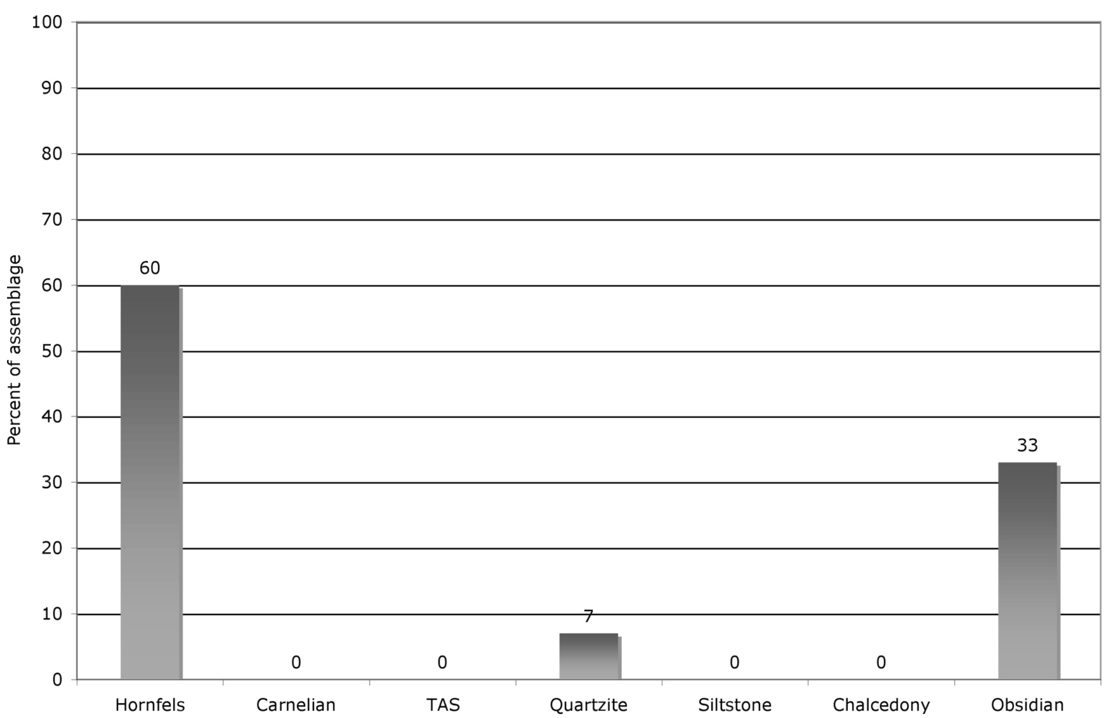

Figure 5.25. Raw material distribution among projectile points, MP-7.

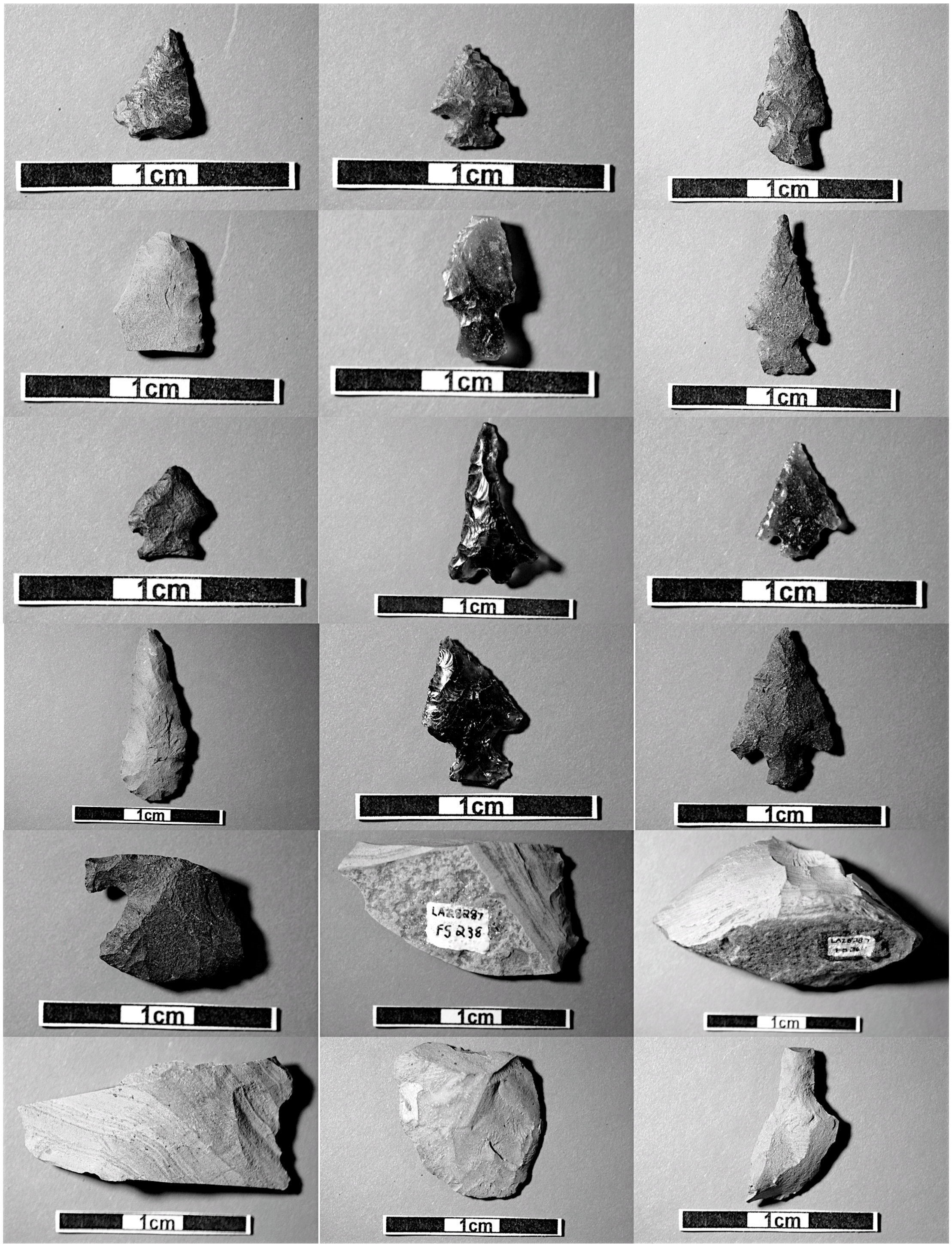

Figure 5.26. Representative projectile points, flake tools, and drills depicting the variety of raw materials used at MP-7. Note the large dart point base, fifth row down, far left, a surface find in the MP-7 activity area (MP-7a).

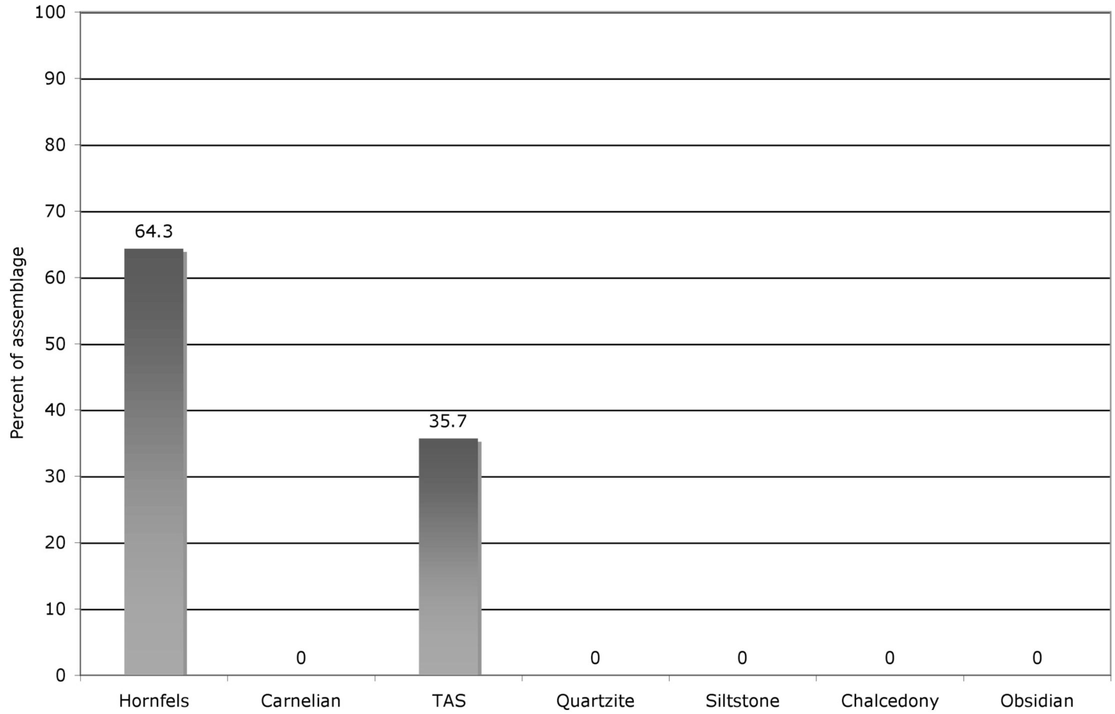

Figure 5.27. Raw material distribution among cores, MP-7.

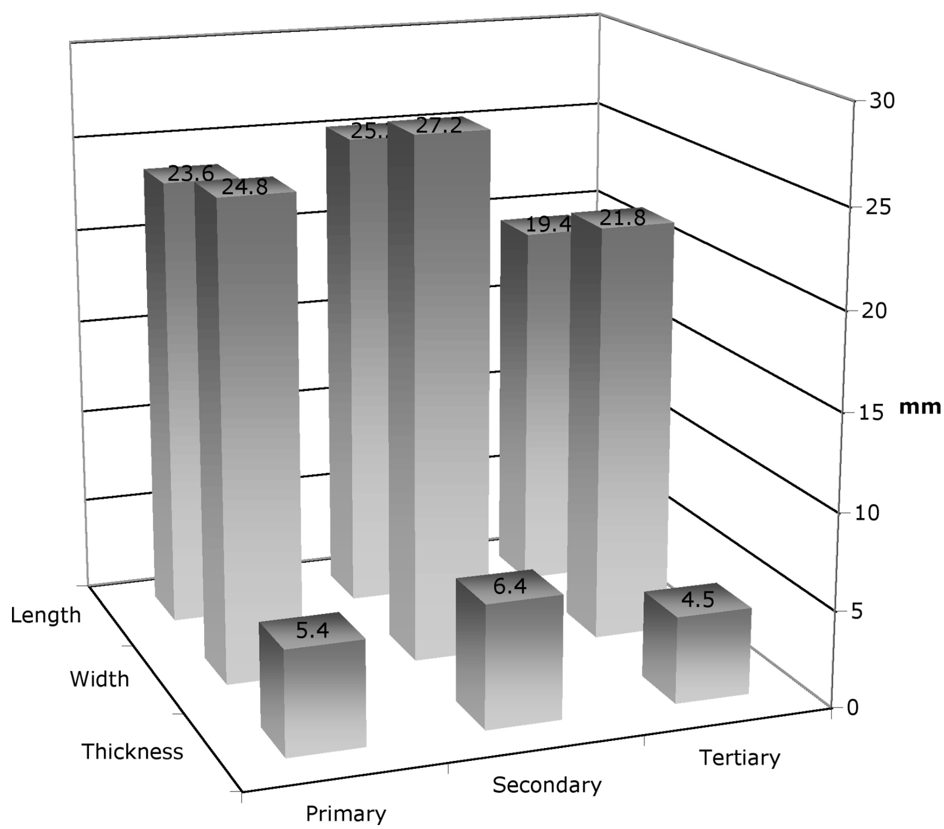

Figure 5.28. Mean metrical data for primary, secondary, and tertiary flakes, MP-7.

6.4 mm. Tertiary flakes were, as expected, the smallest of the class with a mean length of 19.4 mm, width of 21.8 mm, and thickness of 4.5 mm. Angular debris was sized, with 85.4 % being larger than 6.5 mm in length. Only 0.6 % of them were between 3.6 and 4.5 mm, demonstrating the limitation of our use of 6 mm screen mesh (Figure 5.29).

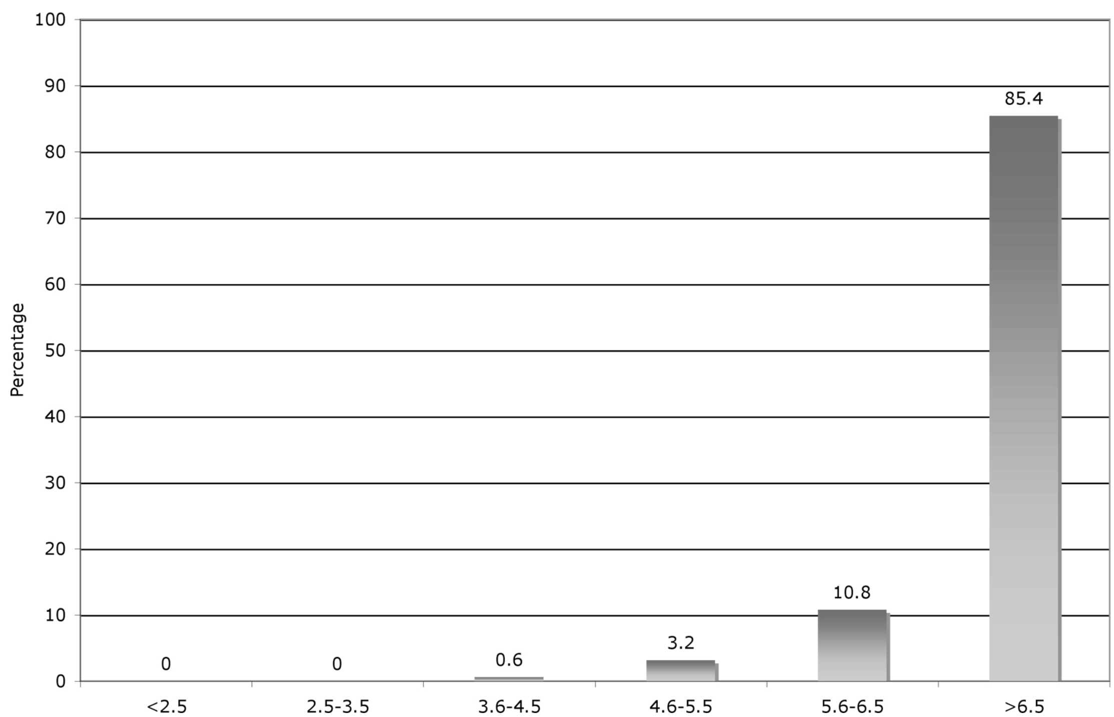

Figure 5.29. Angular debris size ranges, MP-7.

Among tools, formal tools (projectiles and drills) were more common than informal tools (flake tools), yielding a ratio of formal to informal of 1:0.66 (Figure 5.30). Altogether, 21 flake tools were recovered from MP-7, with an average length of 37.8 mm, average width of 42.6 mm, average thickness of 10.8 mm, and average weight of 25.2 g (Figure 5.31).

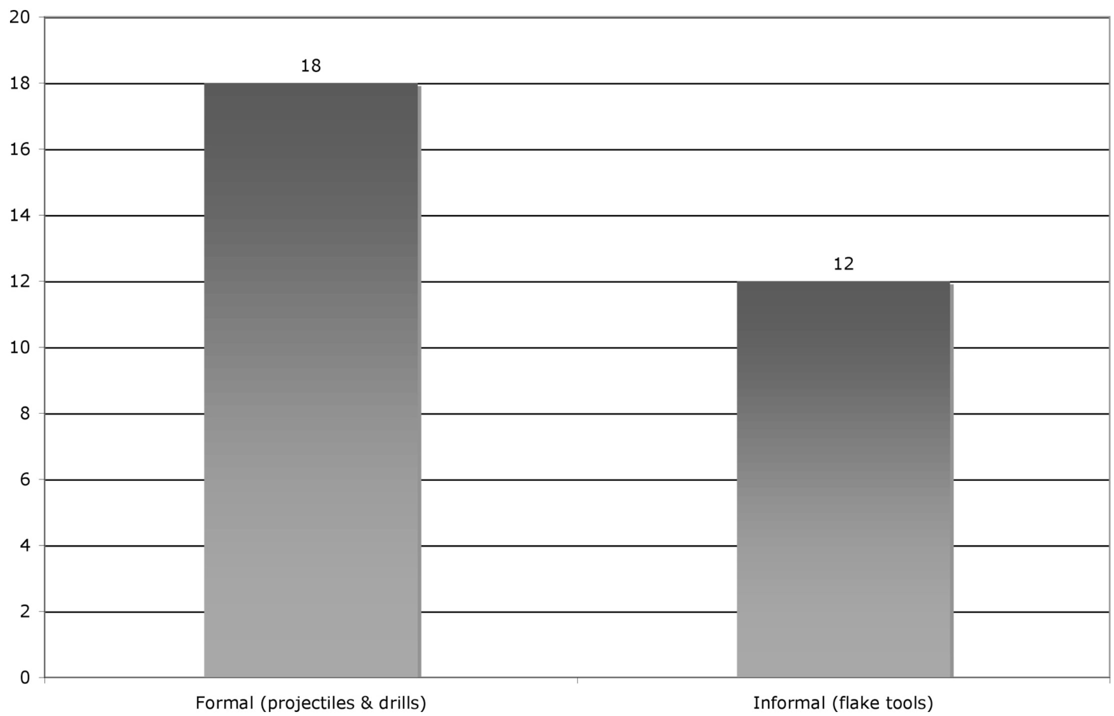

Figure 5.30. MP-7 had a formal-to-informal tool ratio of 1:0.66.

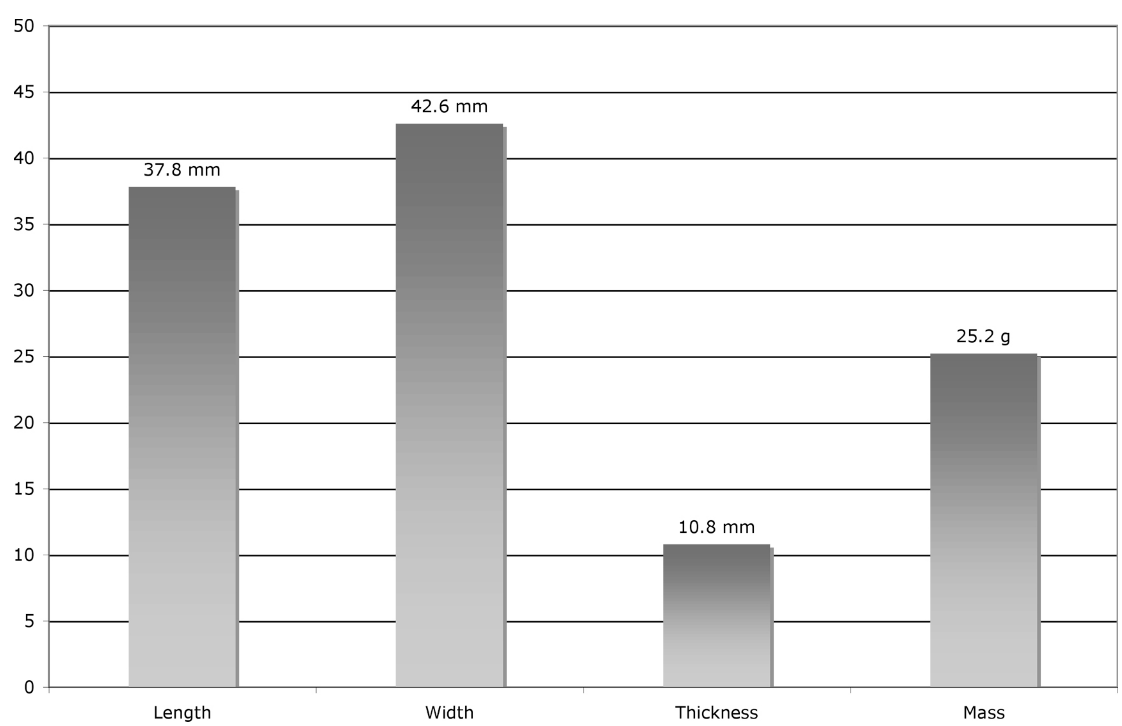

Figure 5.31. Mean flake tool metrical data, MP-7.

Projectile Points

Fifteen projectile points were recovered from MP-7. A measure of metrical data shows that the mean length of the projectiles was 15.5 mm, the mean width 11.6 mm, the mean thickness 2.9 mm, and the mean weight 0.5 g (Figure 5.32). Cores were on average 81.7 mm long, 71.9 mm wide, 31.7 mm in thickness, and 132.6 g in weight (Figure 5.33).

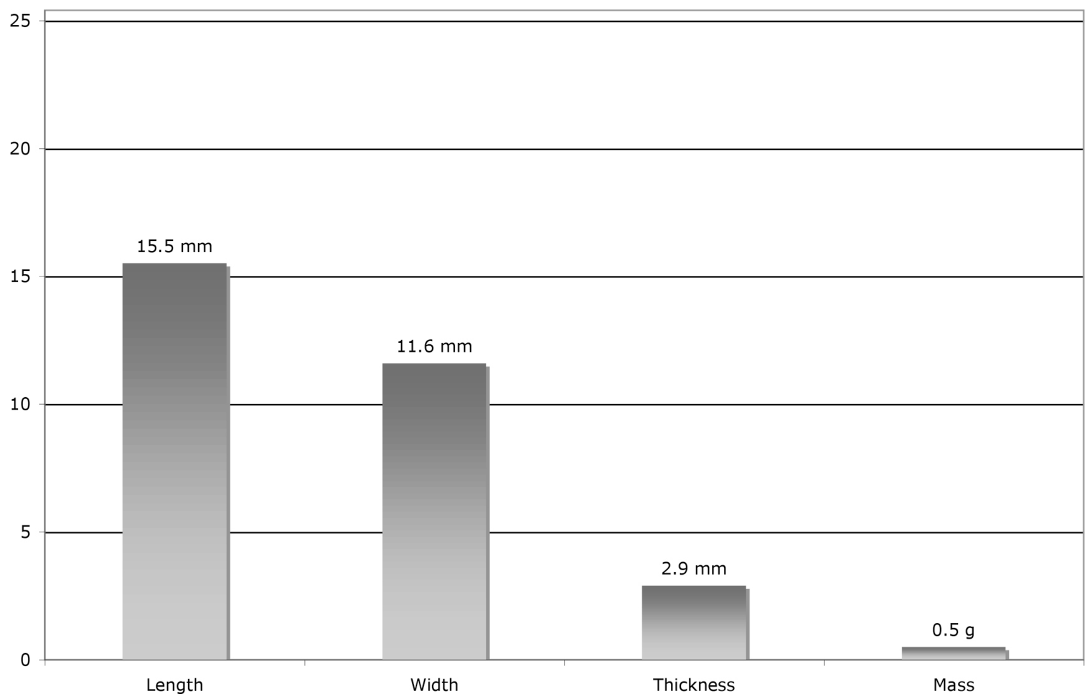

Figure 5.32. Mean projectile point metrical data, MP-7.

Ceramics

One of the key negative indicators of Glassow's (1972a, 1980) Vermejo phase was the absence of pottery. However, our investigations at MP-7 revealed pottery at several levels, including the floor. Altogether we recovered 32 potsherds of a relatively thin brownware (Figure 5.34). The sherds were sand-tempered with

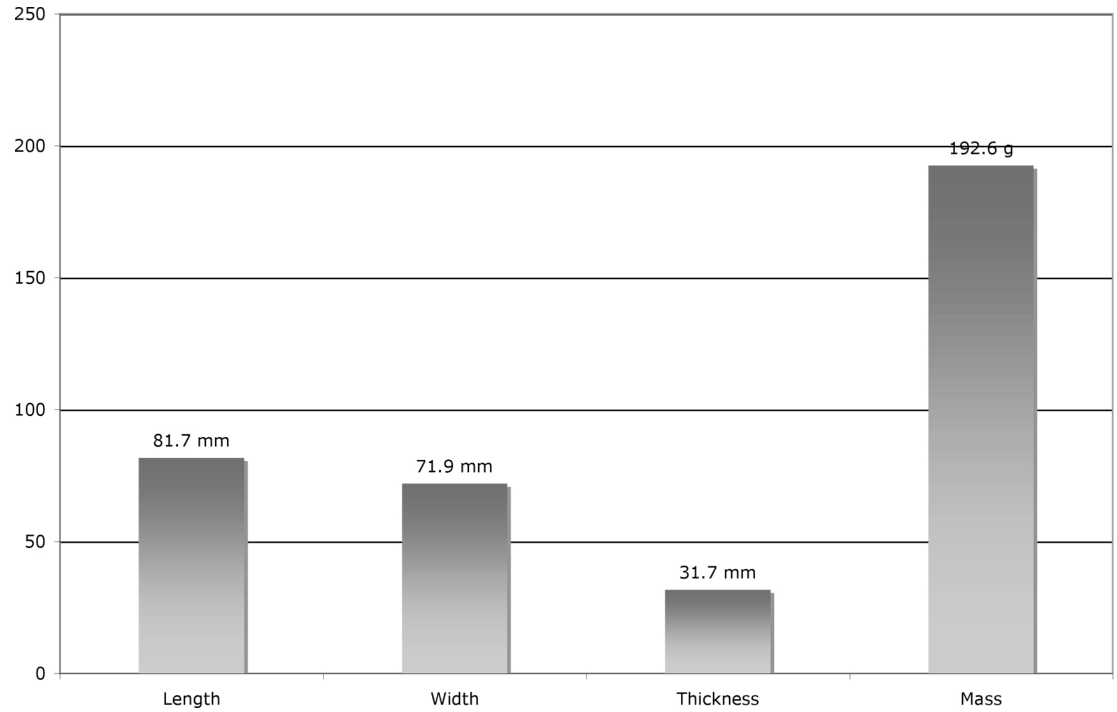

Figure 5.33. Mean metrical data for cores, MP-7.

Figure 5.34. Pottery found in a disturbed area of MP-7.

flecks of mica visible in some specimens. Mean thickness was 5.3 mm. However, context for the sherds is questionable. Most of them appear to have come from a single pot break, likely a bowl, and they were found in an area of heavy bioturbation that spanned three 1 m^2 units on the east side of the structure, near where a piece of wood was recovered that indicated a second occupation date for the site much later than that indicated by a wood sample from Feature #1. It is possible that the sherds and later burned wood entered the structure through the same disturbed area.

Botanical Remains

A total of 22 liters of soil were collected from inside and outside the structure at MP-7. Samples were floated and organic remains collected and analyzed. Because of the amount of organics, samples were split and reduced by 75 %. They were then sorted into charred and uncharred remains as the samples were heavily contaminated with modern seeds. Only charred materials were examined. Two charred *Zea mays* cupules were present, but no other cultivated materials were observed. Charred seeds of wild plants included *Chenopodium sp*, *Amaranthus*, *Pinus edulis*, and *Juniperus monosperma*. Several charred seeds remain unidentified.

Faunal Remains

No faunal remains were recovered from our excavations at MP-7. This is either due to preservation issues or the likelihood that the prehistoric inhabitants discarded such remains off the rock terrace on which the site was located.

NP-69 (A.D. 330; A.D. 680)

NP-69 was intensively excavated. Ninety-four 1 m^2 units were hand-excavated, most of them down to bedrock (see Figure 4.14). NP-69 is also a multi-component site. Of the first (B) component, little is known. We uncovered an extramural hearth (Feature #3) deeply buried and sitting on bedrock on the final day of excavations. The hearth dates to A.D. 330, making it one of the earlier absolutely dated features in the study area. This is important in and of itself, because it shows that the general site area with its high position and overlook was an important "space" on the landscape for prehistoric people. For the primary A component associated with the structure (A.D. 680), we have considerably more data.

Architecture and Features

The A component (A.D. 680, Beta 205651, 2 sigma calibrated to A.D. 650 to 780) of NP-69 was centered on a small, fairly symmetrical circular structure roughly 5 m in diameter, approximately 4 m from the edge of a sheer cliff. Figure 5.35 depicts the site as we found it, including tumbled wall rocks. Figure 5.36 shows the structure and associated features after excavation, with only intact wall rocks remaining. The walls were made of tabular sandstone, which is ubiquitous in the area. Although the stones appeared to be dry-stacked, a close examination of the lower levels revealed that the stones were cemented with a mortar made of mud and ash. A single kernel of corn (*Zea mays*) was recovered from wall matrix on the east side of the structure (N103, E94) in an area that appeared to have been

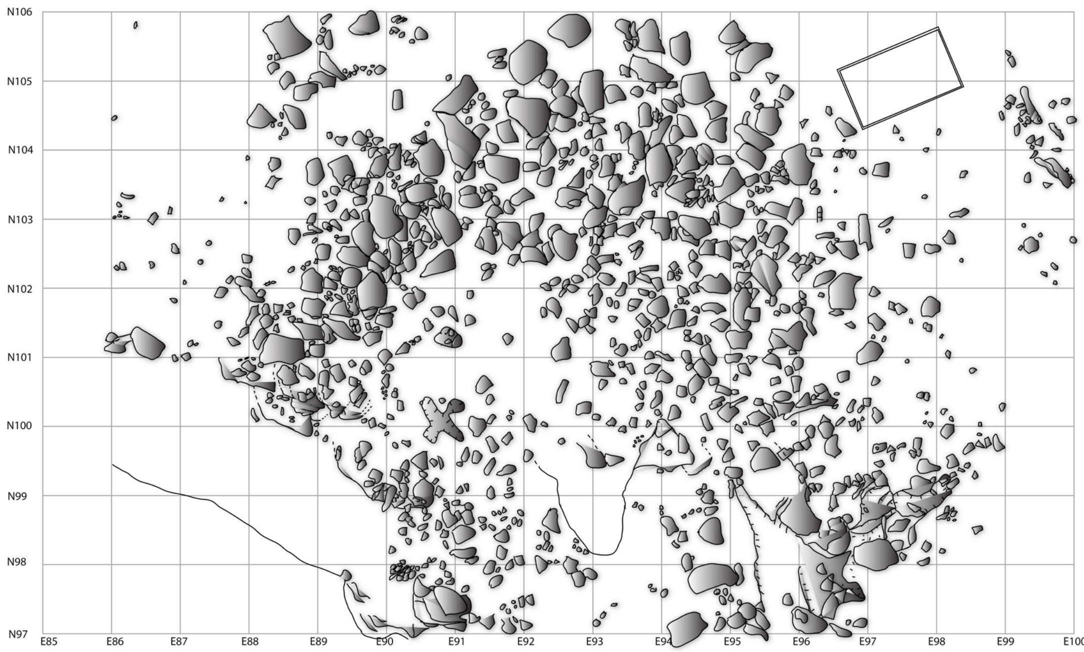

Figure 5.35 Plan view of NP-69 prior to our 2002 investigations. The rectangular figure in the northeastern corner represents the screen left from the 1972 testing at the site conducted by Kirkpatrick (see Kirkpatrick 1975; Kirkpatrick and Ford 1977). The 1972 testing was undertaken in the general vicinity of the area mostly cleared of wall-fall (N101, E91).

repaired or remodeled. In the northern portion of the structure where foundation stones were firmly cemented, the wall was quite thick (up to 75 cm in some areas). Based upon an examination of the distribution of intact and fallen wall rocks, it is estimated that the walls were approximately 1 m tall.

Although the structure had burned at some point, no timbers were found, nor were any postholes observed due to the structure's position directly on the sandstone bedrock. Considering the absence of timbers and postholes, the only plausible roof construction method would have been to use flexible materials embedded in the walls and muddied over jacal or wattle-and-daub fashion, possibly similar to MP-4. However, we never found the type of adobe nodules that

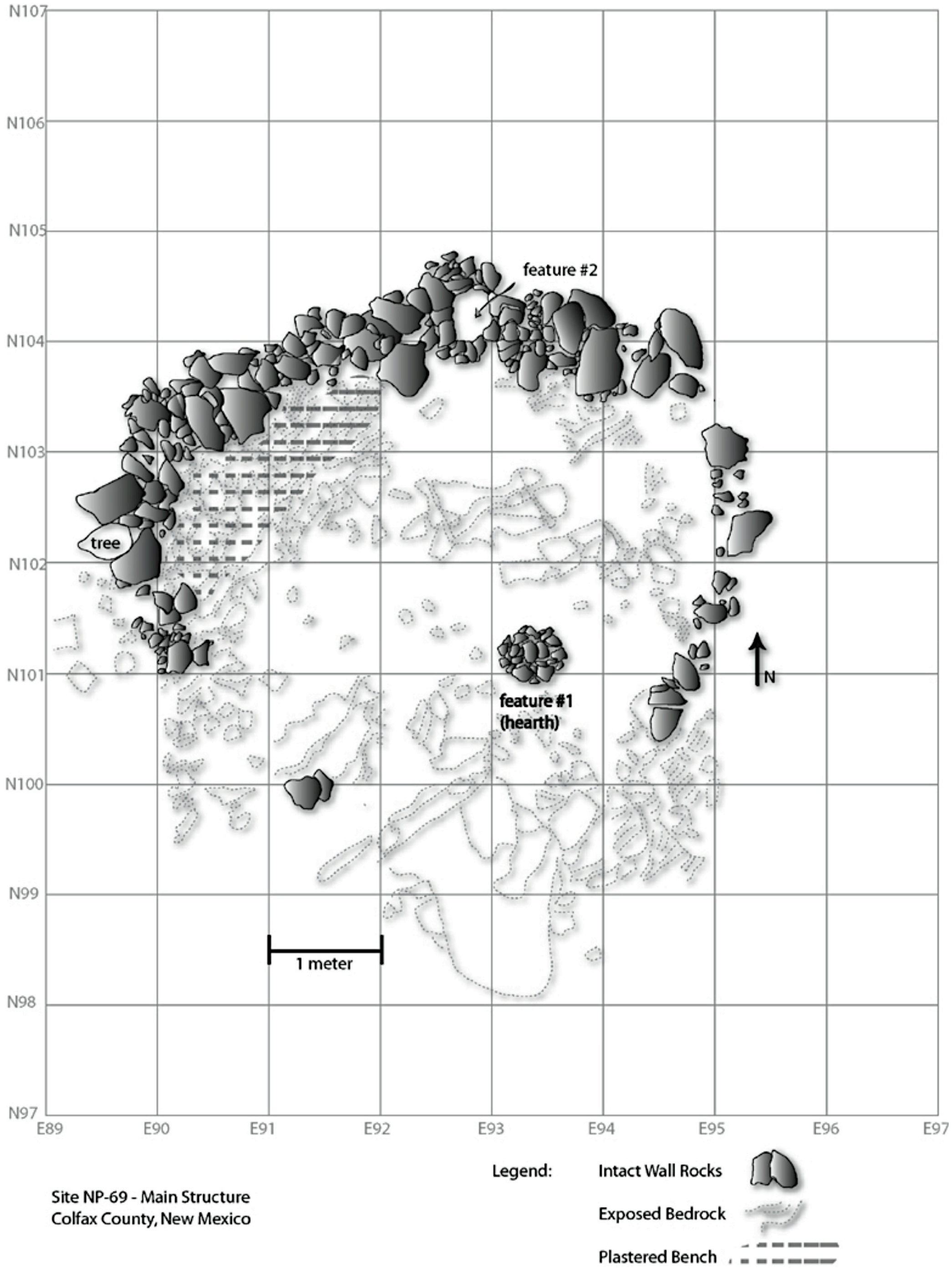

Figure 5.36. Plan view of the structure at NP-69.

are associated with that site. It is quite possible that after the structure was abandoned the adobe had several decades (or centuries) to "melt" before it burned.

The floor was saucer-shaped, plastered, and the rough platy edges of bedrock neatly covered with a thick plaster coating. On the northwest area of the structure where the bedrock was particularly jagged, we unearthed a plastered bench on which we found a number of flake tools.

Apparently the specific location of the structure was important, because had the occupants chosen to build it only 3 m to the north the bedrock would have been smooth and construction much simplified. The only plausible explanation for building the structure precisely where it stood was the excellent view of the canyon floor that this specific location afforded. Reaching the site requires a precipitous climb from the canyon floor (see Figures 4.11 and 4.12).

The structure contained a formal hearth (Feature #1, N101, E93) (see Figures 4.17, 5.36) that was situated in the southeast, about 1 m from the presumed entryway, which faced to the southeast. The entry was somewhat ramped due to the natural orientation of the sandstone bedrock, which appeared to be somewhat smooth from wear. The hearth was approximately 50 cm in diameter, saucer-shaped, and lined with tabular sandstone that was carefully fitted. It was also filled with ash and charred wood. Radiocarbon dating of the contents of the hearth place the date at A.D. 680 (Beta 205651, 2 sigma calibrated to A.D. 650 to 780).

A storage cavity (Feature #2, N104, E92) was built neatly into a section of wall at the north end of the structure. The cavity was roughly 30 cm in diameter and, based upon the height of intact wall rocks, was at least 40 cm deep (see Figure 4.18). The contents of the cavity were floated but no cultigens were found.

However, several pieces of charred wood were recovered from the lining and were dated to A.D. 550 (Beta 205652, 2 sigma calibrated to A.D. 430 to 630), which was likely near the construction date of the shelter.

The hearth that is the B component of NP-69 (Feature #3, N110, E91) did not appear to be associated with the structure. Approximately 45 cm in diameter, it was saucer-shaped and dug down to bedrock, but did not appear to have been built with the same care as the one inside the structure. A number of relatively large pieces of charred wood were recovered and dated to A.D. 330 (Beta 205653, 2 sigma calibrated to A.D. 230 to 410).

Lithics Data

A total of 3,374 lithic specimens were recovered (Appendix C). Of that number, 75.3 % were recovered beneath the surface (Levels 1 and the Floor), which provides particularly good context for a large percentage of the assemblage (Figure 5.37).

Raw Materials

Of the primary flakes recovered, hornfels was the most common material used (71.4 %), followed closely by two forms of chalcedony (Figure 5.38). The first is Corrumpa Creek Carnelian (14.3 %), which is a mottled brown variety found near Clayton, Union County, New Mexico. Commonly misidentified as Alibates flint, Corrumpa Creek Carnelian occurs in abundance some 140 km east of the study area. A general lustrous (and local) white chalcedony made up an equal portion of the primary flake assemblage (14.3 %). Cimarron hornfels, the

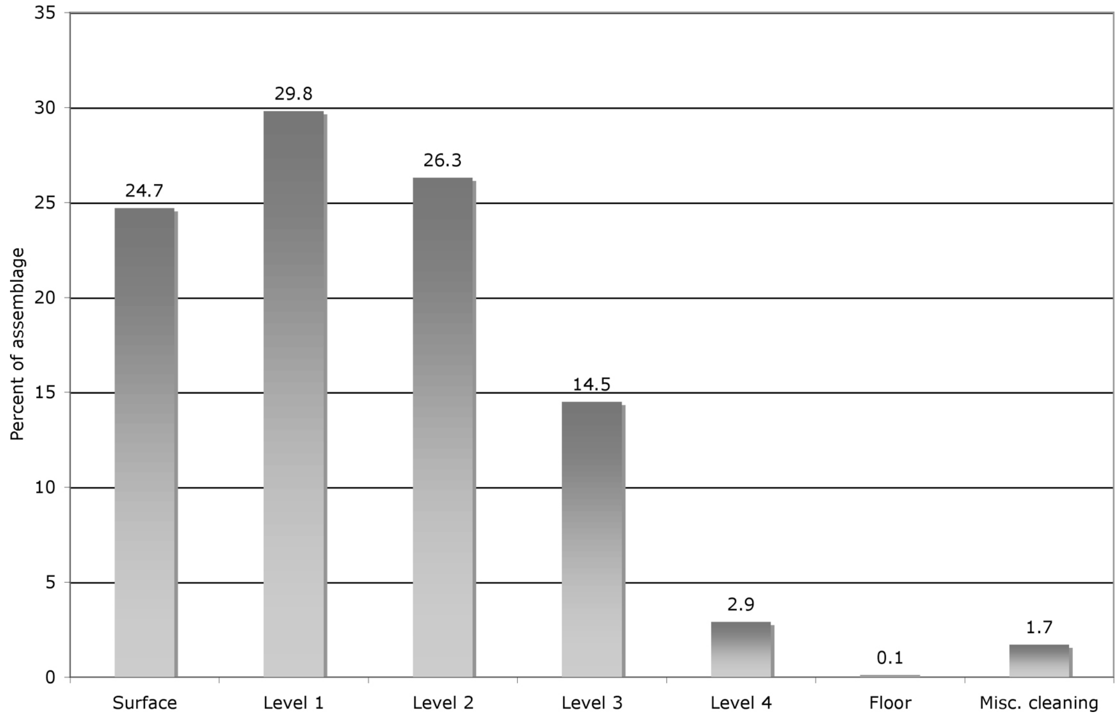

Figure 5.37. Mean number of artifacts by level, NP-69. Fully 71% of the artifacts were recovered from good subsurface contexts.

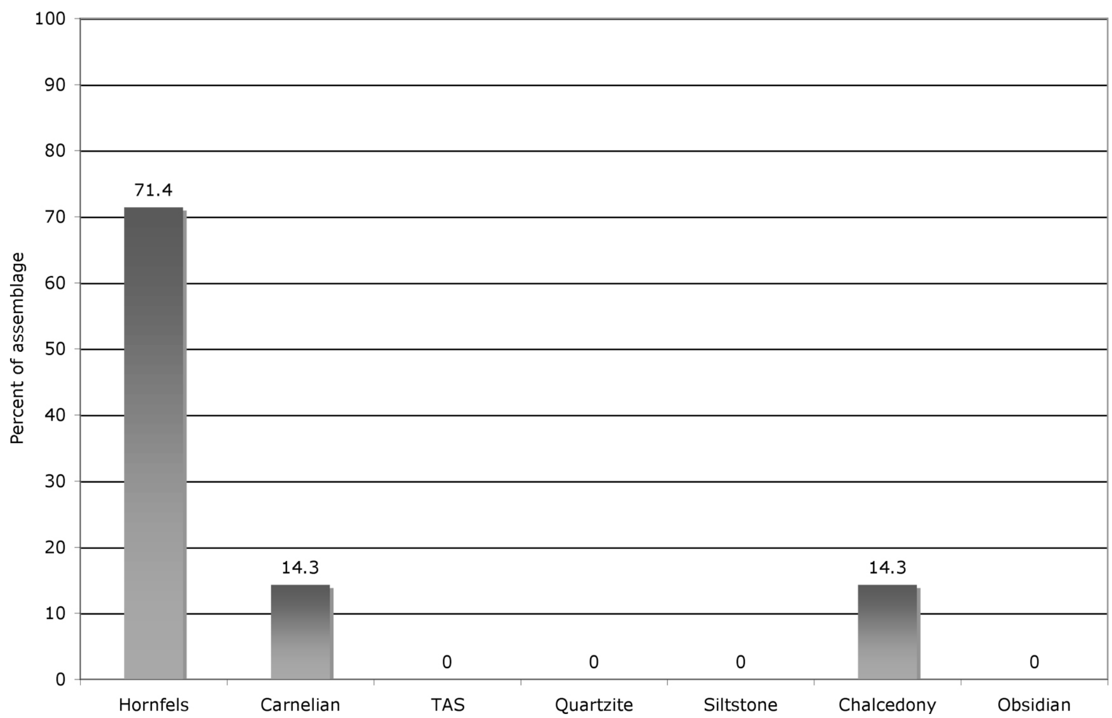

Figure 5.38. Raw material distribution among primary flakes, NP=69. As with MP-4 and MP-7, Cimarron hornfels is by far the most commonly used raw material.

most common material (94.4 %) among secondary flakes, is now followed by obsidian (5.6 %), the two of which made up the entire secondary flake assemblage (Figure 5.39). Several obsidian samples were sourced by the XRF Lab in Berkeley, California (Appendix D), all of which had chemical signatures from the Valles Caldera in the Jemez Mountains, about 160 km (100 mi) to the west of the study area. Among tertiary flakes, carnelian and chalcedony reappear, but at lower percentages than in the primary category. Notably, obsidian flakes make up 23.2 % of the tertiary flake assemblage (Figure 5.40). Retouch flakes (those flakes less than 6.5 mm in length) were largely made of hornfels (60.3 %) and obsidian (26.9 %) (Figure 5.41). Of the angular debris, hornfels was again the most common material by far (82.6 %) with obsidian at 10 % (Figure 5.42).

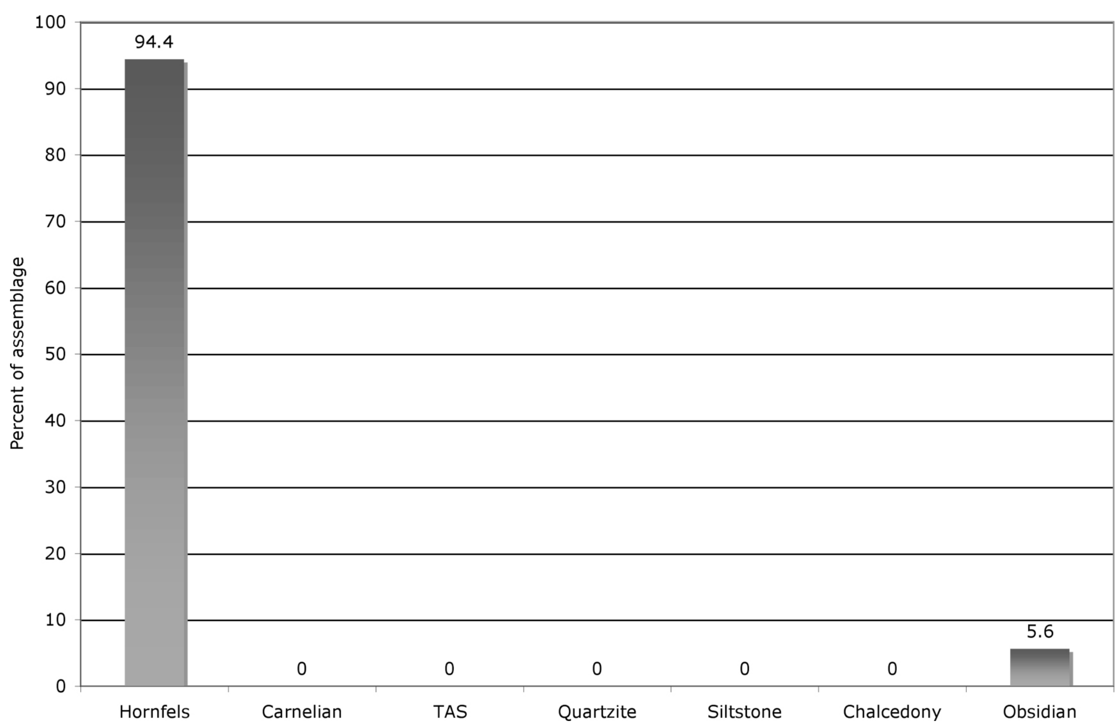

Figure 5.39. Raw material distribution among secondary flakes, NP-69.

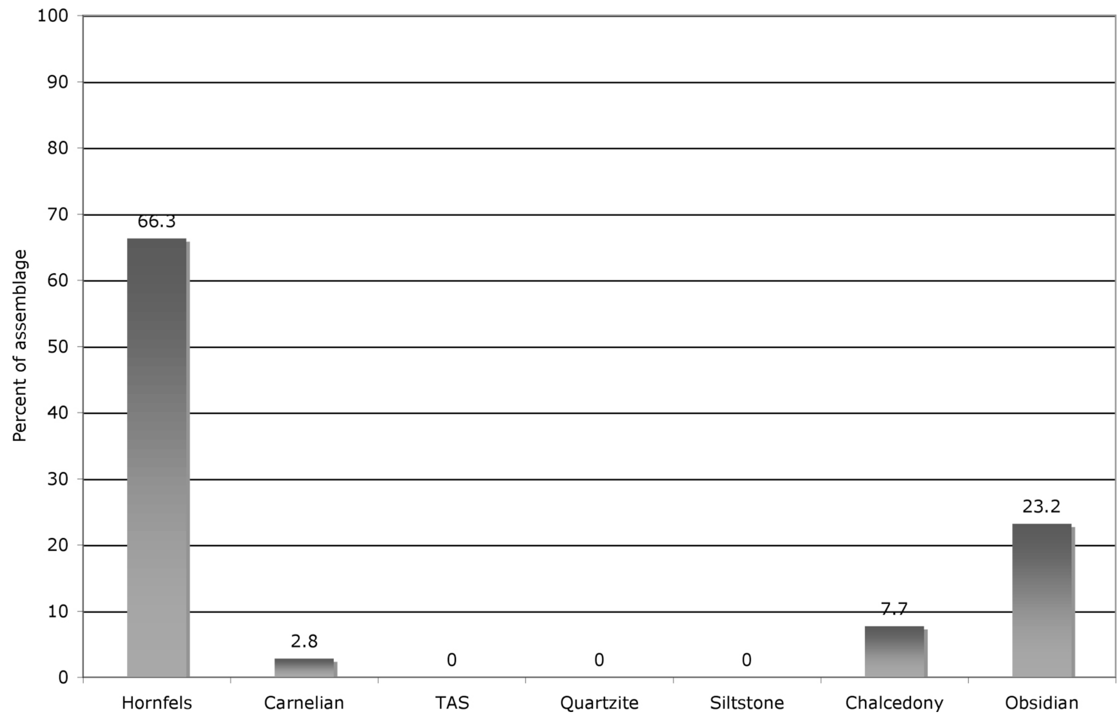

Figure 5.40. Raw material distribution among tertiary flakes, NP-69.

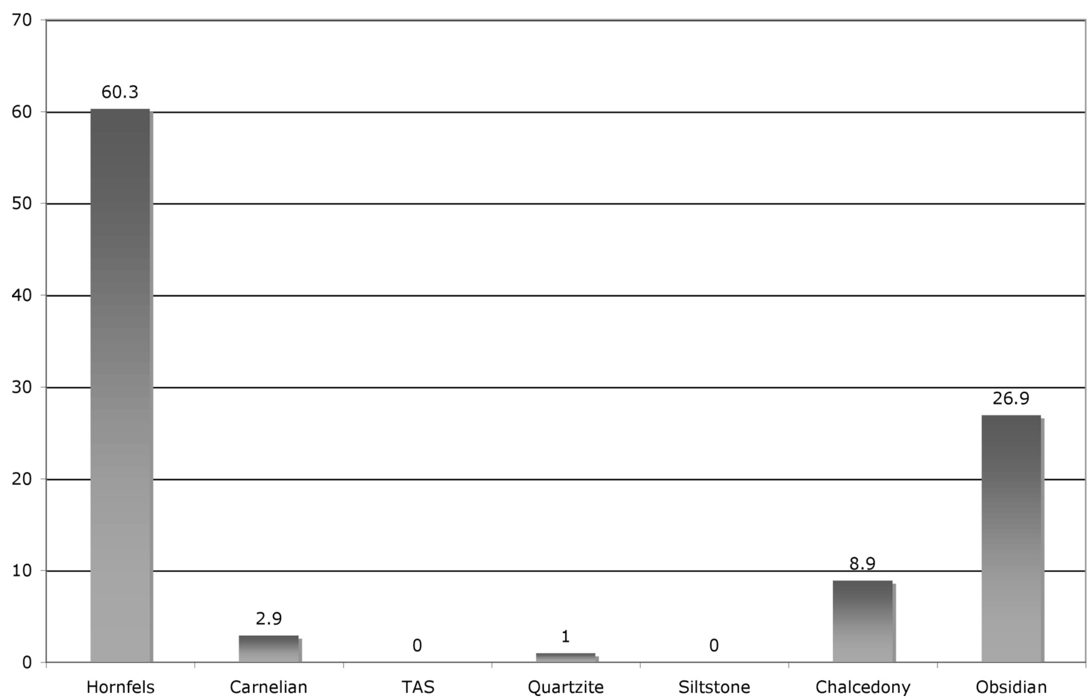

Figure 5.41. Raw material distribution among retouch flakes, NP-69.

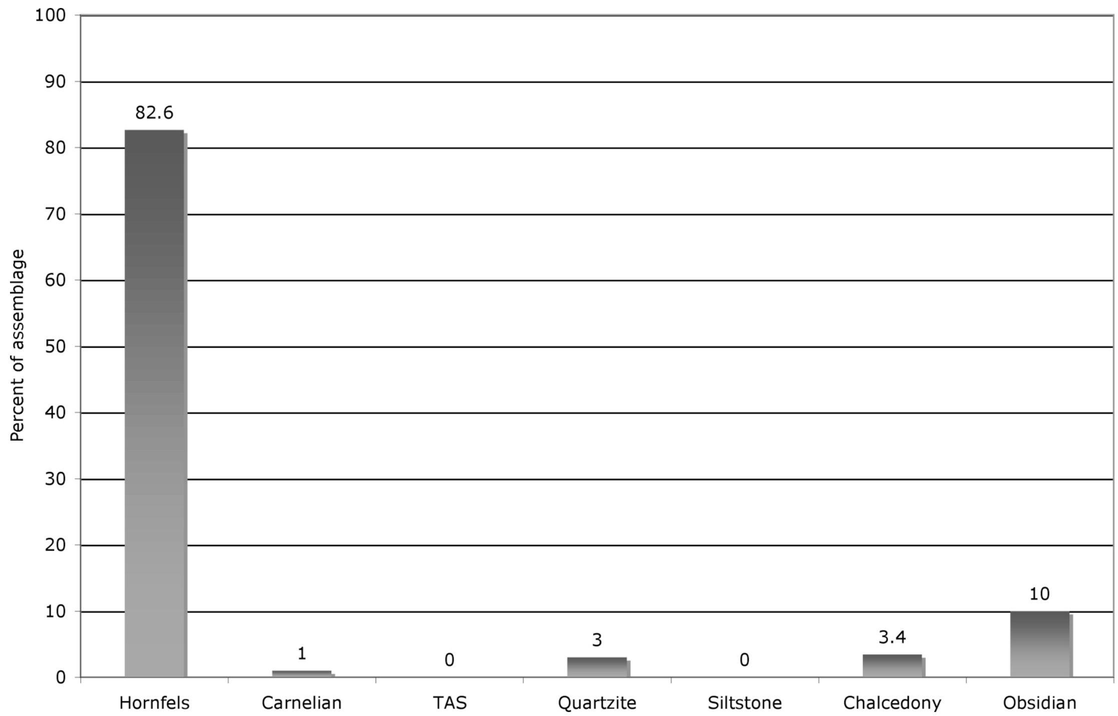

Figure 5.42. Raw material distribution among angular debris.

Of the flake tools, 94.6 % are hornfels, a quasi-local material, whereas no flake tools were made of obsidian, a material obtained from non-local sources (Figure 5.43). These data allow one to surmise that obsidian was used exclusively for the production of formal tools such as projectile points, as is borne out by Figure 5.44, where fully 25 % of the projectile points were manufactured from obsidian. Again, carnelian and chalcedony are used almost exclusively for the manufacture of projectiles, but several flake tools were made from these materials as well. Core data are consistent with other lithic data, showing the relative importance of hornfels and obsidian in the technological repertoire of the Vermejo phase residents of the Poñil drainage (Figure 5.45). Figure 5.46 shows that Cimarron hornfels, Corrumpa Creek carnelian, and chalcedony were important for

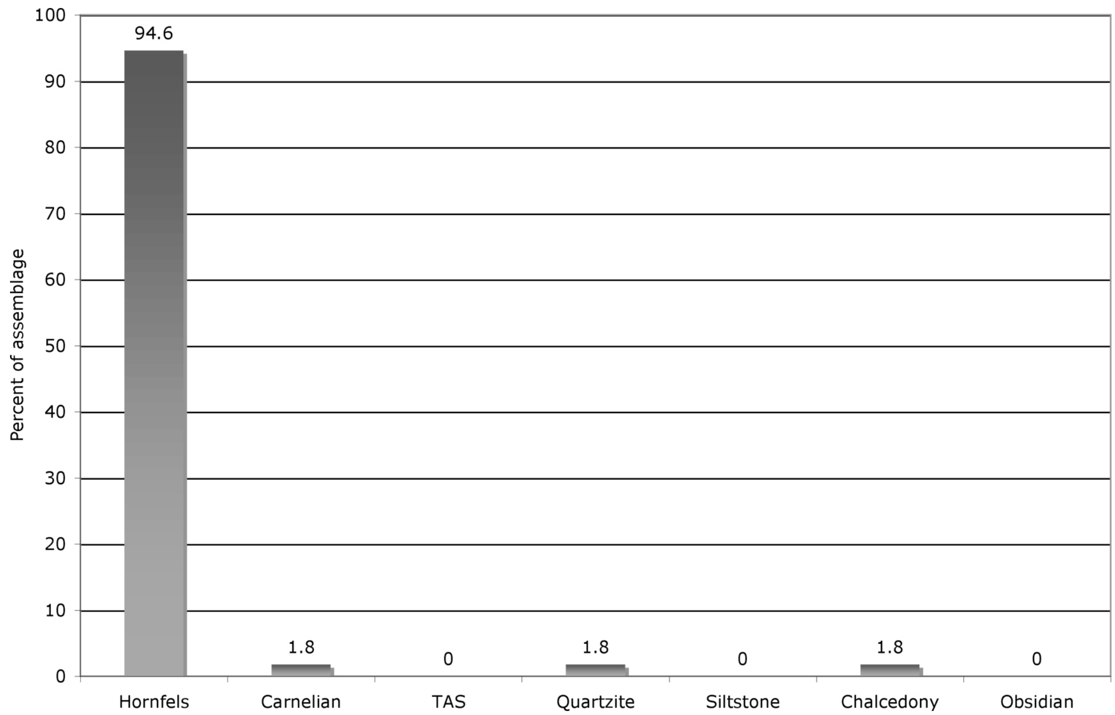

Figure 5.43. Raw material distribution among flake tools, NP-69.

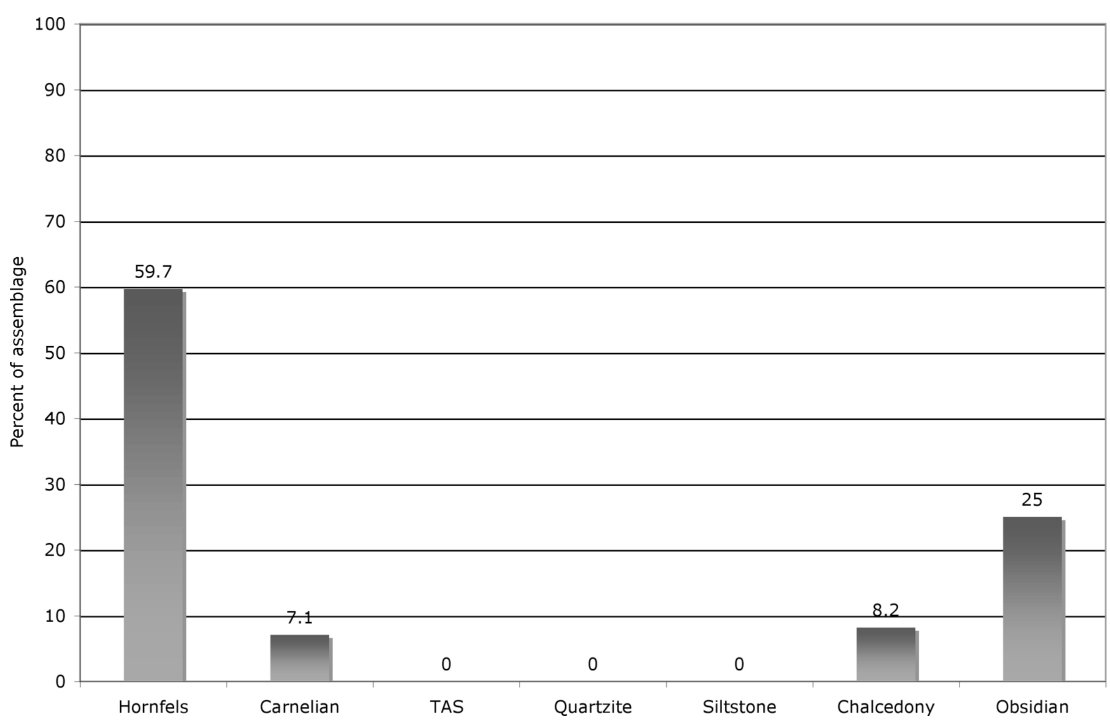

Figure 5.44. Raw material distribution among projectile points, NP-69.

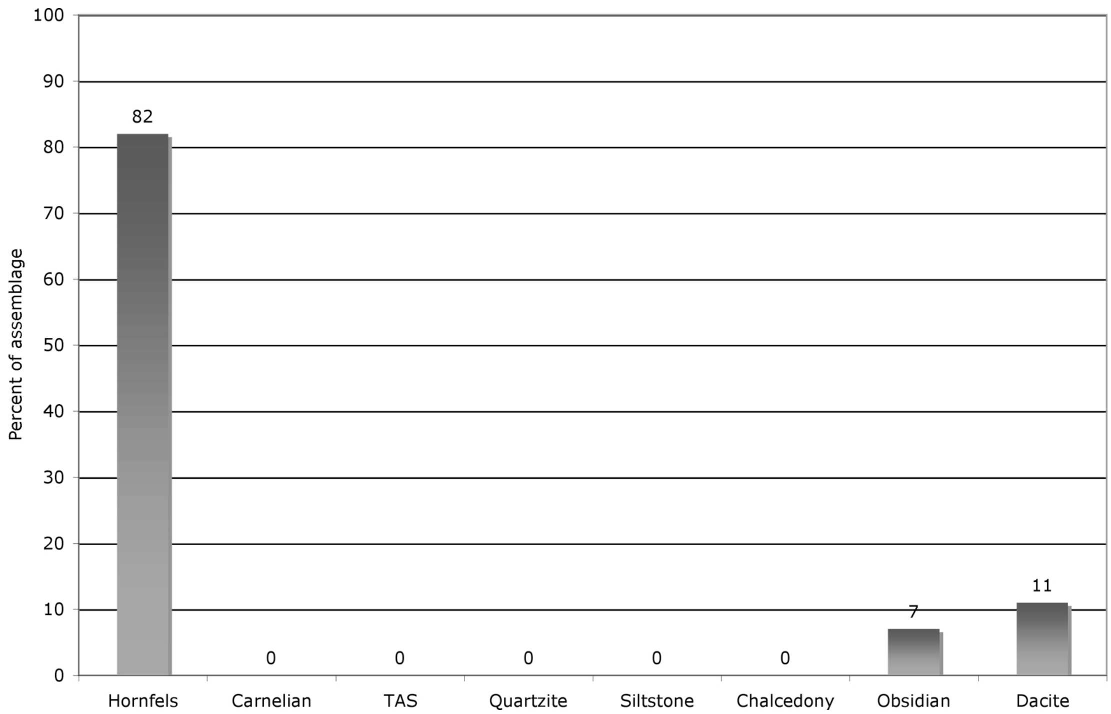

Figure 5.45. Raw material distribution among cores, NP-69.

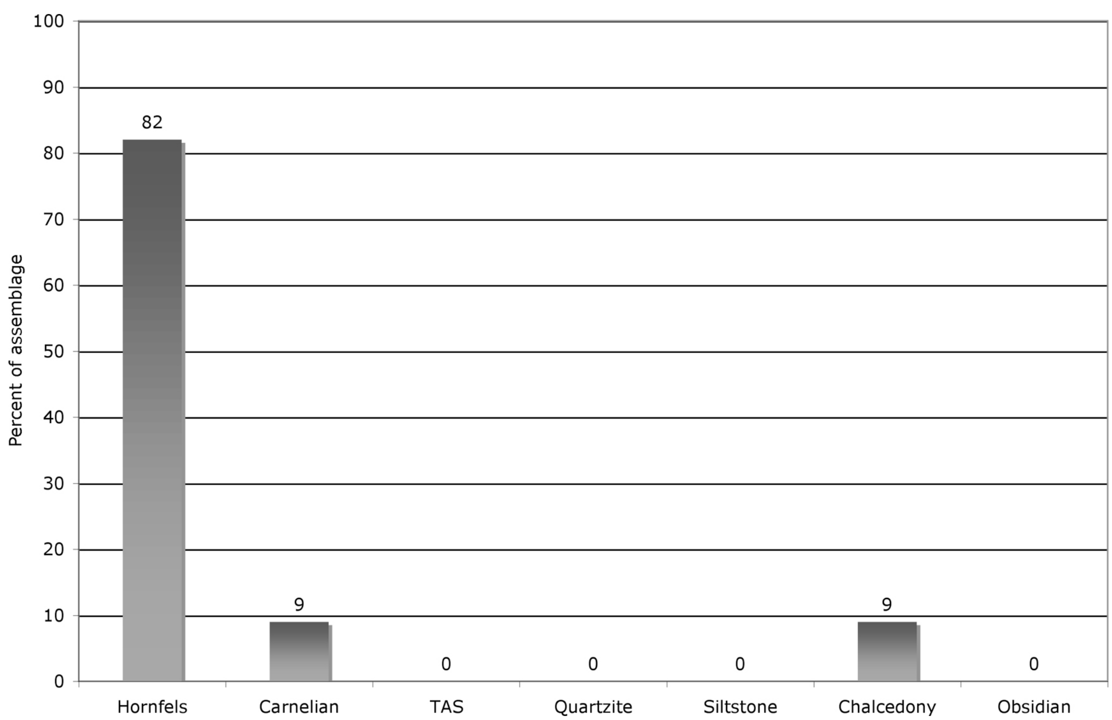

Figure 5.46. Raw material distribution among drills, NP-69. Although obsidian figures prominently in the production of projectile points, it is unused for drills at NP-69.

the production of drills.

Only two materials were used for groundstone: quartzite (available near the site) (83.3 %) and siltstone (available in the drainage itself) (16.7 %) (Figure 5.47). Of hammerstones, all were made of dacite, a material that is fairly common throughout the Poñil drainage system (Figures 5.48 and 5.49).

Flakes and Flake Tools

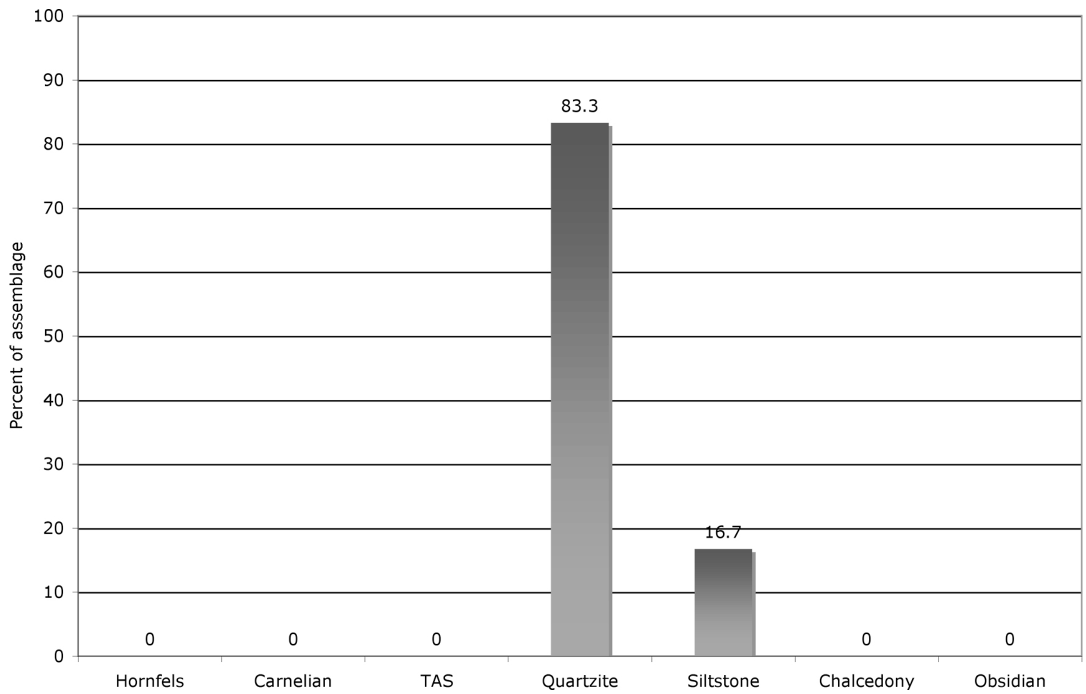

Figure 5.47. Raw material distribution among objects of groundstone, NP-69.

Flake metrical data are presented in Figure 5.50. Note that the larger flakes in each dimension are the secondary flakes. Retouch flakes were sized and weighed, with the largest percentage (42.8 %) of this category of flakes falling within the 3.6 to 4.5 size range (Figure 5.51). No single retouch flaked weighed more than 0.1 g. Flake tools on average were 3.17 mm in length, 29.9 mm in width, 7.9 mm in thickness, and weighed 9.7 g (Figure 5.52). Cores on average

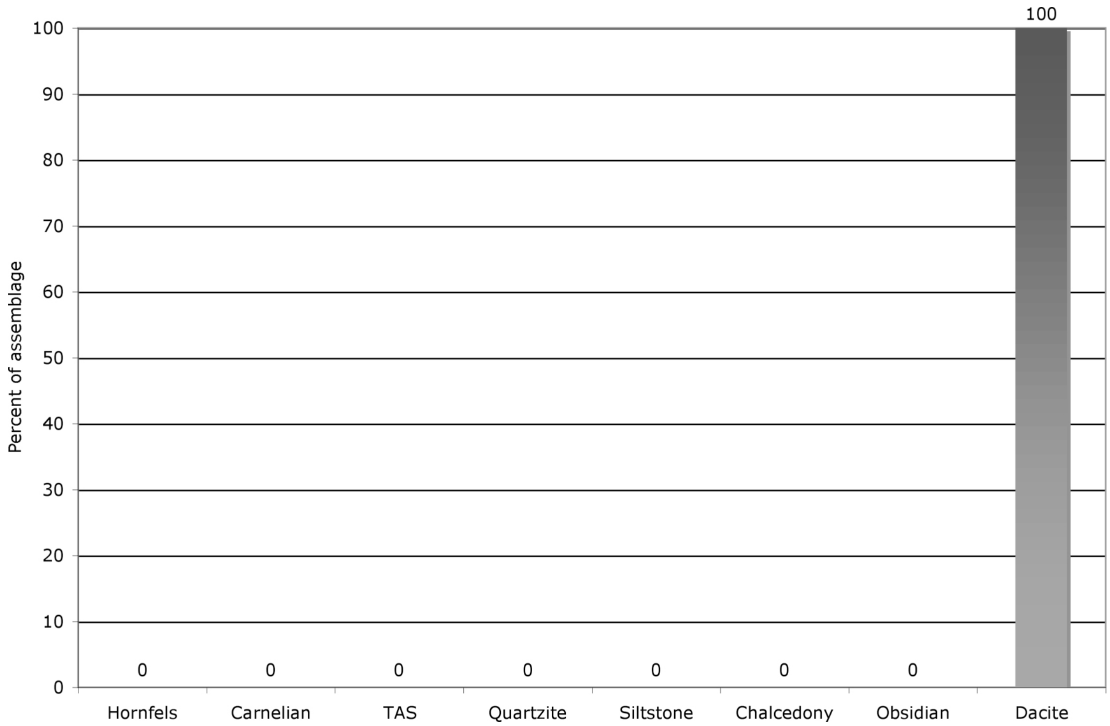

Figure 5.48. Raw material distribution, hammerstones, NP-69.

Figure 5.49. Example of stream-rolled dacite at NP-69. Dacite was used for hammerstones and occasionally for the production of crude flake implements. However, it was most likely carried to the site for use as boiling stones because of its smooth cortex and because of its ability to withstand high temperatures without shattering.

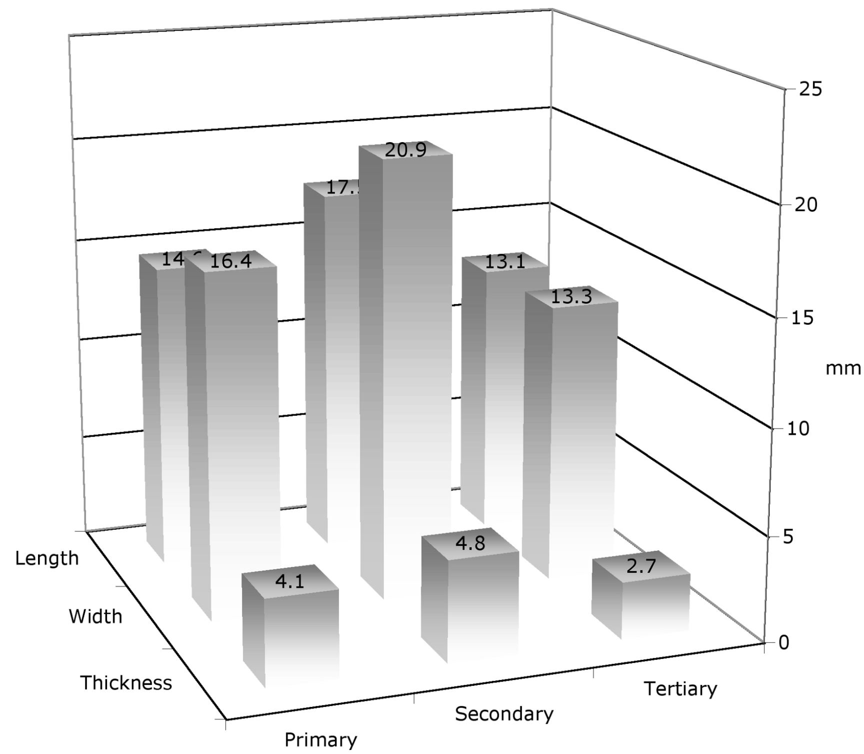

Figure 5.50. Mean metrical flake data, NP-69.

were 43.5 mm long, 43.9 mm wide (maximum dimension), 23.7 mm thick, and weighed 28.0 g (Figure 5.53).

Projectile Points

Fifty-four projectile points were recovered from NP-69 (Figures 5.54, 5.55). Projectile point metrical data reveal a mean length of 16.7 mm, a mean width of 10.8 mm, a mean thickness of 2.5 mm, and a mean mass of 0.5 g. At NP-69, formal tools (projectiles and drills) were slightly more common than informal (flake) tools, with a ratio of 1.09:1 (Figure 5.56).

Ceramics

No ceramics were found at site NP-69.

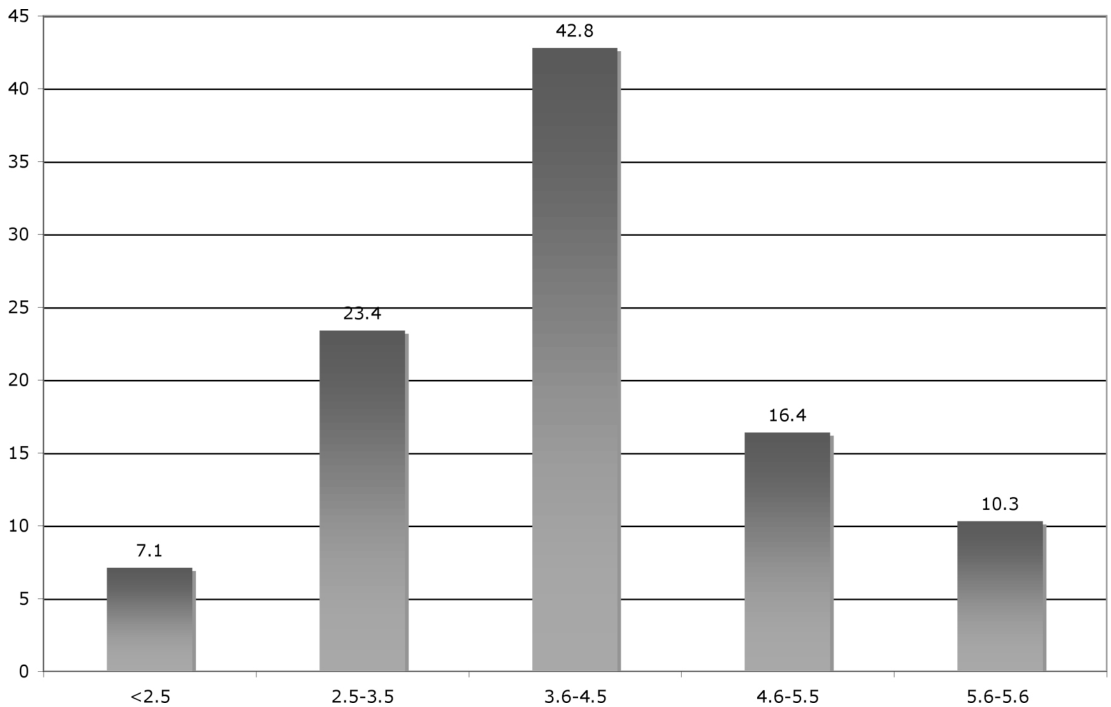

Figure 5.51. Mean size ranges among retouch flakes, NP-69.

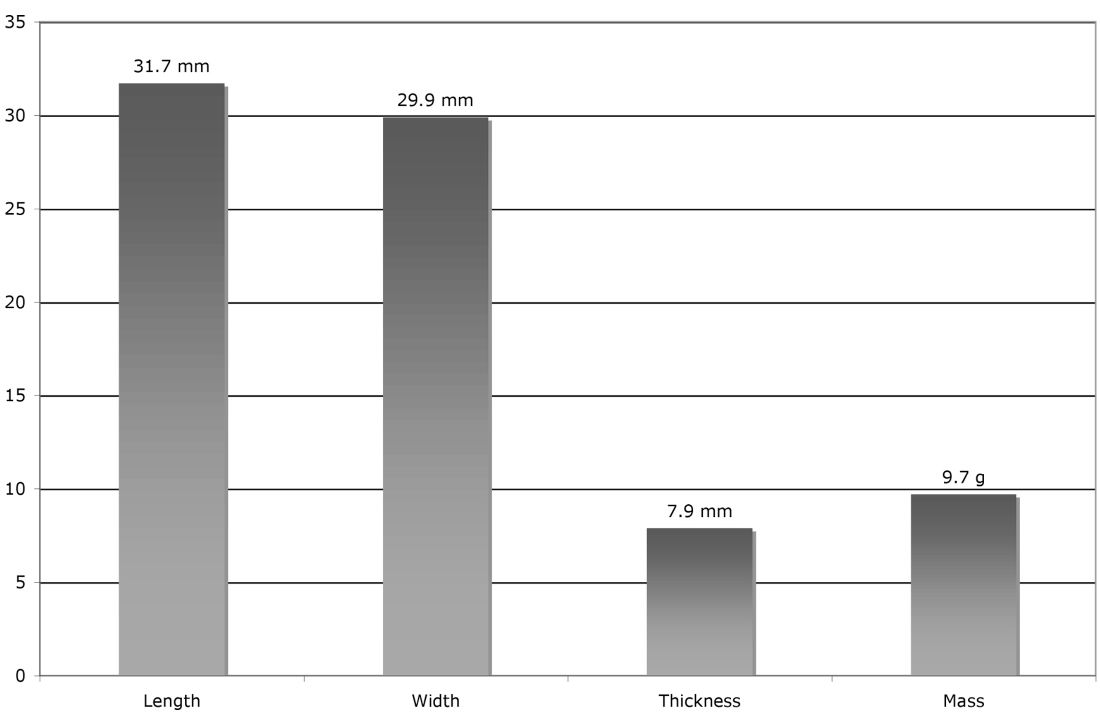

Figure 5.52. Flake tool metrical data (mean values), NP-69.

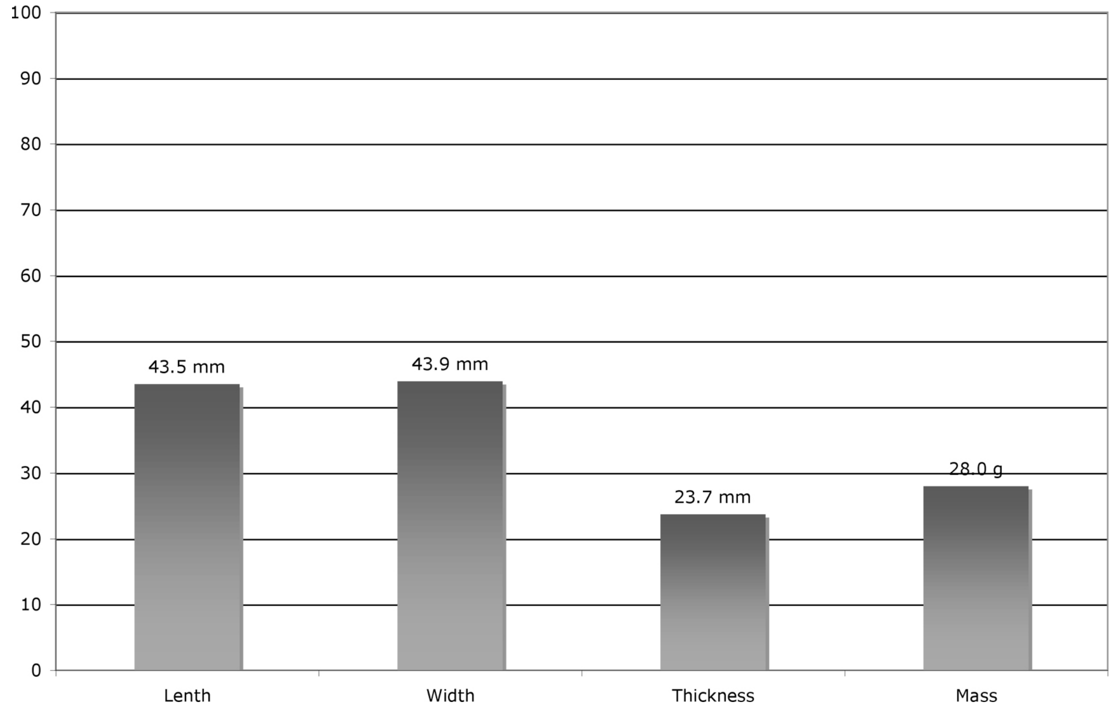

Figure 5.53. Mean metrical data, cores, NP-69.

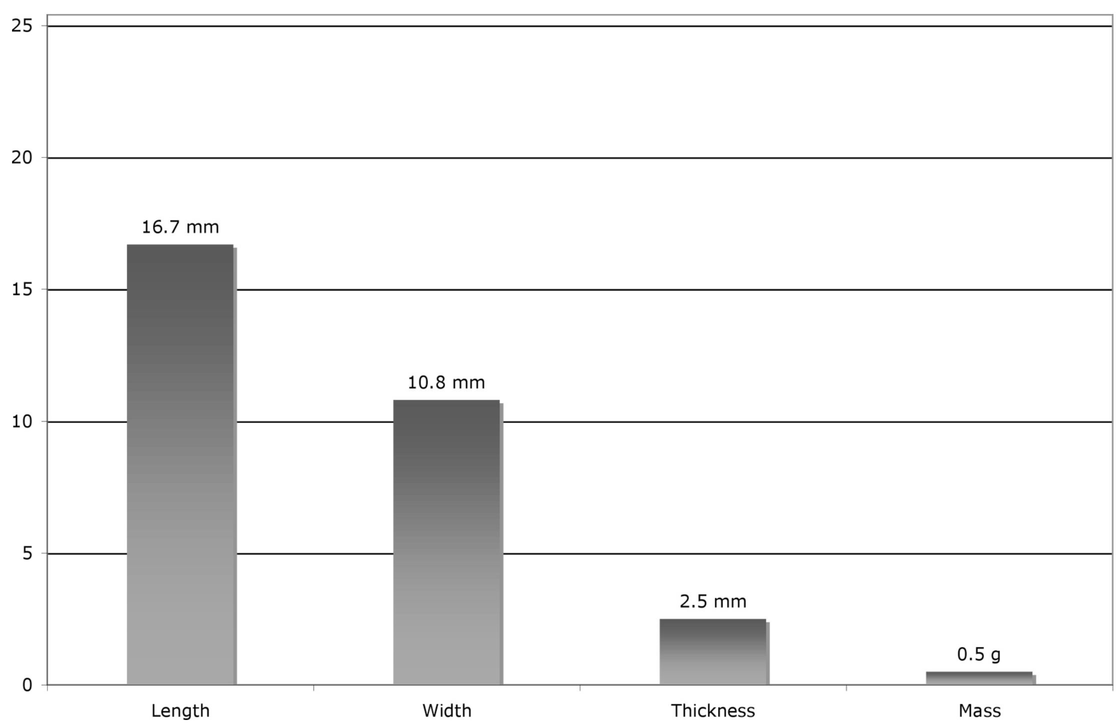

Figure 5.54. Projectile point metrical data (mean values), NP-69.

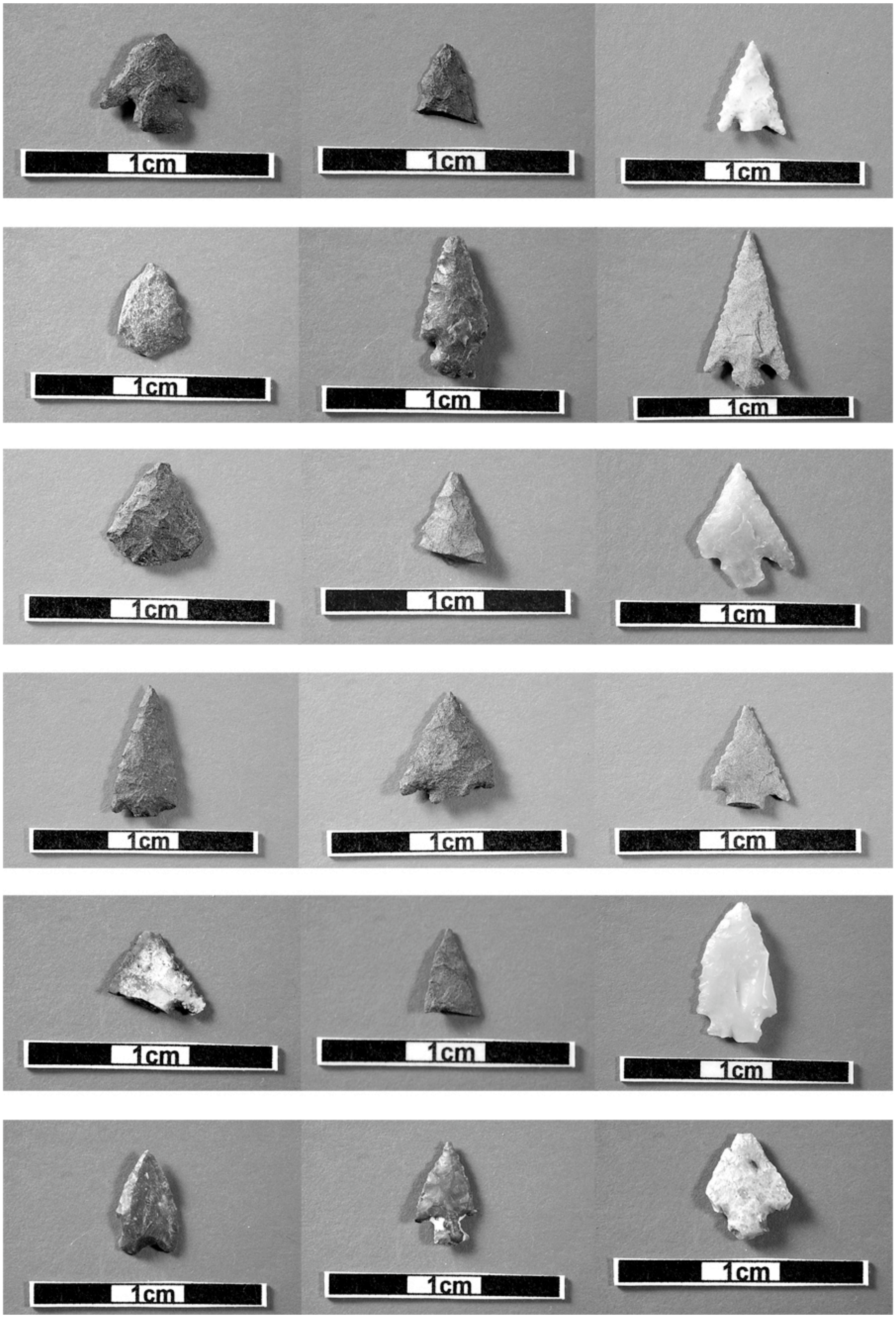

Figure 5.55. Representative examples of projectiles points recovered from NP-69.

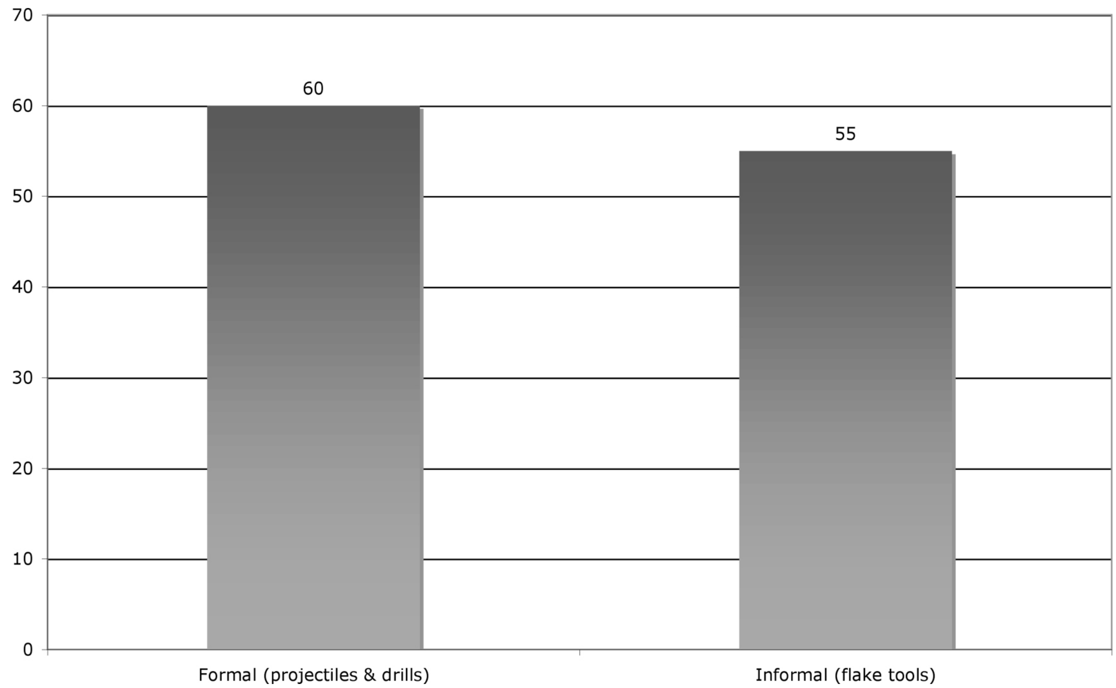

Figure 5.56. The formal-to-informal tool ratio at NP-69 was 1.09:1.

Botanical Remains

Between the two seasons of fieldwork at NP-69, 68 liters of soil, including materials from feature-fills, were collected, floated, and examined. Scant evidence of cultigens was present at NP-69: a single charred kernel of corn (*Zea mays*), found inside a wall (N102, E94), and 10 whole and 13 partial charred corn cupules recovered from flotation. One charred bean (*Phaseolus vulgaris*) was recovered from flotation. Kirkpatrick's 1972 initial testing of NP-69 (Kirkpatrick 1975) yielded a kernel of corn as well. Charred wild seeds included *Chenopodium sp*, *Amaranthus*, *Pinus edulis*, *Juniperus monosperma*, and *Opuntia sp*.

Faunal Remains

A single, modern artiodactyl tooth was recovered from loose surface sand in N102, E99. Other than rodent bones, no other faunal remains were recovered from NP-69. The lack of faunal remains is startling, given that we screened 100% of the materials from NP-69 through 3 mm mesh and floated 68 liters of soil. The paucity of faunal remains is possibly attributable to poor preservation at this shallowly buried site, or to the likelihood that animal carcasses, viscera, and other *disjecta membra* were simply thrown over the edge of the cliff for a variety of reasons, not the least of which is to reduce the visitation of scavengers to the site at nighttime. Beneath the site, the base of the cliff gives way to a steep slope. Surveys of the base and slope area produced a few lithic fragments, but no faunal remains, which through time have likely been washed down to the creek bottom below.

Chapter VI: Interpretations and Conclusions

Introduction

I suggested in Chapter I that in spite of more than 40 years of various environmental-functionalist approaches to the archaeology of the southern Park Plateau, there is still no consensus as to the primary means of subsistence, geographic or cultural origins, ties, or influences of the people who inhabited the region between A.D. 300 and A.D. 800. Moreover, environmental-functionalist approaches alone have failed to explain a broad range of human behaviors in this area of relative resource abundance. If explaining these practices was as simple as assessing resources and describing the adaptive behaviors that optimize them, then long ago we could have begun to focus on the finer details of life during this period. Instead, we are still grappling with the coarser patterns. One problem with environmental-functionalist approaches in the Cimarron District is that economically motivated behaviors are so variable that clear patterns fail to emerge. This is in part because the selective pressures in this forgiving, resource-rich environment are relatively low. Adaptive efficiency is not as important as it would be in a more harsh or limiting environment. People can live in relative comfort where such a wide range of resources is available within a day's walk in most any direction (see Chapters II and IV). Accordingly, this makes it likely that some of the more important factors that shaped resource use and other daily practices are tied to, and reflective of, socially motivated behaviors that are informed by group history, beliefs, values, social organization, culturally bound perceptions of space and resources, and by influences or pressures from outside the group, all of which may or may not relate to the efficient utilization of resources.

The Poñil study area is an ecotone, situated at the interface of three major geographic regions; the Rocky Mountains, the Park Plateau with its myriad of canyons and interfluves, and the Great Plains. The climate within the relatively narrow canyons of the Park Plateau is warmer than the high altitude environments of the Rocky Mountains to the west and largely protected from the winds of the Great Plains to the east (see Chapter II). As the following analysis and interpretations suggest, during the period between A.D. 300 and A.D. 800, the inhabitants of the Poñil drainage appear to have used resources from across all three geographic regions.

Local, Quasi-local, and Non-local Resources

Because natural resources act as centralizing mechanisms, the area or areas from which those resources originate bear directly on the spatial dimensions of a behavioral region, and so I begin this section with a definition of terms.

Local Resources

Catchment surveys conducted during the summer of 2007 (see Chapter IV) established that most of the economic requirements of life and the centralizing mechanisms the sources of these materials represent, such as water, food, fuel, shelter, clothing, and medicine, can be met by walking no more than two hours from either of the sites investigated in this study. I therefore define as "local" those resources that may be obtained within the two hour isochronic catchment area.

Quasi-local Resources

Tool stone is noticeably lacking within the catchment areas, making longer forays to obtain it a necessity. Cimarron hornfels is the most common material used for the production of stone tools at all the sites investigated. Reaching the Cimarron River and its supply of stream-rolled hornfels cobbles, about 18 km (11.2 mi) from sites NP-69 and MP4-7, requires less time and energy than reaching the equidistant bedrock source on Baldy Mountain, but still it lies substantially outside the catchment area. By definition this material is not "local," and yet I am not prepared to put it in the same class as the true non-locals, Valles Caldera obsidian and Corrumpa Creek carnelian. I suggest that if an environment provides for all of their needs save one, people will weigh the benefits of relocating to be near that resource against the time and effort required to reach it. I suggest that if it is not too remote, it will be acquired regularly even though it is beyond the "ideal" time/distance estimation of an isochronic catchment survey. Thus, I define all non-catchment resources that lie between a two hour's walk and a full day's walk "quasi-local." Cimarron hornfels, therefore, is a quasi-local resource.

Non-local Resources

I define as "non-local" those resources the acquisition of which requires more than a full day's travel by one or more parties.

Environmental-Functionalist Approach

Technological Organization, Subsistence, and Mobility

It is widely believed that stone tool technological organization is a fair indicator of subsistence and mobility (Andrefsky 1994; Gilman 1995; Goodyear 1989; Kraft 2005; Lail 1999; Larson 1994; Nelson 1991; Parry and Kelly 1987; Roth 1995; Teltser 1991). Whether the A.D. 300-800 inhabitants of the Poñil drainage were mobile hunters and gathers, people who practiced mixed foraging and farming, or those who were largely sedentary farmers, then their technological organization ought to reflect it.

If the inhabitants of the Poñil drainage were mobile hunters and gatherers, then we should see evidence of the production of formal tools from fine-grained materials, some of which will come from non-local sources. Fine-grained tool stone suitable for the production of formal tools is available from quasi-local sources (see definitions, above). Cimarron hornfels, an isotropic, thermally-altered shale, is reasonably abundant in the Cimarron River, approximately 18 km (11.2 mi) from sites located in the Middle or North Poñil drainages (see Figure 4.20). Raw material distributions among the three sites indicate that the trip to obtain this materials was made regularly, because Cimarron hornfels made up 72.9 % of the combined three-site assemblage (Figure 6.1). Cimarron hornfels was used both for

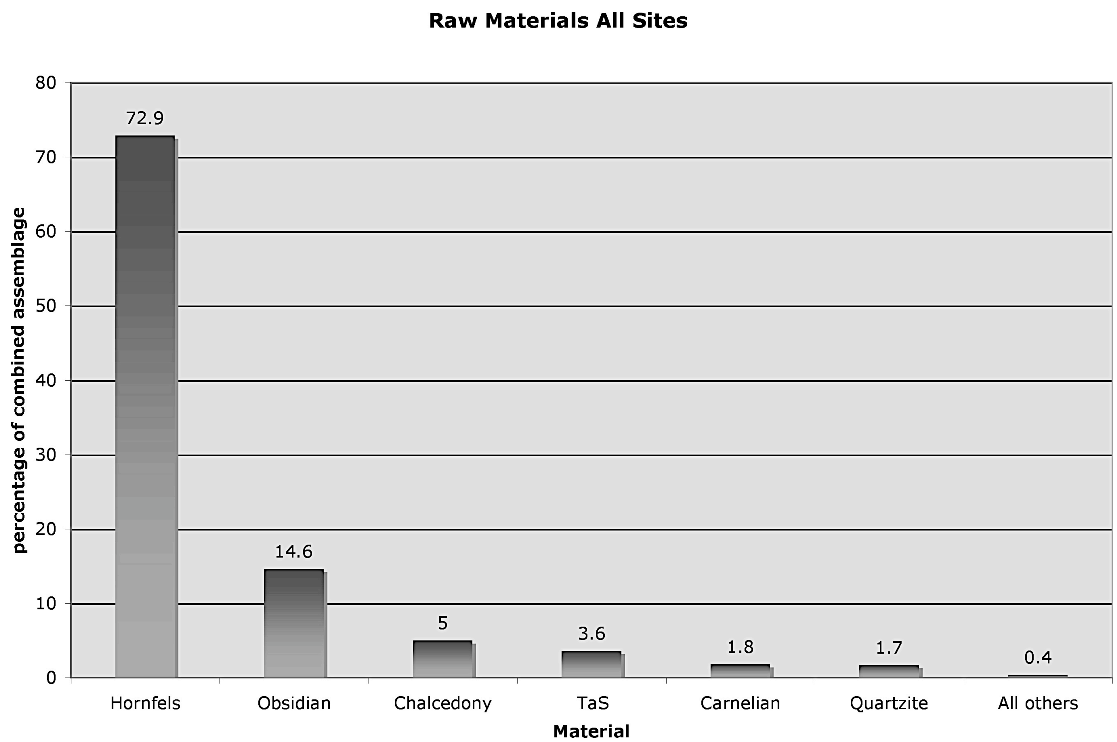

Figure 6.1 Combined raw material distribution at the three sites examined (MP-4, MP-7, and NP-69.

the production of formal and informal tools. For projectile points, it accounted for 57.1 % at MP-4, 60 % at MP-7, and 59.7 % at NP-69. Drills were recovered at NP-69 only, and 82 % of them were made of Cimarron hornfels.

There were, however, more isotropic, more knappable materials within the assemblage that came from distinctly non-local sources. Obsidian was obtained from the Valles Caldera in the Jemez Mountains (Berkeley XRF Report, Appendix D), at a distance of about 200 km (124 mi). At sites MP-7 and NP-69, obsidian was the raw material used for 33 % and 25 % of projectile points, respectively, making it the second most common material within the combined assemblages. Yet obsidian cores were found at only one site, NP-69, where this material accounted for 7 % of cores. The paucity of obsidian cores is consistent with its value both in terms of its knappability and in terms of the transport costs to acquire it. In other words, obsidian was so highly valued and likely required so much time and effort to acquire that it was almost entirely consumed by the manufacture of small corner-notched projectile points and drills. Another fine-grained knappable, Corrumpa Creek carnelian, was likely obtained from the creek bearing its name, just north and west of Clayton, New Mexico, at distance of about 140 km (87 mi) to the east of the study area. Although quasi-local materials were highly favored and required some mobility to acquire, such a significant proportion of non-locals (16.4 %) (Figure 6.2) indicates distant travel or trade, a finding consistent with either a high degree of mobility, an extended social network, or both.

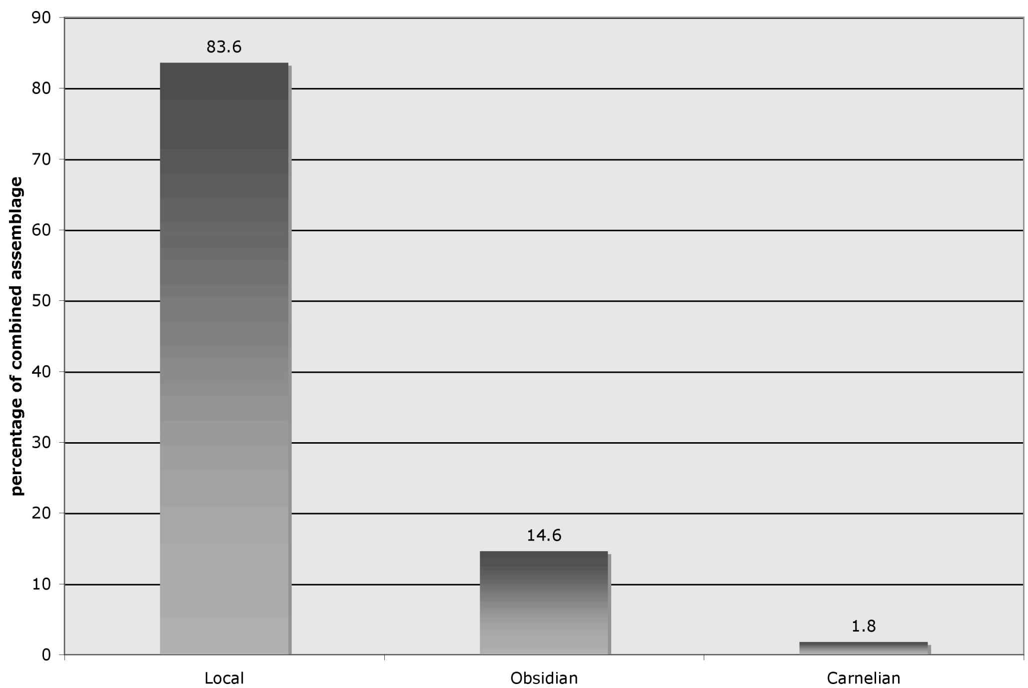

Figure 6.2 Comparison of local (including quasi-local) and non-local materials represented in the three site assemblage.

At sites MP-7 and NP-69, formal tools (projectile points and/or drills) were more common than informal (flake) tools. At MP-7 the formal-to-informal ratio for tools was 1:0.66, and at NP-69 it was 1:0.91, findings consistent with mobile hunting and gathering. Not only were there more formal than informal tools present in the assemblage, but indicators of formal tool production were also observed, including large numbers of retouch flakes at NP-69 (1,716) and high tertiary-to-primary ratios (295:1 at NP-69 and 15:1 at MP-7) (see Lail 1999). Conversely, at MP-4 *informal* tools were more common, with informal tools outnumbering formal tools and producing a formal-to-informal ratio of 1:3.7, which lends itself to several interpretations (discussion below). Arrow points at all sites were virtually indistinguishable; small, corner-notched, and on average 16 mm in length.

Coarse-grained materials were also recovered at sites MP-4 and MP-7. These materials include quartzite, dacite, and thermally-altered sandstone (TaS), a moderately durable, coarse-grained material formed by the baking of sandstone by dacite intrusions. At around A.D. 510, people at MP-4 were producing informal tools on-site from TaS. Fully 24.1 % of the informal (flake) tools at MP-4 were made of TaS, a finding consistent with reduced mobility and increasing involvement with domesticated plants (see Lail 1999). Quartzite was used sparingly at MP-4, but at MP-7 it was used not only for the production of informal flake tools (5 %) but also for the production of projectile points (7 %). At NP-69, where quartzite is available in an outcrop less than 100 m from the site, it was used only for the production of flake tools, and then as a very small proportion (1.8 %). Another coarse-grained material, stream-rolled dacite, was used at NP-69 only, where it accounted for 11 % of what *may be* cores recovered from the site. Some of the fracture surfaces on the dacite cobbles appear to be heat fractures, suggesting that a possible primary use for these cobbles was as boiling stones due to their smooth outer texture and ability to withstand intense heat. No other local material would be suitable for this purpose. Stream-rolled dacite (see Figure 5.49) is available in the North Poñil Creek about 95 vertical meters (312 ft) below the site. The third coarse-grained material, TaS, mentioned above, is available locally in the streambeds next to sites MP-4 and MP-7, where it was used for the manufacture of informal tools only. Considering flake assemblage numbers at MP-4, it appears that TaS was acquired, reduced, and used on site, because we recovered near entire reduction sequences of primary, secondary, and tertiary flakes together with the flake tools into which this material was made. TaS does not occur naturally in the North Poñil streambed and none was recovered from site NP-69.

Site Locations and Means of Subsistence

Sites reflective of sedentism and farming should generally be found in bottomlands with permanent water and rich soils. For food producers, natural food resources are less important in the overall subsistence regimen, although farmers often continue to supplement their domesticated plant-based diets with wild game. The lower Poñil drainage is a broad bottom that possesses permanent water together with rich soils, and it lies at an elevation of approximately 1,950 m (6,400 ft). A number of late sites associated with farming and sedentism are indeed located there (Glassow 1972a, 1980; Gunnerson 2007). Moreover, many of the sites in the lower Poñil drainage show affiliation with distinctly Southwestern cultures (Gunnerson 2007). Most of the pottery is of the Taos Gray, Taos Incised, or Santa Fe black-on-white varieties. However, no sites in the lower Poñil have been dated to the study period, A.D. 300 to A.D. 800.

Conversely, mobile hunter-gatherers are more likely to inhabit areas of relative natural abundance. In the study area, most wild plant and animal resources are located in the canyon uplands and on top of the mesas and interfluves (see Chapter II). All the sites recorded during the study period, A.D. 300 to A.D. 800, are located in these upland settings. Although domesticated plants were absent at MP-7 and only one kernel of corn and one bean recovered from NP-69, a small quantity of corn kernels, one cob, and ten cupules were recovered from MP-4. Only small, one-hand manos were recovered, making it unlikely that intensive maize processing was taking place. Wild plants, on the other hand, seemed to play a more important role in the diets of upland canyon dwellers. Flotation samples from sites MP-4, MP-7, and NP-69 contained a variety of carbonized wild plant species, including *Amaranthus sp*., *Bouteloua sp*., *Chenopodium album*, *Chenopodium ambrosioides*, *Juniperus scopulorum*, *Pinus edulis*, *Prunus americana*, *Prunus virginiana*, *Yucca bacatta,* and *Opuntia sp*.

Faunal remains are virtually absent from all the sites, suggestive of poor preservation, discard over nearby cliffs, or both. Accordingly, these important indicia of subsistence are lacking. Future research will, hopefully, provide more information in this critical area.

Architecture and Features

For the reasons stated in Chapter V, sedentary farmers tend to build square or rectangular houses that require a higher investment of labor, whereas mobile hunters and gatherers build small round ones that exhibit reduced effort in construction (McGuire and Schiffer 1983). All of the structures for the study period are small (approximately 5 m in diameter) and circular in shape. The average interior surface area of the three structure's floors was 19 m^2, suggestive of occupation by a single family, an extended family, or possibly two small families only (see Flannery 2002; Gron et al. 1987:304; Radcliffe-Brown 1964:412).

The dwellings of sedentary farmers are likely to possess formal hearths that are often slab-lined (Diehl 1997). Dwellings used by mobile foragers should generally demonstrate a lower investment of labor in hearths unless they intend to return to a site with some degree of regularity. Two of the sites investigated, MP-4 and NP-69, contained formal hearths; the one at NP-9 was slab-lined. MP-7 lacked a formal hearth, instead having only three ash pits. Regarding other features, only NP-69 had a storage bin constructed in a wall, but no cultigens were found within it.

Different Time, Similar Story

Almost all the data allow for conflicting interpretations regarding mobility and subsistence, a problem that has plagued researchers in this region for many years. The following statements and conclusions are supported by the foregoing analysis.

Data from two sites investigated during the period A.D. 300 to A.D. 800, MP-7 and NP-69, support a finding of hunting, gathering, and the degree of mobility associated with this subsistence regimen. Chipped stone data include high proportions of non-local materials, high proportions of quasi-local materials, high ratios of formal-to-informal tools, heavy utilization of fine-grained knappables, an overall paucity of primary decortication flakes, high proportions of retouch flakes, and high tertiary-to-primary ratios. Site locations are in the uplands, suggestive of utilization of the wild plant and animal resources found there. Structures are small and circular, and features within them contained carbonized remains of a variety of wild edible plants.

On the other hand, site NP-69 did have one kernel of corn and one bean among the charred remains. Moreover, NP-69 had a formal, slab-lined hearth and a storage bin constructed within a wall, features often associated with more sedentary populations. And although data from site MP-4 also include indicators of mobility (high percentages of fine-grained knappables from quasi-local sources, together with some formal tools, a small circular structure, and carbonized wild edible plants), other MP-4 data support a finding of decreased mobility for the period. These data include informal tools produced from local, coarse-grained materials, a low formal-to-informal tool ratio, and evidence of on-site tool production, use, and discard. Moreover, the structure at MP-4 contained a formal hearth and evidence of domesticated plants.

There are several possible explanations for the differences. First, it is possible that the people who occupied NP-69 and MP-7 were not of the same culture group as those at MP-4. One group could have been hunter-foragers, whereas the second group could have been sedentary horticulturists. This is unlikely, however, given the similarities in architecture, site locations, projectile point data, and the overlap in radiometric dates. Second, it is possible that the sites simply served different functions; that MP-4 could have served as a base, while sites such as NP-69 served as resource extraction sites for people who primarily resided elsewhere and used these sites on a seasonal basis. Third, it is possible that during the occupation of MP-4 people were indeed less mobile and more dependent upon domesticated plants. However, the high elevation and short growing season make it unlikely that the corn found at MP-4 was grown near the site. This, taken together with the paucity of corn found at sites during the next several hundred years allows one to interpret the single corn cob and several corn kernels at MP-4 not as evidence of local horticulture, but instead as evidence of trade with one or more partners during this period. One might further surmise that for reason or reasons unknown, this trade alliance broke down and the Poñil drainage's residents reverted from semi-sedentary foragers to mobile hunters and gatherers. By A.D. 780, site MP-7, located in the same canyon on the same rock terrace only .6 km away from MP-4, stands as evidence of mobility resumed, given the absence of cultigens and the absence of a formal hearth, indicating a seasonal (warm weather) occupation of the site.

Overall, the environmental-functionalist data paint a detailed, but somewhat confusing, incomplete picture of life in the Poñil drainage for the study period. Seemingly for each pattern that supports one settlement or subsistence regimen, there is another that detracts from it. These same confusing patterns have been encountered by most researchers in the study area, and some have responded by attempting to force the data to fit one environmental-functionalist perspective or another. In the end, good explanations for the behaviors that created these patterns are lacking, and the important questions regarding cultural ties, affiliations, influences, and traditions remain unanswered. The behavioral regions approach was conceived specifically as a tool to possibly help mitigate this confusion. By taking several additional steps and depicting the spatial dimensions of economic and sociofunctional regions, together with an examination of local practices possibly suggestive of social ties or affiliations, it is believed that we may gain clearer insights into the lives of the former residents of the Poñil drainage circa A.D. 300 to A.D 800.

Behavioral Regions Approach

Economic Functional Regions

Centralizing Mechanisms in the Catchment Area

When the environmental-functionalist data are depicted spatially, we see that the known centralizing mechanisms (in this case natural resources) and the likely functional regions that formed around them are, not surprisingly, local, i.e., they correspond to the two-hour isochronic catchment area (see Figure 4.19). Acquiring these resources involves economically motivated behaviors, i.e., behaviors directed toward securing water, food, clothing, shelter, fuel, and medicine (see Table 6).

Centralizing Mechanisms in the Quasi-local Region

One economic necessity, tool stone, is not available locally. This required people to make trips of up to one day's duration to acquire Cimarron hornfels, a quasi-local resource (Figure 6.3). Even though it is more likely that this raw material was obtained from the Cimarron River because of the reduced transport costs (see discussion in Chapter IV), the Baldy Mountain source is depicted as well. Moreover, it is entirely plausible, even probable, that during these forays people would harvest additional quasi-local resources on return trips, especially if local resources were dwindling seasonally or beginning to show signs of exhaustion from overuse. Resources in the canyons and across the mesas vary little, and so it is foreseeable that resources in the quasi-local functional regions would play an important part in the lives of Poñil drainage residents.

Sociofunctional Regions

Non-local Centralizing Mechanisms

When the economic needs of life can be satisfied by local or quasi-local resources, then the acquisition of any non-local object or material is attributable to something *other than* economic necessity. Even though some non-local resources

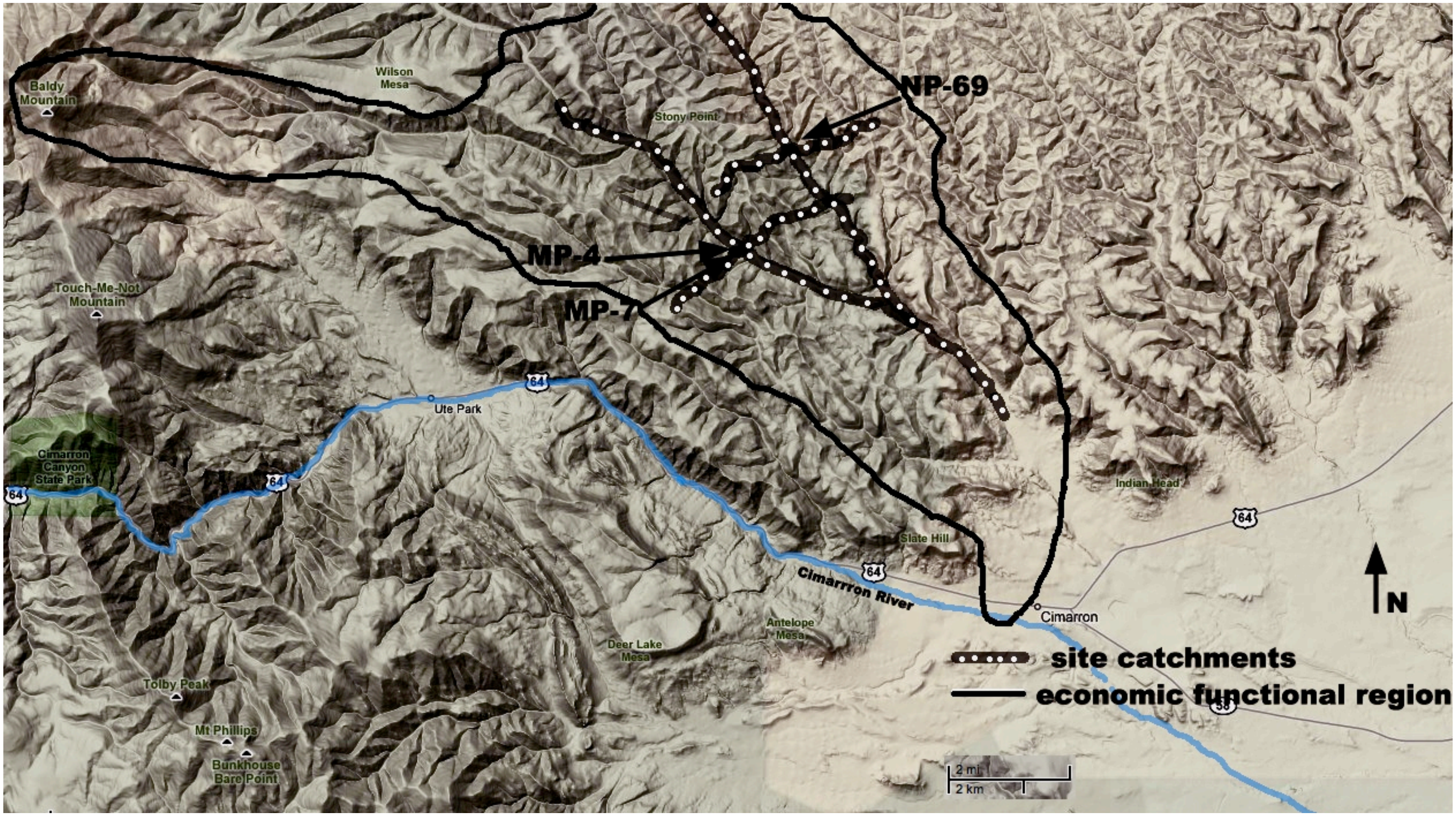

Figure 6.3 The economic functional region of the A.D. 300-800 residents of the Poñil drainage. The approximate boundary of the economic functional region is the same as the boundary for the acquisition of quasi-local resources. Google Maps image (public domain).

might possess *desirable* characteristics, as is the case with obsidian, they are not economically necessary. From the behavioral regions perspective, the only motivation that will result in the acquisition of non-local items is some type of social motivation. In the Poñil drainage, good quality knappable tool stone is available from quasi-local sources that can be obtained with little effort in less than a day's time. Accordingly, non-local materials in the three site assemblage were obtained either for purely social reasons (see definition in Chapter I) or, more likely, they were acquired collaterally to some other type of social activity.

There are a number of social motivations that might result in non-local items reaching a site, including activities that involve trading partners, kin-based gatherings, or actual forays to obtain desirable but economically unnecessary objects or materials. However, there are only three mechanisms whereby this can happen. First, non-local materials might be brought to the site as gifts or trade materials by one or more persons visiting from a region where the resources are readily available. Second, they can be acquired at a trade gathering by meeting at a predetermined time and place, usually someplace intermediate between the site and the resource. Finally, they can be obtained by traveling to the source to acquire them. All non-local resource acquisition requires travel by someone, and thus all movements of non-local materials to a site are indicative of the spatial parameters of the group's social relations.

The non-local materials found among the three sites investigated in the Poñil drainage include Valles Caldera obsidian and Corrumpa Creek carnelian.

The obsidian comes from a source approximately 200 km (124 mi) southwest of the sites. Assuming an average walking speed of 5 km/hour (3.1 mi/hour) for 6.5 hours per day, it would take about six days to travel from the Poñil drainage to the source of Valles Caldera obsidian. After acquiring the obsidian, which would likely be reduced to cores or pre-forms to lighten the load, a six day journey back home to the Poñil would lie ahead. In the case of Corrumpa Creek carnelian, a tool stone resource available approximately 140 km (87 mi) east of the study area, travel would take approximately 4.3 days at a rate of 5 km/hour. To acquire and transport either of these materials from their source to their destination entails forethought, planning, and execution. This requires preparing gear and supplies for the journey and time away from daily activities. It also involves the risks associated with travel, including accident or injury. If travel requires crossing or entering the territory of an unfriendly neighboring group, the risks may also include captivity or even death. The acquisition of non-local resources is not a casual undertaking.

The sociofunctional region (Figure 6.4) lies between the sites and the non-local tool stone resources and demonstrates that the Poñil residents either traveled up to 200 km away from their canyon homes, far beyond the catchment areas, or had social ties or relations that extended that far, i.e., contacts that would transport obsidian and carnelian either all or part of that distance. The fact that the sociofunctional regions exist is direct evidence of social ties, interactions, or influences.

Figure 6.4 The sociofunctional region (blue) of the A.D. 300-800 residents of the Poñil drainage. Only social factors would motivate people to move beyond the boundaries of the economic functional region. Google Maps image (public domain).

Practices and the Poñil Behavioral Region

One of the assumptions of the behavioral regions approach is that when people move into a new region, or even into a different environment, they will, insofar as possible, meet the challenges before them in ways they already know. Their attitudes, beliefs, and ways of problem solving will have carried over to their new homes. They will attempt to settle in places reminiscent of the homeland, search for and gather the same or similar plant and animal resources, move about the landscape from resource to resource (centralizing mechanism to centralizing mechanism) in patterns previously established and, unless these patterns, traditions, and historical ways of doing things fail, they will adhere to the cultural practices of their past.

Because non-local resources in an assemblage arrive because of socially motivated behaviors, plotting their sources, together with the routes likely traveled to obtain them, is the equivalent of plotting the spatial extent of a sociofunctional region. When combined with the economic functional regions, it depicts a behavioral region whose shape and orientation are possibly indicative not only of the historical origins of many of the habits or practices that created the archaeological record, but also of the region from which people came. Moreover, the orientation of the behavioral region possibly points to continuing social connections, ties, and influences.

Poñil Practices: Basketmaker or Plains?

Based upon his observations and findings, Glassow (1972a, 1980) concluded that the occupants of the Poñil drainage during the period A.D. 400 to A.D. 700 had come in to the region from the Rio Grande area after initially leaving the Four Corners area. He believed that the Vermejo phase in the Poñil drainage was essentially a Basketmaker manifestation on the eastern side of the Sangré de Cristo range. Conversely, researchers working in the nearby Vermejo River drainage (see Dorshow et al. 2002; Scheick and Dorshow 2002) concluded that the people who inhabited the canyons of the southern Park Plateau were intruders into the canyon country from the Great Plains. Comparing the practices and material culture of Poñil drainage residents with those of Basketmaker period peoples (variously B.C. 1000 to A.D. 800) reveals some striking parallels. A similar comparison with Plains dwellers is not as fruitful, although the distinction is not entirely clear.

Spatially, the Poñil behavioral region extends westward from the study area, except for a single eastern extension to the source of Corrumpa Creek carnelian (Figure 6.5). Valles Caldera obsidian and Corrumpa Creek carnelian are both highly knappable materials but, given the availability of quasi-local Cimarron hornfels, neither is an economic necessity. Their distribution and proportions within the sites, however, might reasonably be interpreted as markers of their relative importance insofar as they are tethered to the social activities that brought them to the sites, including the interactions with people who lived near the sources

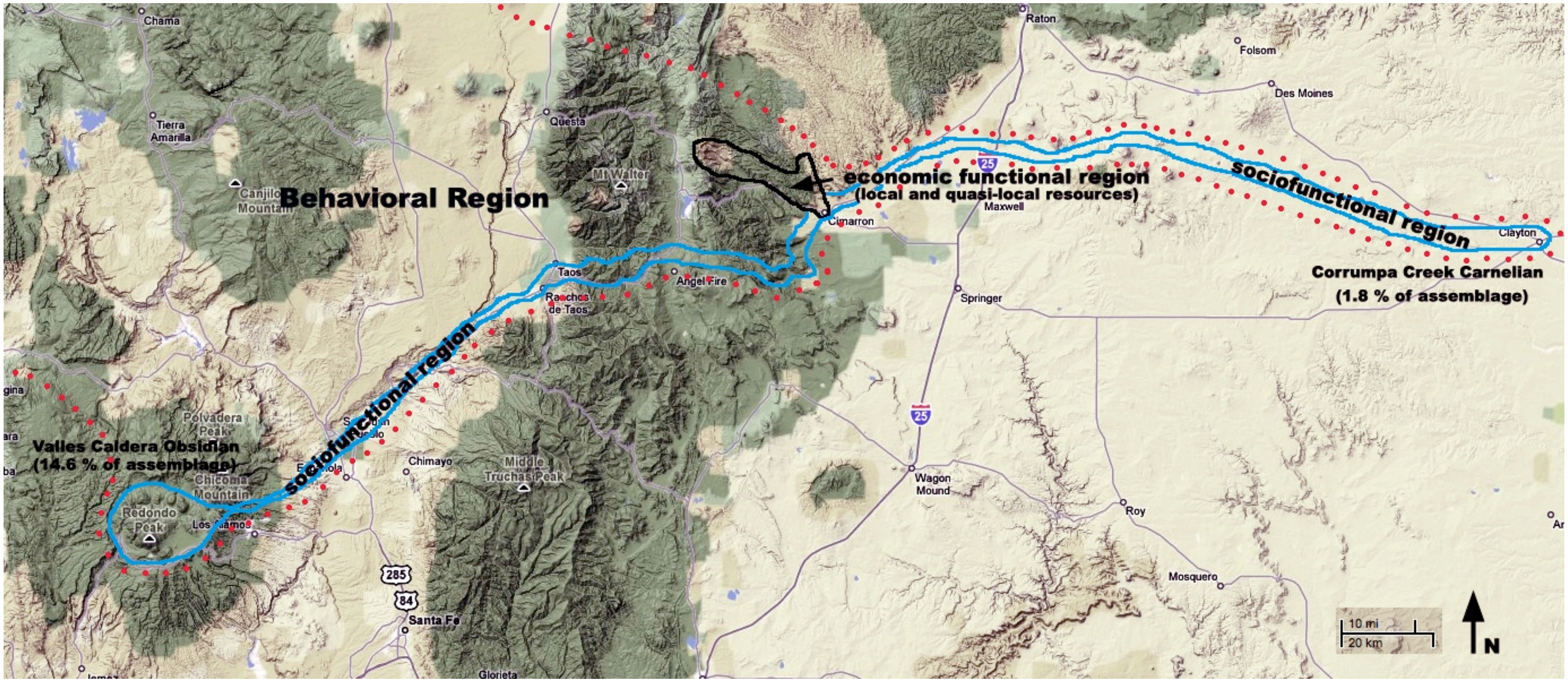

Figure 6.5 The proposed Poñil behavioral region (red) circa A.D. 300 to A.D. 800, which encompasses the economic functional region and the sociofunctional region, both of which are based upon environmental-functionalist analyses. The practices of the residents of this area are suggestive of ties or influences from the west. Google Earth image (public domain).

of those materials. Consistent with the westward skew in the behavioral region, Valles Caldera obsidian is more than eight times more common in the combined assemblage than is Corrumpa Creek carnelian, even though it lies at a source at least a day's walk more distant and requires the crossing of two mountain ranges in each direction (the Cimarron and the Taos Ranges). I attribute this bias toward Valles Caldera obsidian to be social in nature, i.e., it was desired because people were familiar with it, it had been used traditionally, and continuing to obtain it would help to maintain ties with the region from which it came and/or the people who live there. Corrumpa Creek carnelian, highly knappable, closer, and easier to acquire, did not, I think, have such a social or historical connection.

Quasi-local and non-local materials in the Poñil drainage were made into corner-notched dart and arrow points. Dart points are similar to styles from the west - Elko and San Pedro - as are some of the small corner-notched arrow points, which resemble (Cienega) Clearwater and Los Pozos types. In addition, at each site excavated, MP-4, MP-7, and NP-69, I recovered a number of t-shaped drills, one-hand manos, and several shallow basin metates. T-shaped drills, one and two-hand manos, and basin metates are also common at Basketmaker sites, although T-shaped drills and one-hand manos are also found at some Plains Woodland sites.

All the sites recorded for the study period, A.D. 300 to A.D. 800, are found in upland settings that range from 12 m (40 ft) to 95 m (312 ft) above canyon floors; areas rich with animal and plant resources. During the early Basketmaker period, sites were also generally located in upland settings, a strategy believed to

Basketmaker residents closer to foraging and hunting lands (Lipe 1999; Stuart and Gauthier 1988), even though they were beginning to cultivate maize.

During the study period in the Poñil drainage, structures were small (generally 5 m in diameter) with low walls built of sandstone-slabs. During the early Basketmaker period people lived in rock shelters (Smiley 1994), and pithouses. Many pithouses were shallowly excavated into the ground, were between 5 m and 8 m in diameter and, as one researcher states, they are "essentially surface structures" (Lipe 1999:133). Most of the Poñil drainage study period sites are surface structures, but some are incised as deeply into the ground as they can be given that bedrock is directly beneath the floors of several of the ones investigated. Some sites, like NP-69, have structures built directly on bedrock and plastered over to smooth the rocky surface. Both Basketmaker (Fuller 1988:350) and Poñil drainage structures have shallow basin or dish-shaped floors. Some Basketmaker II walls are built of mud spread across upright wooden sticks in a jacal or wattle-and-daub style, while others are built with post and beam frameworks with exterior leaner poles (see Eddy 1972; Morris and Burgh 1954:50). The structure at the Vermejo phase type-site, MP-4, is believed to have been built of post and beam construction and covered in adobe mud (Glassow 1972a, 1980). Several hundred baked adobe nodules were recovered from that site. Although wall construction above the stacked sandstone is unclear, the profusion of adobe-melt indicates that at some point those structures were also covered in adobe mud. Some Basketmaker structures have an apron of rocks at the base to support the walls, and ramped entryways in the south or southeastern side of the structures are common (Eddy 1972; Matson et al. 1988). MP-7 had a ramped entryway in the southeastern portion of the structure (see Figure 5.17), and NP-69, based upon excessive wear on an area of ramped bedrock, appears to have been entered from the southeast as well (see Figure 5.36). Some Basketmaker structures have benches built up inside them (Eddy 1972), as did the structure at NP-69 (see Figure 5.36).

Although a sand-tempered brownware pottery was produced at several sites in the Four Corners area (see Reed and Kainer 1978), one of the primary characteristics of early Basketmaker period sites is the absence of pottery. No pottery sherds were found at MP-4 or at NP-69. Several thin, sand-tempered sherds of brownware pottery (see Figure 5.34) were found at MP-7, but a radiocarbon date from the disturbed area from which they were recovered calls into question the context of those sherds.

Basketmaker period sites are also expected to have maize present, although very little at the early sites. A maize cob and several kernels were recovered from MP-4, maize cupules were recovered at MP-7, and one kernel and several cupules were recovered from NP-69. Hearths at many Basketmaker sites are slab-lined, as was the hearth at NP-69 (see Figure 4.17).

When we consider the movement of people, ideas, or material culture from the nearby Great Plains as some researchers suggest, then not only should the environmental-functionalist data support this, historical practices should also direct us toward this conclusion.

Although there are variations across the Great Plains, the general traits that distinguish Plains Woodland sites are the bow and arrow, corner and basally-notched arrow points, and elongate cord-marked pottery vessels with conoidal bottoms (see Brosowske 2005:71-73; Dorshow et al. 2002, Eighmy 1994; Johnson and Johnson 1998). Although corner-notched projectile points are common in the Poñil drainage, basally-notched points are rare. Moreover, cord-marked sherds have never been recorded in the Poñil drainage. Structures at Plains Woodland period sites differ from Poñil drainage sites dating between A.D. 300 and A.D. 800, in that Plains Woodland structures are often rectangular to rectangular-to-oval in plan view (see Brosowske 2005:78; Johnson and Johnson 1998), whereas all Poñil drainage structures recorded for this period are round. Although a slab-lined hearth was observed at site NP-69, unlined hearths are expected at western Plains Woodland sites (Johnson and Johnson 1998:214). Moreover, Plains Woodland period sites are not commonly found in upland settings like Vermejo phase sites.

There are other problems with the "fit" between the characteristics of Plains Woodland sites and Vermejo phase sites. For example, Dorshow et al. (2001:63) state that "the Ancho Canyon record (*except for the presence of corn*) clearly is consistent with Plains Woodland developments ..." (emphasis added). Moreover, "structures and storage pits differ from Plains Woodland adaptations on the prairie portions of the Central and Southern Plains" (Dorshow et al. 2001:63). The bellshaped storage pits found in the Ancho Canyon study area are unlike those found on the Plains (Dorshow et al. 2001). Dorshow et al. (2001:63) suggest that they "might be characteristic of a foothills adaptation." Referring to the Ancho Canyon area, researchers comment on the "near absence of pottery," (Dorshow et al. 2001:64), even though cord-marked pottery is one of the hallmarks of the Plains Woodland period. Although four cord-marked sherds were found in the Ancho Canyon area (Habicht-Mauche 1997), the largest majority of cord-marked sherds found anywhere near the study area have come from north of the Raton pass in southeastern Colorado, more than 80 km (50 mi) away. The earliest Plains Woodland sites in the region occur on the Chaquaqua Plateau in southeastern Colorado and have associated cord-marked pottery in context (Campbell 1969). So we would expect that if the sites in the Vermejo drainage were Plains Woodland in affiliation, cord-marked sherds would be found at sites dating as late as A.D. 800, but they are not. Moreover, at one deeply stratified site in Gachupin Canyon, the Red Bow Shelter, occupied as early as A.D. 135 (Dorshow and Baugh 2000:35), no cord-marked sherds were found. However, in the upper stratum Taos Plain and Taos Neck-banded sherds were present, suggesting a Southwestern affiliation for at least a portion of the history of the site, and possibly a cultural continuity with Southwestern origins, consistent with Glassow's (1972a) assessment.

While Dorshow et al. (2002:3.22) argue that Vermejo phase structures in the Poñil drainage are "identical to those typifying the Graneros focus of the Northern

Park Plateau in the vicinity of the Raton pass," Graneros focus sites post-date Vermejo phase sites and are known for the presence of cord-marked globular ceramics (Hunt 1975; Withers 1954). However, even the early cultural influence at Graneros focus sites is not wholly clear. Campbell (1976:9) states that "the stone foundational structures and possible horticultural practices [of Graneros focus sites] might result from Southwestern influences." And though Dorshow and Baugh (2000:21) and Dorshow et al. (2002:3.24) argue that the large semi-subterranean pit structures found in that study area are "morphologically different from contemporaneous Basketmaker pithouses," they fail to explain how. One of the sites that is described as being dug into a bank and open on one side is strikingly similar to Sambrito phase Basketmaker architectural style, and very similar to a Pedregoso phase structure described by Glassow (1972a:118) in the North Poñil Canyon. Finally, the apparent absence of Plains Woodland period sites after A.D. 1000 is argued by researchers in the Vermejo River drainage as being indicative of "the apparent departure of Plains affiliated populations and the ephemeral intrusion of Taos or Upper Purgatoire Complex-related groups over the next several hundred years" (Dorshow and Baugh 2000:21), but no explanation for the shift in populations is offered.

Conclusion

The environmental-functionalist analysis of data from sites MP-4, MP-7, and NP-69, the shape of the behavioral region (see Figure 6.5), together with an examination of the practices of the Poñil drainage residents for the period A.D. 300

to A.D. 800, allows one to conclude that life in the drainage during the study period is roughly consistent with Glassow's (1972a, 1980) interpretation. Although further research will be required in order to fully resolve a number of issues, my findings generally support his argument for Southwestern influence, affiliation, trade, and/or ties for the period A.D. 300-800.

The shape of the Poñil behavioral region during the period A.D. 300 to A.D. 800 is revealed by combining the economic functional regions with the sociofunctional regions. This composite includes the catchment area, the area of quasi-local resources, and the region of non-local resources. Since it is based upon inferences derived from recovered data, its shape is subject to change as new data become known. With some qualifications (discussed below), it is believed to be a reasonably accurate depiction of the area within which the inhabitants of the Poñil drainage lived their lives during the study period, as well as an indicator of their social ties, influences, and possible origins.

The Plateau Phase

Radiocarbon dating in both the Poñil and Vermejo drainages now shows a clear overlap between Glassow's (1972a, 1980) Vermejo phase (A.D. 400-700) and his Pedregoso phase (A.D. 700-900). The Pedregoso phase, represented by the E-component of NP-1/Area 2 in the North Poñil Canyon, is indicated by two radiocarbon dates (1200 ± 80 BP, or A.D. 750 [UCLA 1369A] and 1195 ± 80, or A.D. 755 [UCLA 1369B]), which place it within the same range of several dates obtained from MP-7 and NP-69, as well as with a number of sites in the Vermejo

River drainage. According to Glassow (1972a:118), the Pedregoso phase represents practices and strategies similar to those found at Sambrito phase (Late Basketmaker) sites, including the presence of maize, a unique architectural style (the structure was built into the side of a bank), hearth styles, and bottle-shaped storage pits. Moreover, about a dozen thick, oxidized potsherds were found at the site (Glassow 1972a:118).

I now consider those material traits and practices formerly associated with the Vermejo and Pedregoso phases to now be part of what I call, in the Cimarron District at least, the Plateau phase (A.D. 300-800). The Plateau phase represents a transition between the Late Archaic period and the Escritores phase (see Chapter III) on the southern Park Plateau.

The Plateau phase on the southern Park Plateau contains evidence of adaptations and practices suggestive of cultural ties or affiliations with people from the Southwest, possibly the Four Corners region. Early Plateau phase sites are situated in upland settings, usually between 10 and 40 m above modern streambeds, but in some instances may be found as high as 100 m above them. They are characterized by the appearance of maize in limited quantities, small, shallow basin circular structures about 5 m in diameter that are built with tabular sandstone walls. The walls stand about 1 m in height and are cemented with adobe mud (that may now only exist as wall-melt flecked with ash and clay or, if the structure burned, as limb-impressed adobe nodules). It is postulated that the upper walls of the structures are made of upright limbs lashed together and covered with adobe. Roofs are either supported by posts and beams or, in the smaller structures, limbs are rounded over, secured, and covered with adobe.

Floors are slightly saucer-shaped and entryways are generally ramped and oriented toward the east or southeast. Hearths are either centered or just inside the southeastern entryway, and they may be either slab-lined or unlined, depending upon the labor invested in the structure and its intended use. Greater labor is invested in sites that are used regularly than those used only seasonally, but otherwise they are similar in design.

Early in the Plateau phase we see the widespread adoption and use of the bow and arrow, but corner-notched dart points are also still in use. Arrow points are generally 16 mm or shorter, corner-notched and, in the Poñil drainage at least, made from quasi-local variants of Cimarron hornfels (black or gray), obsidian from the Valles Caldera, or carnelian from Corrumpa Creek. T-shaped drills are common and are usually made of Cimarron hornfels.

Midden deposits during the early part of the Plateau phase are usually thin but contain an abundance of burned rock, which was likely heated and transferred to interior hearths for comfort heating. Faunal remains are scarce. It is postulated that decaying organic remains were discarded over cliffs to avoid odors and the scavengers that such materials attract, and so faunal remains at these sites are few.

Pottery is absent early in the phase but begins to appear as a thick, oxidized plainware toward the end of the phase. It is during this time that cultigens begin to play a more central role in the subsistence regimen as evidenced by an increase in the construction and use of storage pits. However, hunting and gathering remain the primary means of subsistence throughout the Plateau phase, and one-hand manos remain more common than two-hand manos.

Later Plateau phase habitation structures are likely to be found above the flood-plain, but usually on the first or second terrace, approximately 10 m above the modern streambed. These later structures are also more deeply incised into the ground or hillside, although it is unclear at this time whether there are any true Plateau phase pithouses (cf. Glassow 1972a:118). Midden deposits at later sites are more substantial and contain charred corn and corncobs and pottery fragments in limited quantities.

Glassow argued for cultural continuity in the study area, beginning with Basketmaker-like practices and material culture and continuing through the Pueblo period (Glassow 1972a, 1980). The shape and orientation of the behavioral region for the period A.D. 300 to A.D. 800 (see Figure 6.5), together with the similarities in the practices of Poñil residents and Basketmaker peoples, discussed above, supports Glassow's findings; that the people who lived in the drainage during this period were likely descended from, were affiliated with, or had ties to people from the Southwest and had limited involvement with the people and resources of the Great Plains.

How far the Plateau phase behavioral region extends into southern Colorado is not known at this time. However, because traits strongly identified with the Plains Woodland period are associated with a number of sites in southeastern Colorado, it is postulated that Johnson Mesa and the Raton Pass are possibly the northernmost limits of the Plateau phase cultural manifestation. Additional research in the area will be required to fully resolve this issue.

Thoughts About the Behavioral Regions Approach and Recommendations for Future Research

The behavioral regions approach was proposed as another way to evaluate environmental-functionalist data by depicting it spatially and then comparing the practices of groups from neighboring regions. It was intended to allow us to draw inferences from the spatial orientation of the regions formed by economically and socially motivated behaviors that are not typically drawn from environmental-functionalists approaches alone. It forces us to look beyond evolutionary fitness and economic considerations and to consider the social factors that may have shaped the archaeological record in an area where these factors are poorly understood. Although in this instance it generally supports Glassow's (1972a, 1980) interpretation of the peopling and practices of the Poñil study area, some things we knew already, and many questions remain unanswered. Accordingly, its overall utility remains to be demonstrated. Among the unanswered questions, first is the issue of inter-site variability. The behavioral regions approach did not contribute to our understanding of the differences in site function. It seems that during the occupation of site MP-4 there was a period of relative sedentism, associated with a mixed foraging-farming subsistence regimen (see discussion, above). It is possible that during this time MP-4 (A.D. 510, A.D. 665) served as a base camp and NP-69 (A.D. 550, A.D. 680) a resource extraction site. MP-7 (A.D. 780), however, paints a different picture. Located only 600 m from MP-4 on the same rock terrace, it has the hallmarks of a seasonal camp (reduced investment of labor in construction, no cultigens, no formal hearth). MP-7 was the most slightly built, least used of the three sites. How the sites were used will be a topic of future research. Second, the behavioral regions approach did not help to address the issue of the presence or absence of corn at the sites investigated. Even early Basketmaker sites are associated with corn production. Although several kernels, cupules, and a cob were recovered from MP-4 and NP-69, we do not find as much evidence of corn as we would expect. High elevation and a short growing season are postulated as the reasons. One could argue that the presence of *any* corn in this environmental setting is evidence of an attempt to sustain cultural practices that included this cultigen. However, this question remains unanswered and will be a topic of future research. Third, the absence of faunal remains is troubling. In spite of examinations of slopes beneath the terrace and cliffside sites, no faunal remains were found. Sites MP-4 and MP-7 are just above the Middle Poñil Creek, and so faunal remains could have been washed away over the millennia. Site NP-69 is high on a cliff where remains could have been thrown off and eventually dispersed by sheet wash to the canyon floor, later removed by the meandering North Poñil Creek. Whether attributable to poor preservation or discard, at some point this issue needs to be resolved, possibly by trenching at the cliff/pediment slope interface. Fourth, in this instance I did not conduct a detailed study of the diminutive projectile points found at sites dating to the Plateau phase to truly compare specific metrical attributes with styles from neighboring regions. In hindsight, this should have been done (and will be done as part of my ongoing research in the study area). Although some of the arrow points and dart points resemble styles from the Southwest, only a detailed study will support or refute this observation. Finally, the behavioral regions approach would likely exhibit greater utility during a time period that has a richer archaeological record and evidence of a more complex social setting. To fully explore its potential during the Plateau phase, more sites will need to be investigated and more data accumulated.

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