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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

CULTURAL RESOURCES SERIES NO. 9, 1992
Cultural Diversity and Adaptation

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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 database 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 program 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, this 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.

Tom Keams 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 Caster discuss the Loma Embro Community, a predominantly Pueblo I period manifestation. Brown and Hancock argue convincingly for pushing the beginnings of the Navajo Dinetah phase back to A.D. 1,500. Reed and Reed provide a new perspective on Navajo/Pueblo interaction by using an alliance-based model. Jacobson, Fosberg, and Bevelly utilize a GIS approach to explore the defensive systems associated with pueblos during the Gobernador phase. Cordell provides 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 Yazzie 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, database 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, Jade Sterne, 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.

Lou Ann 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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# Table of Contents

Foreward ........................................ iii
Preface .......................................... iv
Acknowledgements .............................. v
Contributors .................................. vi
List of Tables .................................. ix
List of Figures ................................. xi
Wellspring of the Anasazi, Home of the Navajo 1
The Pre-ceramic Archaeology of the Upper San Juan River in Northwest New Mexico and Southwest Colorado ......................................................... 9
The Oven Site, LA 4169: A Reevaluation Based on Recent Excavations 37
The Cedar Hill Project: An Anasazi Frontier ........................................ 55
The Dinéh Phase in the La Plata Valley .................................................. 69
The Protohistoric Navajo: Implications of Interaction, Exchange, and Alliance Formation with the Eastern and Western Pueblos ........................................ 91
Navajo Defensive Systems in the Eighteenth Century ................................ 105
References Cited ................................. 137
### List of Tables

**The Preceramic Archaeology of the Upper San Juan River in Northwest New Mexico and Southwest Colorado**

- **Table 1.** Distribution of all study area components from west to east (Colorado and New Mexico) ........................................ 15
- **Table 2.** Distribution of New Mexico components from west to east ........................................ 15
- **Table 3.** Distribution of Colorado components from west to east ........................................ 16
- **Table 4.** Radiocarbon dated preceramic sites in the upper San Juan River study area (uncalibrated) ........................................ 23
- **Table 5.** Relative percentage of study area site types by component ........................................ 34

**The Oven Site, LA 4169: A Reevaluation Based on Recent Excavations**

- **Table 1.** Number of pits per pit base diameter range, LA 4169 ........................................ 45
- **Table 2.** Estimated volume of pits per pit base diameter range, LA 4169 ........................................ 52
- **Table 3.** Estimated person year equivalents of shelled corn per pit base diameter range, LA 4169 ........................................ 52

**The Protohistoric Navajo: Implications of Interaction, Exchange, and Alliance**

- **Formation with the Eastern and Western Pueblos**
  - **Table 1.** Distribution of site by type ........................................ 94
  - **Table 2.** Number of sites with Eastern Pueblo ceramics by site type ........................................ 95
  - **Table 3.** Number of sites with Western Pueblo ceramics by site type ........................................ 96
  - **Table 4.** Number of sites with obsidian and associated ceramics by site type ........................................ 97
  - **Table 5.** Distribution of sites containing Gobernador Polychrome in association with Puebloan ceramics ........................................ 98
  - **Table 6.** Distribution of sites lacking Gobernador Polychrome, but having other ceramic types ........................................ 100

**Navajo Defensive Systems in the Eighteenth Century**

- **Appendix 1.** Pueblos without line-of-sight ........................................ 128
- **Appendix 2.** Pueblos with line-of-sight ........................................ 130
- **Appendix 3.** Pueblito lines-of-sight field tested ........................................ 135
List of Figures

The Prehistoric Archaeology of the Upper San Juan River in Northwest New Mexico and Southwest Colorado

1. Map showing location of the Upper San Juan study area ........................................... 10

2. Map showing distribution of preceramic sites ............................................................... 11

3. Frequency of preceramic components in Colorado, New Mexico, and the total study area .......................................................................................................................... 17

4. Map showing distribution of Paleoindian and Early Archaic sites .................................. 18

5. Map showing distribution of Middle Archaic sites ............................................................ 21

6. Map showing distribution of Late Archaic sites ................................................................ 25

7. Map showing distribution of Basketmaker II sites ............................................................ 27

8. Intensity of Archaic and Basketmaker II presence in the Upper San Juan ......................... 30

9. Intensity of Archaic and Basketmaker II component in the 37°N south UT M zone ...... 31

10. Intensity of Radiocarbon dated Archaic and Basketmaker II component from east to west ......................................................................................................................... 32

11. Relative percentage of Middle and Late Archaic components from west to east ............ 32

12. Relative percentage of Other and Unknown Archaic components from west to east ...... 33

13. Relative percentage of Basketmaker II components from west to east ......................... 33

The Oven Site, LA 4169: A Reevaluation Based on Recent Excavations

1. Setting of the 1987 excavations at the Oven Site: Navajo Reservoir at the confluence of the San Juan and Piedra rivers, looking north ................................................................. 38

2. Site plan map, 1962-1963 excavations at LA 4169 (Eddy 1966:216, Figure 26) .......... 40

3. Location map, 1962-1963 and 1987 excavations, LA 4169 ............................................. 41

4. Site plan showing locations of pits and burials, LA 4169, 1987 excavations ................ 42

5. LA 4169 pits excavated in 1987, looking west ................................................................. 43

6. Excavated pit with subsoil, LA 4169 ............................................................................. 44

7. Storage pit at Utopia Site, LA 4963, showing superimposition of Rosa phase trash midden and burial. After Schonweitzer and Eddy 1964: Figure 17 .................... 46

8. Ceramic assemblages from burials, LA 4169, 1987 excavations .................................... 47

9. Plan view and cross-section, Pit 1, Burial 3, LA 4169, 1987 excavations ....................... 49

10. Estimated dates for Sambrito phase sites, calibrated and adjusted for old wood ......... 51

The Cedar Hill Project: An Anasazi Frontier

1. Map showing location of project area ............................................................................. 56

2. Map showing spatial extent of Rosa phase .................................................................... 61

3. Map showing spatial extent of Piedra phase .................................................................. 63

4. Map showing spatial extent of Arboles phase .............................................................. 66

The Dinétah Phase in the La Plata Valley

1. Location of La Plata Mine on the east side of the middle La Plata Valley in northwestern New Mexico ................................................................. 72

2. Plan map showing burned remains of a Dinétah phase brush structure (Feature 9) associated with two extramural hearths (Features 2 and 4), LA 1848, Block A, Structure 1 ................................................................. 74

3. Plan map of Dinétah phase forked-pole hogan (Feature 3) in Block A and superimposed hearth series (Features 4A-4D) in Block D, LA 61852, Block C, Structure 1 ......................................................................................... 76

4. Buried remains of a Dinétah phase forked-pole hogan, LA 61852, Block A, Structure 1 ......................................................................................................................... 77

5. Plan map showing burned remains of a Dinétah phase forked-pole hogan (Structure 1) and associated dump (Feature 2) and hearths (Features 7, 8, and 9), LA 61852, Blocks A (left) and B (right) ........................................................................ 78

6. Plan map of Dinétah phase forked-pole hogan (Structure 1), LA 61852, Block C, Structure 2 .................................................................................................................................. 80

7. Plan map and profile of Dinétah phase forked-pole hogan (Structure 3/Feature 5), LA 61852, Block E, after exposure of floor materials (compare Figure 5) ........................................................................... 81

8. Buried remains of a Dinétah phase forked-pole hogan excavated to floor level, LA 61852, Block C, Structure 2 (Feature 4). View is to the northwest with roasting pit incorporated into the north wall of the hogan ......................................................................................................................... 81

9. Internal features in Dinétah phase activity area, LA 61838, Block C ................................ 82

10. Partially reconstructed Dinétah Gray (La Plata variety) vessel recovered from Structure 1, LA 61852 ................................................................................................................. 83

11. Selected projectile points from Dinétah phase contexts .......................................................................................................................... 84

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

1. Map showing distribution of Navajo sites in the study area .......................................... 92

2. Distribution of Eastern and Western Pueblo ceramics by site type ................................ 95

3. Distribution of Gobernador Polychrome and associated Eastern and Western Pueblo ceramics by site type ................................................................. 98

4. Distribution of Rio Grande Glaze ware and associated Gobernador Polychrome ceramics by site type ................................................................. 99

Navajo Defensive Systems in the Eighteenth Century

1. Pueblo architectural elements at Three Corn Pueblo, La 1871, including door linte, a vig a, arched ceiling, and plastered masonry walls ....................................................... 106

2. Kin Yazi, LA 2433, perched on top of a sandstone monolith, with far-reaching views to the south and east .................................................................................................................. 107

3. Standing forked stick hogan at Old Fort Ruin, LA 1869 .......................................................................................................................... 107

4. Cross-section of GIS data showing intrusion into the line-of-sight between two pueblos, LA 58289 and LA 12929 .................................................................................................................. 112

5. Cross-section of GIS data showing clear line-of-sight between LA 12929 and LA 2137 .................................................................................................................. 112

6. Lines-of-sight between tree-ringed pueblos ........................................................................ 115
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 Azttec 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] Dittrick 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 [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 Azttec 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 degeneration of the Anasazi into great pueblo structures and the abandonment of the region, were explained by reference to climate 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 foreseen the simple development of 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 beguiled by the 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 see Vivian 1990). These studies document changes in the locations of settlements as they alternate between highlands and lower elevations and between upland and downstream situations. The alternation are underlain by long-term environmental cycles of agrading and cutting of arroyo flood plains and the effects of these on prehistoric agriculture.

The chronological questions concerned culture history, distribution, and the development of a local sequence of phases. The sequence is both widely used and severely criticized. Among the problem areas is the definition and dating of the San Juan phase and its relationship to Anasazi prehistory. A second issue of contention concerns defining and dating the Dinébi 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, Ancestral Pueblo, and Dinétah phases and their appearance outside the Navajo Reservoir Project area. I suspect that this phase of research would be highly productive if it focuses on defining the cultural interactions among peoples of the Colorado Plateaus during the temporal intervals defined by the phases. As it stands, 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 modifications or developments of the arguments, based on new data, but the debt to the Navajo Reservoir Project is clear.

For a long time, the central problem was a serious one. The limitations of the archaeological record, our ignorance of the environment, and the profound nature of the disruptions that caused the abandonment of Anasazi sites all conspired to make the problem of understanding the final collapse of the Anasazi seem intractable. In a number of important ways, the work reported here is novel and innovative. First, it makes use of large data bases that were not just available years ago. Second, it is based on relatively well-organized strategy that is to be expected with an increase in the use of technology. Third, the ongoing use of new computer technology in archaeology has made it possible to undertake systematic surveys and analyze data in ways that were not available in the past.

The work reported here is novel in two respects. First, it makes use of large data bases that were not just available years ago. Second, it is based on relatively well-organized strategy that is to be expected with an increase in the use of technology. Fourth, the work contained in this volume builds on a number of important research initiatives that have been undertaken in recent years. The work contained in this volume builds on a number of important research initiatives that have been undertaken in recent years. The work contained in this volume builds on a number of important research initiatives that have been undertaken in recent years.

The work contained in this volume builds on a number of important research initiatives that have been undertaken in recent years. The work contained in this volume builds on a number of important research initiatives that have been undertaken in recent years. The work contained in this volume builds on a number of important research initiatives that have been undertaken in recent years.
sodic. He argued that gaps in the sequence of chronometric dates were periods of drought during which the Anasazi abandoned the Plateaus for refuge areas both in the southern Basin and Range Province. Berry also attributed cultural changes to the interactions among peoples that occurred in the refuge areas during these intervals. With respect to the Upper San Juan specifically, Berry noted a lack of dates between Archaic and early Basketmaker peoples. He also found the evidence for the Sambrito phase unconvinced, contending that a hiatus occurred between Basketmaker III and Basketmaker IV and between Pueblo I and Pueblo II.

Other scholars, who note gaps in the record of building and occupation events on the Colorado Plateau, simply endorse Berry's inferences about population movement to refuge areas and subsequent return with a modified cultural inventory, Plog (1983), Upham (1984), and Dean et al. (1985) suspect 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 shifts toward regional demographic demarcation (Berry, 1972, 1974, 1975), and 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 Archaic, and between Basketmaker II and Basketmaker III. The very tight clustering of dates reported here (Hammack, this volume) from LA 4169, falls within the Sambrito phase and therefore contradicts the notion of a hiatus in occupation at that time. The radiocarbon dates reported by Kears et al. (1986:637) 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 projectile 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: Wills (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 increase in diversity of site types could relate to the people using the area for a broader range of foraging activities than with the Archaic, which m.aize production is precluded by short growing seasons. If so, the increase in diversity of site types could relate to the people using the area for a broader range of foraging activities than with the Archaic, which m.aize production is precluded by short growing seasons. If so, the increase in diversity of site types could relate to the people using the area for a broader range of foraging activities than with the Archaic, which m.aize production is precluded by short growing seasons.

Kears argues that the excavations at LA 4169 and the reevaluation of the Oven Site (Hammack, this volume) are crucial for our understanding of the early periods of Anasazi occupation of the northern Southwest. As Hammack indicates, the surface indications at LA 4169 were sparse and misleading, suggesting only small Piedra and Navajo component sites. Sills et al. (1986) are the best of the Dolomia site phase recently excavated on Black Mesa (Plog 1986:67-95). In both cases, there are no surface indications of multiple hearths, storage cists, roasting pits, and 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.

Half of the Basketmaker II components reported by Kears (this volume) contain architecture. In addition, the size of the storage pits and evidence of cultivars among their contents at LA 4169 suggest greater sedentarization 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 the area 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 with the unusually 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. Any increase in population density and regional occupation increased the size of territories of foraging populations. Nevertheless, both interpretations could be evaluated through studies of the Archaic phase of the region and through excavation, both of which Kears argues are greatly needed.

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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, 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 for the community of interest. Shields and Cater (this volume) describe communities that are "nucleated" around large pitstructures 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 from being interpreted as Chacoan outliers 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 themselves, can provide areas with strong cultural traditions. The authors will explore the impact of Chaco on its region and some insight into how it functioned.
phase. With respect to the Dinetah phase, it is Dittert's original sequence that is validated. Brown and Hancock'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 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 Athapascons 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 1983). 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 Reeds' 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 pueblos and defenses 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 Pueblos 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 pueblos. 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. Kearns

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, the Rio Grande, the San Juan flows generally southward roughly 400 km (248 miles) to its confluence with the Colorado River. The San Juan River watershed was intensively occupied by 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 pinyon-Juniper woodland,
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 tundra. This montane upland provides a cooler, more mesic setting than the lower San Juan Basin. The Chacoan La Plata and the Luis 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, piñon nuts and miscellaneous berries and fruits in the piñon-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-sized mammals which occur throughout the area, pronghorn antelope and bighorn sheep would have been important game animals of the period, elk and mule deer probably 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 piñon-juniper belt during the winter and their abundance and accessibility is expected to have influenced hunter-gatherer settlement and subsistence strategies (e.g., Ware 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 Escalante Archaeological Exploration Party in 1776 (Chavez 1976). Although they noted the presence of Puebloan ruins further west, they failed to document the architectural sites in the study area. In the late 1860s, Mancos Canyon and Mesa Verde to the west of the study area, Chaco Canyon to the south, the lower La Plata River (e.g., the Holmes group), Aztec Ruins to the west of 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 J acson (Roberts 1930) along the Piedra River, and by Morris (1919b) at Aztec 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 1938-1940 excavations at the Basketmaker II sites of Talus Village and Falls Creek Shelters along 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 Wendorf's (1956) Basketmaker II site excavations at Ignacio, Colorado. No absolute dates were reported for this open architectural site, but 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 southwestern United States (e.g., Bartlett 1943; Bryan and Touloise 1943; Campbell and Ellis 1952; Mohr and Sample 1959). Although this work included the identification of the "Gallo Los culture" 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). Not until the mid-1980s was the study area, the La Plata and the Animas areas of the Upper San Juan River an anticipated result of the Anasazi-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 southwestern New Mexico, if they use any, to assign phases to Archaic sites. Less common, although with increasing frequency, is the use of Schroeder's (1978) Utah-focused Northern Colorado Plateau Archaic phase sequence for Archaic sites in the general vicinity of the study area. Additionally, some researchers use phase designations derived from the Cochise Cultural Tradition of the southwestern United States (Sayles 1983; Sayles 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 cross-cuts the state boundaries of New Mexico and Colorado and two different data sets and organizational schemes were, of necessity, utilized. These include the Archeological Records Management (ARMs) database encompassing the sites within New Mexico and managed by the Laboratory of Anthropology, and the Colorado site data base managed 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

Prehistoric Art and the Upper San Juan River

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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
two separate 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 pre-
ceramic 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 eastern 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 55 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 (1991) 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 com-
ponent 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 projec-
tile 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 identifi-
cation. Point designations include general mor-
phological 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 Archaic Tra-
dition types (e.g., Sudden Side-notch, San Rafael
Side-notch), Cochise Complex types (e.g.,
Chiricahua-Cochineal, and McKean Complex types
(e.g., Hanna). Many of these types overlap or are
stilistically 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-
ple-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
revisions as additional data become available.

The Upper San Juan data base currently (i.e.,
as of March 1991) contains 498 preceramic com-
ponents within the roughly 15,590 sq km study
area. Two hundred thirty-two of these compo-

nents 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 un-
derrepresented. That is, many of the myriad sites
recorded as unknown or undetermined lithic
scatters, 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 un-
known lithic scatter sites are not included in the
current data base because of the ambiguity inher-
ent in their temporal affiliation.

The data base contains 344 preceramic components
determined by period. Considerably fewer of these components are assigned phase
designations (e.g., San Jose, Armijo, En Medio,
Los Pinos). Most of the phase designations are
derived from the New Mexico ARMS data base
whereas the Oshara, Cochise, and Navajo Reser-
voir phase sequences are included in the coding
system. Although the lack of adequate evacu-
ation data has precluded the development of a
preceramic phase sequence for the Colorado
portion of the study area, some of the Colorado
sites do fit into the Oshara and Navajo Reservoir

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<td>18</td>
<td>15</td>
<td>86</td>
<td>9</td>
<td>98</td>
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<tr>
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<td>27.07</td>
<td>3.88</td>
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</table>

Preceramic Archeology of the Upper San Juan River

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

Table 2. Distribution of New Mexico components from west to east.
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 \textsuperscript{1}, one Midland, one Plano 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 unspeciated Paleoindian sites and two Folsom sites are lithic scatters, and one of the latter is associated with a historic site. These sites are supplemented by a possible Folsom-Midland point base from Ridges Basin (Reynolds and Loosen 1987:230), 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; Dykeman 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. (6386±170 B.C.) was recently obtained during a pipeline monitoring 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 Coyle or Alberta points, another point identified as Alberta-like, and a point identified as resembling a Pryor Stemmed, 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; Swaneca 1955; Weimer 1989). However, only one Hell Gap point has been reported from the San Luis Valley (Button 1987:7-8), one possible Hell Gap point has been reported from northeast Arizona (Judge 1982:23; Morris 1958), and no Alberta, Lind Coyle, Pryor Stemmed, Meserve, or Dalton points have been documented in the region. A more parsimonious explanation is that the two Alberta, Hell Gap, or Lind Coyle 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 straight to 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 Stemmed, Meserve, or Dalton designation.

Finally, there are a series of six obsidian hydration determinations from two Piedra Pass sites (SML45, SML46) that range from 12,221 B.C. to 6685 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 Gaulether's (1988:28-33) contention that "generalized" Paleoindian point types (i.e., Clovis, Folsom, Midland, Bolen) will be more highly represented in the higher altitude zones than "specialized" Paleoindian point types (i.e., constricted base and incised base series).

Folsom sites are well documented in the San Luis Valley to the east of the study area (Button 1987; Casden 1974; Pearson and Stanford 1975; Emery and Stanford 1982; Hurst 1941, 1943; Judy 1987; Wormington 1957:29) and in the San Juan Basin and Divide region (Haddock 1962; Hayes et al. 1981:23; Judges 1982:16, 23; Reher 1977:29, 30; Reynolds et al. 1984; Stuart and Gaulether 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 (Judy 1987).

Early Archaic

The Early Archaic period dates roughly between 7950 B.P. (6600 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 the "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, one Jay point from a multicomponent site, five unspecified Early Archaic components at multicomponent sites, and two unspecified Early Archaic single component sites. As Figure 3 illustrates, there are relatively fewer Early Archaic sites in New Mexico (0.9 percent) than in Colorado (4.5 percent). These sites are distributed across the study area (see Figure 4). In addition to those sites identified via projectile points, there is one uncalibrated Early Archaic radiocarbon date of 5800±150 B.P. (3890±200 B.C.) from a recent monitoring project (Reed and Walle 1988:28-33) for Paleoindian and Early Archaic groups. The small number of Early Archaic sites, however, and their frequent association with multicomponent sites negate 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 5150 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 1990a; Ranolph and Reed 1990; Reed 1981; Whitten 1980). These range from 4900±180 B.P. (2590±180 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 is concentrated in the study area uplands. Using data primarily from the Continental Divide region west of Boulder, Colorado, Benedict (1979, 1981) has hypothesized an Anthllithic "mobilization program". Benedict (1979) proposes the occurrence of two major Anthllithic droughts, one at 7000 to 6000 B.P. (5600 to 4500 B.C.) and another at 5000 B.P. to 3500 B.C. He envisions Early Archaic hunter-gatherers retreating from the plains and plateaus into the more mesic uplands during these periods. The current data indicate, however, that the Upper San Juan area did not function as a similar mountain refuge during the Early Archaic. The relative paucity of Early Archaic components is in contrast to the Lower San Juan Basin today and the upper Rio Grande Valley where Early Archaic sites, 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 Gaulether (1988:28-33) for Paleoindian and Early Archaic groups. The occurrence of non-Oshara Middle Archaic populations is discussed in the "Other Archaic" section of this paper.
Figure 5. Map showing distribution of Middle Archaic sites.
Late Archaic

The Late Archaic is identified as that period from roughly 2500 B.C. (1800 B.C. to 2500 B.C.) to 2500 B.C. (800 B.C.) and corresponds to the Arroyo phase of the Osoha Tradition. The En Medio phase of the Osoha 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 corn agriculture, 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., 1800 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 1-3). 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. (1470 ± 60 B.C.) to 2730 ± 80 B.C. (780 ± 80 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 Arroyo 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 Arroyo phase. Also, Fuller (1988:344) notes that the use of large base camps in the Arroyo phase is also supported by the large amounts of sites within the interior area of the San Juan Basin, 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-Osoha Tradition projectile points and represent 46 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-Cochise, 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-Cochise 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 1977-80), Gallina (Ellis 1988), or Piedra Lumbre phase (Schaafsma 1979), all post-Archaic manifestations. They appear to represent Middle to Late Archaic (cf., Copeland 1983; Elveh et al. 1979; Fettermann and Honeycutt 1982; Gilpin 1984; Huse et al. 1978-80) and possibly Basketmaker II artifacts, and have been noted in association with diagnostic Middle and Late Archaic Osoha Tradition points (e.g., Fuller 1988:280; Reed 1979; Winter et al. 1986). Broster and Ireland (1984) date the "Chiricahuas" points from the Jicarilla Reservoir to roughly 5000 to 2500 B.C. (3000 to 1500 B.C.). A point identified as a Cochise point by Vogler et al. (1984:341) from excavations on Gallegos Mesa south of the study area is associated with a 5000 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 dates from the Bolack Exchange funds south of Farmington associate the San Rafael Side-notched style point with a 3900 B.P.

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

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<tr>
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<th>Site</th>
<th>Reference</th>
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<tr>
<td>630±170 B.C.</td>
<td>San Juan 30-6 #439 Area 11</td>
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<td>591±190 B.C.</td>
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<td>Reed 1981</td>
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<td>Reed 1981</td>
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<td>LA 38530</td>
<td>Whiten 1988</td>
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<td>2740±106 B.C.</td>
<td>SML45</td>
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<td>2720±90 B.C.</td>
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*unaadjusted*
(1950 B.C.) structure. Two other medium-sized, side-notched points identified as resembling Suden Side-notch or San Rafael Side-notched points are associated with a Basketmaker II site south of Durango. These points are associated with radiocarbon dates of 2390±70 B.P. (440±70 B.C.) and 2090±70 B.P. (140±70 B.C.) respectively (Fuller 1988:278, 280). Another point identified as a Suden Side-notched specimen had been previously collected from the same site (Fuller 1988:276).

Hogan et al. (1991) and others (e.g., Marshall 1985) consider these large side-notched points more diagnostic of the Northern Colorado Plateau Archaic Tradition (Schroedl 1976) than the Cochise Culture. Hogan et al. (1991) note that in the northern San Juan Basin, these point types appear to have their highest density on the northeastern periphery, an area that equates well with the study area, and in the north-central part of the basin (Hogan and Vierra 1990). They argue that the distribution of the large side-notched points contrasts to the distribution of San Jose points and suggest that they may be indicative of an Archaic Tradition distinct from the Oshara. The presence of these “other” point types in the study area may be underrepresented in the current data base. Some site records document the presence of large side-notched points yet fail to provide illustrations or descriptions. The available data do indicate, however, that there are two distinct clusters of these point types in the study area. One cluster falls within the Animas-La Plata divide and equates well with observations made during the Animas-La Plata Project surveys that large side-notched points were common occurrences (Fuller 1989:280; Winter et al. 1986). The second cluster occurs along the eastern periphery of the study area along the western flank of the Continental Divide and equates well with the occurrence of “Chiricahua-Cochise” points in the Jicarilla Reservation (Broster and Ireland 1984).

The association of these point types with an intrusion of Northern Colorado Plateau Archaic or Cochise Archaic groups has yet to be demonstrated. At least one of the large side-notched points lumped into this group appears to be a

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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
settlement occurred in the Ignacio-middle Los Plinos phase. In the work of an avocational archaeologist, Eddy et al. (1984:76) report that Basketmaker II cobbled ring sites cover not only the entire middle reach of the Los Plinos River but also extend north almost to Vallecitos Reservoir. Eddy (1966, 1972) has suggested that the Los Plinos 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 Jara Canyon area was apparently an important focal point for resource extraction, it does not currently appear to have been a village site. Although the Basketmaker II habitation. The few sites in this area have evidence of architecture; the remainder are open linear or rectangular camps.

Almost half of the Basketmaker II sites in the study area have evidence of architecture and represent a significant departure from the earlier settlement patterns. 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 length 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 the Basketmaker III populations. This is due in part to the lack of sufficient excavation data, particularly from well-stratified contexts, and due to the lack of a local projectile point sequence.

Based on projectile point styles from dated contexts, the Paleoindian 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 En Medio phase. The relatively few sites and the questionable context of some of the diagnostic points restrict 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 et al. (1988), however, the data on which this sequence was built have never been published and, increasingly, researchers are beginning to question the utility of the construction of the validity of the projectile point sequence (e.g., Simmons 1981; Stuart and Gauthier 1986). 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 archaeological projectile point 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 rather later than earlier and may be indicative of prehistoric scavenging or two recycling. 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.

There are currently 64 radiocarbon dates for the preceramic occupation of the study area (see Table 4). These are uncalibrated dates. Some range from 8210±170 B.P. (620±170 B.C.) to 1390±170 B.P. (A.D. 560±170). The context of these dates varies considerably. Some are from discrete excavated cultural features (e.g., hearths, structures), while others represent dates obtained from cultural features exposed in pipeline trenches and data recovered during pipeline monitoring. Also, one and possibly two of the dates have dubious cultural affiliation. Although there may be some ambiguity in individual dates, the collective sample should represent a rough measure of the relative intensity of occupation in the study area through time. The study area here as a place of increasing public and their ultimate validity must await further investigation. The dates (see Table 4) do indicate a relative increase in the utility of the construction of the Early Archaic, Middle Archaic, and Late Archaic periods, with a dramatic increase in cultural activity during the Basketmaker II period.

The chronological placement of the study area data base is based primarily on projectile point identification, and as noted previously, there is a great deal of confusion and misapplication in the extant records relative to point typologies and chronological placement. The general trajectory is similar, however, when the intensity of Archaic and Basketma- ker II presence in the study area based on site record identifications derived primarily from projectile points (Figures 8 and 9) is compared to the intensity based on radiocarbon determinations (Figure 10). Both methods indicate relatively light use of the Upper San Juan study area during the Early Archaic (i.e., ca. 6000 to 3200 B.C.) with a step, although not dramatic, increase in the relative intensity of use through the Middle (i.e., ca. 3200 to 2000 B.C.) and Late (i.e., ca. 1000 B.C. to 800 B.C.) Archaic periods. This is followed by an abrupt and significant rise in use intensity during the subsequent Early Basketmaker II (i.e., 800 B.C. to A.D. 1) and Late Basketmaker II (i.e., A.D. 1 to 450) periods. This dramatic rise in component occurrence is paralleled by a dramatic increase in the number of sites with architectural features and heralds a commitment to agriculture and the beginning of a sedentary lifestyle in this area.

The regional expression of the Archaic component within the study area remains undetermined. It is possible that the study area was being shared or differently used by Archaic populations from the Upper San Juan Basin to the Grand Canyon and by populations operating out of the San Juan Basin. Oshara Tradition points are common in both areas and the large side-notched point styles also occur in both areas. Some researchers consider the large side-notched point indicative of a Cochise intrusion into the Colorado Plateau while others have noted the similarity of some of these points to styles associated with the Northern Colorado Plateau Archaic. Large side-notched points occur in Archaic contexts in north-central Colorado (e.g., Benedict 1975, 1981). One projectile point type from the Feltner and Honeycutt 1984 style with a serrated basal notch or concavity, more closely resembles points from the Albin-Blanding-Chuquicamata region of northern Chile such as those from the San Juan Basin. These points are from the Quemado tradition and are not complete ly understood. The Durango area, the Animas-La Plata divide-La Plata Valley area, and the Los Pinos River-Na vaio Reservoir District area were focal points of Basketmaker II settlement. These settled communities were part of the larger San Juan Basin Basketmaker II region combining the "Durango" Basketmaker II expression with the Los Pinos Basketmaker II expression. The origin of this regional expression remains unclear. Irwin-Williams (1973) argues that the En Medio phase of
the Oshara Tradition represents an in situ continuum of Late Archaic-Basketmaker II development. 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 populations awaits further investigation.

Settlement

The evaluation of patterns of preceramic settlement in the Upper San Juan study area is based on component distribution, site type definitions, assemblage 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 Unknown 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 distribution of Basketmaker II components reflects focused settlement in the La Plata Valley, Animas-La Plata divide, Durango, and Los Pinos-Naajavo 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 these categories 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 suggest, however, that Paleoindian and Early Archaic settlement in the study area was infrequent 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 specific 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 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 only six sites documented for the preceramic portion of the study area. These sites do not include undiagnostic aceramic lithic scatters and presumably underestimate the preceramic site total. The current data base indicates an initial, albeit sparse, occupation during the Paleoindian period with a predominance of Folsom or Folsom-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. Jenky Mont centered site data and Leta Yazzie typed the manuscript. Lori and Paul Reed’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 sites by type component.

<table>
<thead>
<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>
</tr>
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<tr>
<td>Paleoindian</td>
<td>37.50</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Early Archaic</td>
<td>21.43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Middle Archaic</td>
<td>50.00</td>
<td>50.00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>48.44</td>
<td>34.57</td>
<td>1.56</td>
<td>3.12</td>
<td>4.69</td>
<td>3.12</td>
<td>4.69</td>
</tr>
<tr>
<td>Other Archaic</td>
<td>27.27</td>
<td>18.18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unknown Archaic</td>
<td>39.87</td>
<td>53.80</td>
<td>1.27</td>
<td>0.63</td>
<td>1.27</td>
<td>1.90</td>
<td>1.27</td>
</tr>
<tr>
<td>Basketmaker II</td>
<td>19.75</td>
<td>26.11</td>
<td>-</td>
<td>0.64</td>
<td>47.77</td>
<td>5.73</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Preceramic Archeology of the Upper San Juan River

Lori and Paul Reed’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.
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 data base 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...
and Eddy 1964) with cultural studies (Eddy 1966) into a model of climatic change and human response in the reservoir area. This model contained some important surprises. Among the most striking of these was the discovery that the relatively well-known Rosa phase, dated at A.D. 700 to 800 and already understood to be ancestral to the large Gallina phases to the south and probably also the ancestor of the Piedra, Arboles, and Chimine Rock phases to the northeast, was itself preceded in the reservoir by perhaps as much as 300 years of sedentary, agricultural occupation by people of recognizably Anasazi culture who made brownware ceramics. This early brownware-producing occupation was seen by the Navajo Reservoir team as being divisible on architectural and technological grounds into two successive cultural periods or phases, the Los Pinos (A.D. 1 to 400) and the Samrito (A.D. 400 to 700), roughly equivalent to Basketmaker II and Basketmaker III elsewhere in the greater San Juan area (Dittert et al. 1963; Eddy 1961, 1966). The Los Pinos phase was viewed as essentially like the Durango Basketmaker phase (Fenteng and Wendt 1966; Morris and Burgh 1954), but with local peculiarities, including the construction of somewhat unusual and often rather large surface or shallow pit habitation structures, built up with and possibly surrounded with a paving of river cobbles. Small quantities of a plain brownware (Los Pinos Brown), believed to closely resemble Almas Plain, the earliest Mogollon native ceramic type, were manufactured during the Los Pinos phase. A recent conference in Santa Fe (Wilson in prep.), convened to address this problem, concluded that Los Pinos Brown was an early, locally manufactured variant of Samrito Brown.

The Samrito phase was considered to continue but greatly amplify this local ceramic tradition. This Basketmaker III occupation was characterized by locally manufactured Samrito Brown, a brownware differing only in detail from Los Pinos Brown, but occurring much more abundantly. The Samrito occupation appears to have been initially dependent entirely on Samrito Brown vessels in a variety of shapes. By the late Samrito phase, Anasazi Basketmaker grayware and whiteware ceramics, such as Chapin Gray and Chapin Black-on-white (including Durango Variety), were obtained from neighboring groups to the north. The Samrito phase was succeeded by a local variant of the Rosa phase, characterized by the same ceramic assemblage together with locally made plain (Rosa Gray and Rosa Neckbanded) and decorated (Rosa Black-on-white, Bajos Black-on-white) wares. Samrito Village, LA 4195, was first settled in the early Samrito period and was considered by Eddy to be the first central-ized community of the reservoir district by the late Samrito/early Rosa period.

In addition to abundant brownware ceramics, 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 associations. Only at the Oven Site, LA 4169 (SA1A345), 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 ovens of numerous previously unsuspected sites. 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 archaeofaunal 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 reevaluation 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 was 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 subsoils of two of these pits were still...
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.
of the walls and floor (Figure 6). These subcists may be burrowing attempts by trapped animals before or after firing or deliberate human constructs of unknown function. These subcists usually appear to have been fired in the same manner as the main pit.

Ignoring the subcists, 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 0.85 m in diameter. Most were round-to-oval to rectangular in shape and have been interpreted as cist covers. Secondly, 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 frustrum 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 smudging, 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

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**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 frustrum 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 subcists excavated at the intersection

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**Figure 5. LA 4169 pits excavated in 1987, looking west.**

**Figure 6. Excavated pit with subcist, LA 4169.**
only the edges of subcists or the central area of floors. Only one of the pits excavated in 1987 was clearly never burned. 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 silt clay and then fired to produce in-place, terra cotta storage jars, rather than being carefully plastered and slab-revered 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 Oven Site pits both in form and function.

**Dating**

Firing was so intense, and the resulting terra cotta walls so stable, that the archeomagnetic samples collected from five of the pits excavated in 1987 produced a remarkably tight and precise cluster of paleopole 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 archeomagnetic results, this will be the case."

Eighty's enthusiasm is understandable; these samples and the associated dendrochronologic dates allowed the local paleopole 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 +\(\nu\) 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. 458 to 525 +\(\nu\); OVS-2 @ A.D. 455 to 528 +\(\nu\); OVS-24 @ A.D. 461 to 595 +\(\nu\)). A single +\(\nu\) B date (A-795: OVS-3 @ A.D. 455 to 595 +\(\nu\) B) at the turn of the seventh century was commented on specifically by Dean: 'The +\(\nu\) 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 archeomagnetic dating would appear to indicate occupation in the late 6th and early seventh centuries. This agrees with radiocarbon assessment of the 1962-63 data (Eddy 1966). Geomorphological fieldwork at the Uclls Site, LA 4363 (Figure 7), further supports this dating. Schoenwetter and Eddy (1964:45, 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 Sambrito "oven."

**Ceramics placed as funerary items with burials** (Figure 8) indicate a late Sambrito phase (A.D. 600 to 700) context (Erriickson 1990). Sambrito Brown vessels or sherds accompanied four of the five burials. In two of the burials, Sambrito Brown co-occurred with nonlocal whiteware and grayware. If the vessels accompanying the burials are examined as a collection or assemblage, the association of Sambrito Brown vessels with Chapin Black-on-white and Chapin Gray designates a late Sambrito 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 Sambrito phase.

More detailed attribute analysis of the mortuary vessels and sherds suggests manufacturing dates during the latter part of the late Sambrito phase, post A.D. 650 (Erriickson 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 Sambrito Brown vessels are unpolished and were fired in a more controlled reducing atmosphere than is typical for Sambrito 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.
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 terra cotta fragments identifiable as cist throat collapse and mixed sheetwash fill with some ash, charcoal, and cultural material. In a few cases, defined layers of charcoal were encountered. These layers tended to lie well up in the fill sequence. Once their cores failed, the pits seem to have filled rapidly with midden soil and sheetwash alluvium.

When these features were reused as burial pits, the burials were usually placed directly on the clean cist floors or on microlaminated alluvial fill a few centimeters above the floors. In two of the five pits with burials excavated in 1987, the burial surface lay above deeply stratified trash and alluvium (Figure 9). Burials were found both above and below layers of cist cover fragments and wall throat collapse materials.

Although two examples of these cists have been found still filled with their original contents, the redeposited cultural fill of the pits, as well as the contents of the burial offerings, was rich in botanical remains. Matthews' (1988) analysis of bulk soil and vegetal samples identified copious burned and unburned maize cobs (almost all 12-row), a few burned maize kernels, an unburned (but probably prehistoric) cucurbit seed, and wild food and fuel species, especially purslane seeds, goosefoot seeds, and charcoal of pinyon, juniper, willow, poplar/cottonwood, oak, and sage. Less abundant were sunflower seeds, buds/husks seeds, wild tobacco, Indian ricegrass, marsh elder, peppergrass, stickleaf, nightshade, and ground cherry. All of the taxa listed above were recovered from the fill of burial offerings, and most or all were also present in the general pit fill. The original ground surface surrounding the pits would have been rich in charcoal from the original pit fillings, as well as vegetal materials from processing and storage activities that would have been carried out around the pits. Pollen samples from the CASA excavations have not been submitted for study. When analyzed, they will probably prove to be heavily dominated by maize and Mormon tea pollen, as were the pollen samples studied in the 1962-63 project.

As noted above, preservation of unburned vegetal materials was common in the pit fill and in association with the burials. This may have been due to the unique water-retention properties of the terra cotta pit walls. Although no evidence of matting was associated with the burials as in the 1962-63 excavations, a pitch-impregnated 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 1987 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 (Morrison and Burgh 1954). The 1987 tool sets (roughouts, blanks, finished tools, and worn items) were included as burial goods. Numerous individuals of small forms, especially Or k 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 45 items were identified as Oliva (Agaritaea) testacea, of the Family Ovulidae, 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 armbrand.

The osteology of the 1987 burials and most of the 1962-63 burials was restudied 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 semic individual of Platymys compressus. The well-preserved pec-
cary bones were radiocarbon dated by Beta Analytic, in cooperation with the Eidgenössische Technische Hochschule des Züriches (Beta 22669; ETH 3850), to 12260±1780 B.P. uncorrected. This date solidly confirms Schoenwetter and Eddy’s (1964) interpretation of the late Pleistocene swamp preserved in the valley as the lowest set of erosional benches. A pecan tooth recovered from Sambritto Village, and identified by Harris (1963) as being from a white-tipped pecan imported from central Mexico as a trade item, is probably a similar Pleistocene fossil.

Discussion

Other than the early northern brownware 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 (Breternitz 1986; Halloy 1974, Lucius 1982), an unpublished site (LA50337) from the lower middle La Plata Valley (Warren 1986), and LA 33736 (PA 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 plain and whitewares in a late-looking, deep pithouse. Although the main pits of the structure were solidly dendrochronologically dated at A.D. 406 to 483, 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. (TC-4922) to A.D. 840 (TX-4721). Most of the dates would indicate Los Finos 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 Finos phase, which he would date to no later than about A.D. 350. Berry (1982:88-54) 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 dendrochronologie 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 TBN’/T) and A.D. 330 or 390 (Oven site I-1342). These dates are not inconsistent with Eddy’s (1966) ceramic interpretations for late Los Finos 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 780 (Oven site Pit 13 Fill 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 new data indicate that Sambritto Brown, as defined at the recent Santa Fe ceramic conference on this type (Wilson in prepr.), 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 reassembled interpretation of Basketmaker organization and of the chronology of early agriculture and ceramic development is presented by LeBlanc (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>2.2-2.4</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>Total</td>
<td>0.3</td>
<td>10.5</td>
<td>31.5</td>
<td>15.4</td>
<td>40.1</td>
<td>5.2</td>
<td>7.5</td>
<td>110.5</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>2.2-2.4</th>
<th>2.4-2.7</th>
<th>2.7-3.0</th>
<th>Total (1 person year = 0.8 m³)</th>
</tr>
</thead>
<tbody>
<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>
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<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>10.00</td>
<td>40.24</td>
</tr>
<tr>
<td>Total</td>
<td>0.37</td>
<td>13.12</td>
<td>39.37</td>
<td>19.25</td>
<td>50.12</td>
<td>6.50</td>
<td>9.37</td>
<td>138.10</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 sequence (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 as 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 50th 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 (Piblado 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 Langenfeld 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 pistructures 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 pistructures, semi-subterranean/surface structures, midden, 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 (Dittet et al. 1961:221; Dykeman and Langenfeld 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 pistructure depressions are known. Although the number of pistructures 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 hilltop with an estimated 30 depressions. The majority of the pistructures within the community range from 6 to 8 m in diameter and as such, are termed oversized pistructures. 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.
The Cedar Hill Project

Win. Lane Shields & John D. Cater

from the river, which is the closest permanent stream. During recent investigations, the water table was encountered at a depth of less than 2 m below the present ground surface near the community. Based on historical downsizing of the arroyos within the CHP, we posit that the Loma Enchro 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 not central in the context of potentially arable lands. The usual or expected pattern of such settlements would be on the peripheries of such lands, but the setting of the Loma Enchro Nuclear Community at the confluence of several wide valleys is unexpected. For an agricultural group to consume primary arable land for a community settlement seems 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.

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 (Gilbspeic 1985:14-16). There is a strong tendency 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 monsoon circulation patterns than by other factors. Statistically, area precipitation is less than 2 cm throughout the year, with no dominant season. The general area receives approximately 6 to 8 cm (2.3 to 3 inches) of precipitation in each of the four seasons. The San Juan Basin appears to be situated in a transition zone between summer-dominated precipitation patterns to the south and winter-dominated precipitation patterns to the north (Shields 1990a:39-40).

Just as the San Juan Basin in general is in a transition zone, the CHP is located generally on the north/northeast portion of the basin. That is, the project area is near the northern edge of the boundary. This border is reflected in the transitional nature of the flora and fauna (Dittett et al. 1961:266; Woodbury 1961a, 1961b). As a result, even a minor shift in the jet stream path will have an effect in the CHP (Dittett et al. 1961:260). Simply stated, a southerly shift will increase precipitation, especially if that shift occurs during the winter, but also during the summer. A northerly shift in the jet stream path in combination with stronger summer monsoon flows or a very strong monsoon flow will also increase summer precipitation. Discussions of the complex interaction of the various factors involved in areal precipitation patterns may be found in many sources (e.g., Allan 1977; Davis 1989; Peterson 1987), as well as in Tuon et al. (1973), a State of New Mexico publication.

In the semi-arid climate of the San Juan Basin (with other factors considered to be favorable), summer precipitation which is necessary for success with horticultural or agricultural activities. Variations in summer precipitation will affect crops and force population movement out of the valley or allow population movement into the effected areas (Shawewitter and Eddy 1964:108-128). Paleoclimatic data are not currently available for the CHP, but the presence of the Loma Enchro Community indicates that at least during the period of greatest population density and the summer monsoon, there was sufficient in the CHP area for horticultural or agricultural activities at other times is not yet known.
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. Cassels 1983; Cordell 1984; Hancock et al. 1988; Stuart and Gauker 1988; Woynak 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 (Morrisey 1939), the Durango District to the north (Gooding 1980), and Navajo Reservoir District to the east (Gooding 1980). As a result, some have questioned the use of the Navajo Reservoir District phase as a standard for the CHP.

These criticisms and the problem of affiliation have arisen from confusion concerning the definitions of the term 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 with comparison to cultural manifestations outside that project area (e.g. Adams 1975). As Stuart and Gauker (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 W. Eddy, personal communication 12 November 1990). This apparently returns 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 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 archeological based on similar population/settlement patterns, structural orientation, cobble architecture, and the ceramic assemblages. The Navajo Reservoir sequence has been applied to the CHP. The growth and decline in population, as reflected in survey-level sherd counts, is nearly identical between the Navajo Reservoir and the CHP from the Rosa through the Arboles phases (BMIII/early PI through the PII horizon).

The Loma Enchore Community sites are generally multicomponent 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 (1966:993). 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, 261; 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 and 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 Enchore 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 Gobernador, and (3) Robert’s (1929) work at Shabik’echee Village. Hall (1944:65) thought the Rosa phase was a local expression, or of, derived from, Morris’ (1939) La Plata phase. Using the scheme presented by Willey and Phillips (1958), 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. A.D. 780 to 850 (Eddy 1966:484, Eddy et al. 1984:70-81). However, west of the Reservoir area, this time marks the beginning of the Piedra phase from ca. A.D. 700 to 900 (Eddy et al. 1984:60). By A.D. 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 upper Gobernador country (Eddy 1968:199). The maximum spatial extent of the Rosa phase manifestation south and east is well-delineated. To the south, it occupies the entire Gobernador area but has a gradual transition in time and space into the Largo-Gallina phase (Dittert et al. 1961:213; Hall 1944). The eastern boundary of the Rosa phase was first proposed by Dittert et al. (1961:235) to be the Continental Divide, although Eddy (1968:199) 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 unit and the headwaters of both the Piedra and Upper Reach of the San Juan drainage units, it is now known to be present at least west of the La Plata River and 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 formal resumption 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 occupation is present in the southern portion of the drainage west of the Alkali River (Pilbado and Shields 1990; Shields 1989, 1990a, 1990b, Shields and Cater 1991b). Based on this information, it seems likely that the northern border of the CHP extends to the south as it heads west.

Dykeman 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, the upper La Plata River drainage north of the Colorado-New Mexico state line. Rosa phase ceramics were confirmed for the East Side Rincon and while BMII and PI border 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 Division of Archaeology (communication 17 September 1990), it is suggested there to the southwestern extent of the Rosa phase is at least west of the La Plata River and south of the Colorado-New Mexico border. If this interpretation is true, it mirrors a similar northern boundary for the following 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 (1968:199) document it as far as Blanca...
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. 1961:223) 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. 1961:236; Eddy 1966:80, Eddy et al. 1984:76). Based on ceramic analysis conducted by Cather, most Arboles phase occupations have been identified in the CHP (Pibladho and Shields 1990: Shields 1989, 1990a, 1990b, Shields and Cather 1991b). The ceramic assemblages from the East Side Rincon site and from the Fort Lewis College site discussed previously did not contain any Arboles phase ceramics. Based on these data and the published results of New Mexico's investigations along 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 appears to dip to the south in an east-to-west arc (Figure 4). In the east, it is identified as extending to the north 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;59–91). Eddy et al. (1984:59–91) and Eddy (1984:59–91) based this 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 to some degree returned to an Anasazi period hunter-gatherer strategy (Marshall 1985:137–139; Stuart and Gauthier 1989:36–44; Wozniak 1982:23–24).

Settlement Patterns and Traits

Identified settlement patterns again reflect farming practices adapted to summer-dominant precipitation. These include sites on floodplains, terrace sites (Eddy 1966:502), on ridges, or other elevated localities (Wozniak 1982:23–24 citing Tainter and Giffis 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 area within the spatial extent of the Arboles phase (Eddy 1966:500, 505; Shields 1990a:238), which in the Navajo Reservoir area was due to upstream population migrations (Eddy 1984:59–91; Schoenewetter and Eddy 1964:112–113). Stream entrenchment extended over a large area (Nials 1980). Sites assigned to this phase are identified in the southern portion of the Piedra drainage unit east of the Pine River (Dittert et al. 1961:236; Eddy 1966:500–501). Based on this 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.

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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 Langenfeld 1987:22; Morris 1939).
- From the BMII through the PI horizon, 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 PI, major portions of this population were focused on and lived in around both the Loma Encrobo 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 cobbles 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 (Dittett et al. 1961:213, 220, 261), west into the La Plata River valley. It is this population that remodeled portions of Salmon Pueblo and built roomblocks at Artec Pueblo (Dyckman and Langenfeld 1987:87 citing Irwin-Williams 1972).
- Another distinctive trait of this population is the presence of overwashed 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 PI 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 Rosa phase through the Arboles phase located along an easily traversed route between the Animas 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 Langenfeld 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 1966:403). 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 compared to the Reservoir area, there appears to have been only minor occupation during the early BMII horizon in the CHP area. Although some cobble architecture in both areas throughout the Anasazi occupation is viewed as significant.

The occupation sequence and settlement pattern noted within the CHP reflects a trend which took place during the PI horizon throughout the Four Corners region. At that time, the population of the region, which had earlier settled in relatively scattered farmsteads or multi-family units, began to aggregate into larger communal settings, often around overwashed structures in a village focus. This type of aggregation has been noted in the Dolores Valley (Kane 1984), the Navajo Reservoir area (Eddy 1966), Alkali Ridge (Brew 1946), and in the La Plata River valley (Dyckman and Langenfeld 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 horizons, when a population peak is reached. This population is stable during the mid-late PI horizon but breaks down precipitously during the PI 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 outstripped 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 1966, 1968; Schoenwetter and Eddy 1964).

Eddy reports that headwater erosion and arroyo downsizing 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 (Morriss 1939) and local cobble masonry appears at the Artec and Salmon pueblos south of the CHP along the Animas and San Juan rivers (Dyckman and Langenfeld 1987). It is likely that the CHP populations shifted to the well-watered valleys, reverting to smaller hamlet or farmstead settlement patterns. A final point which should be made is that although Eddy (1966, 1968) describes headwater 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. James W. Judge, assisted by Dr. Richard P. Watson of San Juan College, directed a field school for Fort Lewis College in the Loma Encrobo 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), Farmington, 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 Encrobo Community Special Treatment Area (STA). This designation stipulates protective measures beyond those usually required on public lands and excludes 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 map 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 Dinéh 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 38535) 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-13878). Ceramics associated with the hearth, originally classified as plain Anasazi graywares, were reexamined and found to fit Brugge’s (1963) description of Dinéh Gray Ware, a protohistoric ceramic manufactured by Ahtapiaskan groups ancestral to the Navajo. This discovery prompted a scrutiny of all testing-phase ceramics recovered by the project, and resulted in one other site (LA 38536) with Dinéh Gray sherds. A radiocarbon sample from this site was submitted, producing a date of A.D. 1570±50 (uncalibrated) (Beta-13241). DCA went on into the subsequent mitigation phase with the aim of recovering as many chronometric dates from these sites as possible to substantiate the Dinéh 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 Dinéh Phase Research

The Dinéh phase was first proposed during contract archaeological studies in the Navajo Reservoir district (Dittert 1958; Dittert et al. 1961). Based initially on survey data collected during the late 1950s, Dittert defined the Dinéh phase as the earliest occupation by Ahtapiaskan groups, encompassing the time between the initial Spanish colonization of the Southwest and the Pueblo Revolt of 1680 when aboriginal groups drove out the Spaniards. Dittert placed the beginning of the Dinéh 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 (Dittert et al. 1961:247). He hypothesized that the Navajo-Apache split occurred about the same time as the earliest Ahtapiaskan entry into the Southwest, shortly after initial European contact between 1540 and 1542. Thus, the Dinéh phase was proposed as the earliest occupation of the San Juan Basin by Ahtapiaskan 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.

Dittert defined the Dinéh 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 Dinéh phase included forked-pole hogan, Dinéh Gray pottery, sidetopped and corner-notched projectile points, side-notched axes, full-grooved mauds, and a fairly sophisticated and diverse chipped stone technology based on local materials (Dittert et al. 1954:246). Although Dittert was unsure whether or not to include agriculture, one of his collaborators includes corn, bottle gourds, and beans in the list of Dinéh cultural elements (Hester 1962:63).

Because all traits associated with the Dinéh phase were also included in the post-Revolt Gobernador phase, identifying Dinéh occupations was difficult for excavators, and in the minds of some it was suspect. Eddy (1966) rejected the Dinéh phase as an identifiable occupation associated with a ceramic assemblage that included Gobernador Polychrome (Hester and Shiner 1963:41-47). Eddy (1966:285) questioned the excavators’ assignment of the lower component to the Dinéh phase because of the earlier than the two ceramic assemblages consisted of only nine sherds (all Dinéh Gray).

Excavations at Tsoodoo Rock Shelter (LA 4298) revealed comparable stratigraphy (Hester and Shiner 1963:33-46). 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 soil fill suggested a post-Revolt occupation, and a small deposit contained only Dinéh Gray. Again, the excavators’ assignment of the intermediate deposit (upper portion of the wet zone) to the Dinéh phase was questioned by Eddy (1966:506), though the hypothesized Dinéh component in this case included 51 sherds. It seems to be a bit of a paradox that Eddy, while sensitive to the small samples comprising the hypothesized Dinéh phase ceramic assemblages, chose to ignore the evidence for repeated occupation at this site, and relied on a single polychrome sherd to use Tsoodsor Shelter as the type site for assigning a distinctive sandstone (cupped-beat style) and additional perishable materials to the Gobernador phase (Eddy 1966:286).

Three additional Navajo sites were identified as Dinéh sites by excavators at Navajo Reservoir, while additional “indeterminate Navajo” sites were shown to lack Gobernador Polychrome or other Dinéh characteristics. One such site was Parcida Gobecnadoor (LA 3491) wherein perishables included beans embedded in clay plugs from Dinéh Gray vessels. Still, the best arguments for pre-Revolt occupation were based on negative evidence. Eddy (1966:307-308) concluded that the best positive evidence for a Dinéh 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. 1500-1700 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

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

Supporting evidence for the Dinéhah phase was
evertheless 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 hogan
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
Navah (LA 38946) contained both Dinéhah Gray
and Gobernador Indented, a four-post structure
with interior hearth and milting 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-
covered by recent excavations at the La Plata Mine
(Figure 1). Beginning with the investigations at
LA 38555 and LA 38536, described in the introduc-
tion 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 et Horn 1984, 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 Dirksen and Lange-
feld 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; Liddy 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-
ogists during the late 1980s and 1990s have be-
come increasingly aware of these untrodden
remain. 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.

Sites of a "low profile" in terms of
surface indications. This is due, in part, to the
temporary nature of the structures, where pres-
ent, and to the limited number of artifacts. In
general, surface indications are limited to a light
scatter of lithic and ceramic artifacts, fire-
cracked rock, burned sandstone, and, occasion-
ally, ephemeral charcoal staining. In addition to
these subtle surface indications, the associated
grey 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
grave goods.

The sites are located in a variety of settings
between 900 and 1600 feet. Most are in gently
rolling terrain dominated by pinon-juniper wood-
lands adjacent to sage parks or grassland mead-
ows. 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 phases appear to have oriented toward wild plant exploitation with cultivation and hunting less important subsistence pursuits.

Two different types of domestic architecture have been defined at Diné phases 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 brush or covering materials like those used on modern-day Navajo summer brush structures are suggested by the abundance of charcoal and the presence of identifiable charcoal outside the building areas, indicating that green branches and boughs of juniper and pine, 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 forms. Size 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 0.720). 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 at the same site by Mariah, being larger than those defined by DCA and appearing more square in shape, with the corners rounded (Brown 1991). This feature measured 3.48 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 (Hancock et al. 1986; Reed and Horn 1988b, 1989). 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 (Stephen 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, with a large space 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 size 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 6.0 to 18.7 square meters with an average of 13.9 square meters (standard deviation 3.373). 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 of or southeast of the center (i.e., between the center and the typical location of the entranceway). The remaining hogan had a slab-lined hearth built...
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 hogan 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 Mariah 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 hogan had evidently been intentionally burned at the time of abandonment. Structure 1 contained a thick, ashy stratum 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 floor assisted architectural reconstruction (Figure 5). In addition to a hexagonal floor pit excavated prior to construction, a well-defined entry ovoid was observed on the southeast (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 heated the adobe ground surface just outside the hexagon corner (Figure 7).

Structure 3 at LA 61852 had the most complex suite of intramural features with a central hearth and two warming pits. The roasting 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 by a removable flap during inclement weather, such an arrangement would have precluded its use at such times unless a hood or some other covering had been incorporated into the wall covering the feature.

Intramural features were frequently associated with both hogan 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 provide one such example (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 of the photo in Figure 9 (Feature 7B and 7C) 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 refuse areas. The absence of storage features and mealings bins distinguishes the Dinetah sites from Gobernador phase sites documented elsewhere in the San Juan Basin (Brown and Evavskich 1991; Dittert et al. 1984; Edel 1986b; Vincent 1980).

**Artifacts**

Protohistoric ceramics excavated from the La Plata Mine sites were compared with Brugge'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-scarred vessels and a scarcity of mica glints. Tempering materials moderately differ from the type description in that most of the La Plata ceramics have chert sandstone from an igneous source along with sand and quartz temper. Tempering material is not abundant. Exterior and pastel 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 Brugge. The shell fracture, or profile of the sherds' broken edge, was crumbling or irregular and ragged. This is consistent with the vessel wall hardness which was weak to medium weak.
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, IIIB6, IIIB7, and IIIB10. 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 Dinétah phase hogan (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 Dinétah 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).
Figure 6. Plan map of Dinetahe 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 Dinetahe 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.]

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.

In the La Plata Valley, Athapaskan 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 (Brand 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 contained between 16 and 66 chipped stone tools and 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 phase 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 cobbly and shaped forms), basin and slab metates, and some additional formal tools such as shaft abraders.

Most of the projectile points were small un-notched 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 U.S. 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-i) may be one such example. It occurred on the east edge of a hogan that appears to have been ritually abandoned and burned. The two large serrated "points" (Figure 11-j and 11-m), 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. Variousdebitage 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 fragment, and 7 percent shatter. Overall, the debitage assemblages complemented the number of formal chipped stone tools.

Gary M. Brown & Patricia M. Hancock
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 Dinétah phase is the emphasis on hunting and gathering compared to the post-Revolv Governorship 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 Dinétah phase in general, during the course of most of the field work at the La Plata Mine. Although ethnological studies at these shallow sites have not been extremely productive, 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 subsistence base. Despite intensive pollen and flotation analyses, domestic plants were represented only rarely. Corn was found in only one flotation sample and in one other context during normal excavation procedures; domestic beans were recovered from one hearth. Corn pollen was identified in Dinétah 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 presint area.

In contrast, a great deal of information on wild resource procurement has been accumulated. Poplar pollen, the emphasis on the tetraploid, highly identified Cheno-ams, with goosefoot (Chenopodium sp.) in particular being a common macrofossil. Cultural use of the following plant types also was indicated: carrot-parley family (Umbelliferae), grass (Gramineae), catail (Typha sp.), cholla and prickly pear (Opuntia spp.), squashberry (Rhus sp.), wild buckwheat (Fagopyrum esculentum-tomentosum), potato/tomato family (Solanaceae), pea family (Leguminosae), globemallow (Sphaeralcea sp.), and lily family (Liliaceae). The greater part of these data are all readily available in the immediate environment and are suggestive of a gathering economy. In addition, juniper (Juniperus osteosperma), pinon (Pinus sp.), sagebrush (Artemisia sp.), and rabbitbrush (Chrysothamnus sp.) were used as fuel and possibly edible, 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 drainages.

Faunal remains were not common at Dinétah 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 occurred during 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 Dinétah phase was defined in the Navajo Reservoir district, there has been considerable effort to place it into an absolute chronological context. Assuming that a pre-Revolv Athapaskan occupation did occur in the San Juan Basin, there are two important chronological issues to be assessed. The first is the time of the Dinétah phase specific for the La Plata Mine area. The second is the initial arrival date of Athapaskans 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 earliest Dinétah phase may be quite different from either of these better-documented occupations: possibly being an anecric and even more unobtrusive phenomenon than that characteristic of the Dinétah phase (Brown 1981). We regard the origins of Athapaskans in the Four Corners region as an open question that cannot necessarily be equated with the Dinétah phase.

 Chronometric dating has been successful to the extent of most of the La Plata sites. DCA obtained radiocarbon dates from most excavated prehistoric 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 radiocarbon date was secured from a small camp associated with a few Dinétah sherds by the BLM (Gaudy 1986). Mariah secured numerous additional radiocarbon dates, along with obsidian hydration dates and the only prehistoric tree-ring dates from the La Plata Valley (Brown 1991).

Archaeomagnetic dating was also attempted, but the only prehistoric sample that proved successful was from an accretic site.

The results of the chronometric assays are provocative. The small site investigated by the BLM provided the earliest physical radiocarbon date: 600±40 B.P.; 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 Dinétah sherds from seven prehistoric 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.P.). The dates are comparable to raw radiocarbon dates from the same sites, but they are substantially younger than radiocarbon dates that were tree-ring corrected (Reed et al. 1980:356). 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 corrected radiocarbon dates but, on the whole, they are statistically earlier than TL dates from the same sites (Reed et al. 1988:356).

Radionuclide dating is difficult to apply archaeologically, especially with relatively young sites such as those occupied during the Dinétah phase. DCA attempted to circumvent problems with radiocarbon dating by relying on alternative dating methods. This was done with ceramics using TL dating, which has the advantage of dating the object of interest (pottery) directly rather than by associated materials. A question of great concern is the origin of Navajo pottery ware. Based on studies at Abiquiu Reservoir, Schiaffino (1976) 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 Dinétah phase sites at the La Plata Mine was identified, DCA made a concerted effort to determine the age of the associated ceramics. TL dating was one important means of doing this, producing a median date of 1560 and a mode of 1530. These results strongly suggest that Dinétah 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 association, yielded nearly identical dates. At one site (LA 38535), two unburned sherds were dated within 10 years of each other (A.D. 1460±98 and 1470±96). At another site (LA 56042), two sherds with similar TL dates and believed to be from the same vessel were both dated to A.D. 1510, +28 (Alpha-3133) and +24 (Alpha-3139). Burned sandstone and its matrix from the same feature as the sherds provided a somewhat younger date: A.D. 1590±40. A radiocarbon date from the same feature yielded a calibrated date of A.D. 1439-1660 (Beta-17918).

Obsidian hydration dating was also attempted at Dinétah phase sites. The results have been more problematic than the other dating methods, as well as the techniques employed; the best results are those obtained by DCA on 26 artifacts from the Obsidian 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 fell in the 1500s. These dates tend to be slightly earlier than other types of dates submitted from the same sites. This was not true for Kit-Avo (LA 4948), which has a cluster of A.D. 1300 dates that appears inconsistent with both the TL and radiocarbon 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. 1986; Reed et al. 1988). While DCA merely suggested the need to push the beginning date for the Dinétah phase back, Reed and Horn (1988b) were the first to unequivocally claim they had documented a Navajo component fully a century older than the start of the Dinétah phase as originally hypothesized (Dittert...
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 30 years less than the model. Although Hogan (1989) favors a beginning date of 1450, he states that all of the Dinéth 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 Dinéth phase.

Although utilizing a broad array of dates as Hogan (1989) did to elucidate the context of the Dinéth phase, differences in the broadening of the model. Hogan argued mainly on the basis of general patterns in the chronological data that the Dinéth phase should be dated as early as 1450. Obviously, there is little consensus on how to utilize the chronometric data, even among researchers convinced that the Dinéth phase was extended back into the five centuries. Like Reed and Horn, Hogan downplayed the effects of dead wood and other problems inherent in radiocarbon dates derived from wood charcoal for inferring age of occupation, although he observed patterned discrepancies indicating that the upper limits of the 95 percent confidence interval associated with radiocarbon dates was closer to the actual age of occupation than the midpoint or mean of which averaging techniques are based.

Brown's (1990) chronometric analysis of the Dinéth phase included additional dates from four excavated sites by Mariah (1988) and 1989. He stressed the dynamicity for wood charcoal to produce radiocarbon dates grossly overestimating the age of occupation (Schiffer 1982, 1986; Smiley 1985). In addition, wood-use data, especially on the Dinéth phase back prior to 1550 (Brown 1990). Collectively, they provide some evidence in support of a pre-1550 occupation. The clayey and charcoal deposits are more pronounced than those seen in the eighteenth century indicating a more prominent occupation. The presence of wood charcoal is well documented by the BLM, LA 61848 (Gaudy 1986), and two of the six sites dated by Mariah, LA 61828 and LA 61848 (Brown 1991), are regarded as weak cases for extending the Dinéth phase 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 Dinéh" 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 61836 is rejected as a good case for Dinéh 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 61852 fall in the 1218-1460 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. 1387-1555) 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 hogans 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 1, 1415-1634, with a 76 percent probability of being older than 1530.

Conclusions

To summarize, the earliest Dinéh 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 Dinéh phase back further than this, although earlier occupations may be documented through future work. The Dinéh 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 Dinéh phase as a discrete cultural and chronological unit with specific architectural and artifactual traits, rather than to associate it necessarily with the earliest Athapascan 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 Dinéh phase that still merit rigorous evaluation. The Athapascan entry into the Southwest, the beginnings of Athapascan pottery making, the differentiation of Apache and Navajo cultures, and the establishment of the latter in the Dinéh region were not necessarily simultaneous. Our main concern in this paper has been with chronological parameters of the Dinéh 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 Dinéh 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 Dinéh 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 "BP" are uncorrected dates as reported by the radiocarbon labs. Radiocarbon age ranges were calculated based on two standard deviations. The chromometric analysis is discussed further in Brown (1990).

Acknowledgements

The basic research discussed here was funded by BHP-Utah International through cultural resource contracts administered by San Juan County's La Plata Mine. The support and interest of personnel at the La Plata Mine greatly facilitated this work. We are especially grateful to Chris A. Seymour, Bill Sleet, and Fred Samson for their assistance over the years. The Division of Conservation Archaeology provided Hancock with institutional support, while Mariah Associates, Inc. did the same for Brown during completion of the respective contract archaeological projects at the La Plata Mine. Michael M. Chato did most of the final drafting used in this paper. Hancock wishes to acknowledge clerical assistance from Moore Anthropological Research in preparing her sections of the paper. The colleagues who helped in various ways with this study, especially field and lab personnel, are much too numerous to mention here, but we do wish to single out David M. Brugge, Alfred E. Dittert, Jr., James W. Gish, Margaret A. Powers, Michael B. Schiffer, Murray Tamers, and David R. Wilcox for their words of fact, wisdom, and encouragement. We also appreciate the incisive comments of Linda S. Cordell and Jonathan Haas at the symposium in New Orleans. Finally, we are most grateful to Lori Stephens, Reed and Paul F. Reed for the opportunity to participate in both the symposium and the publication of this volume, as well as for their editorial assistance in finalizing this manuscript for publication.
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 database 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.

Dinétah 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 (Dinétah 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; Schraffsmo 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.
and Hancock, this volume; Hancock et al. 1988; Hogan and Manfred 1988; Marshall 1985; Reed et al. 1986; Reed and Horn 1988, 1990; Reynolds et al. 1984), although this latter date has been questioned (Brown 1990). At the present time, the Dinétah phase is dated from ca. A.D. 1500 to A.D. 1690.

Dinétah phase sites are characterized by brush structures and forked-pole hogan, light ceramic and lithic artifact scatters, and hearts (Brown and Hancock, this volume). The Navajo of the Dinétah phase are assumed to have been non-agricultural hunters and gatherers who lived in mobile bands, and used highland and lowland areas of northwestern New Mexico on a seasonal basis (Hester 1962). Contact with other groups such as the Eastern and Western Pueblo is believed to have begun during the early Dinétah phase and continued on a limited basis into the following Gobernador phase (Dittter 1958; Hester and Shiner 1963).

Gobernador Phase

The Gobernador phase (A.D. 1690-1780) is traditionally defined as a period of extensive Pueblo influence manifested in the presence of high numbers of northern Rio Grande and Hopi ceramics, manufacture of Gobernador Polychrome ceramics (which resemble Puebloan ceramic styles), construction of defensive structures or “pueblitos” (which resemble Puebloan architecture), and the appearance of Puebloan-style masked dancers and kachina-like figures in Navajo rock art (Carlson 1965; Hester 1962; Powers and Johnson 1987). This evidence of Puebloan influence is augmented by historical documentation of increased Navajo/Pueblo political interaction and trade networks and by the presence of Puebloan groups along the Rio Puerco following the Pueblo Revolt of 1680 (Forbes 1960; Hammond and Rey 1966; Spicer 1962).

Gobernador phase habitation sites exhibit great variability in dwelling types. These dwellings include any combination of forked-stick hogans, masonry-walled pueblitos, Jean-tos, and ramadas. The range of site complexity for habitations is difficult to specify, but pueblito sites range from 1 to 35 rooms with as many as eight associated hogans (Carlson 1965; Powers and Johnson 1987). A great variety of traded ceramics are found on habitation sites, as well as on associated limited activity nonhabitation sites. These ceramics include Rio Grande Glaze ware, Rio Grande Biscuitware, Jemez Black-on-white, Tewa Polychromes, Eastern Keres ceramics, Zuni ceramics, and Hopi ceramics. Obsidian from the Abiquiu and Jemez areas is also present.

Evidence of Interaction and Exchange

Navajo/Pueblo interaction and exchange in the early Dinétah phase has been demonstrated by the presence of Jemez Black-on-white and Jeddito ceramics on several dated sites (Hester and Shiner 1963; Mills 1988). Other materials such as Pedernal Chert from the Jemez-Abiquiu District, obsidian from the Abiquiu and Jemez area, and the Flagstaff, Arizona area, and copper pigments from the Ojo Caliente District have been recovered from Dinétah phase sites (Hancock and Moore 1988; Hester and Shiner 1963; Kearns 1988). These raw materials may have been obtained through trade networks or by means of procurement expeditions.

Evidence of imported ceramics and lithic raw materials is more abundant during the Gobernador phase than during the Dinétah phase and has been attributed to both exchange and the presence of Pueblo refugees at Navajo pueblito sites. Gobernador phase sites include ceramics from both Eastern and Western Pueblo sites as well as other Puebloan items and characteristics as described above. However, as Hogan et al. (1991) and Marshall (1985) indicate, there are no formal archaeological data other than the presence of trade ware ceramics and Puebloan-like architecture that demonstrate that the pueblito sites were built or occupied by Puebloan refugees. The only data that support the latter assumption come from historical Spanish documents (cf. Hogan 1991).

Spanish documents indicate that during the time of the Spanish Reconquest (A.D. 1690s), following the Pueblo Revolt of 1680, Puebloan populations were leaving many areas of the northern Rio Grande region and moving north or west to escape Spanish repressals. It has been documented that most of the Tano groups, most of the Twas from Santa Clara, some of the Tewas from San Ildefonso and Pojoaque, 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 (Dittter 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 flee to the Navajo area, and merged with the Navajo population. There is, however, no archaeological or historical evidence to suggest that such 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 (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 distribution of ceramic sites it was necessary to classify sites in order to find patterns and trends. The ARMs database 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. It is important to note that the data used in this study does not code information on ceramic types present, this information, along with the rest of the site types had to be taken from each individual site form. The presence or absence of obsidian, Gobernador Polychrome, and trade ware ceramics by type was coded for all Navajo sites in the data base. The types of trade ware recorded for these sites include Rio Grande Glaze ware, Biscuitware, Jemez Black-on-white, and ceramics from the Tewa, Keres, Hopi, and Zuni-Acoma areas. These data for each site were coded into the Rhs data management system and various sorts on the data were generated. In addition to coding the presence of trade ware 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, Biscuitware, or ceramics from the Jemez, Tewa, or Keres areas. Eastern Pueblo ceramics included those ceramics from either Zuni/Acoma or Hopi.

In Table 2, the distribution of Eastern Pueblo ceramics on Navajo sites is presented. Several counts, Jemez Black-on-white ceramics are present on more sites than any other ceramic type. Next in frequency is Rio Grande Glaze ware followed by Tewa ceramics, then ceramics from the Keres pueblos, and finally Biscuitware from the Abiquiu/Chama area. Taking the Estobéan Pueblos ceramics as a group and plotting the percentage of sites within site types that contain these ceramics, a definite pattern emerges. Figure 2 depicts the percentage of sites with Eastern Pueblo ceramics by type site. As the figure shows, for the presence of Eastern Pueblo ceramics there is a downward trend from pueblo to habitation to scatter to camp. The pattern is not unexpected for several reasons. First, given these as central places in Gobernador phase settlements, pueblos are presumably linked to extensive contact with Puebloan groups. Furthermore, ethnic co-resi-

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puebloo</td>
<td>63</td>
<td>5%</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>

Table 1. Distribution of sites by type.
The Protohistoric Navajo

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. Pueblo²</th>
<th>Relative Percentage¹</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>51</td>
<td>2</td>
<td>15</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>-</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.

To another dimension to the discussion of Navajo-Pueblo interaction, the distribution of convet with esidian present in combination with Eastern and Western Pueblo ceramics and on sites with no tradeware was explored (Table 4). In terms of sites with esidian, the pattern de-

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

The level of Navajo trade with Pueblan groups was probably quite variable across time and space. Nevertheless, the high percentage of sites possessing tradeware ceramists 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 ce-

dence during the aftermath of the Spanish Recon-

To another dimension to the discussion of Navajo-Pueblo interaction, the distribution of East Pueblo ceramics and on sites with no tradeware was explored (Table 4). In terms of sites with esidian, the pattern de-

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

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Pueblo</th>
<th>Hopi</th>
<th>Zuni-Acoma</th>
<th>Western Pueblo²</th>
<th>Rel. %¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo</td>
<td>6</td>
<td>12</td>
<td>13</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Habitation</td>
<td>11</td>
<td>14</td>
<td>23</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Camp</td>
<td>6</td>
<td>5</td>
<td>10</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Scatter</td>
<td>7</td>
<td>9</td>
<td>14</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>5</td>
<td></td>
<td></td>
<td>5%</td>
<td></td>
</tr>
</tbody>
</table>

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 Dinetah 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. Pueblos 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 tradeware—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 relative percentage of 9 percent in association with Puebloan ceramics.

### Table 4. Number of sites with obsidian and associated ceramics by site type.

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>Pueblito</th>
<th>Habitation</th>
<th>Camp</th>
<th>Scatter</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gobernador Poly</td>
<td>47 (75%)</td>
<td>163 (42%)</td>
<td>101 (23%)</td>
<td>62 (24%)</td>
<td>33%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; E. Pueblo</td>
<td>17 (27%)</td>
<td>49 (13%)</td>
<td>18 (4%)</td>
<td>20 (8%)</td>
<td>9%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; W. Pueblo</td>
<td>13 (21%)</td>
<td>16 (4%)</td>
<td>5 (1%)</td>
<td>4 (2%)</td>
<td>3%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; Jemez B/W</td>
<td>6 (10%)</td>
<td>30 (8%)</td>
<td>10 (2%)</td>
<td>9 (3%)</td>
<td>5%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; Glaze ware</td>
<td>4 (6%)</td>
<td>25 (6%)</td>
<td>9 (2%)</td>
<td>10 (4%)</td>
<td>4%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; no Tradeware</td>
<td>27 (43%)</td>
<td>107 (27%)</td>
<td>82 (19%)</td>
<td>41 (16%)</td>
<td>22%</td>
</tr>
</tbody>
</table>

*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.

### Table 5. Distribution of sites containing Gobernador Polychrome in association with Puebloan ceramics.

- **GP**: Gobernador Polychrome
- **E**: Eastern Pueblo
- **W**: Western Pueblo
- **H**: Habitation
- **C**: Camp
- **S**: Scatter

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>Pueblito</th>
<th>Habitation</th>
<th>Camp</th>
<th>Scatter</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gobernador Poly</td>
<td>47 (75%)</td>
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<td>101 (23%)</td>
<td>62 (24%)</td>
<td>33%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; E. Pueblo</td>
<td>17 (27%)</td>
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<td>18 (4%)</td>
<td>20 (8%)</td>
<td>9%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; W. Pueblo</td>
<td>13 (21%)</td>
<td>16 (4%)</td>
<td>5 (1%)</td>
<td>4 (2%)</td>
<td>3%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; Jemez B/W</td>
<td>6 (10%)</td>
<td>30 (8%)</td>
<td>10 (2%)</td>
<td>9 (3%)</td>
<td>5%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; Glaze ware</td>
<td>4 (6%)</td>
<td>25 (6%)</td>
<td>9 (2%)</td>
<td>10 (4%)</td>
<td>4%</td>
</tr>
<tr>
<td>Gobernador Poly &amp; no Tradeware</td>
<td>27 (43%)</td>
<td>107 (27%)</td>
<td>82 (19%)</td>
<td>41 (16%)</td>
<td>22%</td>
</tr>
</tbody>
</table>

*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.

### Figure 3. Distribution of Gobernador Polychrome and associated Eastern and Western Pueblo ceramics by site type.
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 Dinétah 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. 1700, 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 phase. Five sites have Glaze D, which dates from A.D. 1400-1515, 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 pueblitos studied had early glazes (C-E) noted in their field reports. Since pueblitos were a focus of trade, this suggests that the sites having these glaze ware types predate pueblitos, 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 pueblitos, 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 site type. Not unexpectedly, few of the pueblitos fell into any of the categories. There is little question that most of the pueblitos 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 tradeware. 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 glazeware is probably underreported 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 Dinétah 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.

### 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>8</td>
<td>2</td>
<td>1</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 1979; 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 (1969).

Levi-Strauss’ ideas of generalized exchange include both the more explicit 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 embodied 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 settlement clusters “may have involved the establishment of affinal kin ties, the transmission of esoteric knowledge, and the exchange of material” ( Upham 1982:157), that claim rests on correlations in archaeological data used in conjunction with a more structuralist definition of the alliance concept (Upham and Reed 1989).

### 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.
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; Underhill 1982; see also 1978, 1977). 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 types occurring 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 ceramic types of the sites containing these wares were engaged in extensive exchange relationships that comprised the respective alliances.

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 social alliance between all of these sites 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. We have discussed the issue of raiding and how it would have affected interaction between the Navajo and Pueblo. Thus, a fuller elaboration of the specifics of this proposed alliance is left for another paper. In the remainder of this paper, however, we discuss how interaction between the Navajo and Pueblo can be elucidated using the alliance concept.

There are three main points to be discussed:

First, socially significant trade between the Navajo and Pueblo occurred for at least two hundred years prior to the Gobernador phase. Second, Gobernador Polychrome may have been manufactured prior to the Gobernador phase as a result of the spread of ceramic technology and ideas from the Pueblo. Lastly, the presence of probable alliance ties between the Navajo and various Pueblo groups provided the social mechanism by which the latter migrated to Navajo settlements for refuge during the Spanish Reconquest. In the absence of such alliance-based ties, it is doubtful that any refugees would have come with the Navajo. These points are taken up individually below.

Dinéh 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 1500s (Dittter 1958; Hester and Shimer 1965; Mills 1969). Because the number of trade goods present on these early Dinéh phase sites is few, this interaction has been viewed as minimal. Although there is evidence for this early contact, the involvement of the Navajo Pueblo exchange, networks in the Dinéh phase. First, a small number of sites in the study contained Jemez Black-on-white ceramics without Governor Polychrome being present. Interestingly, none of these are Pueblos, which is not unexpected since these sites generally date to the Gobernador 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 (Table 6). These three glaze types are collectively dated from A.D. 1450 to 1625, well before the beginning of the Gobernador 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 Dinéh phase, it is clear that trade was important during this period. The importance of this trade, 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 Gobernador 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 Dittter (1958) 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 is derived from elements present in Jemez Black-on-white and Tewa Polychrome. We think that Dittter’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 a combination of Rio Grande glazes and Hopi ceramics. If a Puebloan group was manufacturing Gobernador Polychrome, then it is unlikely that these styles would mix. There is more likely that the Navajo would combine elements of several Puebloan ceramics in order to produce a unique ceramic style such as Gobernador Polychrome. Secondly, 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 such distinctive 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 Gobernador phase by several decades. Hogan (1991) suggests that Gobernador Polychrome was a full developed type by at least A.D. 1669 - 1694, before the beginning of the Gobernador 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 Dinéh phase, it is clear that trade was important during this period. The importance of this trade, 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 Gobernador phase.
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 latter 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.


t103

Conclusions

In this paper, we have attempted to explain and elucidate several aspects of the interaction that occurred between the Navajo and various Pueblo 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 Diné nah 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 Pueblo ceramics, particularly Hopi types and Rio Grande glazes. 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 1600s 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

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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. 1600 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 lines-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 posts, 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
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 Scourlock 1990:76) brought an end to this period in Navajo history when the area was abandoned and the Navajo 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 the 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 Gobernador phase pueblos at this time. Interest in the sites continued through the 1960s and 1970s with a variety of projects completed by individuals (Haskell 1975; Wilson and Warren 1974), amateur groups, and Federal agencies. In 1962, Roy L. Carlson (Carlson 1965) relocated some of the sites excavated by Earl Morris and published the results based on Morris' field notes. Carlson's study is still the most important publication documenting early investigations at the pueblos.

Between 1973 and 1975, the BLM sponsored stabilization at eight pueblos (Bureau of Land Management 1975). In 1985, the San Juan County Museum's Division of Conservation Archeology and the New Mexico Historic Preservation Division sponsored a project to record pueblos and complete a National Register nomination for sites on private, State, and Federal lands (Powers and Johnson 1987). During this project, 76 sites were visited, 49 were fully documented, and 48 were listed on the National Register of Historic Places. This work reinforced the significance of the sites and the Navajo's unique approach to survival in the eighteenth century.

In 1988 and 1990, the BLM sponsored a comprehensive inventory of lands surrounding nine of the pueblos. This work by Marshall (1991) was the first to identify and record, in detail, the multitude of features associated with the pueblos. Marshall concludes that the pueblo structures were only one component of much larger and complex occupational clusters that included forked stick hogans (Figure 3), ramadas, corrals, sweat lodges, work areas, etc.

The pueblos are located in the heavily dissected mesa-canyon country of the Largo Gobernador area east of Farmington, New Mexico. Mesas rise 400 to 500 feet above deep, narrow canyons with elevation ranging from 5,800 to 7,000 feet. Mesa tops are covered with juniper, pithon pine, and sagebrush. Yucca and prickly pear are also found in some areas. The mesa benches are dominated by sagebrush with some Mormon tea, juniper, and pinon. Canyon bottoms are densely covered with rabbitbrush, saltbush, and sage. Small stands of cottonwood are found near drainages.

The Issue of Defense

That the pueblos 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 bottlenecks of bureaucracies, political hierarchies, and/or analytical screens before it is communicated. Because surprise attacks succeed despite warnings, effective defensive systems must succeed despite surprise (Bettis 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.
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 hogans, 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 Dinetah to escape Spanish retribution following the revolt of 1696. Keur (1944:85) argued early on that the Dinetah represented a refuge area, "a place where uprooted Pueblos joined the erstwhile hostile Navahos to hide out against a common foe (i.e., the Spanish)."

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 live stock, 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 north central 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 gallop 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 Ute pressure was greatest.

To counteract Ute tactics of surprise, the Navajos of Dinetah 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 hogans 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
checked for possible obstructions. If elevations were detected that were greater than or equal to the maximum elevation along the line, then the location was not visible (Figure 4), if all elevations along the line-of-sight vector were less than the elevations of the observer location and the viewing location, the pueblo location was assumed to be visible (Figure 5).

It should be noted that line-of-sight projections were not systematically field checked, but visits to about one-third of the pueblos over a period of five years confirm the accuracy of many of the projections. Powers and Johnson (1987) also discuss and confirm line-of-sight from pueblos to pueblo, based on their field observations during preparation of the National Register nomination. However, further systematic work is needed using binoculars, smoke, and/or mirrors to absolutely verify GIS line-of-sight projections and the maximum distance signals might be observed. Field testing is tentatively planned for the Spring of 1992 (see Endnotes, this paper).

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 Cabrero Mesa Ruin, which will be discussed in a moment, there is no obvious increase or decrease in the number of line-of-sight connections.

It is apparent that the Cabrero 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 Cabrero 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 Cabrero 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, Cabrero 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, Cabrero 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 11 to 14 miles to the west and 22 miles to the southwest. A field visit to Cabrero Mesa confirmed this incredible viewshed. Within this viewshed, Cabrero Mesa had (projected) visual ties to 10 pueblos.

The significance of Cabrero 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, Cabrero 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 line-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
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, pueblos with an average of two or three rooms had lines-of-sight to seven and eight pueblos respectively, while larger sites had views to only two or three pueblos (Figure 10).

Definite patterns also emerged in the topographic comparisons (Figure 11). Pueblos without line-of-sight were concentrated on ledges, cliff faces, and areas generally regarded as inaccessible. In fact, 77 percent were inaccessible, while 13 percent were located adjacent to steep-sided mesa or bench edges with generally excellent viewpoints 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 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 hearth beds, forked-stick and masonry-based hogan, and trash middens. Although differences were less pronounced, these pueblos 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 (e.g., 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 pueblos with lines-of-sight have more feature occurrences, pueblos with an average of fewer rooms have more lines of contact with other pueblos.

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 profess to have 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 signaling 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 bluffs, were often enjoyed inferior viewpoints 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 (south half). Lines-of-sight between tree-ring dated pueblos.

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

Figure 8 (north half). Lines-of-sight between pueblos.
Navajo Defensive Systems

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 sig- nalling stations or observatory points while the larger sites were situated on landforms which could support larger concentrations of inhabitants (Figure 13). The larger sites may have housed a suf- ficient 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 ex- tended 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 viewpoints 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 viewpoint 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 pro- tection of larger compounds, or simply disa- ppeared 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 hogans, fireplaces, toe-holds, defensive walls, burned rock, hogans, trash scat- ters, courtyards, storage features, hearths, sweat lodges, and passageways with the numbers of other sites visible from a given structure. On a gross level, we know that sites with views contain similar evidence of domestic use such as hogans, trash scatters, and fireplaces to sites without view sheds.

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 re- present different clans?

Third, issues surrounding the evolution and eventual abandonment of the defensive site sys-tem within the Dinéheth need a careful examina- tion. 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 character- ized by large rectangular room blocks on wide benches or low rises near canyon bottoms. Sites evolved through walled compoundes, to perched locations atop boulders, and culminated in cliff dwellings, the ultimate in defensive sighing. Ad- ditional tree-ring studies, such as those currently being conducted by Ron Towner 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 McNally (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 aban- doned their homes in the Dinéheth and retreated south to Cebolla 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 Wil- son (1967:7), did the eventual acquisition of guns by the Utes make these defensive sites untenable?

Others have pointed out that the Dinéheth never was an area particularly well suited for pas- toralism with its deep canyons and steep mesas. Despite these limitations, herd sites grew and would have become an increasingly important asset which could not have been protected by the pueblo defensive system. The circumscription of growing herds and possible overgrazing may have been factors in the abandonment of Dinéheth.

What evidence is there in the archeological re- cord for growing herd sites from 1730 to 1750? Is there geologic or palynologic evidence to sug- gest over-grazing?

Pratt and Searlock (1990:76, 311) raise still more possibilities. On one hand, they state that a severe drought in the late 1770s forced an aban- donment of this area. On the other hand, they
Navajo Defensive Systems

...that the initial influx of Pueblo people fleeing to the Dinétah following the revolt of 1696 was so large as to result eventually in an overtaxing of the available natural resources. Hogan (1991), however, argues that the Pueblo influx has been severely overestimated and that very few Pueblo people actually lived in Navajo territory.

We do not profess to have the answers to many questions we just posted. It is clear, though, 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 Dinétah. This region offers unique opportunities to study a culture’s systemic 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 is surely 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 stealthy 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 Ute, 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 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, immodest 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 smoke signals.

Figure 13. Old Fort Ruin, LA 1869: a large pueblo and forked stick hogan complex built on a wide mesa bench.
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 pueblito, Gomez Canyon, and the Adolfo 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 pueblos were not visible 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 Cabreto Mesa 12 miles away. The specific pueblos could not be identified. The pueblos 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 Ceriza Canyon and Gobernador Canyon, as well as the small cluster near Cabreto 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 hogans, 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 fire-rings at several pueblos have yielded tantalizing new data about the pueblos and their occupants. However, much more research is still needed if an accurate interpretation of the role and function of these sites within the Navajo settlement system is to be determined.

Figure 14 (north half). Pueblos with field tested lines-of-sight.
Navajo Defensive Systems

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

<table>
<thead>
<tr>
<th>Site #</th>
<th>Name</th>
<th>Topography</th>
<th># Rms.</th>
<th>AttachedFeat.</th>
<th>UnattachedFeat.</th>
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</tr>
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<td></td>
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<td>boulder</td>
<td></td>
<td>fireplace</td>
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<td>canyon bottom</td>
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<td></td>
<td></td>
<td>boulder</td>
<td></td>
<td></td>
<td>burned rock, trash</td>
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LouAnn Jacobson, Stephen Fosberg, and Robert Bewley
## Appendix 1. Pueblitos without line-of-sight (continued).

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<td>1701–1734</td>
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<td>hogan</td>
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<td>55831</td>
<td>Gomez Canyon</td>
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<td>storage area</td>
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<td>4</td>
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<td>55838</td>
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## Appendix 2. Pueblitos with line-of-sight.

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<tr>
<td></td>
<td></td>
<td>1735c</td>
<td></td>
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<td>55834</td>
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<tr>
<td>1868</td>
<td></td>
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<td>1722 – 1749c</td>
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<td>Frances</td>
<td>1689 + + B</td>
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<td>-1745c</td>
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<td>2298</td>
<td>Tapacito</td>
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<td>bench</td>
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<td>hooded fireplace, hatch entryway</td>
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