Cultural Diversity & Adaptation: The Archaic, Anasazi, & Navajo Occupation of the Upper San Juan Basin

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CULTURAL DIVERSITY & ADAPTATION
The Archaic, Anasazi, & Navajo Occupation Of
The Upper San Juan Basin

Edited by
Lori Stephens Reed & Paul F. Reed

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Cultural Diversity and Adaptation

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1992

Bureau of Land Management
New Mexico State Office
Santa Fe, New Mexico
Foreword

The Four Corners area of the Southwest has fascinated professional and avocational archaeologists and laypeople since the turn of the century. Although lesser-known sites in southern Colorado and in the La Plata and Animas valleys of New Mexico were excavated, work in the Four Corners generally focused on the elaborate sites on Mesa Verde and in Chaco Canyon. Throughout the twentieth century, numerous research projects continued this emphasis. With the passage of cultural resource protection legislation, a multitude of small and often ephemeral sites were recorded and sometimes excavated prior to development projects. The Navajo Reservoir Project was certainly one of the most significant. In the 1970s, the exemplary research in Chaco Canyon overshadowed the many small projects that were adding sites to a growing archaeological data base and to the shelves of "grey literature" generated as a result of compliance by federal agencies with the National Historic Preservation Act. In the 1980s, the Dolores Project, itself a result of the compliance process, opened new doors to the interpretation of cultural resources in southwestern Colorado. Meanwhile small projects stemming primarily from widespread mineral development in the Upper San Juan Basin continued to expand the data base. In an insightful move, the State of New Mexico Archaeological Records Management System (ARMS) turned to a computerized data base to manage its exponentially growing site and project files. In 1992, the ARMS contained attributes on over 80,000 sites in New Mexico including 25,000 in the northwest part of the state. Although the data base grew rapidly over the years, most of the small sites it contained were ignored by southwest researchers in favor of the glamour of Chaco Canyon. At last, however, many of the papers in this volume are examples of how these resources (i.e., the ARMS data base and compliance-generated data) can be used to provide new interpretations of cultural adaptation and interaction in the Four Corners. In a workshop held at the 1992 Society for American Archaeology meetings, participants addressed the value of information derived from compliance-generated projects. We feel the analyses presented in this volume are excellent examples of what can be accomplished through contract archeology. As these papers demonstrate, the value of the compliance exercise cannot be doubted for its contribution to archaeology.

The Bureau of Land Management (BLM), administering more public lands and cultural resources than any other agency in New Mexico, takes pride in its compliance program. Most of the projects providing data for these papers stemmed from BLM's adherence to the National Historic Preservation Act over the last 14 years, and more recently, its innovative approach to compliance and site management in the Navajo Reservoir District.

These papers are only the beginning. With the implementation of a research design and data recovery program encompassing much of the Navajo Reservoir District, the next five years of site mitigation will further expand our knowledge of the prehistory of this area, including Basketmaker, Pueblo, earliest Navajo, and historic Native American, Anglo, and Hispanic time periods. Sites in this region are significant, not just for the academic community, but also for Native people and visitors to the Four Corners area. In 1989, the Bureau of Land Management initiated a public outreach project entitled, "Adventures in the Past." One of its objectives is to enlist public support for the management, interpretation, and protection of cultural resources.

As the data base continues to grow, we encourage interested scholars to consider opportunities now available through the BLM's challenge cost share program. Cooperative projects are jointly funded and executed by the BLM and an outside partner. The New Mexico BLM currently sponsors nearly a dozen of these projects and provides anywhere, from $1,000 to $15,000 dollars per year to carry out the project. We are prepared to support long-term research which would provide vital information useful in the interpretation of New Mexico's cultural resources. We are anxious to cooperate with you and, with your help, we can further explain the successes and failures of cultural adaptation in the Upper San Juan Basin over the past 1,000 years of occupation.

LouAnn Jacobson
Stephen Fosberg

Preface

Recent work in the upper San Juan Basin has more than doubled the number of known, as well as excavated, sites. Without exception, the work has modified and expanded long-held views of the Paleoindian, Archaic, Anasazi, and Navajo people who inhabited the area. The papers presented in this volume reflect these changes and represent the cutting edge of southwestern archaeology.

Tim Kearns presents a complete summary of the Paleoindian, Archaic, and Basketmaker II periods in the Upper San Juan Basin. Nancy Hammack takes on the unwieldy task of verifying the Sambrito phase through a discussion of the Oven Site. Shields and Cates discuss the Loma Enebro Community, a predominantly Pueblo I period manifestation. Brown and Hancock argue convincingly for pushing the beginnings of the Navajo Dinéhach phase back to A.D. 1100. Reed and Reed provide a new perspective on Navajo/Pueblo interaction by using an alliance-based model. Jacobson, Fosberg, and Bewley utilize GIS to explore the defensive systems associated with pueblo sites during the Gobernador phase.

Corell presents a summary paper (presented first in the volume) that encapsulates the papers presented and sets the tone for additional research in the area.

This volume is an outgrowth of a symposium held at the 56th annual meeting of the Society for American Archaeology in New Orleans in April 1991. The aims of the symposium were several-fold. First, we wanted to provide archaeologists working in the area with an opportunity to present the results of their research in a scholarly format. Second, we felt that the volume of work being completed in the area and the sheer accumulation of data demanded an outlet in a synthetic form that would be easily available to those interested. Lastly, we believed that the frequently overlooked upper San Juan Basin deserved greater visibility both in southwestern archaeology and at the national level.

Before the symposium was held, and especially after the papers were presented, we were sure we wanted to have the papers put together in published form. Thus, when LouAnn Jacobson and Steve Fosberg suggested the New Mexico BLM Cultural Resource Series as a publishing option, we welcomed the opportunity.

The overall success of the volume is a tribute to all of the contributors, who worked very hard to produce their papers. Although we consider the volume successful, the task of interpreting the prehistory of the Upper San Juan Basin is by no means complete. In fact, as the volume goes to press, large-scale excavations are beginning on the Fruitland Coal Gas Project. Without doubt, the ideas presented here will be modified and refined as the data base expands as a result of this project. Nevertheless, these papers, in conjunction with previous work, particularly the Navajo Reservoir Project, provide a firm foundation for future research.

Lori Stephens Reed
Paul F. Reed
Acknowledgements

Many people contributed to the success of this volume. The Division of Conservation Archaeology (DCA) provided computer facilities, personnel time, and funding for the trip to New Orleans for the symposium. Byron Johnson, director of DCA, was particularly supportive and helpful. Leta Yazici provided assistance with generating tables and initially typing several of the papers. Merry Lynn Brahant digitized many of the maps appearing in the papers and David Wagner assisted with computer graphics, data base development and management for several of the papers, and advice. Richard Cornelius drafted the cover figure. Additional DCA employees who contributed to this volume in either technical support or advisory roles include Lynn Baca, Jan Allen, Penny Whitten, Jude Stere, and Joell Goff.

The Navajo Nation Archaeology Department also contributed funding for the symposium, as well as computer facilities. Kristen Langenfeld and Doug Dykeman read all of the papers and provided insightful comments.

Jonathan Haas and Linda Cordell served as discussants for the symposium and Linda provided a paper for this volume. Jonathan was unfortunately unable to contribute a paper but his incisive comments are reflected in many of the papers.

LouAnn Jacobson and Steve Fosberg, in addition to writing a paper, provided us with the opportunity to publish the results of the symposium as a volume in the New Mexico Bureau of Land Management Cultural Resource Series, of which they are the series editors. Esther Sanchez prepared the tables and provided secretarial assistance during the BLM production of the volume.

Lastly, we wish to thank all of the participants, both of the symposium and those who also contributed written papers, for following our often tight schedule and responding cheerfully to our comments and those of our discussants and reviewers.

Lori Stephens Reed
Paul F. Reed

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The Upper San Juan Basin of northern New Mexico and adjacent Colorado is an area of great natural beauty. The mountain streams and forests attract thousands of tourists each year. Visitors also come to see its justly famous archaeological sites. Most travelers go to Mesa Verde but many also explore Aztec Ruin, Salmon Ruin, and the Anasazi Heritage Center. For visitors and professional archaeologists alike, the Upper San Juan is the hearth and heartland of Anasazi culture. Although known to fewer people, Dinetah, the source of Navajo culture, is located in this area as well.

The richness of the Anasazi ruins in the Upper San Juan was explored and made famous in the early twentieth century when exhibitions of Basketmaker remains were organized at the American Museum of Natural History in New York, and articles on the early Anasazi appeared in National Geographic Magazine (see Lister and Lister 1968; Morris 1925). The Upper San Juan became known as the cradle of Basketmaker and Pueblo culture, although there was often confusion among the public about how the Basketmakers and Pueblos were related to each other or how each is related to modern Pueblo Indians rather than to the Navajo.

Sometimes in parallel with tourist exploration of the Upper San Juan, at other times preceding it, there has been prospecting for and subsequent mining of the region’s minerals and damming of its rivers for flood control and irrigation. Pipelines have been built to transport water and fossil fuels. Roads, rail and power lines, essential for regional development, have been constructed. Accompanying these projects, there has been survey, excavation, and reporting of archaeological finds. The first major contract project in the Upper San Juan Drainage was the Navajo Reservoir Project (Eddy 1966), one of the earliest salvage archaeology projects anywhere in the Southwest. The Navajo Reservoir Project was begun in 1956 and concluded in 1968. It was therefore contemporary with, and financially partially overshadowed by, the Glen Canyon Project in Utah and Arizona. The Navajo Reservoir Project was lead by Drs. Alfred E. [Ed] Dittert and Frank Eddy, and it is a credit to them that they provided a solid base for the immediately subsequent work in the region as well as for the newer work that is reported here. As the title of these brief remarks suggests, I hope to look at the research reported in this volume in terms of various questions about the origins of the two major cultural traditions, Anasazi and Navajo, rather than to their subsequent development.

The focus on origins seems to me to be at the heart of the contributions made in the studies presented here. In my remarks, I hope to provide some perspective for continued appreciation of the contributions of the Navajo Reservoir Project and subsequent work.

Before the Navajo Reservoir Project, particularly through the work of Earl Morris, A. V. Kidder, Kidder and S. Guernsey, Frank H. H. Roberts, Paul Martin, George Pepper, and for Chaco Canyon, the work of Neil Judd, Clyde Kluckhohn, Harold Gladwin, and others, there was a good, basic understanding of Anasazi cultural development in the northern San Juan Basin (see Lister and Lister 1968; Vivian 1990). That understanding was of a gradual development of the “Full Pueblo” Anasazi out of a Basketmaker II and pre-Pueblo Basketmaker III base. San Juan and Chaco branch Anasazi were interpreted as spatially and culturally differentiated variants of the same general culture. At some sites, such as Aztec Ruin and Lowry Ruin, both variants seemed to be represented sequentially, although why or in what cultural context the sequential occupations took place was not elaborated. In general, both the San Juan and Chaco branches were seen as ancestral to the modern
Pueblo Indians of New Mexico and Arizona. The two most salient cultural changes in the sequence, the segregation of the Anasazi into great pueblo structures and the abandonment of the region, were explained by reference to climatic change, particularly arroyo cutting and drought, and the first intrusion of Athabaskan peoples ancestral to the Navajo. Areas outside the San Juan core were treated as local, generally impoverished, and peripheral versions of either the San Juan or Chaco Anasazi. Innovations during the sequence were usually attributed to migrations from other regions.

When Dittert and Eddy began the program in the Navajo Reservoir District, they easily could have focused on simply developing a local sequence for their project area that would fit into the general scheme outlined above. In fact, however, Dittert and Eddy defined three broad problem areas that were to become the focus of their survey and excavation. The first was environmental; the second dealt with the cultural sequence; and the third concerned distributional studies. The environmental program examined the relation of the river flood plain to agriculture and shifts in the locations of settlements over time. Most of the environmental work was tremendously successful. It provided some of the first evidence of the shifting settlement patterns subsequently described in detail by Stuart and Gauthier (1988), and by Vinson 1990). These studies document changes in the locations of settlements as they alternate between highlands and lower elevations and between upstream and downstream situations. The alterations are underlain by long-term environmental cycles of aggrading and cutting of arroyo flood plains and the effects of these on prehistoric agriculture.

The chronological questions concerned cultural history, distribution, and the development of a local sequence of phases. The sequence is both widely used and severely criticized. Among the problems areas is the definition and dating of the Sammrito phase and its relationship to Anasazi prehistory. A second issue of contention concerns defining and dating the Dinébáh phase and the origin of the Navajo people today the largest Indian tribe in the United States.

The third of Dittert and Eddy's research interests, distributional studies, had to do with the geographic distributions of the Los Pinos, Arboles, and Dinébáh phases and their appearance outside the Navajo Reservoir Project area. I suspect that this research domain would benefit by focusing on defining the cultural interactions among peoples of the Colorado Plateaus during the temporal intervals defined by the phases. As such, it remains a major topic of study. In all, it is a remarkable tribute to Dittert and Eddy that so much of what they accomplished provided such a solid beginning for understanding the prehistory of the Upper San Juan. The papers in this volume build on this base. Some papers offer refinements or modifications of the arguments, based on new data, but the debt to the Navajo Reservoir Project is clear.

Forging, limitation of the Navajo Reservoir studies (Dittert 1966), archaeological attention shifted away from the Upper San Juan to the central San Juan Basin. During the 1970s and 1980s, major projects were conducted in Chaco Canyon (see Lekson et al. 1988; Vivian 1990), at the large Chacoan Outlier of Salmon Ruin (Irwin-Williams and Shelley 1980), at the smaller Chacoan Outliers of Guadalupe Rupe (Pippen 1987) and Bis Ja'sani (Breternitz et al. 1982), and on the system of roads and outlying settlements scattered throughout the basin (Lekson et al. 1988; Marshall et al. 1979; Powers et al. 1983). Some of this work was "pure" academic research. Much more of it was related to the district. These studies were one attempt to explain certain episodes in the prehistoric past. The focal point for this book was the archaeological processes that characterized these episodes. In this volume, the emphasis is on the rise and fall of large pueblos, the relationship between large pueblos and smaller settlements, and the nature of the interaction between them.

The twenty years spanning the 1970s and 1980s could probably be referred to as the Chaco Generation in southwestern archaeology. Not only did the various projects, just listed, enhance our basic information about Chaco Canyon but, more important, recontextualizing Chaco Canyon in regional prehistory changed our interpretations of the past. The redefined Chaco was not just the epitome of Anasazi development, it was the center of a regionally organized system of roads and outliers that united people throughout the San Juan Basin. It is a reminder that a great amount of time, effort, and skilled labor went into the Chaco system. Why the system developed where it did, how it lasted for as long as it did, and how it was structured are questions that are still being debated.

The focus on Chaco and its potential role in regional prehistory has seemingly eclipsed other areas of research. For example, excellent research relating to Navajo archaeology was produced during the 1970s and 1980s (e.g., Brugge 1986; Kelly 1986), and there was a general interest in ethnohistory, style and social boundaries (e.g., Auger et al. 1987; Earle and Preucel 1987), the context of the origin of the Navajo people was not a focus of study.

The work reported here is novel in two respects. First, it makes use of large data bases that were just not available years ago. Second, it represents a carefully designed strategy that is to be expected with an increase in the use of fieldwork. Alternatively, as I comment on below, the same change may simply relate to an increase in sedentarism, based on stored wild foods, rather than horticulture. A key issue for the preceramic, and for later times, is that of continuity. Initially, Dittert and Eddy defined three phases of the Pueblo Period based on their survey and on the work of others outside the district. They are: 1) Early Pueblo, 2) Middle Pueblo, and 3) Late Pueblo phases. The Early Pueblo Period is dated to the 1200s. The Middle Pueblo phase is dated to the 1300s. The Late Pueblo phase is dated to the 1400s. The Late Pueblo phase is further subdivided into two subphases.

For the Preceramic period in general, Kears (this volume) brings together far more data from the Upper San Juan than I would have expected. Despite his concerns about the quality of the data recorded and the paucity of sites that have been excavated, Kears' total of 496 preceramic components is a large data base by any standard. In addition, because his data do not include an diagnostic ceramic lithic scatter. Kears suggests that the 496 components actually underrepresent the number of preceramic loci in the region. Kears uses his data to begin the evaluation of some of the dynamics of Paleoindian and archaic use of the region.

The kinds of patterning Kears' chapter explores concern the differential use of his study area and time. He finds support for Stuart and Gauthier's (1988) observation that the earlier (Chao, Cibola) phases of the Hopi and other Indian adaptations occur at locations at relatively high elevations whereas the later (Plano series), "specialized" economies do not. He also notes that the relatively high elevations of the Upper San Juan do not seem to have been used as a refuge area by Early Archaic populations during the Atlatlithermal interval, as has been proposed for other highland areas. Finally, he points out that both Oscura and Cochise (or Oscura and North- ern Colorado Plateau) Archaic point styles are present in the area, and that there is a dramatic increase in the types of sites (e.g., base camp, quarry, limited activity) during Late Archaic and Basketmaker II compared to preceding periods. Kears suggests that diversity in point types and sites is related to a change from more mobile to more sedentary living strategies that is to be expected with an increase in the use of horticulture. Alternatively, as I comment on below, the same change may simply relate to an increase in sedentarism, based on stored wild foods, rather than horticulture.
sodie. He argued that gaps in the sequence of chronometric dates were periods of drought during which the Anasazi abandoned the Plateau for refuge areas, mainly in the southern Basin and Range Province. Berry also attributed cultural interactions to the periods that occurred in the refuge areas during these intervals. With respect to the Upper San Juan specifically, Berry noted a lack of dates between Anasazi and early Basketmaker peoples. He also found the evidence for the Sambrito phase unconvincing, contending that a hiatus occurred between Basketmaker II and Basketmaker III and between Pueblo I and Pueblo II.

Other scholars, who note gaps in the record of building and occupation events on the Colorado Plateau, such as the Chacoan outlier, endorse Berry's inferences about population movement to refuge areas and subsequent return with a modified cultural inventory. Plog (1983), Upham (1984), and Deam et al. (1985) suggest that the record reflects the episodic nature of much cultural change, the punctuated timing of such, and changes in strategies of adaptation that are also differentially visible to the archaeologists. For example, alternating strategies are sometimes characterized as reflecting adaptive reactions to regional diversity or as producing strong, weak patterning and being resilient or hierarchical (Plog 1983).

It is clear that the data are not adequate to resolve all the continuity questions as phrased by Berry and the other investigators, the evidence presented in this volume supports continuity within the Anasazi, and between Basketmaker II and Basketmaker III. The very tight dating of these periods reported here (Hamack, this volume) from LA 4169, falls within the Sambrito phase and therefore contradict the notion of a hiatus in occupation at that time. The radiocarbon dates reported by Kears in his summary for Archaic sites support the inference of continued occupation. The Archaic dates are not from structural wood. Therefore they presumably date people's living in or using the area rather than episodes of building. Building might or be appear to be episodic from the archaeological perspective for any number of reasons that do not involve migrations of Anasazi from the Plateaus to the southern basin and range regions. Finally, the number of Archaic components increases over time which is consistent with our ideas about populations developing in situ.

Returning to Kears' (this volume) suggestion, that an increase in diversity in types of projectile points and sites of types may relate to a shift to a logistic strategy accompanying an increase in the importance of horticulture, may help us begin to evaluate some recent ideas about the nature of Archaic adaptations. The use of disparate terminology for projectile point forms is unfortunately confusing. Because the names mask distinctions between potential stylistic and functional variation.

Nevertheless, the names suggest that it would be worthwhile to explore patterns in reported project types of point morphology over time. Such a study would allow estimation of the amount of stylistic variation in the Early, Middle, and Late Archaic in the area, which might support or refute: Will's (1988) suggestion that stylistic diversity increased at the end of the Middle Archaic, indicating competition and boundary formation just prior to the acceptance of cultivars rather than to increased importance of horticulture per se. If so, the use of diversity of site types could relate people to the region as a broader range for foraging activities, and so permit the size of territories of foraging populations. Nevertheless, both interpretations could be evaluated through notions of the Archaic position from the region and through excavation, both of which Kears argues are greatly needed.

The excavations at LA 4169 and the reevaluation of the Oven Site (Hamack, this volume) are crucial for our understanding of the early periods of Anasazi occupation of the northern Southwest. As Hamack indicates, the surface indications at LA 4169 were sparse and misleading, suggesting only small Piedra and Navajo component. In contrast, the true indications of the Lomawebro phase sites recently excavated on Black Mesa (Plog 1986:69–75). In both cases, there are no surface indications of multiple hearths, storage cists, roasting pits, and bellow-shaped storage structures eventually excavated. The great disparity between surface and subsurface material has undoubtedly caused us to underestimate, perhaps vastly, the size and intensity of Basketmaker occupation specifically in these areas, if not more generally. The problem of low site visibility for Basketmaker sites argues strongly for subsurface testing programs and for rethinking our models of Basketmaker group size, mobility strategies, and subsistence activities.

The Hal of the Basketmaker II components reported by Kears (this volume) contain architecture. In addition, the size of the storage pits and evidence of cultigens among their contents at LA 4169 suggest greater sedentarism and use of crops at relatively higher elevations in the Upper San Juan than most models propose for this period. Although it is obviously premature to speculate, perhaps the proximity of the Upper San Juan (and perhaps Black Mesa) to the boundary beyond which maize production is precluded by short growing seasons might have increased its storage earlier and in greater amounts than in the central Mogollon Highlands, the area with which Will's (1988), for example, is most concerned. North of the San Juan Basin, beyond the physical limits of maize cultivation, hunting and gathering peoples were well-established, and even small, if widely sparse population, presented a barrier to expansion of groups from the south. The hunting and gathering niche north of the Upper San Juan was filled. With any increase in population during this period, the people of the Archaic, the only viable solution in the Upper San Juan may have been a "precocious" dependency on stores. This behavior would have involved features, such as pithouses, that would easily be visible to the archaeologist as well as storage pits that would be less so. Once again, however, the ideas proposed are testable.

As indicated above, the past two decades witnessed a single-minded Chaco-centric view of the Anasazi of the San Juan Basin as a whole. This is unfortunate for two reasons. First, whatever the Chaco system was in terms of its organization and complexity, it ultimately failed. If we are to understand the development of most of modern Pueblo culture, we need to focus more on the success stories. These are likely to be seen in the adaptation reflected at sites at the Mesa Verde, the northern San Juan Basin, the Jemez Mountains, the Chama Valley, and the Pajarito Plateau. Second, both the extent of the impact of Chaco on its region and some insight into how it functioned, must be explored by looking at the contemporary, smaller sites scattered throughout the Upper San Juan and elsewhere. The work of the Cedar Hill Project, particularly the discussion of the Loma Enbro Community (Shields and Cater, this volume) is most relevant with respect to the Anasazi. Shields and Cater (this volume) describe communities that are "nucleated" around large pithouses and whose population is of local origin. They consider these communities to be at the frontier of a variety of situations: physiographic, hydrologic, climatic, and social. The local population of the project area is described as having been in interaction differentially with the regions surrounding it, affiliating more strongly with some populations at some times than with others. These characterizations would seem to preclude them from being interpreted as Chacoan outliers. But one might note, with a general literature, (i.e. Lekson 1991), there has been a tendency to label every nucleated Anasazi settlement a Chacoan outlier of some sort. This kind of over-generalization has caused some scholars to question the existence of an integrated Chacoan system (Wheat 1983).

Characterizing the way in which communities such as Loma Enbro (Shields and Cater, this volume) were organized, and how they sustained their social and regional population, centers on how far areas with areas around them will be important considerations for future research for many reasons. Among such considerations would be the need to differentiate local systems from those that Lekson (1991) might consider outliers of Chaco. It is difficult, without clarifying for whom the community of Loma Enbro was like if, as Shields and Cater (this volume) state, the community practiced intensive agriculture but was not located at the central platform. The ways in which these community centers undoubtedly served as trade and redistribution loci as well as serving as components of the Mimbay and Pajarito communities (Shields and Cater, this volume) should be demonstrated through future archaeological investigation.

The chapters by Brown and Hancock, Reed and Reed, and Jacobson et al. (this volume) concern our knowledge of the first appearance of the Navajo people in the Southwest and our understanding of their early adaptations. Brown and Hancock's chapter confirms the reality of the Dinetah phase, just as Kears and Hamack (this volume) support the existence of the Sambrito
phase. With respect to the Dinetah phase, it is Dittert's original sequence that is validated. Brown and Reed's contribution indicates the importance of obtaining radiocarbon and other kinds of dates as part of routine analytic procedures. Their investment in obtaining dates and their careful evaluation of dates from a variety of sites confirms a pre-Revolt Dinetah phase in the Upper San Juan. This information again opens the door to a variety of scenarios for Athapaskan entry into the Southwest that seems to have been prematurely closed in the late 1970s. The lack of heavy investment in agriculture at Dinetah phase sites in the La Plata area argues against those scenarios that propose that Athapaskans came into the Southwest from the Plains, where they would have adopted agriculture (see Wilcox 1981). Brown and Hancock's data not only provide the basis for confidence in defining the Dinetah phase in the La Plata Valley, but also the necessary descriptions of ceramics, dwellings, and lithics that define that phase, although we should anticipate that Athapaskan presence will be variably reflected in different parts of the northern Southwest. With the La Plata data as a base, Brown, Hancock, and other investigators can begin to address the broader issues of where, when, and within what cultural contexts Athapaskan people entered the Southwest and became differentiated.

Questions about the context of interactions are illuminated in Reed and Reed's chapter (this volume). Over the past ten years, some innovative projects have used models derived from Navajo culture and archaeology in order to better understand some kinds of patterning in Anasazi archaeology (e.g., Powell 1981). The research Reed and Reed present in this volume is unique, to my knowledge, in using the concept of alliances reflected in patterning in Anasazi archaeology to develop a context for understanding the early Navajo. The success of this endeavor is most encouraging. The Reed's use of alliance formation forces us to look at the context and type of interactions between linguistically, biologically, and ethnically different peoples. Their discussion makes the movement of Pueblo peoples into Dinetah during and after the Pueblo Revolt not only plausible but logical. The Reed's analysis of Gobernador Polychrome as a Navajo product in part because this pottery is a mix of Rio Grande and Hopi wares, design styles, and motifs, in my opinion, is truly insightful. Finally, their thoughtful consideration of how alliances develop over time provides an important perspective for a variety of inferences about Navajo-Pueblo interaction.

As the first to point out, Jacobson et al.'s (this volume) analyses of pueblitos and defense in Dinetah raise more questions than answers. As with the Reed's discussion (this volume), emphasis is shifted away from assumptions about form and function in architecture and other artifacts to that of the context of interactions among Navajo, Spaniard, Pueblo, and Ute. The emphasis on context reveals the fact that Pueblitos were built when Navajo and Spaniard were at peace with one another. That this was also a time of maximum Ute raiding and of the greatest increase in Navajo dependence on livestock are both important to any overall solutions about the functions of Navajo pueblitos. Jacobson et al. (this volume) have given us a carefully considered argument that may allow us to better evaluate a variety of interpretations about Navajo and Ute and about defensive systems in general. In sum, as I hope my title suggests, the papers in this volume are primarily concerned with the origins or beginnings of archaeologically identified patterns. These include the beginnings of settlement in general, in the Upper San Juan, the beginnings of the Anasazi sequence, the start of nucleated settlement in the Cedar Hill area, and more broadly the origins of the Navajo.

It is pleasing to me that conclusions from the earlier work of the Navajo Reservoir Project have been substantiated. The nature and timing of the Sambrito and Dinetah phases, at either end of the sequence, must now be reincorporated into our thinking when we plan projects or write summaries of prehistory. As a group, the papers force us to think about the context of the various patterns we take for granted in our summaries. As we move into another period of archaeological research, there are a number of lessons at pragmatic and theoretical levels that these chapters bring forward. We must be concerned with the lack of visibility of features for both the late Archaic and Basketmaker periods as well as for the Protohistoric Navajo. Subsurface testing and a battery of dating techniques should become routine parts of many projects. Complete metric analysis of projectile points and other lithic tools is essential. We must also consider the cultural as well as the natural environmental contexts of the behaviors we wish to understand. Within what setting and circumstances did the Anasazi emerge from the Archaic hunting and gathering? Within what context of trade and other forms of interaction with Pueblo peoples did recognizable patterns of Navajo culture emerge? Within what context were the Archaic and Navajo patterns of land use similar? These are multifaceted problems with a variety of potential answers about which the contributors to this volume encourage thought and discussion.
The Preceramic Archaeology of the Upper San Juan River in Northwest New Mexico and Southwest Colorado

Timothy M. Keams

Introduction

The San Juan River has its headwaters along the west flank of the Continental Divide in the San Juan Mountains of southwest Colorado. From this majestic setting opposite the headwaters of the Rio Grande, the San Juan flows generally southwestward roughly 400 km (248 miles) to its confluence with the Colorado River. The San Juan River watershed was intensively occupied during the prehistoric past and is one of the most archaeologically rich areas of the American Southwest. The San Juan River drains the heartland of the Mesa Verde and Chaco branches of the Anasazi and flows through the Dinétah or traditional homeland of the Navajo.

It is the primary drainage for the northern portion of the Navajo Nation and its tributaries cut through the Jicarilla Apache, Southern Ute, Ute Mountain Ute, and Paiute territories. Although a substantial data base has been built for the ceramic period in this region and despite almost a century of archaeological investigation, the preceramic occupational history of, and adaptive responses to, the Upper San Juan River region of northwest New Mexico and southwest Colorado, have only recently become subjects of interest. This paper summarizes the previous PaleoIndian, Archaic, and Basketmaker II research in the San Juan River area from the La Plata River on the west to the headwaters in the San Juan Mountains on the east (Figure 1). The summary is followed by an appraisal of the current data base and an evaluation of preceramic chronology, cultural affiliation, site distribution, and site types.

Setting

For this discussion, the Upper San Juan River includes that portion of the San Juan River watershed from the Continental Divide near Wolf Creek and Piedra passes in the San Juan Mountains downstream to its confluence with the La Plata River in the northern San Juan Basin of northwest New Mexico; and from the northern edge of Gallegos Mesa on the south to the San Juan-La Plata County, Colorado border on the north (Figure 2). For management purposes the data base was defined by the following UTM coordinates:

- SW – Zone 12 740000E 406000N
- NE – Zone 13 350000E 417000N
- NW – Zone 12 740000E 417000N
- SE – Zone 13 350000E 406000N

The Upper San Juan River is fed by a series of major tributaries including the Navajo, Piedra, Los Pinos (Pine), Florida, Animas, and La Plata rivers draining south from the mountains of southwest Colorado; and the Bancos, La Jara, Gobernador, Largo, and Gallegos canyons draining west and north from the mesa country of northwest New Mexico. Elevations range from roughly 1616 m (5300 feet) at the La Plata-San Juan confluence to over 3658 m (12,000 feet) along the Continental Divide above the river's headwaters. The lower elevations are characterized by desert scrub vegetation grading, with increasing elevation, into pithon-juniper woodland,
Adopted from U.S.G.S maps Cortez, Shiprock, Aztec, Durango.

Figure 1. Map showing location of the Upper San Juan study area.
Figure 2. Map showing distribution of preceramic sites.
mountain scrub or oak scrub, ponderosa pine-Douglas fir, and culminating in dense spruce-fir and aspen forests below the alpine tundra and treeline. This mountainous upland provides a cooler, more mesic setting than the lower San Juan Basin, the upper Rio Grande Valley, and the La Plata Valley to the east. The study area hosts a wide variety of floral and faunal resources which vary in location and availability with season and elevation. Floral resources potentially important to hunter-gatherer populations include grass and annual seeds at lower elevations, pine nuts and miscellaneous berries and fruits in the pinon-juniper uplands, acorns in the oak belt, and the inner bark of various conifers in the higher reaches. In addition to a wide variety of small-to-medium mammals which occur throughout the area, pronghorn antelope and bighorn sheep would have been important game animals of the region. Wild sheep and elk would have been important game animals in the forested uplands. The latter follow a general seasonal migration pattern from the mountains during the summer to the lower pinon-juniper belt during the winter and their abundance and accessibility is expected to have influenced hunter-gatherer settlement and subsistence strategies (e.g., Wares 1981). Specific riverine resources including sedges, cattail, willow, cottonwood, and a host of roots, tubers, berries, and other floral resources would have additionally influenced preceramic group settlement, subsistence, and scheduling along the Upper San Juan River. Migratory waterfowl may also have had an important seasonal resource.

Previous Research

The earliest documentation of archaeological resources in the Upper San Juan area was by the Escalles and the state boundaries of New Mexico (Chavez 1976). Although they noted the presence of Pueblan ruins further west, they failed to document archaeological sites in the study area. In the late 1800s, Mancos Canyon and Mesa Verde extended to the west of the study area, Chaco Canyon to the south, the lower La Plata River (e.g., the Holmes group), Azttec Ruins by the Animas River, and other Pueblo ruins along the San Juan River near Bloomfield and Farmington became focal points of interest for antiquities collectors and more scholarly researchers. Legitimate research on the Anasazi ruins began during this period and continues today. Within the study area, landmark research was conducted in the initial decades of the twentieth century by Morris (1919a) in the La Plata Valley and environs, by Roberts and Jacobson (Roberts 1930) along the Piedra River, and by Morris (1919b) at Azttec Ruins.

In the early 1940s, Renaud (1942a, 1944) proposed the existence of a pre-Puebloan “Upper Rio Grande Culture” based on studies in the San Lain Valley and the upper Rio Grande River immediately east of the study area. Definition of this “culture” was based on surface collections and limited excavations and represents a lumping of what are now identified as temporally differentiated Jay, Bajada, and San Jose point styles under one designation, “Rio Grande Points” (Renaud 1943b).

Although Morris discussed Basketmaker I in his La Plata District Monograph (Morris 1939), formal documentation of a preceramic or pre-Puebloan occupation in the study area did not occur until Flora, Morris, and Burgh’s 1936,1940 excavations at the Basketmaker II sites of Talus Village and Falls Creek Shelters near Durango, Colorado (Morris and Burgh 1954). Morris and Burgh’s (1954) excavations solidly established the presence of Basketmaker II populations in the study area coupled with evidence for the earliest domestic structures in the northern Southwest. These included 13 house floors at the Falls Creek Shelter and 38 house floors at Talus Village and provided the earliest tree-ring dates for the Southwest at that time. Subsequent work in the early 1950s included Fenenga and Wendt’s (1956) Basketmaker II site excavations at Ignacio, Colorado. No absolute dates were reported for this open architectural site, La 2605. The Basketmaker II designation was made on the basis of the architectural features, lithic assemblage, storage facilities, and absence of ceramics. Between the 1940s and 1960s, recognition of preceramic cultural complexes was occurring elsewhere in the northern Southwest (e.g., Bartlett 1945; Bryan and Toulouse 1943; Campbell and Ellis 1955; Mohr and Sample 1959). Although this work included the identification of the Basketmaker I “occupation in the upper La Plata Valley and the divide between the La Plata and Animas rivers (Fetterman and Honeycutt 1990; Hancock et al. 1988; Karlson and Biggs 1985). New insights into the prehistory of the Upper San Juan River is an anticipated result of the Animas-La Plata Project, a reservoir and canal system planned for the divide between the Animas and La Plata rivers (Fuller 1989); and the cultural resource management projects associated with the exploitation of the coal gas resources within the Fruitland Formation in Northwestern New Mexico and southwestern Colorado (Hogan et al. 1991). Archaeological reconnaissance and testing associated with both these projects has provided significant new information relating to the preceramic occupation of the Upper San Juan River. Both projects are on-going and significant data pertaining to the preceramic occupation of the Upper San Juan River should be forthcoming in the next few years.

The more recent survey and excavation projects generally use Irwin-Williams’ (1973) Oshara Tradition sequence developed in the northwest New Mexico, if they use any, to assign phase designations to Azttec sites. Less common, although with increasing frequency, is the use of Schroedl’s (1978) Utah-Focused Northern Colorado Plateau Archaic phase sequence for Azttec sites in the general vicinity of the study area. Additionally, some researchers use phase designations derived from the Cochiti Cultural Tradition of the southwestern New Mexico (Seyles 1983; Seyles and Antevs 1941) or the Navajo reservoir phase sequence (Dittert et al. 1961).

Data Base

The current data base is derived from the aforementioned research and cultural resource management projects. The study area crosses the state boundaries of New Mexico and Colorado and two different data sets and organizational schemes were, of necessity, utilized. These include the Archaeological Records Management (ARMs) database encompassing the sites within New Mexico and managed by the Laboratory of Anthropology, and the Colorado site data base maintained by the Colorado Archaeological Survey. These two site record systems are differentially organized, therefore some data categories were not comparable and specific data sets had to be
modified to fit. For example, the ARMS data base uses a system which provides a general period category and a specific phase designation for up to three different episodes, whereas the Colorado system is oriented toward a general period category without a phase designation. To accommodate the two state data sources, and UTM Zone changes, and to better visualize the distribution of the various preceramic components, the study area was divided into five areas running west-to-east and subdivided north-south along the Colorado-New Mexico State line (see Figure 2). The west-to-east divisions are divided along UTM easting coordinates and are approximately the same size; that is 30 km wide. The two western sections, however, are slightly smaller at 27 km and 28 km wide. The Colorado sections are roughly 35 km north-south while the New Mexico sections are roughly 35 km north-south. Although meshing the two state data bases proved to be a challenging task, certain sets of information relevant to the prehistory of the Upper San Juan River have been formulated.

The current data base is derived primarily from surveys supplemented with information from only a handful of excavated sites. These data must be regarded as tenuous. For example, Moore and Anderson (1981) note that excavations on Gallegos Mesa in northwest New Mexico revealed that roughly 50 percent of the sites identified during surveys were assigned to the wrong temporal component or represented by more components than initially recorded. The majority of the preceramic components in the study area have been identified on the basis of surface artifacts, specifically projectile points. Excluding the illicit collection of points by collectors, one of the critical stumbling blocks for understanding the preceramic occupation of the Upper San Juan River is the confusion and lack of consistency evident in projectile point identification. Point designations include general morphological descriptions (e.g., large corner-notched or side-notched), Great Basin types (e.g., Elko Series), Oshara Tradition types (e.g., San Jose, Armijo), Northern Colorado Plateau Archiac Tradition types (e.g., Sudden Side-notch, San Rafael Side-notch), Cochise Complex types (e.g., Coahuiltec, and McKean Complex types (e.g., Hana). Many of these types overlap or are stylistically very similar (e.g., Pinto and San Jose points); some are ambiguous, and others are inap-

propriate for the study area. Another potential skewing factor is the problem of multicomponent sites or sites that represent palimpsests of multiple use episodes. The temporal affiliation of these sites is frequently based solely on projectile point style and often on a single specimen. These sites can represent the cumulative residue of both differing temporal periods and diverse functions. Therefore, the observations presented in this paper are considered tentative and subject to revision as additional data become available.

The Upper San Juan data base currently (i.e., as of March 1981) contains 498 preceramic components within the roughly 15,950 sq km study area. Two hundred thirty-two of these components are within the roughly 5075 sq km New Mexico portion and 266 are within the roughly 10,875 sq km Colorado portion (Tables 1, 2, and 3). Roughly one-third of these sites (154) are categorized as Unknown Archaic and lack period or phase designations (Tables 1, 2, and 3). The Unknown Archaic sites are included in the data base as a generic preceramic temporal category. Although the rationale for assigning many of these sites to the Archaic period is not explicitly stated and some of the Unknown Archaic sites may date to earlier or later periods, it is highly probable that the preceramic data base is underrepresented. That is, many of the myriad sites recorded as unknown or undetermined lithic scatter, and which are not included in the current data base, are probably preceramic in age. Although some researchers identify these unknown lithic scatters as a priori Archaic sites, the unknown lithic scatter sites are not included in the current data base because of the ambiguity inherent in their temporal affiliation.

The data base does contain 344 preceramic components identified by period. Considerably fewer of these components are assigned phase designations (e.g., San Jose, Armijo, San Rafael, Cochise, Coahuiltec, and McKean Complex types (e.g., Hana). Many of these types overlap or are stylistically very similar (e.g., Pinto and San Jose points); some are ambiguous, and others are inap-

propriate for the study area. Another potential skewing factor is the problem of multicomponent sites or sites that represent palimpsests of multi-

Table 1. Distribution of all study area components from west to east (Colorado and New Mexico).

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Pale-Indian</th>
<th>Early Archaic</th>
<th>Middle Archaic</th>
<th>Late Archaic</th>
<th>BMH</th>
<th>Other Unknown Archaic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>0</td>
<td>0</td>
<td>11</td>
<td>9</td>
<td>44</td>
<td>2</td>
<td>69</td>
</tr>
<tr>
<td>(740000E to 767000E)</td>
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<td>0</td>
<td>8.15</td>
<td>6.67</td>
<td>32.59</td>
<td>1.48</td>
<td>51.11</td>
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<tr>
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<td>4</td>
<td>2</td>
<td>8</td>
<td>17</td>
<td>58</td>
<td>10</td>
<td>37</td>
</tr>
<tr>
<td>(232000E to 259999E)</td>
<td>% 2.94</td>
<td>1.47</td>
<td>5.88</td>
<td>12.50</td>
<td>42.65</td>
<td>7.35</td>
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<tr>
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<td>5</td>
<td>59</td>
<td>0</td>
<td>13</td>
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<tr>
<td>(260000E to 289999E)</td>
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<td>5.88</td>
<td>69.41</td>
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<td>2</td>
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</tr>
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<td>5.00</td>
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<td>30.00</td>
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<td>10</td>
<td>14</td>
<td>4</td>
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<td>18</td>
</tr>
<tr>
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<td>12.45</td>
<td>27.95</td>
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Table 2. Distribution of New Mexico components from west to east.

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<th>Late Archaic</th>
<th>BMH</th>
<th>Other Unknown Archaic</th>
<th>Total</th>
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<td>4</td>
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<td>5</td>
<td>15</td>
</tr>
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<tr>
<td>Total #</td>
<td>4</td>
<td>2</td>
<td>18</td>
<td>15</td>
<td>86</td>
<td>9</td>
<td>98</td>
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<tr>
<td>Total %</td>
<td>1.72</td>
<td>0.86</td>
<td>7.76</td>
<td>6.47</td>
<td>37.07</td>
<td>3.88</td>
<td>42.24</td>
</tr>
</tbody>
</table>

Precordium Archeology of the Upper San Juan River
sequences. Because an insufficient number of sites have been assigned phase designations, however, the preceramic components are divided into seven general temporal periods or categories (see Tables 1, 2, and 3). These include the PaleoIndian, Early Archaic, Middle Archaic, Late Archaic and Basketmaker II temporal periods, along with Other Archaic and Unknown Archaic generic categories. The relative frequency of occurrence of the various components within the study area is illustrated in Figure 3.

PaleoIndian

The PaleoIndian period is represented by eight components totaling only 1.6 percent of the preceramic components. These components are widely distributed across the study area (Figure 4) and include three Folsom, one Folsom-Midland, one Midland, one Paleo or late PaleoIndian, and two components not specifically identified. Five PaleoIndian components are incorporated into multicomponent sites with Archaic or Anasazi associations. One of the unspecified PaleoIndian sites and two Folsom sites are archaic scatters, and one of the latter is associated with a historic site. These sites are supplemented by a possible Folsom-Midland point base from Ridge Basins (Reynolds and Loose 1987:330), one isolated Clovis point found south of Durango (USFS curation record), two isolated Folsom point fragments in the Navajo Reservoir District (Dittert et al. 1961:172, 173, 205; Dyekman 1985), and a reworked Eden point recovered from a Basketmaker III pithouse floor in the La Plata Valley (Hancock et al. 1988:471, 472). Also, although not associated with any diagnostic artifacts, an uncalibrated radiocarbon date of 8210 ±170 B.P. (6262±170 B.C.) was recently obtained during a pipeline monitoring project in the Navajo Reservoir District (Reed 1989).

Four additional PaleoIndian occurrences are reported from the San Juan Mountains in the Colorado portion of the study area (York 1991). These include two isolated projectile points identified as Alberta and Hell Gap, Lind Coulee or Alberta points, another point identified as Alberta-like, and a point identified as resembling a Pryor Steamed, Meserve, or Dalton point. The latter two points are from multicomponent sites. If these identifications are accurate, they represent isolated specimens far removed from the generally accepted areal ranges for those point styles. Clovis, Folsom, Plano, and Cody Complex points have been noted in the adjacent San Juan Basin (e.g., Anderson and Gilpin 1984; Judge 1982) and San Luis Valley (e.g., Button 1987; Hurst 1941, 1943; Jodry 1987; Swanca 1955; Weimer 1989). However, only one Hell Gap point has been reported from the San Luis Valley (Button 1987:VII-8), one possible Hell Gap point has been reported from northeast Arizona (Judge 1982:23; Morris 1958), and no Alberta, Lind Coulee, Pryor Steamed, Meserve, or Dalton points have been documented in the region. A more parsimonious explanation is that the two Alberta, Hell Gap, or Lind Coulee specimens are actually Jay points and the “Alberta-like” specimen is either a Jay or late PaleoIndian lanceolate point. Also, the use of fine-grain black basalt for the latter specimen is not characteristic of PaleoIndian lithic selection. These points are distinguished by relatively straightforward only slightly convex bases (York 1991:Figures 6 and 7) and may conform to Jerry Dawson’s “Middle” or “Late” Jay styles (Judge 1982:23). The fourth specimen (York 1991:Figure 7), a heavily reworked convex-base obsidian point fragment, is too nebulous for adequate identification. A late PaleoIndian or early Bajada designation is, however, more realistic than a Pryor Steamed, Meserve, or Dalton designation.

Finally, there are a series of six obsidian hydration determinations from two Piedra Pass sites (SM445, SM446) that range from 12,221 B.C. to 6858 B.C. These dates generally predate radiocarbon determinations from the same sites and are associated with diagnostic Archaic artifacts; they are not considered indicative of a PaleoIndian occupation (Reed 1981).

The paucity of PaleoIndian remains in the study area and the general association with multi-component or otherwise undiagnostic sites limits meaningful discussion regarding site types, land use patterns, adaptive responses, and interregional relationships. The data tentatively indicate that although the Upper San Juan environs were not critical PaleoIndian habitat, PaleoIndian populations were present in the area. The
Figure 4. Map showing distribution of Paleolndian and Early Archaic sites.
presence of a Clovis point near Durango and the predominant occurrence of Folsom (or Folsom-Midland) components in the study area, including at sites at relatively higher elevations, indicates that early PaleoIndian groups did exploit higher elevations. This, coupled with the general paucity of Cody Complex or Plano points in the study area, supports Stuart and Gauthier's (1988:28-33) contention that "generalized" Paleo- Indian point types (i.e., Clovis, Folsom, Midland, Bolen) will be more highly represented in the higher altitude zones than "specialized" Paleo-Indian point types (i.e., constricted base and indented base series).

Folsom sites are well documented in the San Luis Valley to the east of the study area (Button 1987; Casual 1976; Johnson and Stanford 1975; Emery and Stanford 1982; Hurst 1943, 1948; Jodry 1987; WORMINGTON 1957:29) and in the San Juan Basin to the west of the study area (HADLOCK 1962; HAYES et al. 1981:23; JUDGE 1982:16, 23; REHER 1977:29, 3G; REYNOLDS et al. 1984; STUART AND GAUTHIER 1988). It is possible that the San Juan River and tributaries provided a natural corridor for travel or exchange for these Folsom populations. Evidence for interaction or travel between the two regions is provided by the occurrence of Washington Pass chert, a distinctive lithic material from the Chuska Mountains on the west flank of the San Juan Basin, on Folsom sites in the San Luis Valley (Jodry 1987).

Early Archaic

The Early Archaic period dates roughly between 7900 B.P. (6000 B.C.) and 5150 B.P. (3200 B.C.) and corresponds with the Jay and Bajada phases of the Oshara Tradition (Irwin-Williams 1973). It is represented by 14 components, 12 in Colorado and two in New Mexico (see Tables 1, 2, 3). These comprise only 2.8 percent of the total component population in the study area and include two possible "PaleoIndian or Early Archaic" sites in Colorado and one in New Mexico. In addition to a "late PaleoIndian-Early Archaic biface point base" from a multicomponent site, the New Mexico sample includes one Jay point from a multicomponent site and a Bajada point from an otherwise undiagnostic lithic scatter. The Colorado sample includes the two possible "PaleoIndian-Early Archaic" sites, both multicomponent,

while not numerous, are well represented (e.g., Button 1987; Judge 1982:26; Renaud 1942a, 1942b, 1944). This incongruity may be more apparent than real, however, and may simply reflect the relative intensity of survey coverage. The apparent scarcity of Early Archaic components in the Upper San Juan area does appear to support the model of specialized versus generalized adaptations via a vis upland resource use proposed by Stuart and Gauthier (1988:28-33) for PaleoIndian and Early Archaic groups. The small number of Early Archaic sites, however, and their frequent association with multicomponent sites negates meaningful discussion regarding site types, land use patterns, and interregional relationships. It seems likely, however, that Early Archaic populations were not routinely exploiting the Upper San Juan area.

Middle Archaic

There are 48 components assigned to the Middle Archaic period: 18 from New Mexico and 30 from Colorado (see Tables 1, 2, 3). These components essentially fall between 4150 B.P. (2000 B.C.) and 3750 B.P. (1800 B.C.), and correspond roughly to the San Jose phase of the Oshara Tradition. In addition to the identified components, there are six radiocarbon dates obtained from recent monitoring projects in the study area (Havel 1990; RANDOLPH AND REED 1989; REED 1981; Whitton 1988). These dates range from 4900±180 B.C. (2950±1800 B.C.) to 3590±100 B.P. (2000±100 B.C.). Although not associated with diagnostic Middle Archaic artifacts, these dates are indicative of the increased presence of hunter-gatherer populations in the study area during the Middle Archaic.

The Middle Archaic sites are distributed throughout the study area; the greatest number of Early Archaic components occur in the study area uplands. Using data primarily from the Continental Divide region west of Boulder, Colorado, Benedict (1979, 1981) has hypothesized an Altithermal "migrations program." Benedict (1979) proposes the occurrence of two major Altithermal droughts, one at 7000 to 6000 B.P. (5050 to 4550 B.C.) and another at 5000 to 4500 B.P. (4050 to 3550 B.C.). He envisions Early Archaic hunter-gatherers retreating from the plains and plateaus into more mesic mountain uplands during these periods. The current data indicate, however, that the Upper San Juan area did not function as a similar mountain refugium during the Early Archaic. The relative paucity of Early Archaic components is in contrast to the lower San Juan Basin and to the upper Rio Grande Valley where Early Archaic sites,
Figure 5. Map showing distribution of Middle Archaic sites.
Late Archaic

The Late Archaic is identified as that period from roughly 3700 B.C. (1800 B.C. to 2750 B.C.) and corresponds to the Armiño phase of the Osha Ha tradition. The En Medio phase of the Osha Ha tradition, considered by some to be Late Archaic, is grouped in this paper with the Basketmaker II component. Although the En Medio phase begins prior to the commonly cited beginning of the Basketmaker II period, Irwin Williams (1973) considered it the Arroyo Cuervo equivalent to Basketmaker II. Also, elsewhere in the northern Southwest where linked to a strong reliance on cornculture, Basketmaker II beginnings are being re-evaluated (e.g., Smiley and Parry 1990) and more closely correspond to the En Medio phase dates (i.e., ca. 800 B.C.-A.D. 400).

A total of 62 Late Archaic components are documented in the study area; 15 from New Mexico and 47 from Colorado (see Tables 1, 2, 3). Late Archaic sites represent roughly 13 percent of the study area preceramic components. Proportionately, however, there are a greater number of Late Archaic sites in Colorado than New Mexico (see Figure 3). There are also six radiocarbon dates from this period (see Table 4) ranging in age from 3420±60 B.C. (1700±60 B.C.) to 2730±80 B.C. (780±20 B.C.). These data indicate that although Archaic populations were increasing over the previous period, there was not a dramatic increase in population density within the study area during this period. Elsewhere in the San Juan Basin (Brancard 1983; Kenner 1982) and in southeast Utah (Kearns 1990), the Armiño phase appears to have been a period of general population decline. Hogan (1985), however, has argued that there was heavy use of the uplands along the northeastern edge of the San Juan Basin during the Armiño phase. Also, Fuller (1988:344) notes that the use of large base camps along the Animas-La Plata uplands intensified between 2000 B.C. and A.D. 1.

The distribution of Late Archaic sites in the study area (Figure 6), in part, supports these arguments. Although there appears to have been a slight decrease in the numbers of high altitude sites during the Late Archaic, this period is well represented in the Animas-La Plata region, the Navajo Reservoir District, and in the intervening area. Late Archaic populations also continued to use the same general area east of the Piedra River that had been exploited by Middle Archaic groups.

Other Archaic

There are 23 components in the Upper San Juan study area that are included in an "Other Archaic" category, 9 from New Mexico and 14 from Colorado (see Tables 1, 2, 3). These components are identified by the presence of non-Osha Ha tradition projectile points and represent 4.6 percent of the study area sample (see Figure 3). The projectile points that identify the Other Archaic components are typically variations of large side-notched dart points that include specimens identified as Chiricahua-Cochar, Sudden Side-notched, Northern Side-notched, and San Rafael Side-notched. Often the identifications of these points overlap or conflict with each other and specimens identified as San Rafael, Sudden, or Northern Side-notched have frequently been lumped as Chiricahua-Cochar and vice versa. The lack of consistency in the identification of these points makes interpretation difficult. Compounding the problem is the identification of some of these points as Navajo (Chapman 1977:403), Gallina (Ellis 1988), or Piedra Lumbre phase (Schaafer 1979), all post-Archaic manifestations. They appear to represent Middle to Late Archaic (cf., Copeland 1985; Ehler et al. 1976; Fetterman and Honecutt 1982; Gilpin 1984; Huse et al. 1978:50) and possibly Basketmaker II artifacts, and have been noted in association with diagnostic Middle and Late Archaic Osha Ha Tradition points (e.g., Fuller 1988:280; Reed 1979; Winter et al. 1986).

Broster and Ireland (1984) date the "Chiricahua" points from the Jicarilla Reservación to roughly 5000 to 3000 B.P. (3500 to 1500 B.C.). A point identified as a Cochise point by Vogel et al. (1984:341) from excavations on Gallegos Mesa south of the study area is associated with a 5200 B.P. (3250 B.C.) date. Hogan et al. (1991) identify this specimen as a Sudden Side-notched point. Hogan et al. (1991) also note that radiocarbon dating from the Bolack Exchange funds south of Farmington associate the San Rafael Side-notched style point with a 900 B.P.

### Table 4. Radiocarbon dated preceramic sites in the Upper San Juan River study area (uncalibrated)*.

<table>
<thead>
<tr>
<th>Date</th>
<th>Site</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>6300±170 B.C.</td>
<td>San Juan 30-6 #439 Area 11</td>
<td>Reed 1989</td>
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<td>5910±190 B.C.</td>
<td>SML45</td>
<td>Reed 1981</td>
</tr>
<tr>
<td>3800±150 B.C.</td>
<td>LA 75419</td>
<td>Reed and Walle 1992</td>
</tr>
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<td>2920±180 B.C.</td>
<td>SML45</td>
<td>Reed 1981</td>
</tr>
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<td>LA 70359</td>
<td>Randolph and Reed 1990</td>
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<td>2770±85 B.C.</td>
<td>LA 38520</td>
<td>Whitson 1988</td>
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<td>2740±106 B.C.</td>
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<td>Reed 1981</td>
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<td>Havell 1990b</td>
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<td>Moore 1988a</td>
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<td>1070±150 B.C.</td>
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<td>Hancock, Moore, and Reed 1988</td>
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<tr>
<td>800±90 B.C.</td>
<td>DCA-86-80</td>
<td>Reed et al. 1988</td>
</tr>
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<td>Moore 1988b</td>
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<td>Hancock, Moore, and Reed 1988</td>
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<td>Hefner 1987</td>
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<tr>
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<td>Bunker and Reed 1990</td>
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<td>Foster 1981</td>
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</tr>
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<td>LA 3792</td>
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<td>Fuller 1988</td>
</tr>
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<td>70±170 B.C.</td>
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<td>30±35 B.C.</td>
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</tr>
<tr>
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<td>Bishop and Reed 1990</td>
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Table 4. Radiocarbon dated preceramic sites in the Upper San Juan River study area (uncalibrated)* (continued).

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<td>A.D. 250±60</td>
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<td>Fuller 1988</td>
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<td>A.D. 360±120</td>
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<td>LA 4289</td>
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<tr>
<td>A.D. 560±170</td>
<td>Uells Site (possibly noncultural)</td>
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*Data adapted from Whitten (1992).
Figure 6. Map showing distribution of Late Archaic sites.
distinctive San Juan Basin style (e.g., Chapman 1977:Figure 11.11; fourth row left) and, aside from a flaring concave-base side-notch form (e.g., Dick 1965:26-27; Irwin-Williams 1979:Figure 9), most of the published Chiricahua-Cochise points resemble stemmed indented-base points found with San Jose or Armijo phase sites (e.g., Sayles 1983:120). Points similar to those included in this group are found in the northern Rio Grande region (Klager 1980; Thoms 1977), in southeast Colorado (Lintz and Anderson 1989), and along the Front Range (e.g., Benedict 1975; Benedict and Olson 1978). Also, a number of these points from the study area appear to be made from Jemez Mountains obsidian. Gilpin (1984:295), discussing the occurrence of Chiricahua-Cochise points in the San Juan Basin, notes that rather than being a southern manifestation, side-notched points appear to be most common in the Rocky Mountains, the Colorado Plateau, and the Rio Grande Valley. It is possible, given their presence along the northeastern periphery, that these points or their makers were coming into the San Juan Basin and adjacent uplands from the northeast or east.

Basketmaker II

As discussed here, the Basketmaker II period ranges from ca. 800 B.C. to A.D. 500 and combines early, or pre-A.D. 1, and late, or post-A.D. 1, Basketmaker II components under a single heading. This includes components identified in the site records as Basketmaker II, En Medio, En Medio-Basketmaker II, San Pedro-Basketmaker II, and Los Pinos. A total of 189 Basketmaker II components was identified in the Upper San Juan study area; 97 in New Mexico and 92 in Colorado (see Tables 1, 2, 3). This represents roughly 38 percent of the preceramic component sample and marks a dramatic increase in the number of components over previous periods (see Figure 3). In addition, in the study area there are 22 radiocarbon dates ranging between 620±60 B.C. and 60±90 B.C. that correspond to an early Basketmaker II period and 29 radiocarbon dates between A.D. 30±60 and A.D. 560±170 that correspond to a late Basketmaker II period (see Table 4). Even though the Basketmaker II sample contains the greatest number of preceramic sites, it may be underrepresented. For example, following excavations in the Bodo Canyon area south of Durango, Fuller (1988:351) identified a set of “Basketmaker II signatures” which, in various combinations, includes:

1. An absence of ceramics.
2. A high frequency of cracked igneous cobbles removed from their natural context.
3. The presence of burned popcorn-sized adobe daub.
4. Basketmaker II-style projectile points: broad, large corner-notched points with prominent tangs.
5. Magnetometer data indicating structures on aceramic sites.

Using these criteria, Fuller (1988:351) identified 20 possible Basketmaker II site components from the Ridges Basin-Bodo Canyon area which had not been identified as Basketmaker II sites by the original site recorders. These sites, and presumably similar sites, are not included in the current Basketmaker II data base.

Although the Basketmaker II components are widely scattered throughout the study area, over 80 percent occur in the western half and there are at least four areas where Basketmaker II sites form discrete clusters (Figure 7). These clusters include a major concentration of habitations, temporary camps, and other site types along the lower Los Pinos River and adjacent San Juan River in the Navajo Reservoir District. This area corresponds to the core area of Los Pinos phase sites identified by Dittert et al. (1961) and Eddy (1961, 1966). Other Basketmaker II site concentrations occur in the upper Gobernador Canyon and La Jara Canyon uplands southeast of Navajo Reservoir, in the middle La Plata River Valley, and on the Animas-La Plata divide. These areas are mid-elevation settings (i.e., 5800-7200 feet) in piñon-juniper and sage-dominated environs.

Although not adequately illustrated in Figure 7, the current data (Fetterman and Honeycutt 1981, 1982, 1990; Fuller 1988, 1989; Winter et al. 1986) indicate that the Animas-La Plata divide from just south of the Colorado-New Mexico border north to Hesperus and Durango was another major Basketmaker II settlement area comparable to the Navajo Reservoir District. It is also apparent that another focus of Basketmaker II
Figure 7. Map showing distribution of Basketmaker II sites.
settlement occurred in the Ignacio-middle Los Pinos region based on the work of an avocational archaeologist, Eddy et al. (1984:76) report that Basketmaker II cobbles ring sites cover not only the entire middle reach of the Los Pinos River but also extend north almost to Vallecitos Reservoir. Eddy (1966, 1972) has suggested that the Los Pinos Basketmaker II population center was in the Bayfield-Ignacio area, and that the Navajo Reservoir District settlements are south of the primary area of occupation. Although the Basketmaker II site cluster in the upper Gobernador-La Cara Canyon area was apparently an important focal point for resource extraction, it does not currently appear to have been a key of Basketmaker II habitation. Only 2 out of 17 sites in this area have evidence of architecture; the remainder are open linear earthwork alignments.

Almost half of the Basketmaker II sites in the study area have evidence of architecture and represent a significant departure from the earlier settlement pattern. Also, as noted by Eddy et al. (1984) and Fetterman and Honeycutt (1990), the location of many of the Basketmaker II settlements in areas where today the short growing season makes corn agriculture a tenuous undertaking. Finally, the distribution of Basketmaker II sites in the study area closely corresponds to the distribution of the subsequent Basketmaker III settlements.

Chronology and Cultural Affiliation

Two of the major problem domains of the preceramic archaeology of the study area are chronology and cultural affiliation. There is presently no clear understanding of the chronology and cultural affiliation of the groups who occupied the Upper San Juan region prior to the emergence of sedimentary Basketmaker III populations. This is due in part to the lack of sufficient excavation data, particularly from well-stratified contexts, and also due to the lack of a local projectile point sequence. Based on projectile point styles from dated contexts throughout the San Juan region occupation of the study area may have begun as early as 11,500 to 11,000 B.P. (Clovis period), intensified between 11,000 and 10,000 B.P. (Folsom period), and continued (albeit less intensively) during the subsequent Early Archaic. The relatively few sites and the questionable context of some of the diagnostic points restricts the evaluation of the timing and duration of the Paleoindian occupation in the study area. The cultural affiliation of the Paleoindian occupants is similarly difficult to assess given the limited data base.

Many researchers use the Oshara Tradition phase sequence outlined by Irwin-Williams (1975) for the Arroyo Cuervo region of northwest New Mexico to organize Archaic period sites in the study area. As recently noted by Fuller (1988), however, the data used upon which this sequence was built have not been published and, increasingly, researchers are beginning to question the utility of the contrast between the validity of the projectile point sequence (e.g., Simmons 1981; Stuart and Gauthier 1988). Despite the increasing skepticism of the Oshara Tradition sequence, however, most researchers in the San Juan Basin continue to apply it to Archaic period sites. Moore's (1985) analysis of chronometric dates associated with Oshara Tradition projectile points indicates that there is general agreement between the point types and the Oshara phase sequence. Although there are occasional misplaced points in Moore's tabulation, these are all later rather than earlier and may be indicative of prehistoric scavenging or re-use. Vierra (in press), however, observes that differences exist between the intensity of Archaic (Oshara Tradition) component population in the northern San Juan Basin when projectile point dated sites are compared or contrasted to radiocarbon dated sites. Rather than question the validity of the point chronology or the point designations, Vierra (in press) suggests that the difference "may be due to the long-term redistribution of earlier Basketmaker II projectile points in the San Juan Basin and surrounding uplands area," and that the samples may be biased. It is likely that long-term redistribution of Archaic populations did occur in response to environmental and social changes. Any generalizations based on Archaic projectile point data must remain tentative, because the Oshara Tradition sequence projectile point data base is made available and prior projectile point designations are reassessed.

There are currently 64 radiocarbon dates for the preceramic occupation of the study area (see Table 4) that are uncalibrated (ranging from 10,000 to 7,500 B.P. interval (Plano-Cody times). The relatively few sites and the questionable context of some of the diagnostic points restricts the evaluation of the timing and duration of the Paleoindian occupation in the study area. The cultural affiliation of the Paleoindian occupants is similarly difficult to assess given the limited data base.

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Irwin-Williams (1973) argues that the En Medio phase of
the Oshara Tradition represents an in situ continu-um of Late Archaic-Basketmaker II develop-ment. Conversely, Berry (1982; 1985) suggests that Basketmaker II populations represent an intrusion of groups into the Colorado Plateau from the south. Whether the Basketmaker II populations in the study area represent an in situ development or whether they represent an influx of southern pop-ulations awaits further investiga-tion.

Settlement

The evaluation of patterns of preceramic settle-ment in the Upper San Juan study area is based on component distribution, site type definitions, as-semblage data, and features. The distribution of the preceramic components within the study area is presented in Tables 1, 2, and 3 and illustrated in Figures 11 through 14. Although scattered, the general paucity of Paleoindian components negates meaningful discussion of their occurrence across the study area. The Early Archaic sites are distinctly associated with the middle to upper reaches of the study area with roughly 64 percent occurring in the Colorado section of the eastern portion (zones 13C and 13D) of the study area (Figure 11). The distribution of Middle Archaic and Late Archaic components is roughly similar. They are scattered across the study area, and include a substantial increase in site locations in the western portion and lower elevations of the study area (Figure 12). The Other Archaic sites occur primarily in the eastern and western upland portions of the study area (Figure 13). The Un-known Archaic sites occur throughout the study area, yet tend to be clustered in the western area (Figure 13). The distribution of Basketmaker II components is focused in the western and central portions of the study area (Figure 14) with few components in the eastern uplands. The distribu-tion of Basketmaker II components reflects fo-cused settlement in the La Plata Valley, Animas-La Plata divide, Durango, and Los Pinos-Narajo Reservoir District areas.

DUE TO THE GENERALLY LIMITED DESCRIPTIVE DATA, THE SITE TYPE CATEGORIES ARE, OF NECESSITY, RATHER
Figure 11. Relative percentage of PaleoIndian and Early Archaic components from east to west.

Figure 12. Relative percentage of Middle and Late Archaic components from west to east.

Figure 13. Relative percentage of Other and Unknown Archaic components from west to east.

Figure 14. Relative percentage of Basketmaker II components from west to east.
coarse. Seven site types have been identified. These site types include open lithic scatters characterized by flaked stone artifacts only; open camps characterized by flaked stone artifacts and groundstone, fire-cracked rock, or hearth features; sheltered camps which occur in rockshelters and otherwise duplicate the open camps; lithic procurement or quarry locales; open architecture sites characterized by a variable artifact inventory coupled with evidence for structural remains; a residual miscellaneous other category (e.g., rock art locales); and multicomponent sites. Although multicomponent sites do not designate a site type per se, multicomponent sites represent locales where the nature of any specific temporal component's occupation is undetermined. The relative occurrence of representative types by temporal component is presented in Table 5.

The Paleoindian and Early Archaic site types, and ultimate settlement patterns, are obscured by the occurrence of most of these components on multicomponent sites (see Table 5). The limited data do suggest, however, that Paleoindian and Early Archaic settlement in the study area was frequent and restricted to small ephemeral camps or activity areas. The Middle Archaic sample is evenly split between open lithic sites and open camp sites (see Table 5). Both of these site types appear to represent short-term camping and specialized activity locales. The common association of projectile points, biface knives, scraping implements, and flake debris at many of these sites suggests a hunting-oriented function. This artifact association is particularly apparent at the high altitude sites where milling equipment infrequently occurs. Although dominated by multicomponent site types, the identifiable "Other" Archaic site types and frequency are similar to the Middle Archaic pattern of lithic scatter and open camp sites (see Table 5).

The sharp increase in site type diversity during the Late Archaic (see Table 5) represents a dramatic departure from the site type pattern noted for the earlier Archaic periods. The open lithic and open camps continue to be the predominant site types. These types are supplemented, however, by the occurrence of sheltered camps, lithic procurement locales, miscellaneous sites, and significantly, the first appearance of sites with architectural remains. These data indicate a divergence from the early settlement patterns and an increase in the diversification noted in the study area. The open architectural sites imply a shift in settlement strategy, perhaps from a foraging-oriented lifeway to a more logistically oriented lifeway, and presumably the initial shift to an agricultural lifeway. This departure from the earlier pattern may be indicative of an in situ development of incipient agricultural groups. These groups may have formed the nucleus of the later Basketmaker II development in the region. The Unknown Archaic site types are dominated by lithic scatters and open camps (see Table 5). There are, however, a small percentage of sites that represent more diversified settlement types. These include sites characterized by architecture that probably date to the Late Archaic or Basketmaker II periods.

The Basketmaker II site types continue the pattern of diversification begun during the Late Archaic. The sites are, however, dominated by the presence of open architectural sites (see Table 5) and indicate that the shift from a fully mobile foraging-oriented lifeway to a sedentary logistically-oriented lifeway had begun in earnest. The investment in domestic structures, their frequency of occurrence, and the common association with storage facilities implies that the Basketmaker II populations of the Upper San Juan were fully committed to an agricultural economy.

Conclusion

This overview has evaluated the current data base pertaining to the preceramic occupation of the Upper San Juan River region. There are presently no recognized sites documented in the study area. These sites do not include undiagnostic aceramic lithic scatters and presumably underrepresent the preceramic site total. The current data base indicates an initial, albeit sparse, occupation during the Paleoindian period with a predominance of Folomor or Folomor-Midland components. This period is followed by a similarly sparse Early Archaic occupation. The data indicate that the subsequent Middle Archaic and Late Archaic periods witnessed increasing occupational intensity, greater diversity in land use, and possibly an influx of populations from outside of the San Juan Basin. A dramatic change is evident during the Basketmaker II period when site density and variability increases dramatically. The Basketmaker II occupation coincides with increased evidence for architecture, site complexity, and presumably, increased dependence on corn agriculture.

In a 1984 review of the prehistory of southwestern Colorado, Eddy et al. (1984:4) noted: "As with the earlier Paleoindians, abundant evidence for early and middle era maps, Jeney Montgomery's centered site data and Leta Yazzie typed the manuscript. Lori and Paul Redd's edit of the original manuscript resulted in some productive changes and reorganization. Lori and Paul also redrafted the graphs and Lori, particularly, was patient, although relentless in the goal to keep the manuscript preparation on schedule."

---

Table 5: Relative percentage of study area site types by component.

<table>
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<tr>
<th>Period</th>
<th>Open Lithic Scatter</th>
<th>Open Camp</th>
<th>Sheltered Camp</th>
<th>Quarry</th>
<th>Open Architectural</th>
<th>Multi-Component</th>
<th>Other Total</th>
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<tr>
<td>Paleoindian</td>
<td>37.50</td>
<td>-</td>
<td>-</td>
<td>62.50</td>
<td>100.00</td>
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<td>-</td>
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<td>Early Archaic</td>
<td>21.43</td>
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<td>-</td>
<td>78.42</td>
<td>99.85</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Middle Archaic</td>
<td>50.00</td>
<td>50.00</td>
<td>-</td>
<td>4.69</td>
<td>4.69</td>
<td>99.99</td>
<td>-</td>
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<tr>
<td>Late Archaic</td>
<td>48.44</td>
<td>34.77</td>
<td>1.56</td>
<td>3.12</td>
<td>4.69</td>
<td>99.99</td>
<td>-</td>
</tr>
<tr>
<td>Other Archaic</td>
<td>27.27</td>
<td>18.18</td>
<td>-</td>
<td>54.54</td>
<td>99.99</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Unknown Archaic</td>
<td>39.87</td>
<td>53.80</td>
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<td>0.63</td>
<td>1.27</td>
<td>1.27</td>
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<td>Basketmaker II</td>
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<td>26.11</td>
<td>0.64</td>
<td>47.77</td>
<td>5.73</td>
<td>100.00</td>
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The Oven Site, LA 4169: A Reevaluation Based on Recent Excavations

Nancy S. Hammack

Introduction

In the summer of 1987, the water level of Navajo Reservoir was drastically lowered to facilitate repairs on the dam. This drawdown exposed over 60 vertical feet of shoreline, and wave action resulted in the erosion of a narrow ridge extending into the reservoir at the junction of the Piedra and San Juan rivers (Figure 1). Upon the report of an eroding burial, the Bureau of Reclamation authorized emergency salvage excavations. Twenty-three pits and six separate burned rock and artifact concentrations were mapped, collected, and excavated by the staff of Complete Archaeological Service Associates (CASA), under contract to the Bureau of Reclamation.

From the geographical location and the nature of the burned pits, it was originally assumed that these features were within a previously unknown portion of the Oven Site, LA 4169, excavated in 1962 and 1963. Based on this premise, all data from the 1987 project have been collected and analyzed under the LA 4169 site designation. Data resulting from these excavations will be used to review the functional and social implications of these subterranean features and their associated artifactual contents in relationship to the latest Archaic and earliest Formative cultural resources in the Navajo Reservoir District of Colorado and New Mexico.

History and Context of the Oven Site

In 1956, the Bureau of Reclamation, managing agency for the proposed Navajo Reservoir, requested that the National Park Service arrange for the recording and study of archaeological sites threatened by the new reservoir, which was to flood the San Juan River valley from just downstream of the Los Pinos River in northwest New Mexico to several miles upstream in Colorado. Eventually, a system of canals was to be installed to transport the impounded water to the area south of the San Juan River between Bloomfield and Farmington, New Mexico, where it would support an extensive irrigation project to be developed in compliance with United States treaty obligations to the Navajo Nation.

The National Park Service in turn contracted with the School of American Research and the Museum of New Mexico to carry out the survey, which was begun that year under the direction of Dr. A. E. Dittert, Jr. (Dittert et al. 1961). The various phases of this project were, over the years, to account for some of the largest cultural resource management (CRM)/research projects ever carried out in the Southwest. The Navajo Reservoir survey and ensuing mitigation effort was the first of these, but eventually they included studies on the canals and other components of the Navajo Indian Irrigation Project.

The team assembled by Dittert carried out the first large but genuinely interdisciplinary archaeological project ever done in the San Juan Basin, in one of the least-studied parts of the basin. The field team surveyed in the expected disturbance area between 1956 and 1959 (Dittert et al. 1961). Excavation work in the reservoir began in 1957 and continued into 1963.

The resulting database allowed Dittert, Eddy, and their many collaborators to synthesize and, to some degree, test a model linking cultural adaptation and change to conditions and changes in the environment. The synthesis integrated environmental studies (Harris 1963; Schoenwetter
The Samrito phase was characterized by the use of very large conical (jug-shaped or bell-shaped) subterranean cists, almost always displaying evidence of intense burning. Because of this burning, these features were interpreted by Eddy as ovens. Samrito "ovens" were commonly reused as burial vaults, trash dumps, or both. These features were found in varying quantities at a number of locations around the reservoir, in late Los Pinos through Rosa association: Only at the Oven Site, LA 4169 (5AA1345), were they present in quantity. Here over 40 "ovens" were excavated or mapped within an area of less than 5000 square meters (Eddy 1966:214-229).

The Oven Site, which was to share importance only with Samrito Village as a type site of the Samrito phase, was thought by the original surveyors to contain only a small Piedra habitation and a sparse historic Navajo sherd scatter. No ovens were evident on the surface. The site was scheduled for excavation as a Piedra site, but was inadvertently bulldozed by the clearing contractor, who obliterated the Piedra component almost entirely. This small disaster was actually of great significance to Southwest archaeology, as it revealed the burned offerings of numerous previously unsuspected pit features. During the 1962 and 1963 field seasons, 45 "ovens", 5 pithouses, a refuse area, and numerous associated human and dog burials were excavated (Figure 2). The assemblages recovered were dominated by Samrito Brown pottery, including some vessels in burial association.

The Oven Site data base was correctly viewed (Eddy 1966) as being central to understanding the Samrito phase. The "ovens" seemed to contain relatively pure Samrito and Samrito/Rosa transition assemblages, together with considerable archaeobotanical and archaeological material, human and dog burials with associated mortuary offerings having chronological value, and abundant tools and tool sets. The "ovens" themselves were interpreted as having played a substantial and probably central role in social and subsistence processes within the district.

The 1987 Study

In 1987, salvage excavations of 23 burned pits were carried out by the staff of Complete Archaeological Service Associates. These pits were located along the top and edges of a narrow clay ridge on the eastern shore of Navajo Reservoir near the junction of the Piedra and San Juan rivers. Large burned pits had been uncovered during the extreme drawdown of the reservoir and were eroding from the lower exposed edges of the ridge. Others, less eroded, were visible as circular depressions on the top of the ridge.

From the geographical location of the site and the nature of the burned pits, it was assumed that these pits formed a previously unknown portion of the Oven Site, LA 4169, located upslope from that portion of the site excavated in 1962 and 1963. Later resurvey of the location indicated that the pits excavated in 1987 were not, as first presumed, an extension of the original Oven Site. This new concentration of "ovens" excavated thus far within the Navajo Reservoir area were not detectable during survey and were only revealed after removal of deep overburden by bulldozing or wave erosion. Twenty-two of the pits were clustered in a 200 square meter area, with a single isolated pit located to the east of this main concentration (Figure 4). Three of the pits were apparent only as eroded burned surfaces representing the base, although the subsurfaces of two of these pits were still
LA 4169
THE OVEN SITE

- Refuse
- Post
- Limits of excavation
- Projected house limits
- Bench
- Burial
- Exterior pit
- Fire basin
- Pit house
- Surface structure

Figure 2. Site plan map, 1962-1963 excavations at LA 4169 (Eddy 1966:216, Figure 26).
Figure 3. Location map, 1962-1963 and 1987 excavations, LA 4169.
Figure 4. Site plan showing locations of pits and burials, LA 4169, 1987 excavations.
intact. Human burials were recovered from five of the pits. The only structural features present on the ridge were the pits (Figure 5). Unlike that portion of the Oven Site excavated in 1962 and 1963, no pit structures, hearths, or other domestic features were located. Six sparse artifact scatters were mapped and collected on the lower slopes of the ridge. These scatters were mainly composed of fire-cracked sandstone, and flaked and ground lithics. Small quantities of bone and ceramics were also present. Due to the differential sorting from wave action, these scatters are difficult to interpret.

Pit Form and Function

The group of "ovens" investigated by CASA in 1987 proved to be smaller and more concentrated than those excavated in 1962 and 1963 at LA 4169. It contained about half as many pit features (but in a single compact cluster) and was not associated with any structures. A total of 21 single "ovens" and 1 "oven" with an intruded unburned pit, all eroded to some degree, were recorded by CASA. These have proved to be comparable in construction and proportions to those originally excavated. The following description is based on, and applies equally to, both data sets.

A typical "oven" was excavated with a digging stick into the underlying massive, Late Pleistocene pond-deposited bank of clay with a very high bog-iron content (Schoenwetter's Pleistocene bench), to make a regular and usually circular pit, in form, the frustum of a cone. The angles of the flaring walls of those pits excavated in 1987 typically ranged between 23 degrees and 29 degrees to the vertical. The original pits had somewhat sharper pit wall angles, probably due to slumping from the weight of the bulldozer.

Although the majority of the features had flat floors, over half of those excavated in 1987 had one or more subsists excavated at the intersection of the walls and floor (Figure 6). These subsists may be burrowing attempts by trapped animals before or after firing or deliberate human constructs of unknown function. These subsists usually appear to have been fired in the same manner as the main pit. Ignoring the subsists, the basal diameters of the pit features range from just over a meter to just under three meters, with the largest and smallest occurring in the 1962-63 clusters. Both the 1962-63 and 1987 samples display a bimodal distribution of basal diameters (Table 1). For both groups of pits, this distribution has a higher peak at about 1.6 m (about 3/4 of the 1987 pits and 2/3 of the earlier pits) and a lower peak at about 2.2 m.

As all of the "ovens" excavated to date were eroded or disturbed, the initial depth and character of the entrance orifices can only be inferred, but several lines of evidence suggest that the original depths were typically almost equal to the basal diameters. First, the majority of the pits had, within their fill, large, worked, and unburned slabs of thin sandstone. When reconstructed, these slabs tended to measure about 0.35 m in diameter. Most were round-to-oval-to-rectangular in shape and have been interpreted as cist covers. Second, the covers or cover fragments were often associated with conical piles of slump from the throat and upper wall, indicating that the features originally had considerable depth. We judge that the original shape of the "ovens" was that of a frustum of a cone, with an entrance opening about 0.75 m in diameter at the top.

The pit walls were trimmed smooth but were never plastered. The completed features were then intensively and deliberately burned, producing hard terra cotta walls. Burning was visible in both the 1962-63 pre-inundation and 1987 post-inundation pits as a layer of hard, discolored fired clay which graded from dark gray smudging, sometimes with associated smutting, on the wall surfaces down to bright orange oxidation layers that penetrated 5 to 10 cm into the soil matrix. In a few cases, burning was less dramatic, involving...
only the edges of subcists or the central area of floors. Only one of the pits excavated in 1987 was clearly unburned. This pit was intruded into an earlier typically burned feature.

The current interpretation of the pits is that they functioned as storage cists rather than as ovens. The uniformity of size and shape, their occurrence in clusters of 9 to 23, the intense burning, and the lack of evidence for overheating of the cover slabs supports the current functional interpretation. They are, we believe, the local expression of the ubiquitous Basketmaker slab-lined cist.

In this area, the cists were dug into massive silty clay and then filled to produce in-place, terra cotta storage jars, rather than being carefully plastered and slab-veneered as are examples built in other soils elsewhere. They would have provided dry, sterile storage for corn, pinon nuts, or other gathered or cultivated products. Similar storage pits with hard-fired walls were excavated during the Black Mesa Project in northern Arizona (Smiley 1985:290-308). These pits are associated with Lolomai Phase, or Basketmaker II sites, and closely resemble the Oyen Site pits both in form and function.

### Dating

Firing was so intense, and the resulting terra cotta walls so stable, that the archaeological samples collected from five of the pits excavated in 1987 produced a remarkably tight and precise cluster of paleoquake observations. Eighty (1988) reported, "I believe all these features were fired at the same time...I have never seen a set of samples plot so close together before, and this observation includes experimental hearths which I knew to be contemporary. If there is ever going to be a case made for contemporaneity based on archaeological results, this will be the case."

Eighty's enthusiasm is understandable; these samples and the associated dendrochronologic dates allowed the local paleoquake curve to be extended back to ca. A.D. 600.

Of some 30 dendrochronologic samples submitted, only four were datable (Dean 1987), and all indicated dates late in the 6th or early in the seventh centuries. Three +v dates had sequences reaching back to A.D. 455 and implied cutting or death in the middle or late sixth century (A-795: OVS-1 @ A.D. 455 to 525 +v; OVS-2 @ A.D. 455 to 528 +v; OVS-24 @ A.D. 461 to 595 +v). A single + B date (A-795: OVS-3 @ A.D. 465 to 595 + B) at the turn of the seventh century was commented on specifically by Dean: "The + B indicates that OVS-3 possessed ring attributes suggestive of natural tree death. Thus, this date probably specifies the use of wood from a tree that died long before being incorporated into a site context...the chances are strong that the event postdated 600." With a unique exception (see below), no radiocarbon dates were submitted from the 1987 excavations. The tree-ring and archaeoquake dating would appear to indicate occupation in the late 6th and early seventh centuries. This agrees with radiocarbon asssessment of the 1962-63 data (Eddy 1966). Geomorphological fieldwork at the Uccls Site, LA 4363 (Figure 7), further supports this dating. Schoenwetter and Eddy (1964:51; Figure 17) illustrate and discuss the superposition of a Rosa phase burial within Rosa phase sheet midden on an erosional surface that had truncated a typical Samhrito "oven".

Ceramics placed in funerary items with burials (Figure 8) indicate a late Samhrito phase (A.D. 600 to 700) context (Errickson 1990). Samhrito Brown vessels or sherds accompanied four of the five burials. In two of the burials, Samhrito Brown co-occurred with nonlocal whiteware and grayware. If the vessels accompanying the burials are examined as a collection or assemblage, the association of Samhrito Brown vessels with Chapin Black-on-white and Chapin Gray designates a late Samhrito phase (A.D. 600 to 700) or early Rosa phase (A.D. 700 to 800) context. However, the lack of early Rosa phase vessels or sherds (e.g., Rosa Black-on-white, Rosa Gray, Rosa Neckband) indicates that the burials predate the Rosa phase and likely date to the late Samhrito phase.

More detailed attribute analysis of the mortuary vessels and sherds suggests manufacturing dates during the latter part of the late Samhrito phase, post A.D. 650 (Errickson 1990). Designs on the whiteware bowls and sherds display late Chapin Black-on-white characteristics such as a trend toward bolder and broader lined execution and the symmetrical placement of elements within the field of decoration, precedent to Piedra Black-on-white. In addition, two of the six Samhrito Brown vessels are unpolished and were fired in a more controlled reducing atmosphere than is typical for Samhrito Brown. These vessels may be representative of a transitional stage prior to true grayware technology and production which becomes dominant in the Reservoir District during the early Rosa phase.

### Pit Stratigraphy and Contents

The lowest fill stratum above the floor of the cists was usually clean, finely stratified alluvium.

---

<table>
<thead>
<tr>
<th>Number of pits</th>
<th>0.9-1.2</th>
<th>1.3-1.5</th>
<th>1.6-1.8</th>
<th>1.9-2.1</th>
<th>2.2-2.4</th>
<th>2.5-2.7</th>
<th>2.8-3.0</th>
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<tr>
<td>1987</td>
<td>0</td>
<td>7</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>22*</td>
</tr>
</tbody>
</table>

Table 1. Number of pits per pit base diameter range, LA 4169.

Figure 7. Storage pit at Uccls Site, LA 4363, showing superimposition of Rosa phase trash midden and burial. After Schoenwetter and Eddy 1964: Figure 17.
Figure 8. Ceramic assemblages from burials, LA 4169, 1987 excavations.
with few cultural inclusions and little ash. Often overlying this stratum were conical strata of burned terracotta pit walls. Although no evidence of matting was associated with the burials as in the 1962-63 excavations, a pitch-imregnated coiled basket of "kiva-jar" shape was found with one of the 1987 burials.

The 1987 collections were generally richer in faunal materials (Bertram 1988) than were the original collections as reported by Harris (1963). Cooked bone was almost exclusively limited to cottontail rabbits. Both the upland and desert species of cottontail were present, as in Harris' study. Other probable food species included jackrabbit, deer, wapiti (American elk), and turkey. Bone tools were also much more common in the 1970s collections and were made almost exclusively on the long bones of wapiti and mule deer. Tool types conform well to those already described for the reservoir (Eddy 1966) and for the Durango Basketmaker sites (Morris and Burgh 1954). The 1987 tool sets (crouches, blanks, finished tools, and worn items) were included as burial goods. Numerous individuals of small forms, especially Ord kangaroo rat and Woodhouse toad, appear to have been trapped in the pits over the years. Again, this agrees well with Harris' observations.

Shell jewelry was found with three burials and additional shell beads were found in a fourth pit. All 43 items were identified as Oliva (Agaronia) testacea, of the Family Oliviidae, a form rarely reported in the Southwest (Urban 1988). The unusual wear patterns and body holes identified on examples associated with the wrists and arms of two of the burials indicate that the shells may have been sewn onto an armband.

The osteology of the 1987 burials and most of the 1962-63 burials was studied by Nickens (1988), who reported degenerative lesions strongly suggestive of tuberculosis in several individuals. If Nickens' interpretation is correct, then tuberculosis would seem to have been present as early in the Navajo Reservoir area as anywhere in North America.

An unexpected aspect of the 1987 excavations was the recovery of a partial skeleton and an isolated tooth of a terminal Pleistocene giant pecary, found imbedded in the claybank surface near the cist complex. This specimen was identified (Bertram 1988) as a semi individual of Platymys compressus. The well-preserved pec-
This Solidly Confirms Schenewetter and Eddy’s (1964) interpretation of the late Pleistocene swamp preserved in the valley as the lowest set of erosional benches. A pecary tooth recovered from Sambritto Village, and identified by Harris (1963) as being from a white-lipped peccary imported from central Mexico as a trade item, is probably a similar Pleistocene fossil.

Discussion

Other than the Navajo Reservoir sites, very few early northern brownware sites have been reported. This lack of sites with brownware ceramics may be due to the low surface visibility of these early, very friable brownwares. Nevertheless, the near absence of reported sites with brownware ceramics in the San Juan area, as noted by Hogan et al. (1991), indicates that such sites must be uncommon.

Previously-reported brownware sites include 5MTUMR2389 and 5MTUMR2344, from the Mancos Canyon road project (Bretrenir 1986; Halley 1974, Lucius 1982), an unpublished site (LA90337) from the lower middle La Plata Valley (Warren 1986), and LA 33736 (FA 2-8), a multi-component scatter near the mouth of the Animas River tested during the Elena Gallegos project (Bertram 1991). The Mancos Canyon sites seem anomalous; UMR2344 has "Mogollon" brownware associated with Chapin point and whitewares in a late-looking, deep pithouse. Although the main posts of the pitstructure were solidly dendrochronologically dated at A.D. 406 to 485, a full ceramic or chronological analysis of the site has never been done. LA 50337 in the La Plata Valley is, based on ceramics, probably of Sambritto age, but is currently undated. LA 33736, on the Elena Gallegos project, produced seven radiocarbon dates with calibrated central tendencies ranging from 82 B.C. (TX-4922) to A.D. 840 (TX-4971). Most of the dates would indicate Los Pinos or Sambritto occupation.

Since their discovery, the brownware sites in the Navajo Reservoir have been the subject of controversy. Issues most discussed have related to chronology, settlement, and demographic interpretation, and ceramic typology. Probably the most extreme views are those of some ceramicists who have simply ignored the early northern brownwares entirely. Among those who do consider the issues, Berry (1982) and Eddy (1966) are probably farthest apart.

Berry dismisses dates, stratigraphic data, and ceramic associations for the Sambritto phase. He would combine the Sambritto with Los Pinos phase, which he would date to no later than about A.D. 350. Berry (1982:48-54) argues that the most reliable dates for the Sambritto phase are from roof fall in LA 3430 and from the floor hearth in the odd, large Pithouse 1 at the Oven Site. He discards Eddy’s later dates on less than unpeachable grounds. Berry does not recalibrate the radiocarbon dates, although he compares them to dendrochronologic dates for the Durango sites. Berry does not consider the old wood/interior ring problem in this context, although he uses equally pertinent old or interior wood arguments convincingly a few pages earlier to dismiss inconveniently early dates from Hay Hollow (Berry 1982:39-42).

If modern recalibration is done, and if a reasonable allowance of 75 years is made for old wood/inner ring problems (Figure 10), then Berry’s favored dates come in with central tendencies of A.D. 200 or 280 (LA3430 TBN7) and A.D. 330 or 390 (Oven site I-1342). These dates are not inconsistent with Eddy’s (1966) ceramic interpretations for late Los Pinos and early Sambritto. Eddy’s own favored dates, treated in the same way, come in at A.D. 715 (Uells site, Zone 10A-I-1344) and A.D. 650 or 670 (Oven site Pe 13 618: I-1343), agreeing quite well with earlier interpretations (Eddy 1966) of late Sambritto ceramics and with present interpretations from the 1987 excavations.

The author’s assessment of dating for the Oven Site(s) and for the early brownware horizons at Navajo Reservoir does not differ greatly from Eddy’s. Previously published and now data indicate that Sambritto Brown, as defined at the recent Santa Fe ceramic conference on this type (Wilson in prep.), was produced from about A.D. 275 to about A.D. 775. There are indications that the Rosa and Piedra phases may have begun later than originally suggested by Eddy. These indica-

Figure 10. Estimated dates for Sambritto phase sites, calibrated and adjusted for old wood.
tions have been confirmed by Eddy at the above-mentioned conference. Present data lead to the conclusion that Sambrito Brown, a locally made ware using bog-deposited, iron sesquioxide-enriched (Hill 1988; Wilson 1989) San Juan River alluvial clays, especially the Pleistocene terrace clays, remained in production as long as large populations were resident in the alluvial clay bottomlands and low benches of the Navajo Reservoir area. In short, Eddy’s overall model, with refinements, is supported by presently available data.

A conservative, insightful, and carefully rea-soned assessment of Basketmaker organization and of the chronology of early agriculture and ceramic development is presented by Le Blanc (1982). He models the growth of agriculture in terms of archaeologically observable data and artifacts: grooved axes, trough metates, the bow, occupation of well-watered bottoms at or below 6000 feet, early pottery, large pithouses, and many big storage features.

Using LeBlanc’s (1982:37) arguments, which are based on estimates from Ford (1968) and Nelson (1980), about 0.8 cubic meters of shelled corn would have fed one person for one year. Unfortunately, he made an algebraic error. A typical large cist 1.5 m deep and 2.5 m in maximum diameter would have 5.0 cubic meters of volume, and not 0.5 cubic meters as he calculated. Using the corrected volume calculations, the storage cist data from the Oven Site (Table 2) supports LeBlanc’s model superbly. Table 3 presents estimated person/year equivalents for the Oven Site, based on the assumption that all pits were filled and used simultaneously. Given this extreme assumption, the storage capacity represented at the Oven Site would have fed at least 136 persons, or 27 families, for one year.

Table 2. Estimated volume of pits per pit base diameter range, LA 4169.

<table>
<thead>
<tr>
<th>Basal diameters (m)</th>
<th>0.9-1.2</th>
<th>1.2-1.5</th>
<th>1.5-1.8</th>
<th>1.8-2.1</th>
<th>2.1-2.4</th>
<th>2.4-2.7</th>
<th>2.7-3.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962-63</td>
<td>0.3</td>
<td>5.6</td>
<td>16.4</td>
<td>13.2</td>
<td>30.1</td>
<td>5.2</td>
<td>7.5</td>
<td>78.3</td>
</tr>
<tr>
<td>1967</td>
<td>0.0</td>
<td>4.9</td>
<td>15.1</td>
<td>2.2</td>
<td>10.0</td>
<td>0.0</td>
<td>0.0</td>
<td>32.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>0.3</strong></td>
<td><strong>10.5</strong></td>
<td><strong>31.5</strong></td>
<td><strong>15.4</strong></td>
<td><strong>40.1</strong></td>
<td><strong>5.2</strong></td>
<td><strong>7.5</strong></td>
<td><strong>110.5</strong></td>
</tr>
</tbody>
</table>

Table 3. Estimated person year equivalents of shelled corn per pit base diameter range, LA 4169.

<table>
<thead>
<tr>
<th>Basal diameters (m)</th>
<th>0.9-1.2</th>
<th>1.2-1.5</th>
<th>1.5-1.8</th>
<th>1.8-2.1</th>
<th>2.1-2.4</th>
<th>2.4-2.7</th>
<th>2.7-3.0</th>
<th>Total</th>
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<tr>
<td>1962-63</td>
<td>0.37</td>
<td>7.00</td>
<td>20.50</td>
<td>16.50</td>
<td>37.62</td>
<td>6.50</td>
<td>9.37</td>
<td>97.96</td>
</tr>
<tr>
<td>1967</td>
<td>0.00</td>
<td>6.12</td>
<td>18.87</td>
<td>2.75</td>
<td>12.50</td>
<td>0.00</td>
<td>0.00</td>
<td>40.24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>0.37</strong></td>
<td><strong>13.12</strong></td>
<td><strong>39.37</strong></td>
<td><strong>19.25</strong></td>
<td><strong>50.12</strong></td>
<td><strong>6.50</strong></td>
<td><strong>9.37</strong></td>
<td><strong>138.10</strong></td>
</tr>
</tbody>
</table>

**Conclusions**

Reevaluation of the Oven Site, based on original data from the 1962 and 1963 excavations and new data from the 1987 excavations, indicates that the features originally believed to be cooking ovens were actually sophisticated storage cists, later used as convenient burial vaults. The concentrations of these cists, which may have been constructed simultaneously, indicates a favorable climate conducive to surplus production and an expanding population in the A.D. 600s. Reevaluation of the data also confirms the validity of Sambrito Brown as a dated ceramic type and the Sambrito phase as a definite cultural entity.

Further application of LeBlanc’s model to the San Juan River area may prove extremely rewarding. The Los Pinos-Sambrito period should eventually be seen as a precocious but regionally continuous development from En Medio Archaic to full-fledged Pueblo I Formative, broken only by local and predictable altitudinal population shifts (i.e., short local abandonments) up and down the Animas, Los Pinos, Piedra, Gobernador, and Largo drainages. These shifts, like the ones documented in the Mesa Verde once (Petersen 1980), will prove to have occurred in response to climatic and demographic factors.

There is no way to assess the potential of the area to contain more Sambrito storage locations. We may speculate confidently that similar concentrations composed of multiple features await detection within the Durango-Piedra-Largo country, but their abundance is unpredictable. They may be

a specialized adaptation to unique claybank soils peculiar only to this one location, but they could be easily be ubiquitous, although undetectable through surface surveys.

The unusually high volume of storage capacity represented at the Oven Site raises numerous questions concerning the nature of the late Sambrito occupation in the San Juan River drainage. Known late Sambrito habitation sites are scarce and would not account for the unusual number of pits present in these concentrations. One possible interpretation is that the Oven Site was a unique example of centralized storage, which in turn implies a centralized society. It is also possible that late Sambrito occupations, like Basketmaker III occupations in other areas, are masked by later superimposed settlements and not apparent during surface surveys and that the late Sambrito population was much higher than indicated by presently available data.

**Acknowledgements**

This article is based on a paper presented by Jack Bertram (Bertram and Hammack 1991) at the 56th annual meetings of the Society for American Archaeology. Most of the data discussions and interpretations, including Figures 4 and 10, are the product of Jack Bertram. The author would also like to thank the excavation and laboratory staff of CASA, without whose help this paper could not have been successfully completed. Their insights and suggestions were invaluable.
The Cedar Hill Project:
An Anasazi Frontier

Wm. Lane Shields and John D. Cater

Introduction

The investigations discussed are referred to as the Cedar Hill Project (CHP), and are concerned with nearly 34 km (over 21 miles) of pipeline corridors within a 5 km N/S x 8 km E/W (3 x 5 miles) area adjoining the Colorado border between the Animas and La Plata rivers (Figure 1). The CHP is near physiographic, hydrologic, climatic, spatial-cultural, and temporal boundaries or frontiers (Priblado and Shields 1990; Shields 1989, 1990a, 1990b; Shields and Cater 1991b).

The concept and the implications of frontiers have been discussed by numerous investigators (e.g., Green and Perlman 1985). Essentially, a frontier is marginal to a core area or to several core areas. As such, it is exposed to influences from more than one source. Simultaneously, a frontier is also a core in as much as it provides a normative view for in situ populations.

Although only a small portion of the CHP area has been inventoried, well over 100 sites are known to exist. The majority of these sites are associated with a complex of sites which are considered to constitute an Anasazi community (e.g., Dykeman and Langesfeld 1987; Eddy 1977). Anasazi settlement patterns, although they may vary in different geographic settings/areas, are determined by the relationship of the sites to great pithouses located in nuclear communities throughout the Four Corners area. As such, each nuclear community is a core for affiliated populations.

The Loma Enebro Community

The center, or nucleus of the CHP site complex, the Loma Enebro Community, covers more than 1.5 square km at the confluence of several wide valleys. Numerous pithouses, semi-subterranean/surface structures, middens, and other complex features, as well as a great pithouse, are present within the constituent sites. These latter features are more commonly termed great pithouses (Brew 1946) or great kivas (Ballard 1962) and are the ceremonial center and unifying factor in Anasazi communities (Dittert et al. 1961:221; Dykeman and Langesfeld 1987:105-107; Eddy 1977:29).

Currently, 10 sites with arbitrarily defined boundaries are recorded as the nucleus of the community. Several multiple roomblock mounds and up to 60 pithouse depressions are known. Although the number of pithouses appears to be low, three structures have been located along cutbanks and within a backhoe trench. The tops of the structures are from about 1 m to over 2 m below the present ground surface. There are no surface indications such as circular depressions, charcoal stains, etc. that would indicate the presence of these structures.

Many of the surface structures within the community nucleus had burned at, or subsequent to, abandonment, leaving vitrified jaccal mounds to mark their presence. On the east side of the community, two large sets of roomblocks are positioned atop massive platforms constructed of cobbles on the crest of a low ridge. On the south side of the community is a pithouse village on a hill top with an estimated 30 depressions. The majority of the pithouses within the community range from 6 to 8 m in diameter and as such, are termed oversized pithouses. The great kiva is located near the center of the community in the middle of the broad valley and measures between 15 and 18 m in diameter.

The most obvious settlement pattern for the CHP area is the location of sites at the confluence of valleys. Another apparent pattern is the location of village sites on the mesa edges and on low ridges which extend into the valleys. The largest village which is not a portion of the nuclear com-
Figure 1. Map showing location of project area.
community, Hawk House (LA10723), is located on a large bench with very high and vertical cliff drop-offs, especially on the east side.

Hawk House may represent a smaller community center, with up to 13 pithouses and associated jacial and cobble rubble mounds. Near the center of this village is a pithouse with a 9 m diameter which is identified as a great pithouse. The area surrounding Hawk House has had less survey than that around the Loma Encreo Community and the number of contemporary sites which could be associated with Hawk House is unknown. Four sites are currently considered to be a part of this small community.

A total of 25 sites which are associated with the Loma Encreo Community are identified in the CHP corridors. It is known that this is a small fraction of the sites in the valley.

Frontiers: Physiographic

The CHP is located in the extreme east-central portion of the Colorado Plateau physiographic province, in the north-northeast portion of the Central Basin of the San Juan Basin. The San Juan Basin is an asymmetrical, structural depression with a northwest-trending axis. The central basin is bound to the east, north, and west by the Hogback Monocline, and to the south by the Chaco Slope (Lomouri 1977). Elevations within the project area range from approximately 1823 to 2077 m (5980 to 6815 feet).

The northern portion of the project area is dominated by Tertiary period outcrops of the San Jose and Animas Formations (New Mexico Geological Society 1983). These formations are composed primarily of resistant sandstone beds which form mesas and buttes bound by near vertical to overhanging cliffs. The maximum relief of the cliffs is approximately 40 m (130 ft). The calcareous sandstones are weathering rapidly and are a major soil component throughout the region.

Frontiers: Hydrologic

The landscape has been sculpted by Pleistocene epoch glacial outwash which eventually dissected the sandstone and formed broad canyons/valleys. Terraces and other deposits from these actions are present throughout the project area. They are identified by surfaces paved with large, well rounded cobbles and often by distinctive cultural deposits. These Pleistocene deposits are more prevalent along the eastern survey corridors which are atop a high ridge overlooking the Animas River valley. The majority of the cobbles are of various types of quartzite and were used for both construction materials and for lithic artifacts.

In the project area the stream systems, which are now deeply entrenched and ephemeral, drain in an east-to-southeast direction into Cox Canyon. Cox Canyon, along with the major drainages in the Central Basin, flows south and drains into the Animas River (Loose 1977). The Cox Canyon debocheur into the Animas River is located less than 2 km (1.2 miles) from the southern end of the survey area. Seep springs are very common and quite large perennial springs are located on either side of the community along the Loma Encreo Valley. Based on the size of the intermittent channel floors, most of which are flat bottomed and sandy, seasonal runoff has been high in the past. The project area drains into the San Juan River sub-basin of the Upper Colorado River Hydrologic Region (Bureau of Land Management 1989:60).

The valley floors of Cox Canyon and its tributaries are low gradient surfaces without impediments to pedestrian traffic. Although the bluffs on either side of the valleys are generally vertical and quite high, there are enough discontinuities to allow fairly easy access to the mesa and ridge tops. The Cox Canyon tributaries are situated in broad valleys draining Lone Tree Mountain to the west. The headwaters of the Cox Canyon valley are on the east side of Black Ridge about 11 km (6.8 miles) north of the project area. The Loma Encreo Community is located about halfway along the length of a long valley which offers easy access west into the CHP. The calcareous sandstone is weathering rapidly and are a major soil component throughout the region.

Frontiers: Climatic

With average annual precipitation ranging from about 25 to 80 cm (10 to 12 inches), the CHP is located within a semi-arid climate. Although there is a positive correlation between the amount of summer precipitation and elevation within the San Juan Basin, the correlation is generally less than in other areas of New Mexico which are lower in elevation (Gillespie 1985:14-16). There is a strong predisposition to an increase in summer precipitation along a south-to-north gradient and along a west-to-east gradient. Due to the continental scale of the summer monsoon, there are no local orographic precipitation factors for the region. However, the Mogollon Rim creates a summer rain shadow for the basin and, as a result, the area is less influenced by summer monsoonal circulation patterns than by other factors. Statistically, area precipitation is well below the present ground surface near the community. Based on historical downsizing of the arroyos within the CHP, we posit that the Loma Encreo Valley contained at least a low-capacity perennial stream during the period of occupation. Based on the location and extent of known cultural manifestations in the center of the valleys, agricultural fields were apparently located along the periphery of the valley and relied on springs for moisture. The location of a large settlement is generally not in the center of potentially arable lands. The usual or expected pattern of such settlements would be on the peripheries of such lands. Based on the setting of the Loma Encreo Nuclear Community at the confluence of several wide valleys is unexpected. For an agricultural group to consume prime arable land for a community settlement would seem counterproductive, unless there is an overriding reason to do so. Whether this reason was culturally oriented or resource based remains unclear. Two possibilities can be ruled out, however. Although the community location is astride a transportation corridor, ease of access to higher ground does not seem to be a factor. Additionally, water needs do not seem to be a factor. That is, fields were placed along the edges of the valley not only for access to spring water, but because that was the only space available for field locations.

Win. Lane Shields & John D. Cater

The Cedar Hill Project
Regional overviews of the cultural prehistory and history of the northern San Juan Basin have been presented by numerous authors (e.g. Castles 1983; Cordell 1984; Hancock et al. 1988; Stuart and Gauthier 1988; Wozniak 1982). However, the spatial-cultural setting of the CHP appears to create a problem of affiliation as it is near the boundaries of several previously defined culture areas. That is, based on some reports, the CHP is near the intersection of the La Plata District to the west (Morriss 1939), the Durango District to the north (Gooding 1980), and the Navajo Reservoir District to the east (Gooding 1980). As a result, some have questioned the use of the Navajo Reservoir District phase for the CHP. These criticisms and the problem of affiliation have arisen from confusion concerning the definition of the term “district” and the current, inappropriate usage in the literature (v. Shields and Cater 1991a). Although it is easy to comprehend what the term refers to when original sources are consulted, some archaeologists have recently been utilizing the term “district” in the sense of a geographically delimited area which contains an internally cohesive cultural sequence specific to that area (Collins 1983). These investigators, usually incorrectly, reference earlier works to lend credence to their "districts" (e.g., Adams 1975; Gillespie 1976; Gooding 1980). At worst, researchers define space (a district) by what is found within their project area rather than comparison to cultural manifestations outside that project area (e.g., Adams 1975). As Stuart and Gauthier (1988:2-3) point out, this can lead to fallacious interpretations of the spatial distributions of cultural concepts.

The issue of whether the term "district" refers to a project area or a culturally significant unit of space has been directly addressed by Collins (1983) and Eddy et al. (1984). Eddy et al. (1984:7) now reserve the term "district" to designate an administrative unit and the term "drainage unit" to identify cultural space (Dr. Frank E. Eddy, personal communication 12 November 1990). This appears to return to a concept first explicated by Edgar Lee Hewett in 1908 (Collins 1983).

In any event, the spatial extent of the various Navajo Reservoir District phases was always defined as extending beyond the boundaries of that project's area (Dittert et al. 1961:235-236). This paper is partially in response to the Navajo Reservoir investigator's call to conduct surveys into other areas in order to determine (Dittert et al. 1961:263-264)...

...the extent of the manifestations that have been uncovered as well as an indication of the direction and extent of outside influences. Through research outside of the Reservoir, it should be possible to delineate spatial divisions for the cultures represented in the Reservoir District, and to relate those divisions to surrounding archaeological basins.

Based on similar population/settlement patterns, structural orientation, cobble architecture, and the ceramic assemblage, the Navajo Reservoir sequence has been applied to the CHP. The growth and decline in population, as reflected in survey-level sherds counts, is nearly identical between the Navajo Reservoir and the CHP from the Rosa through the Arboles phases (BMIII/Early PI through the PI horizon).

The Loma Enchob Community sites are generally multicompartment and exhibit a clear pattern of a growing BMIII/Early PI occupation followed by a major Late PI component. A minor PI occupation is then present, which is occasionally followed by a very limited PIII element.

Settlement patterns and random structure arrangements are virtually the same in the CHP (Shields and Cater 1991b) as that reported by Eddy (1966-93). The actual number and type of structures are quite different but this may only reflect the presence of the great kiva. Additionally, the use of cobble architecture in both areas throughout the Anasazi occupation is viewed as significant (Dittert et al. 1961:213, 220, 264; Shields 1990c).

The ceramic assemblages are also very similar. In the early portion of the Anasazi occupation, ceramics are constructed of poor quality clays with rolled quartzite sand temper. During the middle of the sequence, better quality clays begin to dominate the collections and crushed rock, in combination with sand, appears to have been the preferred additive material. By the end of the sequence, ceramics no longer follow a localized technology, but have been supplanted by technologies from the Mesa Verde region (Breternitz et al. 1984), including crushed igneous rock temper. Thus, the primary concern here is with the Anasazi Rosa, Piedra, and Arboles phases formally defined for the Navajo Reservoir Project which span the time of occupation at the Loma Enchob Community.

The Rosa Phase of the Anasazi Tradition

The Rosa phase was defined by Hall in 1944 based on: (1) his excavations in the Gobernador south of the Navajo Reservoir area, (2) H. P. Mera's (1935, 1938) previous survey work in the central and north and north of the Gobernador, and (3) Robert's (1929) work at Shabik'eeshie Village. Hall (1944:44) defined the Rosa phase as a local expression, or of, derived from, Morris' (1939) La Plata phase. Using the scheme presented by Willey and Phillips (1938), Dittert et al. (1961:220-236) formally expanded the concept for the area surrounding the Navajo Reservoir. As defined, the Rosa phase dates from ca. AD 700 to 900 (Eddy 1966:484; Eddy et al. 1980:70-81). However, west of the Reservoir area, this time marks the beginning of the Piedra phase from ca. AD 700 to 900 (Eddy et al. 1984:460). By AD 850, the Piedra phase replaces the Rosa phase in the Reservoir area.

Spatial Extent

The center of the Rosa phase (Figure 2) is apparently in the upland Gobernador country (Eddy 1966:199). The maximum spatial extent of the Rosa phase manifestation south and east is well delineated. To the south, it occurs over the entire Gobernador area but has a gradual transition in time and space into the Largo-Gallina phase (Dittert et al. 1961:236; Hall 1944). The eastern boundary of the Rosa phase was first posited by Dittert et al. (1961:235) to be the Continental Divided, although Eddy (1986:199) would place the eastern border just west of the Divide. Recently, new evidence supports extending it to the Divide (Donaldson 1983).

Although Dittert et al. (1961:235-236) identified the northern extent of the Rosa phase only about half-way up the Pine drainage and the headwaters of both the Piedra and Upper Reach of the San Juan drainage units, it is now known to be present in at least west of the lower headwaters of the Pine drainage and is dense to the headwaters of the Piedra drainage (Eddy et al. 1984:76-85). Only along the Upper Reach of the San Juan drainage does it still follow the distribution first proposed (Eddy et al. 1984:85-88). Although Eddy et al. (1984:65-66) discuss the continuation of BMIII occupations and lack of PI occupations in the Animas drainage, they note that PI sites are being documented in the northern reaches of the drainage. Based on Cater's analysis of the CHP ceramics, Rosa phase occupations clearly are present in the southwestern portion of the drainage west of the Alkali River (Piblado and Shields 1990; Shields 1989, 1990a, 1990b, Shields and Cater 1991b). Based on this information, it seems likely that the northern border drops to the south as it heads west.

Dyckman and Langenfeld (1987) identified Rosa phase ceramics at the East Side Rincon site located on the east side of the La Plata River. Cater has recently studied ceramics from excavations conducted by the San Juan College Archaeological Field School (Watson in prep.) at the East Side Rincon and from excavations conducted by the Fort Lewis College Field School on a site in the upper La Plata River drainage north of the Colorado-New Mexico state line. Rosa phase ceramics were confirmed for the East Side Rincon while BMIII and PI pottery ceramics of the Mesa Verde tradition were identified in the assemblage from the site excavated by the Fort Lewis field school. Based on these data and investigations in progress along the lower La Plata drainage conducted by the Research Section of the Museum of New Mexico's Department of Communication (17 September 1990), it is suggested that both the northernmost extent of the Rosa phase as well as the lowest extent of the La Plata River and north of the Colorado-New Mexico border. If this interpretation is correct, it mirrors a similar northern boundary shift to the west of the Piedra and Arboles phases which are discussed below. The southwestern extent of the manifestation is less clear but Dittert et al. (1961:235) and Eddy (1986:199) document it as far as Blanco.
Figure 2. Map showing spatial extent of Rosa phase.
Although a lack of absolute dates somewhat hampers interpretation, it seems most likely that the northwestern boundary of the phase was expanding from the core of the Rosa phase occupations in the Gobernador until it met the southeastern expansion of the Piedra phase from the Mancos drainage. This Piedra phase expansion is discussed below. It thus appears that Hall's original concept that the Rosa phase was a derivative of the La Plata phase should be more closely examined.

**Settlement Patterns and Traits**

The Rosa phase settlement pattern reflects a population both aggregated and dispersed across the landscape in the Navajo Reservoir area (Eddy 1968:203-204). Because of winter-dominated precipitation patterns and large-scale spring water overflow events, most of the lower terraces contained at least some boggy areas which could not be farmed. But because of slightly wetter conditions than present, farming was possible in what would normally be less desirable areas such as Pleistocene terraces and mesa tops (Eddy 1968:54-56). Site clusters begin to appear where populations are aggregating. However, the horticultural techniques and field locations required numerous small farmsteads. Thus, the overall number of sites is highest for this phase. It appears that the population was increasing at the start of the phase and reached a peak which was sustained during the Piedra phase (Eddy 1966:492-494).

**The Piedra Phase of the Anasazi Tradition**

Employing the Midwest Taxonomic System (McKern 1939), Erik K. Reed (1958) defined the Piedra Focus from two data sources. The first source was from excavations he conducted in the Mancos Canyon, and the other was Frank H. H. Roberts' (1930) excavations north of the Navajo Reservoir area. However, using the scheme presented by Willey and Phillips (1958), Dittert et al. (1961:236) refined the concept and defined the late PI horizon Piedra phase for the area surrounding the Navajo Reservoir ("phase" and "focus" are different terms for the same level of abstraction in the two classificatory schemes [Willey and Phillips 1958:21-23]). As defined, the Piedra phase dates from ca. A.D. 700 to 900 (Eddy et al. 1984:59-60; Reed 1958). However, in the Reservoir area, this time is split into the Rosa phase from ca. A.D. 700 to 850 and the Piedra phase from ca. A.D. 850 to 950 (Dittert et al. 1961; Eddy 1966; Eddy et al. 1984:76-89). The Piedra phase is thus earlier in the western portion than in the eastern portion of its spatial extent.

**Spatial Extent**

The maximum spatial extent of the Piedra phase manifestation west-to-east is well-delineated (Figure 3). It is present on the west from the area south of the Mesa Verde, or within the south central portion of the Mancos drainage unit (Eddy et al. 1984:60; Stewart L. Peckham, personal communication 15 November 1990; Curtis F. Schaafsma, personal communication 15 November 1990), and extends east to the Upper Reach of the San Juan drainage unit (Eddy et al. 1984:83) or to the Continental Divide (Dittert et al. 1961:236).

However, during the time of the Piedra phase within the Reservoir area, the western spatial extent of the manifestation is nebulous (Dittert et al. 1961:236). Bullard (1962:59) notes that ceramics along the La Plata drainage are very similar to ceramics near the Reservoir area. The similarity of ceramics in these two project areas during this time has been noted by other investigators (Dittert et al. 1961:236; Dykeman and Langenfeld 1987; Pitblado and Shields 1990; Shields 1989, 1990a, 1990b, Shields and Cater 1991b). Additionally, the presence of Piedra phase manifestations along the east side of the La Plata River valley (Dykeman and Langenfeld 1987), coupled with data collected by the CHP east of the Farmington Glade, contrasts sharply with a near absence of Piedra phase manifestations west of the La Plata River (C. Dean Wilson, personal communication 29 October 1990). This may indicate that the area west of the La Plata River and east of the Mancos River drainage was never occupied by Piedra phase populations. That is, Piedra phase populations either went around this area or leap-frogged across it.

The maximum northern extent of the phase is identified as the Mancos drainage unit in the west (Eddy et al. 1984:57-62) and the Piedra and Upper Reach of the San Juan drainage units in
Figure 3. Map showing spatial extent of Piedra phase.
The Arboles Phase of the Anasazi Tradition

The Arboles phase was first defined from Navajo Reservoir Project data (Dittert et al. 1961:221) and dates from A.D. 925 to 1050 (Eddy 1966:452, 457, 458, 504). The spatial extent of the phase is not clearly delineated, but sites assigned to this period are documented over most of the Navajo Reservoir area and as far west as the Pine River (Dittert et al. 1961:216; Eddy 1968:80; Eddy et al. 1984:76). Based on ceramic analysis conducted by Cate, most Arboles phase occupations have been identified in the CHP (Pitblado and Shields 1990; Shields 1989, 1990a, Shields and Cather 1991b). The ceramic assemblages from the East Side Rincon site, located from the Fort Lewis College site, previously did not contain any Arboles phase ceramics. Based on these data and the pattern of New Mexico’s increasing vertical extent of the lower La Plata drainage (C. Dean Wilson, personal communication 17 September 1990), it is suggested here that the western extent of the Arboles phase may have been along the Farmington Glade.

Spatial Extent

The northern boundary of the Arboles phase apparently dips to the south in an east-to-west arcuate pattern (Figure 4). In the east, it is identified as extending to the northern boundary of the Upper Reach of the San Juan drainage unit (Eddy et al. 1984:85) and just to the south of Chimney Rock (Eddy 1977) in the Piedra drainage unit (Eddy et al. 1984:91). Sites assigned to this phase are identified in the southern portion of the Piedra drainage east of the Pine River (Dittert et al. 1961:216; Eddy 1966:504). Based on data presented above concerning the western extent of the phase, the boundary seems to have been in the vicinity of the Colorado-New Mexico border as it approaches the Farmington Glade, or farther south, near the modern location of La Plata village.

The eastern extent of this phase is vague, though it extended at least through the Upper Reach of the San Juan drainage unit (Eddy et al. 1984:85). The southern extent was originally thought to have been about 15 km (9.3 miles) south of the confluence of the Piedra and San Juan rivers (Dittert et al. 1961:236). However, some of the population which migrated south of the reservoir during the Piedra phase were still present in the Gobernador area during the Arboles phase (Dr. Alfred E. Dittert, personal communication 14 November 1990; Donaldson 1983:41; Wozniak 1982:24). It is also likely that the area was inhabited during this time by Puebloan populations which had some degree returned to an Archaic period hunter-gatherer strategy (Marshall 1985:137-139; Stuart and Gaither 1986:30-44; Wozniak 1982:23-24).

Settlement Patterns and Traits

Identified settlement patterns again reflect farming practices adapted to summer-dominant precipitation. These include sites located on floodplains along river courses (Eddy et al. 1966:502), on ridges, or other elevated locations (Wozniak 1982:23-24 citing Tainter and Gillo 1980), and on high mesa terrain above 900 feet in elevation (Schoenewetter and Eddy 1964:125-126).

The summer-dominant precipitation pattern and associated headward erosion, which began during the preceding Piedra phase, continued within the Reservoir area during the Arboles phase. There apparently was a precipitous decline in overall population throughout the spatial extent of the Arboles phase (Eddy et al. 1980:300, Shields 1990a:238), which in the Navajo Reservoir area was due to upstream population migrations (Eddy et al. 1984:125-126). All three modern communities (Schoenewetter and Eddy 1964:112-113). Stream entrenchment extended over a large area (Nials 1980). Extensive stream entrenching occurred along the lower La Plata River valley where a large population increase occurred during this time. Because of peoples abandoning locations affected by stream downcutting and by related factors reflected in areas such as the Loma Enchanted community (Shields 1990a). Although trade with the Mesa Verde area was maintained, a decrease in the amount of long-distance trade goods compared to preceding phases is noted (Eddy 1966:500-501).
Figure 4. Map showing spatial extent of Arboles phase.
Premises for the Northern San Juan Basin

Based on the data and discussions presented above, several premises have been formulated (Shields 1990c):

- It appears that an indigenous northern San Juan Basin population adopted an Anasazi lifeway. This probably took place during the BMII horizon but was definitely integrated by the BMIII horizon (Dyckman and Langeinfeld 1987:22; Morris 1939).
- From the BMII through the PIH horizons, this population had stronger affiliations with Mesa Verde than with Chaco Canyon developments and may have had more contact with the Chuska Mountains/southeast Utah region than Chaco Canyon.
- From BMIII to PIH, major portions of this population were focused on and lived in and around both the Loma Encoro and East Side Rincon communities.
- During the Arboles phase, as a result of population movements, the La Plata River drainage was of greater importance to this population than the CHP area.
- One of the earmarks of this population is the use of cobble structures instead of dressed sandstone for construction. The extent of this in situ population is reflected in similar architectural styles seen from the Navajo Reservoir area (Dittert et al. 1961:233, 261), west into the La Plata River valley. It is this population that remodeled portions of Salmon Pueblo and built roomblocks at Aztec Pueblo (Dyckman and Langeinfeld 1987:87 citing Irwin-Williams 1972).
- Another distinctive trait of this population is the presence of oxidized pit structures compared to other Anasazi populations (Cater 1989). In many instances, structures (both surface and subterranean or semi-subterranean) were intentionally burned at abandonment.
- During the PIH horizon, the CHP area was used primarily either as a travel corridor or for resource procurement but may also have contained a small population with permanent habitations.

Conclusions and Remarks

The CHP identified a community center dating from the Arboles phase located along an easily traversed route between the Anasimas and La Plata rivers. It is the second large community of its kind to be identified in the area. The first community of this type, centered around the East Side Rincon site, was identified a short distance west in the La Plata River valley (Dyckman and Langeinfeld 1987).

Although the community is nucleated, the orientation and arrangement of structures within the community is random. This is similar to village layout noted throughout the region (Eddy 1986:493). The occupation sequence of the CHP area appears to parallel the sequence in the Navajo Reservoir area during the time discussed herein (Eddy 1966). However, when resettled to the Reservoir area, there appears to have been only minor occupation during the early BMII horizon in the CHP area. Around a central cobbled architecture in both areas throughout the Anasasi occupation is viewed as significant.

The occupation sequence and settlement pattern noted within the CHP reflects a trend which took place during the PIH horizon throughout the Four Corners region. At that time, the population of the region, which had settled in relatively scattered farmsteads or multi-family units, began to aggregate into larger communal settings, often around remodeled structures in a village locus. This type of aggregation has been noted in the Dolores Valley (Kane 1984), the Navajo Reservoir area (Eddy 1969), Alkal Ridge (Brew 1946), and in the La Plata River valley (Dyckman and Langeinfeld 1987).

What functions these aggregated systems served is still unclear, but it can be suggested that they afforded the opportunity to communally practice intensive farming in a limited spatial area, as well as exploit several micro-niches, because of the topographic location of the villages. These community centers undoubtedly served as trade and redistribution loci as well as serving as centers of ritual activities. In a very real sense these communities were the "cities" of their day.

Throughout the Four Corners region, community aggregations exhibit rapid growth during the late BMIII-early PI horizon, when a population peak is reached. This population is stable during the mid-late PI horizon but breaks down precipitously during the PIH horizon in the northern Anasazi area. This timing of these population fluctuations varies from subregion to subregion. Although the topic of abandonment is not directly addressed herein, some causative factors can be suggested. It is possible that as populations continued to grow within these limited spatial areas, they outran the resource potential around them. This, in combination with shifting climatic conditions, could create devastating effects on a large, centralized population. That environmental shifts were taking place at this time is evinced by work done in the Dolores Valley (Peterson 1981, 1983) and in the Navajo Reservoir area (Eddy 1968, 1972; Schoenwetter and Eddy 1964).

Eddy reports that headward erosion and arroyo downcutting in the Navajo Reservoir area parallels the abandonment of that area (Eddy 1974). If this trend continued west into the CHP area, the water table could have been lowered enough to make floodwater farming impossible. This may also have affected the flow of the local springs which are today the only source of permanent water in the CHP area.

At the time the CHP was being abandoned, the population within the La Plata Valley to the west was growing (Morris 1939) and local cobbles ma­sonry appears at the Aztec and Salmon pueblo south of the CHP along the Anasimas and San Juan rivers (Dyckman and Langeinfeld 1987). It is likely that the CHP populations shifted to the well-watered valleys, reversion to smaller hamlet or farmstead settlement patterns. A final point which should be made is that although Eddy (1966, 1968) describes headward erosion along the upper San Juan, Piedra, and Pine rivers, this may not have affected the lower reaches of these and other river valleys, where silting would have occurred. It is unknown whether similar headward erosion took place along the upper reaches of the Animas and La Plata rivers, but the population centers of the Pueblo II horizon appear to be located in the lower reaches of these valleys.

Postscript

Early in the summer of 1991, Dr. William James Judge, assisted by Dr. Richard P. Watson of San Juan College, directed a field school for Fort Lewis College in the Loma Encoro Community. Several remote sensing techniques were employed with considerable success and in addition to the field school report, professional papers are planned (Dr. Richard P. Watson, personal communication 27 July 1991).

Later in the summer of 1991, the Bureau of Land Management (BLM) Farmingtown Resource Area, which administers the property containing the nuclear community, in consultation with the New Mexico State Historic Preservation Office, designated approximately 16 square km (10 square miles), including most of the CHP as well as additional areas, as the Loma Encro Community Special Treatment Area (STA). This designation stipulates protective measures beyond those usually required on public lands and compels the BLM to acquire all private holdings in the STA. Additionally, a large area around the nuclear community will be intensively surveyed and a larger area surrounding it will be sampled. The focus of these investigations will be to define contemporaneity of structures and to fully outline settlement patterns. These investigations, in conjunction with the field school, should be a major contribution toward refining our understanding of nuclear communities.

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The Dinéhah Phase in the La Plata Valley

Gary M. Brown and Patricia M. Hancock

Introduction

During test excavations in 1984 by the Division of Conservation Archaeology (DCA) at an Anasazi site (LA 38353) in the La Plata Valley, an extramural hearth was routinely sampled for radiocarbon dating. To the investigators' astonishment, this sample produced a date much younger than expected—A.D. 1510±50 years (uncalibrated) (Beta-13787). Ceramics associated with the hearth, originally classified as plain Anasazi graywares, were reexamined and found to fit Brugge's (1963) description of Dinétah Gray Ware, a protohistoric ceramic manufactured by Athapaskan groups ancestral to the Navajo. This discovery prompted a scrutiny of all testing-phase ceramics recovered by the project, and resulted in one additional site (LA 38536) with Dinétah Gray sherds. A radiocarbon sample from this site was submitted, producing a date of A.D. 1570±50 (uncalibrated) (Beta-12341). DCA went onto the subsequent mitigation phase with the aim of recovering as many chronometric dates from these sites as possible to substantiate the Dinétah phase in the La Plata Valley. These dates, plus additional dates and a wealth of data from subsequent discoveries at the La Plata Mine, are the topic of this paper.

History of Dinétah Phase Research

The Dinétah phase was first proposed during contract archaeological studies in the Navajo Reservoir district (Dittet 1958; Dittet et al. 1961). Based initially on survey data collected during the late 1950s, Dittet defined the Dinétah phase as the earliest occupation by Athapaskan groups, encompassing the time between the initial Spanish colonization of the Southwest and the Pueblo Revolt of 1680 when aboriginal groups drove out the Spanish. Dittet placed the beginning of the Dinéhah phase at around A.D. 1550-1600, suggesting that both early Navajos and Apaches were descended from a hunter-gatherer tradition adapted to the High Plains of eastern Colorado (Dittet et al. 1961:247). He hypothesized that the Navajo-Apache split occurred about the same time as the earliest Athapaskan entry into the Southwest, shortly after initial European contact between 1540 and 1542. Thus, the Dinéhah phase was proposed as the earliest occupation of the San Juan Basin by Athapaskan groups, with Navajo culture differentiated from that of the Apaches in terms of this new adaptation to the Southwest at a time when the Apaches retained a Plains orientation.

Dittet defined the Dinéhah phase using a subtractive approach. Assuming the pre-Revolt complex to be relatively unaffected by European and Pueblo contacts, traits attributable to their influence were subtracted, including painted and slipped pottery, masonry architecture, and animal husbandry. The hypothesized core of the Dinéhah phase included forked-pole hogans, Dinétah Gray pottery, side-notched and corner-notched projectile points, side-notched axes, full-grooved mauls, and a fairly sophisticated and diverse chipped stone technology based on local materials (Dittet et al. 1954:246). Although Dittet was unsure whether or not to include agriculture, one of his collaborators included corn, bottle gourds, and beans in the list of Dinéhah cultural elements (Hester 1962:63).

Because all traits associated with the Dinéhah phase were also included in the post-Revolt Gobernador phase, identifying Dinétah occupations was difficult archaeologically, and in the minds of some it was suspect. Eddy (1966) rejected the Dinéhah phase as an identifiable occupation at Navajo Reservoir in his synthesis. This rejection was based largely on his interpretation of the survey data. Over 170 Navajo components were identified in the reservoir area with the highest concentrations near the San Juan River, particularly in the lower reaches of Frances and Pine River canyons (Dittet et al. 1961). Eddy reasoned that because of the great number of Gobernador components, it should be expected that a certain proportion would simply lack diagnostics of that particular phase (Eddy 1966: Schoenwetter and Eddy 1964). What he did not acknowledge was the conservative approach Dittet had taken in his classification; although only 4 percent of the Navajo components were classified as Dinétah, another 15 percent also lacked Gobernador phase diagnostics and were assigned to an indeterminate Navajo category due to small sample size or mixing of assemblages. The remaining 81 percent of the Navajo components were classified as Gobernador phase occupations (Dittet et al. 1961:127, Fig. 32).

The early Navajo excavation data were treated with equal skepticism. Although only a single site classified by the surveyors as Dinéhah was included in the salvage excavations (LA 3398), testing at this rockshelter produced results comparable to the survey, except for artifacts but a complete lack of Gobernador Polychrome despite the presence of Dinétah Gray, lithics, corn, a yucca square knot, and a bulbrooter (Eddy 1966:61-69). A minor Anasazi component occurred in a wet zone beneath the dry upper deposit containing the Navajo materials. Further evidence of Navajo rockshelter use during the Dinéhah phase was obtained during work at other Navajo sites (Hester and Shiner 1963), including some stratified examples, but as with results of the other excavations, potential Dinéhah components were lumped with "indeterminate Navajo" evidence in the synthesis (Eddy 1966). Data from LA 4294 are especially interesting because the argument for a Dinéhah occupation is bolstered with stratigraphic and geomorphic evidence. The lower, wet zone, interpreted at other Navajo rockshelters as a widespread deposits predating A.D. 1550 (Eddy 1966:444), contained a burned area and postholes from a burned structure associated with four hearths, while the upper, dry zone contained the remains of two masonry structures, a hearth, and another burned area associated with a ceramic assemblage that included Gobernador Polychrome (Hester and Shiner 1963:41-47). Eddy (1966:258) questioned the excavators' assignment of the lower component to the Dinéhah phase because of the earlier two ceramic assemblages consisting of only nine sherds (all Dinétah Gray).

Excavations at Tososa Rock Shelter (LA 4298) revealed comparable stratigraphy (Hester and Shiner 1963:53-63). The upper, dry zone included a rich assemblage of perishable materials, while the lower, wet zone lacked perishables but contained additional Navajo remains overlaying a basal deposit which contained Anasazi remains. A single sherd of Gobernador Polychrome in the uppermost fill suggested a post-Revolt occupation. A minor Dinétah deposit contained only Dinétah Gray. Again, the excavators' assignment of the immediate deposit (upper portion of the wet zone) to the Dinétah phase was questioned by Eddy (1966:506), though the hypothesized Dinétah component in this case included 51 sherds. It seems a bit of a paradox that Eddy, while sensitive to the small samples comprising the hypothesized Dinétah phase ceramic assemblages, chose to ignore the evidence for repeated occupation at this site, and relied on a single polychrome sherd to use Tososa Shelter as the type site for assigning a distinctive sandal (cupped-heel style) and additional perishables to the Gobernador phase (Eddy 1966:286).

Three additional Navajo sites were identified as Dinéhah: Rockshelter 7, excavators at Navajo Reservoir, while additional "indeterminate Navajo" sites were shown to lack Gobernador Polychrome or other attributes. One such site was Parchay Tray Shelter (LA 3491) where perishables included beans embedded in clay plugs from Dinétah Gray vessels. Still, the best arguments for pre-Revolt occupation were based on negative evidence. Eddy (1966:507-508) concluded that the best positive evidence for a Dinétah component in the Navajo Reservoir District was the occurrence of maize pollen in alluvial deposits cross-dated on the basis of geomorphic studies to the A.D. 1300-1400 time interval. He interpreted the pollen data as evidence of floodplain farming by early Navajo groups but
The Dinéhah Phase in the La Plata Valley

do not acknowledge this as collaborative evi-
dence in support of arguments for a Dinéhah occu-
patin at Navajo Reservoir.

Supporting evidence for the Dinéhah phase was
extremely slow in coming. Although many pre-
Revolt tree-ring dates have been obtained from
Navajo sites elsewhere in the San Juan Basin, none
are cutting dates. Six sites on Chacra Mesa pro-
duced tree-ring dates, many indicative of occupa-
tions during the eighteenth century (Gobernador
phase). One of these sites had a forked-pole hogun
that appears to have been built during the seven-
teenth century, possibly as early as A.D. 1600 (Viv-
ian 1960). More convincing evidence was not
obtained until the early 1980s when work in Blanco
Canyon by the Office of Contract Archaeology at
the University of New Mexico was reported by
Marshall (1985), who assigned components at two
sites to the Dinéhah phase based on analysis of the
ceramic assemblages and associated radiocarbon
dates. The early Navajo component at El Campo
Navahu (LA 38946) contained both Dinéhah Gray
and Gobernador Indent, a four-post structure with
interior hearth and milling bin, and an extra-
mural activity area with hearths (Marshall 1985:83-
93). Both maize and wild plant resources appear
to have been exploited. La Ceja Blanca (LA
38951) also contained temporary structures, prob-
ably made of brush, with occupations inferred dur-
ing both Dinéhah and Gobernador phases

A great deal of additional evidence supporting
the concept of the Dinéhah phase has been un-
earthed by recent excavations at the La Plata Mine
(Figure 1). Beginning with the investigations at
LA 38555 and LA 38536, described in the introducti-
on of this paper, 11 sites at the La Plata Mine have
been assigned to the Dinéhah phase based on chro-
nometric and ceramic data. Field work started in
1984 and continued intermittently until 1989 with
the efforts of DCA, Nickens and Associates, and
Marshall Associates, all supported by San Juan Coal
Company (Brown 1991; Hancock et al. 1988; Reed
et al. 1986; Reed and Horn 1986a, 1986b).

Dinéhah Phase Sites
in the La Plata Valley

La Plata sites comprise a distinct cluster near the
confluence of McDermott Arroyo, a major
tributary of the La Plata River, and Cinder Gulch,
a minor tributary of McDermott Arroyo. Both
drainages are intermittent, while the La Plata
River, only a short distance downstream, sup-
ports a lush riparian environment. Despite the
long history of both survey and excavations in this
rich archaeological district (see Dikeman and
Langenfeld 1987), Dinéhah sites have been docu-
mented only in the McDermott Arroyo area. Ad-
ditional sites may occur to the northeast up
McDermott Arroyo in southern Colorado (Karl-
son and Biggs 1985; Leidy 1976). Archaeological
visibility may play a role in the apparent cluster-
ing, with Dinéhah sites becoming more common in
other parts of the San Juan Basin as archaeol-
gists during the late 1980s and 1990s have be-
come increasingly aware of these unobtrusive
remains. Still, Dinéhah sites have not been docu-
mented in other parts of the La Plata Valley
despite ongoing survey and excavation projects in
the middle and lower sections.

These sites have a “low profile” in terms of sur-
facer indicators. This is due, in part, to the
temporary nature of the structures, where pres-
et, and to the limited number of artifacts. In
general, surface indications are limited to a light
scatter of lithic and ceramic artifacts, fire-
clay debossed rock, burned sandstone, and, occa-
sonally, ephemeral charcoal staining. In addition
to these subtle surface indications, the associated
gray and brown ceramics easily blend into the soil.
Their friable nature makes for very small sherds.
It is possible in a survey situation that these sites
could be classified as Anasazi because the sherds
can easily be mistaken for local Basketmaker III
grapeswars.

The sites are located in a variety of settings
between 9000 and 6100 feet. Most are in gently
rolling terrain dominated by pinion-juniper wood-
lands adjacent to sage parks or grassland mead-
os. All of the Dinéhah sites are associated with
intermittent drainages. Shelter is mainly offered by
the woodland setting. Despite the rich ripar
ian environment and floodplains along the La
Plata River, a zone densely occupied by the An-
asazi, the Dinéhah phase sites are consistently
located in upland settings or on terraces along
tributary drainages. Interestingly, these settings
are also where most Archaic sites in the region
appear to be located, possibly due to similar ad-

Figure 1. Location of La Plata Mine on the east side of the middle
La Plata Valley in northwestern New Mexico.
aptations. Both the Archaic and Diné phase sites appear to be oriented toward wild plant exploitation with cultivation and hunting less important subsistence pursuits.

Two different types of domestic architecture have been defined at Diné phase sites in the La Plata Valley: brush structures and forked-pole hogan. The first and most expedient type occurs archaeologically as an adobe, charcoal-stained lens with charcoal concentrations, representing charred posts in some cases. These simple dwellings appear to have been built entirely of perishable material. There are minimal remains of a log superstructure, while brushy covering materials like those used on modern-day Navajo summer brush structures are suggested by the abundance of ash and the presence of identifiable charcoal other than that attributed to the main posts and beams. Botanical analyses indicate that green branches and bark of both juniper and pinon, along with rabbitbrush and possibly additional materials, were used to cover the log framework.

Six brush structures were defined by DCA's excavations at three sites (LA 56841, 56842, and 56843) in the La Plata Mine lease (Reed et al. 1986). These ranged from oval to irregular in shape, with at least four examples having very shallow, basin-shaped floors. Site was fairly consistent, ranging from a minimum dimension of 2.0 m to a maximum of 2.9 m; floor area ranged from 3.5 to 5.1 square meters, averaging 4.4 square meters (standard deviation 0.789). Only three of the brush structures had central hearths, while one had a hearth on the north edge, and two were associated only with extramural hearths. One structure contained both a hearth and a shallow, rock-lined pit. Four of the six brush structures were excavated at a single site, but it is unclear whether any are contemporaneous; the other two structures occurred singly. DCA interpreted one other feature at a fourth site (LA 38536) as a brush structure (Hancock et al. 1986), but subsequent studies suggest that this feature could be a heavily eroded hogan (see below). A seventh brush structure was excavated by Mariah, being larger than those defined by DCA and appearing more square in shape, with the corners rounded (Brown 1991). This feature measured 3.45 by 3.75 m with a floor area of 10.2 square meters. More evidence of charred posts occurred in this structure, but there were no internal features. Two hearths were located outside of the structure (Figure 2).

The second type of domestic structure is a unique kind of forked-pole hogan constructed over a previously excavated hexagonal floor pit. This type of structure has been defined in five instances at three separate sites (LA 61828, 61838, and 61852) excavated by Mariah (Brown 1991). An additional hogan tested by DCA and later excavated by Nickens and Associates (LA 49098) may be similar, though architectural details are not as clear (Nickens et al. 1988; Reed and Horn 1980b, 1990). As noted, one additional feature originally interpreted as a brush structure by DCA (LA 38536) may be a seventh example of a hogan (Hancock et al. 1986). Ethnographically, some brush structures have shallow floor pits, but these are excavated after construction of the dwelling (Stephan C. Jett, personal communication, 1990). The hogans excavated by Mariah, however, were unquestionably built after excavation of the hexagonal foundation, with six sturdy logs abutting the corners of the hexagon or resting just outside the corner. The spaces between these primary support poles were filled with smaller logs and the conical framework was then layered with juniper bark and boughs which were, in turn, covered with 5-10 cm of earth. This type of feature represents an interesting blend of two different traditions in ethnographically known Navajo domestic architecture - conical, forked-pole construction and multi-sided floor plans. Traditionally, multi-sided hogans are built using cribbed-log construction, while forked-pole structures have informal, oval floor plans. The site of Diné phase hogans is more variable than brush structures. The six definite hogans ranged from a minimum dimension of 3.2 m to a maximum of 6.0 m; floor area ranged from 8.6 to 18.7 square meters with an average of 13.9 square meters (standard deviation 3.737). The structure at LA 38536 is consistent with the larger size range of the hogans, suggesting that our reinterpretation of this feature as an eroded hogan is plausible. Five of the six definite hogans (and the possible hogan at LA 38536) contained central hearths, more precisely described as slightly south or southeast of the center (i.e., between the center and the typical location of the entryway). The remaining hogan had a slab-lined hearth built

Figure 2. Plan map showing burned remains of a Diné phase brush structure (Feature 9) associated with two extramural hearths (Features 2 and 4), LA 1848, Block A, Structure 1.
into the north wall, forming a small alcove that could possibly have been opened to the outside to clear the dwelling of smoke. Additional intramural features were rare; two hogans had small interior warming pits and one had a low bench in the northern floor area.

The first forked-pole hogan, where a multi-sided floor plan could be defined, was excavated by Maryah in 1988 (Figure 3). Similar features were defined at two other sites the following year. The best preservation of Dinetah phase architecture occurred at LA 61852 where three forked-pole hogans had evidently been intentionally burned at the time of abandonment. Structure 1 contained a thick, aby sty inum of burned roof material surrounded by dense charcoal where the superstructure had articulated with the protohistoric ground surface (Figure 4). Patterns of charcoal and oxidation where burning structural members had collapsed on the roof assisted architectural reconstruction (Figure 5). In addition to a hexagonal floor pit excavated prior to construction, a well-defined entry lobby was observed on the southcast (Figure 6). Structure 3 at this site showed the most unequivocal evidence for excavation of a hexagonal floor pit prior to construction, especially with the major support posts which had clearly oxidized the abutting ground surface just outside the hexagon corners (Figure 7).

Structure 3 at LA 61852 had the most complex suite of intramural features with a central hearth and two warming pits. The room-pit (Feature 13) to the immediate north of the hogan is rather unusual. Structure 2 at the same site is characterized by an even more unusual roasting pit that had been built into the north wall of the hogan (Figure 8). Although this feature may have been covered with a removable flap during inclement weather, such an arrangement would have precluded its use at such times unless a hood or some such covering had been incorporated into the wall covering the feature.

Extramural features were frequently associated with both hogans and brush structures. Such features were commonly hearths, sometimes overlapping stratigraphically, suggesting reuse of the same activity areas (Brown 1991). The hearths south of Structure 1 at LA 61828 provided one such example (see Figure 3). At least one such activity area appears to have been partially sheltered by a shade. This area contained a small roasting pit and two small warming pits, along with various artifacts and site furniture (Figure 9). The two excavated basins on the right side of the photo in Figure 9 (Feature 7C and 7B) were filled with charcoal and appeared to be warming pits, while the unexcavated hearth filled with ash and burned rocks on the left (Feature 7A) proved to be a shallow roasting pit. The large slab at the top of the picture and additional remains suggest that this cooking area may have been partially sheltered by a windbreak or ramada. Other extramural features include ash lenses that appear to have been refine areas. The absence of storage features and mealng bins distinguishes the Dinetah sites from Gobernador phase sites documented elsewhere in the San Juan Basin (Brown and Evavoski 1991; Dittert et al. 1961; Edens 1966; Voss 1960).

**Artifacts**

Protohistoric ceramics excavated from the La Plata Mine sites were compared with Brugger's (1963) description of Dinetah Gray. In particular, seven attributes showed interesting similarities or differences: exterior surface treatment, interior treatment, temper, color, wall thickness, rim style, and fracture. In both interior and exterior surface treatment, the ceramics fit the type description except for a lack of cornel-scraped vessels and a scarcity of mica glints. Tempering materials frequently differ from the type description in that most of the La Plata ceramics have detrital sandstone from an igneous source along with sand and quartz temper. Tempering material is not abundant. Exterior and pastic colors are quite variable, but they fall within the previously described range. The variety of colors recorded for one vessel are believed to be the product of uncontrolled firing techniques. Rim style differs from the type description with the La Plata ceramics tending to curve outward at the lip, a characteristic occasionally observed by Brugger. The shield fracture, or profile of the shield's broken edge was crumbling or irregular and ragged. This is consistent with the vessels hardeness which was weak to medium weak.

![Figure 3. Plan map of Dinetah phase forked-pole hogan (Feature 3) in Block A and superimposed hearth series (Feature 5A-4D) in Block D, LA 61828. Note: Hearths to the east of the hogan(Features 5A, 5B, and 9) occurred slightly deeper than the Dinetah phase component, dating to the Archaic Period.](image-url)
The only distinctive attribute differences between Brugge's type description and the La Plata ceramics are rim lip and tempering material. Temper in the La Plata collections displays a wide variety of mixed materials of various mineral compositions, size, and degree of sorting. Some of the fragments appear to be quartzite, granite, gneiss, and diorite. Sherds containing sand or sandstone and crushed andesite or diorite are very common. No consistent pattern of temper choice can be seen. Most of the material looks more like coarsely sorted lithic fragments from detrital outwash slopes than from well-sorted riverine sands. Sandstone from this area has more uniformity in composition than the temper in most of these sherds. Materials from various localities occur in the temper. Tempering materials were not the product of intentional crushing of volcanic rocks, as with the Anasazi, but rather the collection of sands having igneous rock as part of their composition. The original source of the igneous rocks is believed to be the La Plata Mountains to the north; however, the material was evidently transported by river and simply gathered as sediments by protohistoric potters, potentially within the project area. Using Colton's typology (1953:Figure 10), rim styles from DCA's collection fall into the following categories: IA3, IIIA3, IIIIB6, IIIIB7, and IIIIB10. Brugge's rim forms are IA3, IB3, IB4, IIa4, IIb3, IIIA10, IIIB3, IIIB5, VB4, AND VB5.

The slightly curved/flared lip morphology distinctive of La Plata Variety ceramics is illustrated by a partially reconstructed vessel excavated from floor context in one of the Dinetah phase hogans (Figure 10). The vessel has a globular body built up with wide coils that have been bonded together but only partially smoothed. The coils can still be distinguished individually, especially at the top where three fillets evidently were intentionally left unobliterated to create a neckbanded style reminiscent of early Pueblo plainware jars. In this regard, the vessel is rather unique. It was recovered from one of the most tightly dated contexts, dated to the early 1500s. The interior of
Figure 5. Plan map showing burned remains of a Dinetah phase forked-pole hogan (Structure 1) and associated ash dump (Feature 2) and hearths (Features 7, 8, and 9), LA 61852, Blocks A (left) and B (right).
The Dinetah Phase in the La Plata Valley

Figure 6. Plan map of Dinetah phase forked-pole hogan (Structure 1), LA 61852, Block A, after exposure of floor materials (compare Figure 5).

Figure 7. Plan map and profile of Dinetah phase forked-pole hogan (Structure 3/Feature 5), LA 61852, Block E, after exposure of floor materials.
The Dinetah Phase in the La Plata Valley

Figure 8. Buried remains of a Dinetah phase forked-pole hogan excavated to floor level, LA 61832, Block C, Structure 2(Feature 4). View is to the northwest with roasting pit incorporated into the north wall of the hogan.

this cooking jar contained traces of organic residue, probably some kind of broth or stew. The Dinetah Gray collections from the La Plata Mine can be sorted into three groups. In decreasing order of abundance these are: (1) La Plata Variety; (2) standard Dinetah Gray; and (3) Gobernador Variety. La Plata Variety ceramics have temper like that just described, consisting mainly of local detrital sand and igneous rock. Standard Dinetah Gray is characterized by quartz sand, while Gobernador Variety ceramics (Brugge 1980), also referred to as Gobernador Indented (Carlson 1965), are distinguished by shallow, finger-impressed indentations on a surface that is otherwise smooth. The last two varieties are fairly uncommon in the La Plata Valley. We propose that Dinetah Gray, La Plata Variety ceramics (1) are the product of Athapaskan groups ancestral to the Navajo; (2) are among the earliest pottery manufactured by Athapaskan groups in the Southwest; and (3) differ slightly from standard Dinetah Gray.

In tempering material due to the nature of local resources. Lithic artifacts were fairly common at these sites, including both chipped stone tools and debitage, along with moderate quantities of ground stone. Sites with forked-pole hogan cores, averaging about 20 tools per hogan, while brush structures were associated with a comparable number (Brown 1991). Ground stone was more variable in occurrence, but generally occurred in similar numbers, while hammerstones and other pecked stone tools were less common. Various unflaked lithic tools were generally more common in Dinetah assemblages than at either Anasazi or Archaic sites at the La Plata Mine. Interestingly, formal tools were more common than at the earlier sites, even the Archaic assemblages. Formal tools, including bifaces, projectile points, scrapers, choppers, and other items, made up nearly half of the chipped stone tools and cores, with expedient flake and core tools comprising much of the remainder. The ground stone assemblages were diverse, containing one-hand and two-hand manos (both cobble and shaped forms), basin and slab metates, and some additional formal tools such as shaft adzes.

Most of the projectile points were small unnotched triangular arrow points (Cottonwood series) and small side-notched arrow points with a concave base and/or basal notch (Desert series). Examples of these two main forms occurred at several sites (Figure 11). Both forms are common in protohistoric collections through much of the western United States. Scavenging of points and other tools from Anasazi sites appears to have been fairly common at La Plata sites (Hancock et al. 1988). The Late Pueblo style point (Figure 11-a) may be one such example. It occurred on the east edge of a hogan that appears to have been recently abandoned and burned. The two large serrated "points" (Figure 11-b and 11-c), one stained with ochre, were collected from the floor of the hogan, along with a deer antler that had been placed in the entry (see Figure 6). The neckbanded jar described above also was found on the floor of this structure. Chipped stone debitage was fairly abundant in Dinetah assemblages, generally including about 80 to 100 items per dwelling, although debitage was not actually common within the domestic structures. The ratio of flakes to angular debris was slightly higher than even Archaic assemblages. Although biface reduction and thinning flakes were somewhat less common than at the Archaic sites, smaller-sized tool retouch and refurbishing debris were more common than in any of the other assemblages at the La Plata Mine. Various debitage types in a collection of 797 pieces from Dinetah phase contexts were represented in the following percentages: 38 percent core reduction flakes, 15 percent biface flakes, 9 percent retouch flakes, 11 percent indeterminate flake fragments, and 7 percent shatter. Overall, the debitage assemblages complemented the number of formal chipped stone tools.

Figure 9. Internal features in Dinetah phase activity area, LA 61838, Block C.
Figure 10. Partially reconstructed Dinetah Gray (La Plata variety) vessel recovered from Structure 1, LA 61852. Width of vessel at the neck is 17 cm.

Figure 11. Selected projectile points from Dinetah phase contexts. Cottonwood Triangular and Desert Side-notched points from LA 61882 (a, b); LA 61848 (c, d); LA 61852 (e, f, g, h, i, j, k); serrated "points" (l, m) from LA 61852; and Late Pueblo style point (n) from LA 61852.
Subsistence

One of the most salient characteristics of the Dinéh phase is the emphasis on hunting and gathering compared to the post-Revolv Goben-
ador phase when the importance of domesticated animals and plants increased along with various other influences from the Spanish and various Pueblo groups (Hester 1962). The degree of reliance on agricultural resources was uncertain, as was the status of the Dinéh phase in general, during the course of most of the field work at the La Plata Mine. Although ethnohistorical studies at these shallow sites have not been extremely pro-
ductive, they have produced some subsistence data. One of the major conclusions is that although domestic plants were raised, they appear to have made a relatively minor contribution to the subsis-
tence base. Despite intensive pollen and flotation analyses, domestic plants were represented only rarely. Corn was found in only one flotation sam-
piece and in one other context during normal excavation procedures; domestic beans were recovered from one hearth. Corn pollen was identified in Dinéh contexts at six sites. Corn pollen was very scarce, with no aggregates, thus, we are unsure whether or not corn was actually cultivated in the project area.

In contrast, a great deal of information on wild resource procurement has been accumulated. Pol-
les was the emphasis on the use of repeatedly identified Cheno-ams, with goosefoot (Chenopodium sp.) in particular being a common macrofossil. Cultural use of the following plant types was also indicated: carrot/parsecy family (Umbelliferae), grass (Gramineae), cattail (Typha sp.), cholla and prickly pear (Opuntia sp.), squashberry (Rhus sp.), wild buckwheat, and potato/tomato family (Solanaceae), pea family (Leguminosae), globemallow (Sphaeralcea sp.), and lily family (Liliaceae). These genera, or at least some of the species in each, were all readily available in the immediate environment and are suggestive of a gathering economy. In addition, juniper (Juniperus osteosperma), pine (Pinus sp.), sagu-
aro (Artemisia sp.), and rabbitbrush (Chrysothamnus sp.) were used as fuel and possibly edibles, as well as for construction material. Oak (Quercus sp.) was also used for fuel, but there is no evidence for its use as acorns. Although oak is not presently found in the La Plata Mine area, drift-
wood washed down from higher elevations to the north probably can be found in the major drain-
geages. Faunal remains were not common at Dinéh phase sites, but various artiodactyls, lagomorphs, rodents, and birds were identified. One site (LA 61852) where faunal remains were unusually common produced all of these taxa, with mule deer (Odocoileus hemionus), cottontail (Sylvilagus sp.), and jackrabbit (Lepus sp.) well represented. Given the excellent deer habitat in the project area, the minimal presence of deer bone and faunal remains generally appears to be noteworthy. It would appear that hunting was relatively opportunistic rather than selective, at least during spring and summer when botanical data suggest most sites were occupied. Botanical analyses suggest overwintering only at the one site that did produce substantial faunal remains. Artiodactyls were abundant during growing spring and summer, displayed a similar lack of faunal remains, although in this case the scarcity might be due to taphonomic factors.

Chronology

Since the Dinéh phase was defined in the Navajo Reservoir district, there has been consid-
erable effort to place it into an absolute chrono-
logical context. Assuming that a pre-Revolv Athapaskan occupation did occur in the San Juan Basin, there are two important chronological is-
sees to be assessed. The first is the age of the Dinéh phase specific dates; the second is the initial arrival date of Athapaskan in the region, a subject beyond the scope of this paper. There is some evidence from the La Plata Mine suggesting that occupation between the Anasazi abandonment and the earli-
est Dinéh phase may be quite different from either of these better-documented occupations, possibly being an aceramic and even more unob-
trusive phenomenon than that characteristic of the Dinéh phase (Brown 1991). We regard the origins of Athapaskan in the Four Corners re-
gion as an open question that cannot necessarily be equated with the Dinéh phase.

Dinéh phase research has been successful to a certain extent. DCA obtained radiocarbon dates from most of the La Plata sites. DCA obtained radiocarbon dates from most excavated protophoric components, as well as obsidian hydration and thermoluminescence (TL) dates (Hancock et al. 1988; Reed et al. 1988). Additional radiocarbon dates were obtained from one site by Nickens and Associates (Reed and Horn 1988), while another radio-
carbon date was secured from a small camp asso-
ciated with a few Dinéh sherds by the BLM (Gaudy 1986). Mariah secured numerous addi-
tional radiocarbon dates, along with obsidian hy-
dration dates and the only protophorphic tree-ring dates from the La Plata Valley (Brown 1991). Archaeomagnetic dating was also attempted, but the only protophoric sample that proved successful was from an aceramic site.

The results of the chronometric assays are pro-
vocative. The small site investigated by the BLM provided the oldest radiocarbon date (600±40 B.C.; cal A.D. 1285-1408 (D1C-3334)). Comparable radiocarbon dates were generated by DCA's work, the mean on the majority ranging between 570 and 210 B.P. (cal A.D. 1332-1659). DCA obtained more direct dates by TL dating on 27 Dinéh sherds from seven protophoric sites. Mean dates ranged from 470 to 250 B.P. (A.D. 1480-1700) except for one very early outlier having a large standard deviation (610±122 B.C.). The dates are insufficient to raw radiocarbon dates from the same sites, but they are substantially youn-
ger than radiocarbon dates that were tree-ring cor-
rected (Reed et al. 1988:356). Thirty obsidian artifacts from prehistoric contexts also were dated. The mean dates ranged from 643 to 333 B.P. (A.D. 1307-1617), comparing favorably with cor-
rected radiocarbon dates but, on the whole, they are substantially earlier than TL dates from the same sites (Reed et al. 1988:356). Radiocarbon dating is still difficult to apply archae-
ologically, especially with relatively young sites such as those occupied during the Dinéh phase. DCA attempted to circumvent problems with ra-
diocarbon dating by relying on alternative dating methods. This was done with ceramics using TL dating, which has the advantage of dating the ob-
ingen of interest (pottery) directly rather than by associ-
ated materials. A question of great concern is the origin of Navajo pottery marfacature. Based on studies at Abiquiu Reservoir, Schachner (1979) argues that Navajo pottery dates only after the Pueblo Revolt because the associated radiocarbon dates could be earlier than the actual occupation.

Once the presence of Dinéh phase sites at the La Plata Mine was identified, DCA made a con-
certed effort to determine the age of the associ-
ated ceramics. TL dating was one important means of doing this, producing a median date of 1560 and a mode of 1530. These data strongly suggest that Dinéh Gray pottery from the La Plata Mine was made prior to the Pueblo Revolt of 1680.

In this study, TL dating was consistent in that sherds from the same vessel, submitted to the laboratory without information on their associa-
tion, yielded nearly identical dates. At one site (LA 38535), two combined sherds were dated within 10 years of each other (A.D. 1460±98 and 1479±87). At another site (LA 56042), two sherds with similar ceramic characteristics were dated and believed to be from the same vessel but were dated to A.D. 1510, ±88 (Alpha-3133) and 2±4 (Alpha-3139). Burned sandstone and its matrix came from the same feature as the sherds provided a somewhat younger date: A.D. 1590±40. A ra-
diocarbon date from the same feature yielded a calibrated date of A.D. 1439-1660 (Beta-17918).

Obsidian hydration dating was also attempted at Dinéh phase sites. The results have been more problematic than the other chronological dates, as techniques employed; the best results are those obtained by DCA on 26 artifacts from the Obsid-
ian Ridge and Polvadera source areas in the Jemez Mountains (Hancock et al. 1988; Reed et al. 1988). The mean dates ranged from A.D. 1309 to 1617 with 1494 representing both the median and mode. The majority of the dates cluster in the 1500s. These dates tend to be slightly earlier than other types of dates submitted from the same sites. This was especially true for Kin'Ata' (LA 49498), which has a cluster of A.D. 130 dates that appears inconsistent with both the TL and radio-
carbon dates.

DCA used the TL dates, supplemented by a large suite of radiocarbon dates, to demonstrate pre-Revolv occupation at the La Plata Mine (Hancock et al. 1988; Reed et al. 1988). While DCA merely suggested the need to push the be-
ginning date for the Dinéh phase back, Reed and Horn (1986) were the first to unequiv-
ically claim they had documented a Navajo com-
ponent fully a century older than the start of the Dinéh phase as originally hypothesized (Dittrit
Navajo construction, were used to argue that radiocarbon dates 100-200 years older than the building event should be expected with wood charcoal samples derived from burned hogan, primarily because of the use of dead wood. Comparing such dates with associated tree-ring dates and nonwood radiocarbon dates (i.e., burned seeds and bark) made it possible to test predictions of the old-wood model at two of the newly-excavated sites at the La Plata Mine (Brown 1990). This analysis showed how sites radiocarbon-dated to the fourteenth and fifteenth centuries really were occupied 100-200 years later, as expected by the model. These results support Hogan's (1989) conclusion that the late end of the 95 percent confidence interval obtained from calibrated radiocarbon dates is a useful constraint on the calendar date than the mean. Although Hogan (1989) favors a beginning date of 1450, he shows that all of the Dinéh phase radiocarbon dates have ranges with upper limits extending into the sixteenth century. Hogan relies largely on several TL dates with means prior to 1500 to support his argument for revising the beginning date of the Dinéh phase.

Although utilizing a broad array of dates as Hogan (1990) did to elucidate regional and cultural patterns, Brown (1990) went a step further in attempting to identify individual sites that could provide "strong cases" for dating the beginning of the Dinéh phase. Rather than a single radiocarbon date, he argued that it was more appropriate to focus on late dates and examine the possibility that earlier dates from the same context reflect old wood use, cross-section effects, and other predictable characteristics of radiocarbon dating. At K'Atsa, for instance, rather than averaging all six dates and accepting the midpoint (Reed and Horn 1988, 1990), it seems more reasonable to average only the two "cutting dates" provided by DCA, since only they control for at least cross-section effect. Both dates are the same, providing an average of 1420±24 B.P., which has a 95 percent confidence interval in the 1413-1524 range. Assuming the use of dead wood in building the structure, construction during the early sixteenth century is most probable. As noted above, the TL dates rejected by Reed and Horn (1990) indicate occupation during the seventeenth century.

Brown (1990) was most interested in sites that would demonstrate the need to revise the current beginning date of ca. A.D. 1550 for the Dinéh phase. Employing the lag-time hypothesis with the wood-use model, he argued that only dates 150 years older than the originally proposed date of A.D. 1550 provided convincing evidence that the behavior associated with the radiocarbon dates occurred prior to that time. Probability distributions generated through computer analysis of the radiocarbon data were used to identify all radiocarbon dates with a major probability during the fourteenth century or earlier. Eighteen of the 46 probistic Navajo dates from the La Plata Mine fit into this range (30 percent). Eight of 13 sites in the sample produced one or more early dates, but two of these later dates are debatable (the 1444-1451 range, i.e., LA 38538 [Hancock et al. 1988] and LA 56841 [Reed et al. 1988], each site having disparate dates obtained from a single hearth. As suggested, the most prudent conclusion in such cases is to accept the later of the two dates and attribute the earlier date to wood characteristics.

One of the DCA sites (LA 56043) has three early dates, all associated with an open camp area in the south-central part of the site (Reed et al. 1988). A fourth date (1413±20 B.P. - cal A.D. 1332±1440) from the same site was not classified as "early" (i.e., pre-1440) but supports a relatively early occupation. Two proto-structural features elsewhere in the site have younger dates, suggesting that the probability of two separate components: a relatively early Dinéh phase open-air camp and a later Dinéh occupation that included forked-pole hogan. The four dates associated with the former are statistically contemporaneous and can be averaged to provide a single date (cal A.D. 1332±1440 - cal A.D. 1332±1440) with a 93 percent probability in the A.D. 1394-1440 range. This component is regarded as a strong case for a Dinéh occupation prior to 1550. In terms of the above-defined "cutting dates" provided by DCA, since only they control for at least cross-section effect both dates are the same, providing an average of 1420±24 B.P., which has a 95 percent confidence interval in the 1413-1524 range. Assuming the use of dead wood in building the structure, construction during the early sixteenth century is most probable. As noted above, the TL dates rejected by Reed and Horn (1990) indicate occupation during the seventeenth century.

Collectively, they do provide some evidence in support of a pre-1550 occupation. Two other sites excavated by Reed and Horn (1988) provided one strong case for occupation as early as 1500 (LA 61852) and one very positive test of the old wood model (LA 61838), showing how radiocarbon dates predictably overestimate occupational dates. The latter site is of special interest because two "early" radiocarbon dates were compared with later dates, including the only tree-ring dates available from a Dinéh site. Both early dates came from cooking features in an outdoor activity area and fall in the 1385-1463 range. A third, directly associated cooking feature was dated slightly later (1443-1555 with a 93 percent probability of the 1444-1551 range). Tree-ring samples from one of the "early" features also produced dates toward the later end of the early range: 1454±9 and 1454±9. A partially burned forked-pole hogan at this site also produced both tree-ring and radiocarbon dates, although the latter were not classified as "early." The radiocarbon dates are both on outer rings from charred poles, one pinon and one juniper. The two dates are very similar with sample La 56842A dated 1455±12 (1445-1550, 95 percent confidence) and 1455±12 (1455±12, 95 percent confidence). The pinon specimen that provided a radiocarbon date was also dated by the Tree-Ring Lab at 1500±50. Another date of 1490±50 was classified from a juniper pole. The radiocarbon dates and tree-ring dates complement each other very well. However, if it had not been possible to control cross-section effects by collecting outer wood, this factor would probably have been considerable. Both tree-ring dates are older than the radiocarbon date which must have been obtained from a structure that could not have been built before A.D. 1560. Realistically, the absence of sapwood on the latest tree-ring dates back beyond 1550 (Brown 1990).
ring sample indicates that the structure was probably not built before A.D. 1600, even if dead wood was not used (William J. Robinson, personal communication 1990).

Predictably, the occupation of this site is overestimated by the radiocarbon data, despite the control over cross-section effects. Even the tree-ring dates grossly overestimate the occupation date since sapwood is lacking on all four specimens and the hogan, at least, could not have been built during the "early Dinétah" phase, even if live trees were cut. Given the probability of dead wood use, the occupation of the hogan probably occurred during the late seventeenth century, possibly later, and definitely toward the youngest extreme of the youngest radiocarbon date range. The activity area at this site might be earlier, but still must have occurred well after the youngest of the two tree-ring dates, most likely not before the early sixteenth century. Again, however, this is much later than associated radiocarbon dates would suggest, occurring at the youngest extreme of the youngest date. Thus, LA 60586 is rejected as a good case for Dinétah occupation before 1550, despite the occurrence of "early" radiocarbon dates.

In spite of the implications of the wood-use model, one site was identified with occupation during the early fifteenth century. Six out of 12 radiocarbon dates from LA 60582 fall in the 1218-1496 range. Even the latest of the dates from this site has a 93 percent probability of being older than 1625, and no evidence at all contradicts relatively early assignment. Several of the "later" dates (A.D. 1387-1955) are on juniper seeds and bark, not affected by dead wood or cross-section effects. Comparing the dates on seeds and bark with wood dates supports the model of dead wood use and associated lag time. The data also support the relatively early status of this site. However, seeds and bark in all three hogan at this site produced dates encompassing the early 1600s, suggesting that post-1590 occupation cannot be ruled out, despite the number of wood dates in the "early" range. The earliest reliable occupation date from this site is provided by charred seeds from Structure I, 1415-1634, with a 76 percent probability of being older than 1530.

Conclusions

To summarize, the earliest Dinétah occupation at the La Plata Mine appears to date around A.D. 1500. With the evidence currently available, we do not see any justification in pushing the Dinétah phase back further than this, although earlier occupations may be documented through future work. The Dinétah example shows how misleading reliance on a single dating technique can be. The use of multiple dating techniques is especially critical with periods requiring tight chronological control like the protohistoric.

We prefer to characterize the Dinétah phase as a discrete cultural and chronological unit with specific architectural and artifactual traits, rather than to associate it necessarily with the earliest Athapaskan occupation of the Southwest. Caution should be exercised against loading too much meaning into a chronological unit. There are several testable hypotheses embedded in Dittert's original description of the Dinétah phase that still merit rigorous evaluation. The Athapaskan entry into the Southwest, the beginnings of Athapaskan pottery making, the differentiation of Apache and Navajo cultures, and the establishment of the latter in the Dinétah region were not necessarily simultaneous. Our main concern in this paper has been with chronological parameters of the Dinétah model and providing as full a description of its cultural and archaeological traits as we can for the La Plata region.

The origins of the Dinétah phase are still poorly known. Only recently has it been possible to clearly identify such a phenomenon as more than just a complex lacking certain Gobernador phase diagnostics. Tentative dates of A.D. 1500-1700 can be placed on the Dinétah phase, but the early protohistoric is still fertile ground for continued research.

Endnotes

1. Radiocarbon dates have been corrected based on tree-ring calibrations published by Stuiver and Pearson (1986) so that these dates can be compared with dendrochronological, obsidian hydration, TL, and other calendar dates (e.g., historic events). A computer program developed by the Quaternary Isotope Lab at the University of Washington (Stuiver and Reimer 1986, 1987) was employed in all calibrations, probability plots, and averaging done in this study. Calibrated dates are rendered in years A.D. with the "cal" prefix, while radiocarbon dates with the suffix "B.P." are uncorrected dates as reported by the radiocarbon labs. Radiocarbon age ranges were calculated based on two standard deviations. The chromatic analysis is discussed further in Brown (1990).

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The Protohistoric Navajo: Implications of Interaction, Exchange, and Alliance Formation with the Eastern and Western Pueblos

Lori Stephens Reed and Paul F. Reed

Introduction

The protohistoric Navajo occupation of the Upper San Juan Drainage Basin spans the time period from approximately A.D. 1500 to 1780. Contact between the Navajo and the Eastern and Western Pueblo groups began during the Dinétah phase (A.D. 1500-1690). Although this interaction was limited, by the beginning of the Gobernador phase (A.D. 1690-1780), contact between the two groups had increased to a great extent. This interaction climaxed during the Pueblo Revolt and Spanish Reconquest when Eastern Pueblo refugees from the Jemez Mountains, and several other areas, fled to live with the Navajo and their Western Pueblo neighbors. The degree and significance of exchange and interaction between the Navajo and Pueblo groups has been an issue for many years. Traditionally, the interaction has been viewed as a significant development for the Navajo, whereby they adopted many Pueblo cultural traits. Among the more significant traits adopted were the use of masonry architecture (pueblitos) and the manufacture of sophisticated polychrome ceramics (e.g., Gobernador Polychrome) (Carlson 1965; Dittert 1958; Hester and Shiner 1963).

In this paper, we draw upon a data base of over 1100 Navajo sites located in the Upper San Juan Drainage area (Figure 1) in order to discuss the extent and significance of interaction between the Navajo and Pueblo on several levels. Our primary focus is on interpreting this interaction as it relates to the alliance behavior that developed between the Navajo and Pueblo cultural groups and how this contact provided networks by which Pueblo refugees were able to rely on the Navajo for sanctuary during the aftermath of the Pueblo Revolt.

Dinetah Phase

The earliest period of Navajo occupation in the Upper San Juan Drainage area is termed the Dinétah phase. The Dinétah phase was defined by Hester (1962) as the period during which the Navajo settled in the Southwest. Although extensive work in the Navajo Reservoir District (Dinetah area) was conducted during the 1950s and 1960s, no concrete evidence of Navajo occupation prior to A.D. 1700 was uncovered (Eddy 1966).

Identifying the time frame during which the Navajo entered the Dinétah area has been problematical. Some researchers believe the Navajo were in the Southwest by approximately A.D. 1500 (e.g., Bailey and Bailey 1978; Brugge 1984; Hester 1962), while others believe they arrived at the time the Spanish entered New Mexico in A.D. 1540 or even later (Gunnerson and Gunnerson 1971; Schafmsa 1976, 1979, 1981; Schroeder 1974; Wilcox 1981). New evidence that supports an early entry for the Navajo into the Southwest, as well as supporting the proposed Dinétah phase, has been accumulating over the last decade. These data indicate that the Navajo were in northwestern New Mexico by A.D. 1500 and probably had arrived in the A.D. 1400s (Brown...
Figure 1. Map showing distribution of Navajo sites in the study area.
Table 1. Distribution of sites by type.

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habitation</td>
<td>390</td>
<td>34%</td>
</tr>
<tr>
<td>Camp</td>
<td>455</td>
<td>36%</td>
</tr>
<tr>
<td>Scatter</td>
<td>258</td>
<td>23%</td>
</tr>
<tr>
<td>Total</td>
<td>1146</td>
<td>100%</td>
</tr>
</tbody>
</table>

Tewa from Santa Clara, some of the Tewas from San Ildefonso and Poojape, and some of the Jemez fled the northern Rio Grande during the revolt and subsequent reconquest. Many of these refugees went to the Hopi, Zuni, or Acoma regions and a smaller group of refugees went to live with the Navajos (Dover 1966; Forbes 1960; Hogan 1991; Spicer 1962).

Based upon the presence of Pueblo refugees at Navajo sites, Bailey and Bailey (1986:15) have suggested that the Navajo became "biological and cultural hybrids" as a result of this contact. In order for this to have happened, a substantial number of Pueblo refugees would have had to have fled to the Navajo area, and merged with the Navajo population. There is, however, no archaeological or historical evidence to suggest that great numbers of Pueblo refugees went to the Navajo area or remained permanently with the Navajos. Thus, as recently suggested by Hogan (1991), this assumption of biological and cultural mixing is probably unrealistic.

Data

The data used in this study were derived from the Archaeological Records Management System (ARMS) data base maintained by the Laboratory of Anthropology in Santa Fe, New Mexico. In addition, data on numerous sites not currently in the ARMS data base were taken directly from the site files of the Division of Conservation Archaeology and the San Juan College Cultural Resource Management Program. A total of 1146 sites were used in the study.

In order to understand the patterning and distributional change in a site typology was necessary. Because the site typology used by the ARMS data base was too complex for the purposes of this paper, each site was reclassified using a more simplistic typology. Sites were grouped into one of four categories based on number and types of features: pueblo, habitation, camp, and scatter. Certain specialized sites such as rock art and sweatlodges were excluded from the study. The frequency and percentage of these site types are presented in Table 1.

Because the ARMS data base does not code information on ceramic types present, this information, along with the recoded site types, had to be taken from each individual site form. The presence or absence of obsidian, Gobernador Polychrome, and tradeware ceramics by type was coded for all Navajo sites in the data base. The types of tradeware recorded for these sites include Rio Grande Glaze ware, Bisqueware, Jemez Black-on-white, and ceramics from the Tewa, Keres, Hopi, and Zuni-Acoma areas. These data for each site were coded into the Rhose data management system and various sorts on the data were generated. In addition to coding the presence of tradeware in this manner, two subsequent categories were added to the data base: Eastern Pueblo and Western Pueblo. Sites coded as having Eastern Pueblo ceramics included those sites with either Rio Grande Glaze ware, Bisqueware, or ceramics from the Jemez, Tewa, or Keres areas. Western Pueblo ceramics included those ceramics from either Zuni/Acoma or Hopi.
dence during the aftermath of the Spanish Reconquest is a possibility. If the Puebloan visitors were from nearby Eastern Pueblos, a relatively high number of sites with such ceramics is expected. In the case of habitation sites, a considerable amount of trade ceramics are to be expected given the wide range of activities that normally occur at these sites. The declines in percentage at scatter and camps are also expected given the limited nature of activities occurring at these sites, as well as greater specialization of such activities.

Table 2. Number of sites with Eastern Pueblo ceramics by site type.

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Jemez</th>
<th>Glaze</th>
<th>Biscuit</th>
<th>Tewa</th>
<th>Keres</th>
<th>E. Pueblo</th>
<th>Relative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo</td>
<td>7</td>
<td>4</td>
<td>-</td>
<td>9</td>
<td>8</td>
<td>18</td>
<td>29%</td>
</tr>
<tr>
<td>Habitation</td>
<td>64</td>
<td>31</td>
<td>2</td>
<td>13</td>
<td>3</td>
<td>104</td>
<td>27%</td>
</tr>
<tr>
<td>Camp</td>
<td>64</td>
<td>30</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>88</td>
<td>20%</td>
</tr>
<tr>
<td>Scatter</td>
<td>42</td>
<td>27</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>65</td>
<td>25%</td>
</tr>
</tbody>
</table>

Average: 23%

*1Based on totals in Table 1.
*2This column is not a total of other columns, but reflects the total number of sites with any Eastern Pueblo ceramic type present.

What is surprising is that the average percentage (23 percent) of Navajo sites having any type of Eastern Pueblo ceramics is so high. Nearly one in four Navajo sites have Eastern Pueblo ceramics, indicating that a great deal of contact occurred between the two groups. In fact, such a high percentage of trade ceramics compares favorably to Anasazi regions said to have engaged in heavy trade. For example, out of 198 Anasazi sites recorded during work undertaken by the Office of Contract Archaeology along the lower Chaco River (the CGP Project), over 50 percent had imported ceramics present (Wines 1977). On the other hand, on Wetherill Mesa at Mesa Verde, Colorado, less than 4 percent of the recorded sites had trade ceramics (Hayes 1964). In Chaco Canyon, later Navajo sites dating from the mid-1700s to the mid-1800s also exhibited a high percentage of Puebloan trade ceramics (34 percent) (Hayes et al. 1981). The level of Navajo trade with Puebloan groups was probably quite variable across time and space. Nevertheless, the high percentage of sites possessing tradeware indicates that trade was important, perhaps more socially than economically.

Western Pueblo ceramics are not distributed as heavily on Navajo sites as are Eastern Pueblo ceramics (Table 3 and see Figure 2). Sites with sherds from the Zuni-Acoma area are more common than those with sherds from Hopi on all site types except for camps. Overall, pueblos had the most Western Pueblo ceramics. Unlike the distribution of sites with Eastern Pueblo ceramics, however, there is a considerable drop to habitation sites, where only 6 percent had Western Pueblo ceramics. It is thus obvious that with the exception of pueblos, there are considerably fewer sites with Western Pueblo ceramics. Overall, only 5 percent of all sites had Western Pueblo ceramics. This lower percentage of sites can probably be explained primarily as a function of proximity - the Eastern Pueblos are closer to the Diné area than are the Western Pueblos.

To add another dimension to the discussion of Navajo-Pueblo interaction, the distribution of sites with obsidian present in combination with Eastern and Western Pueblo ceramics and on sites with no trade was explored (Table 4). In terms of sites with obsidian, the pattern described above is reversed to a degree - pueblos have the lowest number of sites with obsidian. However, it is possible that because of the diverse assemblage of ceramics usually present on these sites, that lithic materials are underreported. Indeed, few of the site survey reports on pueblos make mention of lithics at all. On the other hand, habitation and camps had nearly identical percentages of sites with obsidian present (43 and 42 percent, respectively), while 28 percent of the scatter contained obsidian.

Turning next to the presence of obsidian in association with any Eastern Pueblo ceramic type, we see that habitation sites have the highest percentage, followed by camps, scatter, and pueblos. The association of obsidian with Western Pueblo ceramics follows a similar pattern, with habitation sites being most numerous followed by scatter, camps, and pueblos. What is most interesting is the relatively high average percentage (24 percent) of sites with obsidian that lack trade ware. Because the Jemez Mountains

Table 3. Number of sites with Western Pueblo ceramics by site type.

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Zuni-Acoma</th>
<th>Western Pueblo</th>
<th>Rel %1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo</td>
<td>6</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Habitation</td>
<td>11</td>
<td>14</td>
<td>23 %</td>
</tr>
<tr>
<td>Camp</td>
<td>6</td>
<td>5</td>
<td>10 %</td>
</tr>
<tr>
<td>Scatter</td>
<td>7</td>
<td>9</td>
<td>14 %</td>
</tr>
</tbody>
</table>

Average: 5%

*1Based on totals in Table 1.
*2This column is not a total of other columns, but reflects the total number of sites with any Western Pueblo ceramics present.
are a major source of obsidian in the area, as well as being a source of Eastern Pueblo ceramic types such as Jemez Black-on-white and Glaze ware, a strong association of obsidian with these ceramics was expected. This probable association was not, in fact, revealed, suggesting that the procurement of obsidian was largely independent of trade in ceramics. Thus, one can perhaps postulate an even higher degree of interaction between Navajos and Pueblos, assuming that obsidian was not obtained by the Navajo without the help and/or permission of the Pueblos. Independent trade in both ceramics and obsidian, if such was the case, could only have served to increase the links between Navajo and Pueblo groups.

Table 5 and Figure 3 show the distribution of Gobernador Polychrome ceramics alone and in association with a number of different ceramic types. In comparison to other ceramic types, Gobernador Polychrome is found at a considerably higher percentage of sites (33 percent). This is not unexpected given that Gobernador Polychrome is thought to have been manufactured by the Navajo and/or refugee Pueblo groups in the Dinéh area (Brugge 1981, 1984; Dittert 1958; Marshall 1985). The figure also shows that Gobernador Polychrome is found more in association with Eastern Pueblo ceramics than with Western Pueblo ceramics, again a reasonable expectation given the proximity of the Eastern Pueblos. Pueblitos have the highest association of

Gobernador Polychrome with both Eastern and Western Pueblo ceramics. Other interesting associations include Gobernador Polychrome with Jemez Black-on-white and Glaze ware. The number of sites having both of the above combinations are nearly identical, and in the case of habitation sites, represent approximately 10 percent of the sites. Lastly, numerous sites of all types had Gobernador Polychrome and no trade ware—a total of 22 percent.

The data described above are not necessarily temporal and include sites that date between ca. A.D. 1500 to 1780. Few temporal markers are present on the 1146 Navajo sites in the study area, especially sites classified as habitation, camp, and scatter. Many pueblito sites, on the other hand, have been dated dendrochronologically, and most have occupations from the early to mid-1700s, although some have cutting dates in the 1500s and 1600s (cf. Towne 1991).

Several of the ceramic types found on Navajo sites are dated. Unfortunately, the primary Eastern Pueblo type is Jemez Black-on-white which dates from A.D. 1550-1750, a date range too broad for use as a cross-dating tool. Gobernador Polychrome also has potential but its date range is generally too late (A.D. 1700-1800) for the data being considered. It is also unlikely that all of the sites with Gobernador Polychrome date after the turn of the eighteenth century. Rio Grande Glaze ware, on the other hand, includes a

| Table 4. Number of sites with obsidian and associated ceramics by site type. |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Ceramic Type                   | Pueblito Habitation | Camp Scatter Average |
|--------------------------------|--------------------|--------------------|-------------------|-------------------|
| Obsidian                       | 5 (8%) 169 (43%)   | 182 (42%) 71 (28%) | 33%               |
| Obsidian with Eastern Pueblo   | 3 (5%) 63 (16%)    | 46 (11%) 26 (10%)  | 12%               |
| Obsidian with Western Pueblo   | 0 (0%) 14 (4%)     | 5 (3%) 7 (3%)      | 2%                |
| Obsidian with no Trade ware    | 2 (3%) 98 (25%)    | 133 (31%) 44 (17%) | 24%               |

*Relative percentages are based on totals in Table 1. Note: Categories are not mutually exclusive; some sites are represented in several of the above categories.
series of dated types that are based on changes in rim shape (Hawley 1936; Honea 1967; Mera 1933). Many of these types are found on Dinéh and Gobernador phase sites and provide a means of relatively dating these sites by ceramic cross-dating. In order to attempt to date some sites in the period prior to A.D. 1300, sites with specific Rio Grande Glazeware types (C-E) were tabulated and the number of sites with these types of glaze ware is presented in Figure 4.

As Figure 4 shows, few sites with identified glaze ware types are present in the sample. Unfortunately glaze ware types (A-F) were not specified for the majority of sites that contain Rio Grande Glazeware. There are two sites with Glaze C, which dates from A.D. 1450-1490. One of these sites also has Gobernador Polychrome. Five sites have Glaze D, which dates from A.D. 1490-1515, and three of these had Gobernador Polychrome. Lastly, 20 sites had Glaze E (A.D. 1515-1625) present, and nine of the latter also had Gobernador Polychrome. These site totals do not represent wholly exclusive categories—some sites have several glaze types present. It is interesting that none of the pueblos studied had early glazes (C-E) noted in their field reports. Since pueblos were a focus of trade, this suggests that the sites having these glaze ware types predate pueblos, which is quite interesting given that over half of the sites also possess Gobernador Polychrome. Thus, one could postulate that Gobernador Polychrome may predate the advent of pueblos, perhaps going back as far as the early 1600s. This point is taken up below.

In an attempt to see how many sites may potentially predate the production and use of Gobernador Polychrome (pre-1600), sites lacking Gobernador Polychrome but containing other early ceramics (Jemez Black-on-white and Glazes C-E) were selected. Table 6 shows the distribution of these sites by type site. Not unexpectedly, few of the pueblos fell into any of the categories. There is little question that most of the pueblos post-date A.D. 1600 and would have strong Gobernador Polychrome associations (cf. Towner 1991). The other site types, however, reveal interesting patterns. Numerous habitations, camps, and scatters have Jemez Black-on-white and lack Gobernador Polychrome. These sites represent 11 percent of the total site sample and 15 percent of the sites having trade ware. The number of sites having either Glaze C, D, or E and no Gobernador Polychrome is very low (n = 14). However, many sites are simply noted as having glaze ware without any specific type being mentioned. Thus, typed glaze ware is probably under-reported in the literature.

In any case, between those sites having Jemez Black-on-white and Glazes C-E and lacking Gobernador Polychrome, there is a sizeable number of sites that may predate the Gobernador phase and thus be indicative of Dinéh phase settlements. This must be considered tentative evidence, of course, since the lack of Gobernador Polychrome does not necessarily mean that such sites do predate the Gobernador phase. Nevertheless, it is possible that some of these sites are earlier, and this suggestion lends support to the view that the Navajo were trading extensively with the Pueblo as early as the A.D. 1400s or 1500s.

Discussion

In this section, we apply the concept of alliance as used in southwestern archaeology to the exchange of ceramics and, to a lesser degree, obsidian, between the Navajo and Pueblo. It is apparent from the data generated in the study that some kind of informal alliance network was in place and guiding the exchange relationships that occurred, as well as allowing for the influx of Pueblo refugees in the 1600s and later.

Table 6. Distribution of sites lacking Gobernador Polychrome, but having other ceramic types.

<table>
<thead>
<tr>
<th>Ceramics Present</th>
<th>Pueblo</th>
<th>Habitation</th>
<th>Camp</th>
<th>Scatter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jemez B/W (no GP)</td>
<td>1</td>
<td>34</td>
<td>54</td>
<td>33</td>
</tr>
<tr>
<td>Glaze C (no GP)</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Glaze D (no GP)</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Glaze E (no GP)</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: These sites do not represent wholly exclusive categories—some sites have several glaze types present.

Alliances

The alliance concept has been used in the Southwest to describe the ways in which diverse groups interact with one another, exchanging both material goods and ideas (Cordell and Plog 1970; Plog 1984; Upham 1982, 1987). As noted in Upham and Reed (1989:65) the alliance concept is used by archaeologists in much the same manner as formal alliance theory intended. Much of the core of alliance theory stems from the work of Claude Levi-Strauss (1960).

Levi-Strauss' ideas of generalized exchange include both the more concrete and symbolic exchange of marriage partners and also, at a higher and more inclusive level, the exchange of all forms of material and information. In fact, his elucidation of alliance formation and generalized exchange is embedded in a conception of information theory that includes both material and nonmaterial (read symbolic) dimensions. Consequently, when a claim is made that an alliance of fourteenth-century settlements clusters "may have involved the establishment of alliance kin ties, the transmission of exotic knowledge, and the exchange of material" [Upham 1982:157], that claim rests on correlations in archaeological data used in conjunction with a structuralist definition of the alliance concept (Upham and Reed 1989).
As Upham and Reed (1989:65-66) note, "the foundation of the alliance concept is the ability to demonstrate, in the context, high levels of exchange and interaction took place over a wide region."

The key elements of alliance behavior include the transmission of information, the exchange of material goods, and the exchange of marriage partners between diverse groups. The basis for linking two of these activities is found in the ethnographic literature of a number of diverse societies which illustrate the clear relationship between the exchange of material goods and the exchange of marriage partners (Levi-Strauss 1969).

In addition, the exchange goods themselves often convey information in the form of overt and covert stylistic messages (Plog 1983; Upham and Reed 1989; Winter 1987, 1989a, 1989b). The following alliances have previously been defined in the Southwest: White Mound, Unit Pueblo, Chaco, Mesa Verde, Little Colorado-Kayenta, White Mountain, Jeddito, and Salado (Plog 1983, 1984; Upham 1982). Furthermore, alliances have been proposed for various areas in the northern Rio Grande region (Reed 1990; Upham and Reed 1989). These alliances are based upon the distribution of highly distinctive ceramic wares that occurred across wide areas. It should be noted that all of these alliances vary considerably in terms of extent and complexity. It has thus been suggested that "the inhabitants of the sites containing these wares were engaged in extensive exchange relationships that comprised the respective alliances..." (Dietter 1992).

Navajo-Pueblo Exchange as Alliance Behavior

Based on the data presented above concerning the distribution of Puebloan ceramics and Governor Polychrome on Navajo sites, we believe that the concept of alliances is useful for addressing and explaining these patterns. We are not suggesting that an alliance of the scale or complexity of any of those mentioned above occurred in the Navajo area. Rather, we see the alliance concept as being particularly useful in understanding and explaining the nature of Navajo-Pueblo interaction, as well as other phenomena. Furthermore, it is not our intention to fully define or explain the nature of this alliance. At this point, we simply do not have the detailed data necessary to undertake the latter for example, we have not yet explored the presence of Navajo trade goods in Puebloan contexts between the fifteenth and seventeenth centuries.

Dinetah Phase Exchange

It is generally accepted that the Navajo were engaged in exchange and interaction with the Eastern and Western Pueblos at an early date, probably in the 1550s (Dietter 1985; Hester and Schiffer 1965; Mills 1969). Because the number of trade sherd s present on these early Dinétah phase sites is few, this interaction has been viewed as minimal. Although this evidence for early contact is not overwhelming, the significance of the interaction in terms of alliance formation and social interaction can not be overstated.

In addition to the evidence provided in the literature mentioned above, the present study has revealed several trends which may support Navajo-Pueblo exchange relations in the Dinétah phase. First, a sizeable number of sites in the study contained Jemez Black-on-white ceramics without Governor Polychrome being present. Interestingly, none of these sites are pueblos, which is not unexpected since these sites generally date to the Governor phase. Second, Rio Grande Glazes C, D, and E are present on a number of habitation, camp, and scatter sites but not on any pueblo sites, indicating that these glaze types occurred in this area of the Rio Grande before the beginning of the Governor phase and the construction of pueblos. The data are not, of course, conclusive, but when examined in combination with other evidence about trade during the Dinétah phase, it is clear that trade was important during this period. The importance of these trade relations, however, was not primarily economic but rather social, relating to the ties that were made and maintained. These ties were very important during the later Governor phase.

Gobernador Polychrome

Our discussion of Gobernador Polychrome involves several points. First, it is our contention that it was manufactured by the Navajo and not by Puebloan groups. Several lines of evidence support this view. As Dietter (1985) notes, Gobernador Polychrome appears to represent a combination of elements present in both Hopi and Rio Grande glaze ware ceramics. Carlson (1965), on the other hand, suggests that Gobernador Polychrome was derived from elements present in Jemez Black-on-white and Tewa Polychrome. We think that Dietter's suggestion is more reasonable given that Gobernador Polychrome is essentially a yellow ware, thus more closely resembling Rio Grande and Hopi ceramics than Jemez and Tewa types. Furthermore, we feel that in terms of design styles and motifs, Gobernador Polychrome appears to reflect the style of both Rio Grande glazes and Hopi ceramics. If a Puebloan group was manufacturing Gobernador Polychrome, then it is unlikely that two so diverse styles would be mixed.

It is more likely that the Navajo would combine elements of several Puebloan ceramics in order to produce a unique ceramic type such as Gobernador Polychrome. Second, given that most of the refugees who went to live with the Navajo were apparently derived from the Jemez and Tewa pueblos, it is unlikely that these groups, who had an essentially black-on-white ceramic tradition, would have manufactured a yellow ware with polychrome designs.

Lastly, we believe that Gobernador Polychrome may predate the beginnings of the Governor phase by several decades. Hogan (1991) suggests that Gobernador Polychrome was a fully developed type by at least A.D. 1695 - 1696, based on the evidence available from sites near the Rio Grande. In addition, data obtained during the current study also suggest that Gobernador Polychrome predates the Governor phase. As shown in Table 6, several sites contain Gobernador Polychrome along with Rio Grande Glazes C through E. Considering that these glaze ware types date from A.D. 1650 to 1625, it is possible that Gobernador Polychrome was being manufactured sometime during this interval.

Recent excavations at a Navajo habitation site, DCA-88-257 (Ayers 1992), also provides support for this hypothesis. Low-fired Gobernador Polychrome sherds were recovered from the excavated area and assigned an approximate date of 400±65 years B.P. The two sigma dendrocalibrated range is A.D. 1410 to 1606. Given the other evidence presented above, it seems reasonable to assume that the later end of the range is a realistic approximation of the initial manufacture of Gobernador Polychrome. The sherds from the site appear to be a crude version of the type. The paste is extremely soft compared to most other Gobernador Polychrome ceramics which have an extremely hard and tensile strength (Bragg 1981). Considering that Gobernador Polychrome is one of the highest fired ceramic types (A. E. Dietter, personal communication 1991), it is possible that these low-fired sherds from DCA-88-257 are an early Navajo attempt at producing polychrome vessels. Thus, the data from the site suggest that Gobernador Polychrome was manufactured at least as early as the mid-1400s. As we have mentioned above, Gobernador Polychrome is a ceramic tradition whose development was influenced by the Hopi and Rio Grande yellow pottery traditions. As such, it is another link in the yellow pottery continuum first postulated by Upham and Reed (1989). Upham and Reed (1989:70) suggest that "... broad comparisons between the fourteenth and fifteenth centuries of the fourteenth and fifteenth centuries of the fourteenth and fifteenth centuries..." do not show evidence of movement from the Galisteo Basin. They further suggest that these links allowed for the movement of people from the Galisteo Basin to Hopi following the Pueblo Revolt. Gobernador Polychrome, of course, postulates

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the zenith of the other yellow wares by at least a hundred years, although the Puebloan tradition continued into the sixteenth and seventeenth centuries. Nevertheless, Gobernador Polychrome does represent a continuation of the yellow ware tradition as interpreted by Navajo potters. As such, it is illustrative of informal alliance behavior and the sharing of information across spatial, cultural, and temporal boundaries.

Navajo/Pueblo Ties and Pueblo Refugees

During the Spanish Reconquests of 1692 and 1696, substantial numbers of Pueblo Indians from the Tano, Tewa, Tiwa, Keru, and Jemez villages fled to the west (Dozier 1966; Forbes 1960; Spicer 1962). Many went to other Puebloan villages such as Hopi, Zuni, and Acoma to take refuge with distant relatives. The historical record also documents that Pueblos joined the Navajo in the Dinétah area. There is considerable debate concerning the actual number of Puebloan people who came to live with the Navajo. Hogan (1991) believes that the number was not as great as others have suggested (e.g., Bailey and Bailey 1986). Similarly, the building of the pueblos in the same approximate period as the arrival of the Pueblo people has prompted many researchers to assume that the pueblos were built by Pueblo refugees (e.g., Carlson 1963; Hester 1962). However, Hogan (1991) disputes this by suggesting that the Navajo may have adopted pueblos as defensive structures to ward off Ute raids, which had intensified during the same period (see Jacobson et al., this volume).

In any case, the presence of Pueblo refugees with the Navajo (no matter how large or small the actual numbers were) suggests that some type of relationship existed between the two prior to their arrival. Indeed, the trade discussed above and the ties that were formed in conjunction with it allowed the Dinétah area to serve as a refuge for Puebloan groups, particularly the Jemez and Tewa. It is impossible to say whether or not the exchange of marriage partners was a part of the alliance behavior that occurred, but given the relative case with which the Pueblos were taken into Navajo settlements, it is certainly possible and even likely. Hester (1962) uncategorically states that intermarriage did occur between the Navajo and Pueblo during this period.

Finally, it is unlikely that Pueblo refugees would have migrated to the Navajo area with the specific intention of seeking refuge if strong social ties did not exist between the two groups. Given the cultural differences between the Navajo and Pueblo, it is more likely that the former would have sought refuge at Hopi, Zuni, or Acoma, as many did. The fact that some groups took refuge with the Navajo is proof of a strong social relationship. Thus, the alliance-based ties that developed out of the long-term trading relationships between the Navajo and certain Pueblo groups allowed refugees to join the Navajo.

Conclusions

In this paper, we have attempted to explain and elucidate several aspects of the interaction that occurred between the Navajo and various Puebloan groups during several hundred years of contact. The alliance concept has been applied to aid in understanding the nature of the economic and social contact that developed. Several key points emerge from our discussion:

- The Navajo and Pueblo were engaged in socially-significant trade (an early component of alliance formation behavior) as early as A.D. 1500 during the Dinétah phase. This initial contact laid the groundwork for the more intensive trade and social interaction that occurred later.

- Gobernador Polychrome was apparently made by the Navajo drawing on the styles, motifs, and designs of Puebloan ceramics, particularly Hopi types and Rio Grande glazeware. Based on several lines of evidence this type may have been made as early as A.D. 1650, over 50 years prior to the beginning of the Gobernador phase. As a yellow ware, Gobernador Polychrome represents a continuation of the yellow ware tradition of the Hopi and Rio Grande villages. The type thus represents additional proof of the alliance concept as manifested in the diffusion of an idea - yellow pottery.

- The movement of Pueblo refugees into Navajo settlements in the 1690s was made possible by over 200 years of alliance-based interaction of both an economic and social nature between the two groups. Such a joining of these groups in the absence of previously existing, alliance-based interaction is highly improbable.

We consider the above statements as testable hypotheses and welcome additional inquiries that may serve to refute or verify them. We fully expect that the impending large-scale excavations in conjunction with the Fruitland Coal Gas Project will provide the perfect opportunity to do just that. Given the current uncertainty regarding the nature of Navajo-Pueblo interaction and the origin of Gobernador Polychrome, however, we consider our hypotheses to be both apropos and reasonable.

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Navajo Defensive Systems in the Eighteenth Century

LouAnn Jacobson, Stephen Fosberg, and Robert Bewley

Introduction

The Navajo pueblo sites of northwestern New Mexico were the result of an intensive period of contact between the Navajo and Pueblo people from approximately A.D. 1660 to 1780. Armed conflict during the Gobernador phase forced the use of defensive mechanisms by the early Navajo and resulted in a tightly woven social network and defensive architecture.

An analysis of attack and defense in relation to eighteenth century cultural goals concludes that this network was established for protection against the "hit-and-run" raiding tactics of the Ute. Geographic Information Systems software was utilized to calculate the potential for line-of-sight contact between pueblos. Sites were then examined to determine if sites with line-of-sight and sites without line-of-sight differed in key attributes such as number of rooms, associated features, and topographic situation. This analysis concluded that pueblos with line-of-sight contained more rooms but that larger pueblos had fewer potential visual ties than smaller pueblos. In addition, pueblos without line-of-sight were more inaccessible while more vulnerable sites were participants in visual networking. Finally, pueblos with lines-of-sight had more evidence of permanent residence and had substantially more features than pueblos without lines-of-sight.

Background and History

The Navajo and Pueblo people probably first encountered one another sometime after A.D. 1500. Although periodic Navajo raids against the Pueblos were carried out, the Navajo-Pueblo relationship was generally one of trade. As a result of these periodic contacts, Pueblo influence is evident in eighteenth century Navajo ceramics, rock art, and architecture. Most notable, and enigmatic, is the Puebloan architectural influence (Figure 1) seen in the multi-roomed masonry dwellings referred to as pueblos.

The majority of Navajo pueblos were occupied during the Gobernador phase—a time of social disruption, turmoil, and hostility beginning soon after the Pueblo Revolt in 1680 and ending about 100 years later. The revolt broke the Spanish hold on Pueblo villages along the northern Rio Grande, but when the Spanish regained control following a second revolt in 1696, many Pueblo groups fled westward into traditional Navajo territory. Although tree-ring dates indicate that pueblo construction began as early as 1570 (Towner 1991), the number of pueblos increased dramatically after 1700 and the occupation peaked between approximately 1715 and 1735, probably in response to Ute attacks that threatened the survival of the Navajo and Pueblo people in the Largo-Gobernador area after 1715.

The pueblos were built on mesa tops, cliff faces, and large boulders (Figure 2), and were obviously positioned for defense. Most pueblos also have expansive views to the surrounding territory, and have line-of-sight to other pueblos nearby. In addition to topographic and visual defense, architectural elements often contributed to the defensive nature of the pueblos. Small observation ports, called loopholes, were almost always angled downward for visual sighting along access routes into the pueblo and, presumably, for shooting projectiles down onto unwanted visitors. Although the pueblos were often surrounded by steep-sided cliffs or embankments, points of access from below were blocked by masonry walls or log roofs over crevices. "Entryways were secured by using deadend 'entries,' serpentine passages, narrowed entrances, single points of access to room complexes, and removable logs for bridges and ladders" (Powers and Johnson 1987:9).

As an example, Shaft Ruin contains many of these features. Its two-story tower encloses the only access (by log ladder) to the upper rooms. If intruders actually were able to enter and climb to the top of the shaft, the entryway to the upper rooms forces a blind 90 degree turn into the cramped upper rooms. Downward slanting loopholes provide excellent visibility from the upper story and also could have served as arrow portals. High masonry walls are constructed at critical areas not visible from the second story and form a protective barrier to the north.

The pueblos' size varies from single rooms to a large multi-storied building with 38 rooms. Many of the sites still have standing walls, intact

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Figure 1. Pueblo architectural elements at Three Corn Pueblo, LA 1871, include door lintels, a viga and latilla ceiling, and plastered masonry walls.
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roofs, and forked stick hogans. Artifacts found at the sites indicate contact with a wide geographical area and include both Navajo and historic Puebloan artifacts. Increased influence from Spanish missionaries, the constant pressure of Ute raids, and a possible drought in the late 1770s (Pratt and Scurlock 1990:76) brought an end to this period in Navajo history when the area was abandoned and the Navajos shifted to the south and west.

Ranchers and Hispanic shepherds were probably the first to observe the pueblos after they were abandoned. Some of the sites were professionally recorded by A.V. Kidder in 1912 (Kidder 1920) and excavated by Earl Morris in 1915. Between 1934 and 1941, both amateur and professional investigators (Farmer 1942; Keur 1944) recorded sites, collected tree-ring samples, and excavated forked-stick hogans and pueblos.

A third period of intensive research began in the 1950s when sites were documented as part of Navajo Land Claim investigations. The most important archeological work associated with the Land Claim was the collection and analysis of tree-ring samples (Navajo Land Claims, various dates). The San Juan Archaeological Society, an amateur archeological group, also recorded many Gober­

\textbf{The Issue of Defense}

That the pueblo sites exhibit obvious defensive characteristics has already been noted. But let us examine this issue more carefully. In what way were the sites defensive? And what sort of hostilities were the sites designed to protect against?

Any effective defensive system must accomplish two basic tasks. First, it must detect an impending attack and, second, it must communicate the nature of the threat to decision makers. The response to the perceived attack might be an alert, mobilization, or redeployment. It is important to remember that detecting evidence of a threat is only a prerequisite for warning; this information must pass through the bottleneck of bureaucrats, political hierarchies, and/or analytical screens before it is communicated. Because surprise attacks succeed despite warnings, effective defensive systems must succeed despite surprise (Bets 1980:551-572). The fortified pueblos enabled smaller forces to hold off against superior forces. They provided rest and refuge to their occupants and increased substantially the costs to an attacker of a frontal assault. A fortress can be defeated only through surprise, bombardment, or the starvation resulting from a formal siege. We will shortly examine the effectiveness of these fortifications against the principal Navajo antagonists of the early eighteenth century.

First, however, we should review the nature of the defensive system afforded by these sites. Powers and Johnson (1987:9) noted that the defensive strategy employed included a warning or communication system with other sites and the limitation of access to each pueblo. Many of these sites are situated on high buttes, mesa rims, or canyon mouths, locations that provide substantial views and which allow direct line-of-sight with other pueblos and hogans in the surrounding region. Hostile entry into the sites was prevented

\textbf{Figure 2. Kin Yazhi, LA 2433, perched on top of a sandstone monolith, with far-reaching views to the south and east.}
through the erection of walls across the necks of mesas or the roofing over of crevices with logs. Entryways were protected by dead-end false entries, narrow, winding passages, single points of entry into room complexes, and removable log ladders and bridges. Even the surrounding hogan walls, partially covered with soil and located on the timbered benches of the mesa walls, may have been difficult to detect at a distance.

Some researchers have postulated that the masonry architecture of the pueblos reflects the influence of Pueblo refugees from Jemez, Cochiti, and San Ildefonso who fled to the Dinétah to escape Spanish retribution following the revolt of 1696. Keur (1944:85) argued early on that the Dinétah represented a refuge area, "a place where uprooted Puebloans joined the erstwhile hostile Navahos to hide out against a common foe (i.e., the Spanish)."

Figure 3. Standing forked stick hogan at Old Fort Ruin, LA 1869
The site complex is surrounded by protective masonry walls.

Certainly, Spanish-Navajo relations were strained in 1700. Navajo raids against frontier Spanish settlements and Pueblos in northern New Mexico took livestock, horses, and captives. Spanish campaigns against the Navajo began in the 1670s and culminating in the successful suppression of the Navajo by Roque de Madrid in 1705 were large-scale affairs. They frequently included 50 to 100 soldiers, militiamen, and several hundred Pueblo auxiliaries (Reeve 1958:228). Against such a large force, retreat into a small pueblo perched atop a boulder would not have been a particularly effective strategy. Indeed, historical Spanish accounts of the 1705 campaigns describe defeated Navajos as melting away before they could be reached (McNitt 1972:22). Such descriptions do not fit the image of siege warfare against pueblo sites. Spanish objectives were to kill the enemy, capture others for the slave market, rescue those captives held by the Navajo, take horses or livestock, and destroy crops. So effective was Roque de Madrid's strategy of "laying waste the fields" that after the successful campaign of 1709, the Navajo entered into an unprecedented period of peace with the Spanish from roughly 1709 until 1760. During this period, Spanish documents do not record a single Navajo raid upon a Spanish settlement (McNitt 1972:23). Interestingly enough, this is the very time when most of the pueblos were built and occupied.

In contrast, Ute attacks reached their peak in northern New Mexico from 1696 until 1727 (Jefferson et al. 1972:5). With the acquisition of the horse in the mid-seventeenth century, the Utes increased the range of their territory and earned a well-deserved reputation as accomplished horse-mounted warriors. Ute raiding tactics and objectives differed radically from the Spanish. Ute warfare was launched by stealth. They hoped to surprise the enemy, burst into their camps on their fastest horses, and make off with personal property, horses, and women or children. The objective was to capture livestock, slaves, and such prized possessions as blankets and pottery, not to kill the enemy or burn his corn fields (Marsh 1982:145-146).

Ute raiding strategy, then, was to galaxy into an enemy's camp and grab the goods and women before an adequate defense could be organized. As Haskell (1975:173) has noted, "In light of the fact that the principals were technological equals, the Navajo in all probability were more than able to hold their own against attacks." What made this possible was the ingeniously constructed system of pueblos. Powers and Johnson (1987:5) note that most pueblos were built and occupied between 1715 and 1750. Indeed, new pueblo construction is rare after 1735 and available dates suggest these sites were principally constructed between 1710 and 1735, precisely the time when the Ute pressure was greatest.

To counteract Ute tactics of surprise, the Navajos of Dinétah needed to spot a raiding party in advance of the attack and signal this fact to the rest of the settlement system. Occupants of surrounding hogan could have sought refuge in the defensive pueblos until the raiders had passed through. Given the lack of a water source within any of these defensive sites and the limited food-stuffs which could have been stored there, all indications are that refuge would have been sought for no more than a matter of days. While they might lose some livestock and personal possessions, the Navajo were fairly secure in knowing that the Utes were not willing to suffer the casualties required to make a frontal assault upon a walled and sealed masonry fortification.

GIS Description

In order to measure the effectiveness of such a sighting and signalling system, an analysis of pueblo distributions was conducted utilizing the Bureau of Land Management's Geographical Information System (GIS). The viewed analysis executed on the 72 selected pueblo locations used the cell processing portion of the GIS. Elevation data from USGS 1-degree Digital Elevation Models (DEMs) were used to determine visibility between pueblo locations. Data from the 1-degree DEM are highly consistent with the planimetric features normally found on 1:250,000 scale topographic maps.

Visibility was determined by first calculating a line-of-sight vector between each of the 72 pueblos. For each line-of-sight vector, an angle of observation from the observer location to the viewing location was computed using the elevations of the two locations. Subsequently, the elevation of all cells between the two locations was
Emerging Patterns

The GIS software produced two maps. The first (Figure 6) identified point locations of the 23 pueblos dated by tree-ring analysis and those pueblos with line-of-sight to other pueblos. The intent was to determine if there were any changes in line-of-sight through time, particularly if the number of pueblos with line-of-sight increased in response to the threat of Ute attacks. Twelve of the dated pueblos had line-of-sight connections. Beginning construction dates for these sites varied from 1570 (not a cutting date and suspiciously early) to dates in the first quarter of the eighteenth century. Final construction dates within this group are generally in the ten year period from 1735 to 1745. The latest construction date is 1785. With the exception of a site built in 1705, the Cabresto Mesa Ruin, which will be discussed in a moment, there is no obvious increase or decrease in the number of line-of-sight through time.

It is apparent that the Cabresto Mesa Pueblo, even in the smaller sample of dated sites, served an important function within the network. Perhaps most noteworthy are the six line-of-sight connections between Cabresto Mesa and other dated sites (see Figure 6). The limited data available at this time make it impossible to demonstrate conclusively that the line-of-sight pueblos were all occupied at the same time; although the range of cutting dates leads us to believe that all twelve of the dated sites could have been in use during the first fifty years of the Gobernador phase. The significance of Cabresto Mesa in the pueblo network is amplified further when all the pueblos, both dated and undated, are considered.

The second and third GIS maps plotted the location of 72 pueblos (Figure 7 and Appendices 1 and 2) and identified those pueblos with line-of-sight to other pueblos (Figure 8). With this larger sample, even more fascinating patterns began to emerge. As you can see, over 75 percent of the plotted sites either have line-of-sight ties or are within or immediately adjacent to the communication network. Again, Cabresto Mesa, along with LA 12929, emerges as a key point in the system. Two other smaller networks within the larger network also appear on the west side of Navajo territory.

Of the 72 pueblos, 42 have line-of-sight to at least one pueblo (see Appendix 2). Although in the general scheme of things, Cabresto Mesa does not appear to be a particularly unusual site in terms of architecture, the number of features present, or unique attributes, its location high on a talus slope affords it spectacular vistas to the west and south. In fact, the computer analysis showed lines-of-sight from 13 to 14 miles to the west and 22 miles to the southwest. A field visit to Cabresto Mesa confirmed this incredible viewshed. Within this viewshed, Cabresto Mesa had (projected) visual ties to 10 pueblos. The significance of Cabresto Mesa is reinforced by its construction in 1705 before the intensive pueblo building phase of 1715 to 1740. The site was therefore occupied prior to the final attack of Roque de Madrid in 1709 and could have been established as an outpost adjacent to and above what was probably a primary transportation corridor for Spanish incursions into the area from the Spanish settlement of Chama. In addition, as the threat of Ute attack became more prevalent, Cabresto Mesa, as one of the early northernmost points, could also have served as an outpost for observation of Ute movement.

Since working with dated sites really did not provide us with any concrete patterns, we moved to comparisons of pueblos with lines-of-sight to other pueblos versus pueblos without lines-of-sight. Comparisons were made of room counts, topography, and site complexity. In addition, the relationship of room count to number of sites visible was also plotted. Using these attributes, some interesting patterns emerged.

There were 39 pueblos with lines-of-sight for which room counts were available. These 39 pueblos contained a total of 212 rooms for an average of 5.44 rooms per site. The twenty-four pueblos without lines-of-sight had a total of 84 rooms and averaged 3.5 rooms per site. Therefore, the average pueblo with line-of-sight had 55 percent more rooms than a pueblo without line-of-sight (Figure 9). Room count versus the

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number of sites visible was also examined. Again, an interesting but somewhat unexpected pattern developed. As the average number of rooms increased, the number of lines-of-sight decreased. That is, pueblitos with an average of two or three rooms had lines-of-sight to seven and eight pueblitos respectively, while larger sites had views to only two or three pueblitos (Figure 10).

Definite patterns also emerged in the topographic comparisons (Figure 11). Pueblitos without line-of-sight were concentrated on boulders, cliff faces, and areas generally regarded as inaccessible. In fact, 77 percent were inaccessible, while 10 percent were located adjacent to steep-sided mesa or bench edges with generally excellent viewsheds but were vulnerable from at least one side. Other topographic situations such as benches, mesa tops, gentle ridges, or valley bottoms were occupied by 16 percent of the sites. In comparison, 50 percent of the sites with lines-of-sight were located in inaccessible areas, 26 percent were on mesa and bench edges, and 24 percent were in “other” topography. We therefore see sites that were isolated from direct means of communication in more defensible positions, while those that could participate in an “early warning system” were located in areas that were more vulnerable.

Finally, the type and variety of features in pueblitos with and without lines-of-sight were compared (Figure 12). Although there were only one or two more sites in the line-of-sight group, this same group had almost twice as many feature occurrences than the group without line-of-sight. It should be noted that the number of features within each site was not counted because of the inconsistency of data available. At this level of analysis, however, the sites with line-of-sight had more evidence of residency as indicated by the presence of hooded fireplaces, forked-stick and masonry-based hogans, and trash middens. Although differences were less pronounced, these pueblitos also had more defense-related features, such as defensive walls and passageways, and interior courtyards or small plazas. Both groups had a similar occurrence of loopholes (an observation points in masonry walls), burned rock piles—which are generally associated with use of sweat lodges, and storage areas. It is worth recalling at this point that, although pueblitos with lines-of-sight have more feature occurrences, pueblitos with an average of fewer rooms have more lines of contact with other pueblitos.

**Directions for Future Research**

The application of our GIS technology essentially represents a sophisticated approach to basic pattern recognition. Early impressions that the pueblo settlement system was characterized by line-of-sight relationships between communities have been confirmed. And while we do not possess the answers at this point, numerous research questions are suggested by the intriguing patterning. These questions can be grouped into several broad categories.

First, let's examine the operation of the defensive system itself. For these visually linked sites to function effectively, a signalling or communication system was required to transmit warnings of impending attacks. How did the communication take place? Line-of-sight distances generally range from 2 to 5 miles between sites although some distances were as great as 22 miles. Were signal fires employed? Few of the sites exhibit any definitive evidence for large burned areas that could have resulted from fires. Is it possible that burned rocks currently being interpreted as the remains of sweat lodges actually are the remains of signal fires? Could small smudge pots have been employed? If large bonfires were not utilized, were mirrors or some devices employed? Given the remarkable distances between some line-of-sight points, what are the effective limits for these means of communication?

The actual function of different site types within the defensive system also merits exploration. Site types which are highly defensive, such as those located on cliff faces and those perched atop sheer boulders, often enjoyed inferior viewsheds compared to sites in slightly less defensive locations along mesa edges. Does this suggest that cliff and boulder sites were more or less on their own whereas the less defensive sites could signal danger and marshall forces to counter the threat? A comparison of the number of rooms at each pueblo with the number of other sites which could be spotted from a given location demonstrates clearly that as the number of rooms increases, the number of other sites.

Figure 6 (north half). Lines-of-sight between tree-ring dated pueblitos.
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Figure 6 (south half). Lines-of-sight between tree-ring dated pueblos.

Figure 7 (north half). Location of recorded Navajo pueblos in GIS study.

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Figure 7 (south half). Location of recorded Navajo pueblos in GIS study.

Figure 8 (north half). Lines-of-sight between pueblos.
Figure 8 (south half). Lines-of-sight between pueblos.

Figure 9. Number of sites vs. number of rooms (sites with and without views).

Figure 10. Number of sites visible vs. average number of rooms.
within the area that are visible decreases. This suggests perhaps that small sites functioned as signaling stations or observatory points while the larger sites were situated on landforms which could support larger concentrations of inhabitants (Fig. 13). The larger sites may have housed a sufficient number of Navajos whose very presence served as a kind of deterrent. So the question arises: were "lookout" families designated to live in the pueblos while the remainder of the extended family or survival unit occupied hogans nearby? Given that two-thirds of the pueblos have six rooms or less and barely enough room for a small extended family, it may well be that they were strictly used as a defense mechanism rather than for domestic purposes.

Second, a host of issues related to the political and social relations between pueblo communities merit investigation. Was a site that could see six or seven others more important politically than one that possessed line-of-sight with only one other location? Were the sites with more restricted viewsheds dependant politically or militarily upon the key nodal sites which could communicate with a much larger community? Since we know that larger sites generally enjoyed an inferior viewshed compared to the smaller sites, it may be that the role and function of the smaller sites was merely to spot and then communicate the presence of enemy forces, after which, the inhabitants fled to the protection of larger compounds, or simply disappeared into the surrounding territory.

As these sites are examined more closely, we should attempt to discover whether common site characteristics are found among sites with similar view sheds. Analyses should compare such site characteristics as storage, hearths, fireplace, post-holes, defensive walls, burned rock, hogans, trash scatter, courtyards, storage features, hearths, sweat lodges, and passageways with the numbers of other sites visible from a given site. On a gross level, we know that sites with views contain similar evidence of domestic use such as hogans, trash scatters, and fireplace sites without viewsheds.

It is fascinating to ponder whether or not line-of-sight implied anything in terms of social relations. Were sites linked visually also related by marriage or blood? Do groups of linked sites represent different classes?

Third, issues surrounding the evolution and eventual abandonment of the defensive site system within the Dinébigh need a careful examination. Powers and Johnson (1987:125-127) propose that an evolution of site types took place in which they became increasingly defensive over time. They argue that early sites contained few defensive features; instead, they are characterized by large rectangular room blocks on wide benches or low rises near canyon bottoms. Sites evolved through walled compounds, to perched locations atop boulders, and culminated in cliff dwellings, the ultimate in defensive sighting. Additional tree-ring studies, such as those currently being conducted by Ron Tower at the University of Arizona, will enable us to plot the addition to and abandonment of sites from the system and the gradual shift to the south and west of Navajo settlement in the region as a whole.

Some scholars such as McNicol (1972:23) point out that during the very time period when Ute raiding was at its peak, Navajo livestock increased substantially. From 1700 and for several decades thereafter, the defensive system which evolved was obviously successful. What ultimately caused the system to fail? By 1754, the Navajo had abandoned their homes in the Dinetah and retreated south to Cebolleta near Laguna and west to area near Zuni (Schroeder 1972:10). If they retreated in the face of relentless Ute pressure as suggested by Schroeder (1972), Vivian (1960:216), and Wilson (1967:7), did the eventual acquisition of guns by the Utes make these defensive sites untenable?

Others have pointed out that the Dinébigh never was an area particularly well-suited for pastoralism with its deep canyons and steep mesas. Despite these limitations, herd sizes grew and would have become an increasingly important asset which could not have been protected by the pueblo defensive system. The encumbrance of growing herds and possible overgrazing may have been factors in the abandonment of Dinébigh. What evidence is there in the archeological record for growing herd sizes from 1700 to 1770? Is there geologic or palynological evidence to suggest overgrazing?

Pratt and Scarllock (1990:7, 311) raise still more possibilities. On one hand, they state that a severe drought in the late 1770s forced an abandonment of this area. On the other hand, they...
that our understanding of the evolution, strategic operation, and eventual collapse of this defensive site settlement system is far from complete. We are hopeful that the profession will recognize the tremendous potential in studying the defensive sites of Dinébáh. This region offers unique opportunities to study a culture’s systematic response to increasing military pressure over time. Given the application of what can be learned here to our understanding of the collapse of other cultural systems due to unrelenting competition over resources, this surely is an endeavor worth pursuing.

**Conclusions**

Navajo Pueblos represent some of the most visually arresting and intriguing sites in northwestern New Mexico and further systematic study could shed light on important questions pertaining to raiding and defensive military strategies. In the above discussion, it is stated that military principles dictate that successful defense systems detect threats and notify system participants of danger. Defense networks offer additional protection if participants have at least one alternative to fall back upon in case the primary defense fails. The Navajo pueblos were, in fact, a successful adaptation of the above principles, using a line-of-sight communication network to provide advance warning of trespassers in Navajo territory and heavily fortified architecture as an alternative defense in cases where attack was too swift or was so stealthful that broadcast of an alarm could not provide sufficient time to allow dispersal and concealment in the rugged countryside. This strategy was implemented primarily and most effectively as a defense against the relentless Utes, who were sweeping into Navajo territory from the north.

GIS projections of lines-of-sight between 42 pueblos combined with defensive features in pueblos both with and without lines-of-sight, demonstrate the apparently well-planned and executed existence of a Navajo system that offered not only the requisite early warning to prepare for attack but also a fall back position for protection within impenetrable masonry fortresses.

An analysis of pueblo attributes concluded that pueblos with lines-of-sight had more rooms than pueblos without lines-of-sight but that as the number of rooms increased the number of lines-of-sight decreased. As might be expected, pueblos lacking line-of-sight were the most defensively positioned and inaccessible. (Admittedly, this is partially because of some locations on canyon cliff faces with limited views.) Pueblos with lines-of-sight were more complex, containing more residential-type features and, although less pronounced, more defensive features than pueblos without line-of-sight. It is therefore suggested that pueblos without line-of-sight were not occupied for long periods of time because of their potential vulnerability, in spite of their relative inaccessibility, but served as protective fortresses, gathering spots, and points to escape to once the alarm was issued. Inhabitants of smaller pueblos with numerous lines-of-sight could send warnings throughout the system and then had the option of fleeing to and congregating in larger or more impenetrable structures.

This system provided safety to the Navajo for almost 100 years. Constant Ute pressure, combined with environmental and economic factors, probably forced the Navajo to move south and west, away from their Ute attackers and into areas more amenable to the pastoral lifestyle that replaced the earlier hunting and gathering economy.

**Endnotes**

On May 9, 1992, a field test of the GIS line-of-sight analysis was conducted as a New Mexico Heritage Preservation Week event. The field test had two goals: to test the accuracy of the GIS analysis and to involve the public in cultural resource interpretation. The second goal was particularly successful. Over 70 professional and amateur archaeologists and interested laypeople participated in the “Pueblo Flare-Up.” In spite of the threatening weather, the enthusiasm was evident.

Twenty-one pueblos were included in the field test using smoke bombs which emitted white smoke for three minutes. Smoke was selected for the test because it could have easily been generated in a small, smudge fire. A modern source was readily available and relatively easy to create. Two smoke bombs were lit simultaneously at each site and placed in a coffee can. The bombs were either lit directly on the site or in a nearby position with excellent visibility. Wind was a deterring factor, making ignition difficult and causing rapid dispersal of the smoke. In spite of the wind, results were generally good and there were some unexpected sightings. Binoculars and compasses were allowed, as partial compensation for the fact that the Navajo residents would have known exactly where to watch and what to expect from the signals.
One enthusiastic participant tested not only the smoke bombs, but also fired a pistol and used a small military signalling mirror. All three were successful signalling devices between his pueblo, Gomez Canyon, and the Adolph and Gould Pass pueblos.

Not all of the pueblos tested were included in the original GIS analysis (i.e., the recently relocated Morris #1 and newly recorded Kiva); they were included in the field test because of their location within clusters of line-of-sight pueblos. Others were tested even though they did not have GIS-projected line-of-sight because other visual sightings had been previously noted or they appeared to be in a cluster of pueblos that did have line-of-sight. Pueblo clusters were selected where the sites were generally one to two miles apart, because, in a trial run, it became obvious that smoke bomb visibility would probably be limited.

Appendix 3 lists the 21 sites tested and identifies what sites were and were not visible. In many cases, participants could clearly see each other in the pueblos without any visual assistance or signalling device. For others, the pueblo location was unclear until the smoke bombs were set off. Confirmed and reported "maybe" lines-of-sight are shown on Figure 14.

The longest line-of-sight reported was by observers at Three Corn, who saw signals from two points on Cabrelo Mesa 12 miles away. The specific pueblo could not be identified. The pueblo with the most sites visible was the newly discovered Kiva Pueblo, located high on a sandstone butte and accessible only with an extension ladder. From this location seven other sites could be seen. Although the Kiva Pueblo remnants are less than impressive, its strategic location is a key point in the central Largo site cluster. Other line-of-sight clusters were found in the pueblos off Cereta Canyon and Gobernador Canyon, as well as the small cluster near Cabrelo Mesa.

Of the 26 GIS-projected lines-of-sight for the pueblos tested, 16 were confirmed visible and 10 not visible. Seventeen additional sightings were reported that were not predicted by the GIS. Nineteen more sightings were reported when Morris #1 and Kiva pueblos (not in the GIS analysis) are included in the counts. The total number of lines-of-sight confirmed is 52.

The GIS was 62% accurate in its predicted lines-of-sight but only 38% accurate in locating all visually confirmed lines-of-sight. Accuracy of the GIS predictions may be lessened given the potential 100 meter error in the topographic projections of the GIS data and other vagaries such as the earth's curvature, vegetation, weather conditions, etc. In addition, some leeway was allowed in the placement of smoke bombs, as noted above.

The many research questions originally posed in 1991 must continue to go unanswered, pending excavation and analysis of environmental and cultural data gathered at the pueblos and their affiliated forked stick hogan, hearths, corrals, and other features. The 1992 Pueblo Flare-up visually confirmed the defensive network, demonstrated its complexity and scale, confirmed one method of signalling warnings, and reinforced the utility of GIS applications in pattern recognition and prediction of line-of-sight systems.

Recent inventory and reexamination of treering at several pueblos have yielded tantalizing new data about the pueblos and their occupants. However, much more research is still needed for an accurate interpretation of the role and function of these sites within the Navajo settlement system to be determined.

Figure 14 (north half). Pueblos with field tested lines-of-sight.
Figure 14 (south half). Pueblitos with field tested lines-of-sight.

### Appendix 1. Pueblitos without line-of-sight.

<table>
<thead>
<tr>
<th>Site #</th>
<th>Name</th>
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<th>Topography</th>
<th># Rms.</th>
<th>Attached Feat.</th>
<th>Unattached Feat.</th>
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## Appendix 1. Pueblitos without line-of-sight (continued).

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## Appendix 2. Pueblitos with line-of-sight.

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<tr>
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<td>Old Fort</td>
<td>1722-1749c</td>
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<td>bastion, defensive wall,</td>
<td>hogan, trash, burned rock</td>
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<td>1871</td>
<td>Three Corn</td>
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<td>2138</td>
<td>defensive wall, passageway, bins, storage, hatchways, courtyard, hooded fireplace</td>
<td>hogan, trash, burned rock, burial areas, petroglyph</td>
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## Appendix 2. Pueblitos with line-of-sight (continued).

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<th>Site No.</th>
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<th>Topography</th>
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## Appendix 2. Pueblitos with line-of-sight (continued).

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<th>Site No.</th>
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Heftner, Ronald G.

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