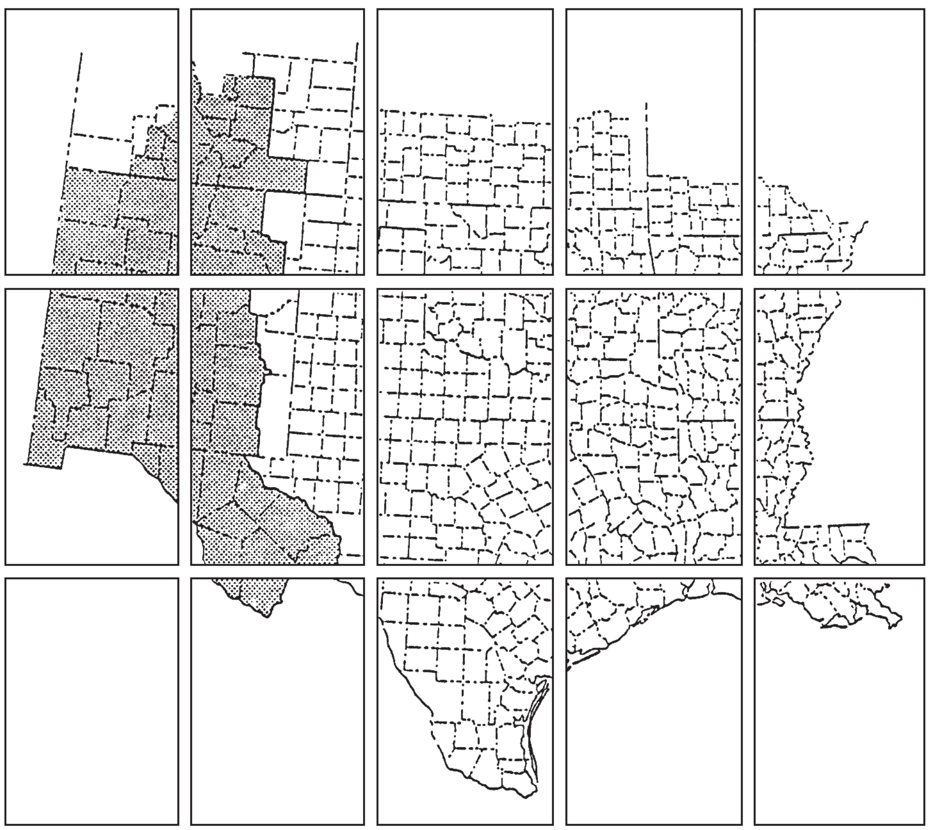
Human Adaptations and Cultural Change in the Greater Southwest:

An Overview of Archeological Resources in the Basin and Range Province

by Alan H. Simmons, Ann Lucy Wiener Stodder, Douglas D. Dykeman, and Patricia A. Hicks



Prepared by the Desert Research Institute, Quaternary Sciences Center, University of Nevada, Reno, and the Bureau of Anthropological Research, University of Colorado, Boulder, with the Arkansas Archeological Survey, Fayetteville.

Final Report Submitted to the U.S. Army Corps of Engineers, Southwestern Division. Study Unit 4 of the Southwestern Division Archeological Overview.

Contract DACW63-84-C-0149

1989

Academic Press of Orlando, Florida, kindly granted permission for use of a number of figures from *Prehistory of the Southwest* (Cordell 1984)

The Historic Preservation Division, Office of Cultural Affairs, State of New Mexico, kindly granted permission for use of figures from *Prehistoric New Mexico* (Stuart and Gauthier 1980)

Library of Congress Catalog Card Number 1-56349-060-9

Arkansas Archeological Survey
Fayetteville, Arkansas 72702

Printed in the United States of America, 1989
Second Printing, 1996
New Printing, 2004

Offset Printing by Arkansas Department of Corrections, Wrightsville.
Second Printing by University of Arkansas Quick Copy and Printing Services, Fayetteville.
New Printing by University of Arkansas Copy Center

ABSTRACT

The archeology of the Region 4, Basin and Range, of the Southwestern Divisions of the U.S. Army Corps of Engineers is examined in detail. The area included in this study is most of New Mexico and parts of south-central Colorado and the Trans-Pecos region of Texas. This area represents one of the richest archeological regions in the United States. While this work is not a comprehensive overview of the cultural resources in the study area, it does include synthetic treatment of the major cultural periods represented. It also discusses data deficiencies and problem areas within this culturally complex region. The final portion of the study uses the concept of adaptation types as a synthetic comparative unit.

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ACKNOWLEDGMENTS

The preparation of a volume as large as this one is obviously has required the assistance of a great many individuals. Now that this work is completed, a collective sigh has escaped from several of these people. I can only single out a handful of the brave souls who contributed, either directly or indirectly, to this undertaking.

At the Desert Research Institute in Reno, Pat Hicks is to be commended for her thoroughness in compiling the annotated bibliography that was a requirement of this contract. This was a monumental task and was not without its moments. Pat also undertook the synthesis of an area that she previously had little direct experience with: Trans-Pecos. Now we both know where Terlingua is. Finally, Pat's thorough assistance with the final editing is greatly appreciated. Shirley Garcia and Ramona Reno were responsible for the final formatting and word processing on this document. While I did not inflict my handwriting on even their formidable talents, they have taken a huge manuscript and made order out of it. Lois Snedden assisted considerably with several editing tasks. Steve Durand read parts of the manuscript and made several suggestions on a variety of the elements of this work. His time and attention is appreciated, as is Lonnie Pippin's, who educated me to his views of the Chacoan outliers. Cynthia Irwin-Williams was instrumental in the inception of the project, and her comments on various aspects of Southwestern archeology are appreciated.

Marsha Jackson, Rosemary Talley, Cheryl Wase, and LouAnn Haecker of the Survey Records Room, Laboratory of Anthropology, Museum of New Mexico, and Laura Holt, Librarian at the Museum of New Mexico are gratefully acknowledged for their help in locating some of the rare and more obscure references included in this work. We also would like to thank Bobbie Ferguson of the Bureau of Reclamation, Amarillo Office; John Roney of the Bureau of Land Management, Puerco District Office; Ken Lord of Chambers Consultants and Planners; Lynn Sebastian and Signa Larralde of the Office of Contract Archaeology, University of New Mexico; John Bradley of San Juan Community College; and James Judge of the Fort Burgwin Center (Southern Methodist University), for providing copies of publications and manuscripts.

The comments of various reviewers also are much appreciated. We have tried to incorporate their multitude of suggestions into this final document, realizing that there is no way to please all of the archeologists all of the time.

Other individuals and agencies also provided information or support. These include Larry Banks (U.S. Army Corps of Engineers), Cory Breternitz (Soil Systems, Inc.), David Doyel (Pueblo Grande Museum), Doug Dykeman (Navajo National Cultural Resources Management Program), Fred Limp (Arkansas Archeological Survey), John Speth (University of Michigan), Ann Lucy Wiener Stodder (University of Colorado), Jim Trott (National Park Service), Fred Wendorf (Southern Methodist University), and the Colorado, New Mexico, and Texas SHPO offices, to name but a few.

Alan H. Simmons

The bioarcheological resources survey would not have been possible without the help of many individuals who were generous with their time and resources. My sincere thanks to Roberta Bradley and Sandra Karhu for their help in the research and report production. At the University of Colorado, invaluable assistance was provided by Fran Snow, David Greene, David Breternitz, Dennis Van Gerven, and Richard Wilshusen. Special thanks to Patricia Hicks of the Desert Research Institute, to John Shelberg of the U.S. Army Corps of Engineers, Albuquerque District, to Nancy Akins, and to Dwight Schmidt of the National Museum of Natural History.

The Colorado research was made possible by Martha Sullenberger, Jay Byers, and O. D. Hand, of the Office of the State Archeologist of Colorado, and by Claudia Nissley.

Research on the Texas portion of the project area was facilitated by Jim Boone of the Texas Archeological Research Laboratory, and by Pat Mercado-Allinger of the Office of the State Archeologist, Texas Historical Commission.

Our research in New Mexico was made possible by Curtis Schaafsma, the State Archeologist of New Mexico, Stanley Rhine of the Maxwell Museum of Anthropology, Marsha Jackson, Stanley Growchowski, and Rosemary Talley at the Site Survey Office of the Historic Preservation Division, Office of Cultural Affairs, Laura Holt of the Laboratory of Anthropology, Marilyn London and Maria Bauer at the Maxwell Museum, David Stuart of the New Mexico Archeological Council, John Bradley at San Juan College, and Dr. and Mrs. George L. Dixon.

The assistance of the following individuals is also most gratefully acknowledged: J. Richard Ambler, Colin I. Busby, Jaymie L. Brauer, Nancy J. Blomberg, Jan Biella, Mark Chenault, Glen Cole, Mrs. Hedy Dunn, Katie Davis, C. Jean DeRousseau, Frank Lee Early, Gloria J. Fenner, Patricia Grewe-Mullins, Bert A. Gerow, Jan Guy, Ann Hannibal, Ann Lane Hedlund, Dave Herod, Brenda Holland, Elaine Hughes, Alfred Johnson, Suzanne P. Kenyon, Timothy Kohler, Nevin P. Lamb, Fred Lange, Ellen S. Payson, Helen Pustmueller, Clark Spencer Larsen, Ralph Luebben, Una Macdowell, Loretta Martin, James C. Maxon, Robert McGregor, Charles Merbs, John L. Montgomery, Maureen O'Neil, Ben Olive, Ann Ramage, Darbey Ray, Virginia Robicheau, William L. Schart, Norman Sauer, Elizabeth Steinert, Kit Schweitzer, Cheryl Wase, Virginia A. Wulfkuhle, and Bonnie Yates.

The author's research on Protohistoric paleoepidemiology was supported by the Richard Lounsbery Foundation and the American Museum of Natural History, Sigma Xi, and the University of Colorado Graduate School Foundation.

Ann Lucy Wiener Stodder

INTRODUCTION

Alan H. Simmons

In 1539, when the Spanish Franciscan Marcos de Niza purportedly laid eyes on one of the "lost cities of Cibola" (actually the Zuni pueblo of Hawikuh), he undoubtedly fantasized of untold riches in gold. While that fantasy was unrealized, de Niza was one of the first Europeans to enter a region that has a cultural richness unsurpassed anywhere in North America. The American Southwest, of which New Mexico forms a core, is a remarkably diverse region with a rich and complex heritage that has involved the often tumultuous interaction of several distinct cultures. The archeological history and remains of the region are equally complex. This volume represents an attempt to place this archeological heritage in a framework for understanding its significance and the need for its preservation.

This work is a part of a much larger study commissioned by the Southwestern Division of the U.S. Corps of Engineers. The Corps has contracted for an archeological overview/management plan of all lands within the Southwestern Division's jurisdiction. The coordinating institution for this massive project is the Arkansas Archeological Survey at the University of Arkansas. The Survey, in turn, subcontracted portions of the study to institutions and individuals with expertise in the different regions that comprise the Southwestern Division. The present work represents the Desert Research Institute's (DRI) examination of archeological materials within the Basin and Range region of the division. The volume also contains an assessment of bioarcheological information from the region by Ann Lucy Wiener Stodder of the University of Colorado's Bureau of Anthropological Research.

The Basin and Range region of the Southwestern Division covers a huge area and is delineated both by natural and modern political boundaries (Figure 1). The boundaries of the study area were defined in consultation with the other institutions responsible for conducting similar studies in adjacent regions of the Southwestern Division. While historic preservation legislation originates at both the federal and the state levels, management of cultural resources is most pragmatically approached on a state-by-state basis. Thus, the geographic coverage of this work represents a mosaic of natural, political, and expedient boundaries. This may not necessarily reflect the best way to discuss cultural activities that largely occurred prior to the emergence of modern boundaries, but it does represent a reasonable compromise.

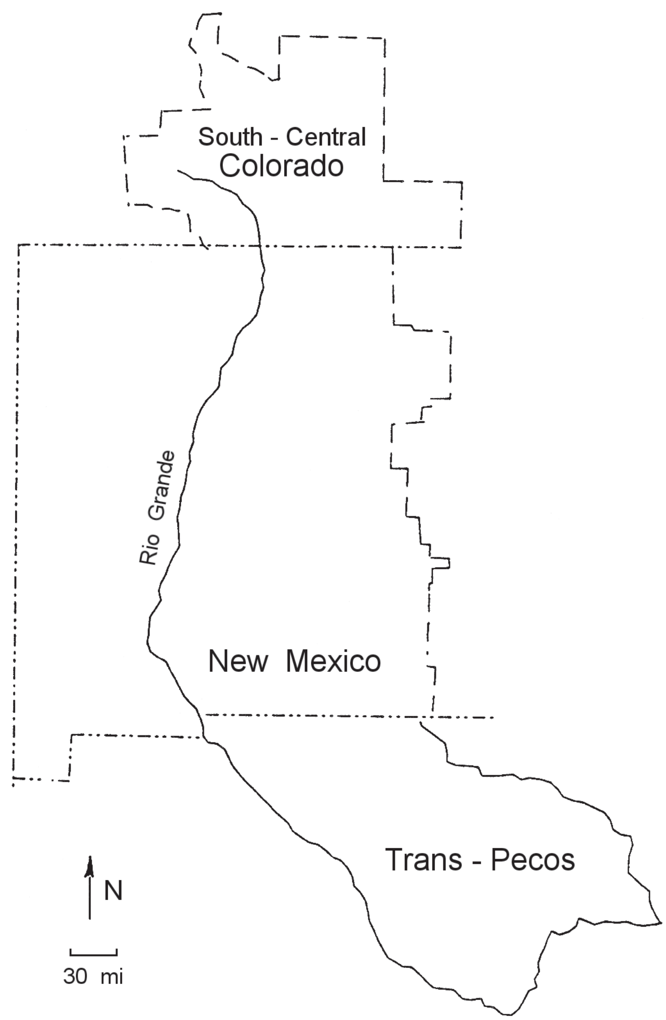


Figure 1. The project area showing the major regional subdivisions used in this overview

The present study area may be defined as follows. The core of the study area is the state of New Mexico. We deal with the entire state with the exception of the extreme eastern counties (Curry, Lea, Quay, Roosevelt, and Union; and these are addressed in general terms as appropriate). Because the majority of the land area in these counties falls within the Great Plains physiographic province (Fenneman 1931:10, Figure 4), it was decided that they were best dealt with in detail by our colleagues at the University of Oklahoma who are responsible for reviewing cultural materials in the larger Plains region. Besides New Mexico, this study includes the majority of the Trans-Pecos of western Texas and the south-central mountains of Colorado. On the state level, a common approach to managing cultural resources data is to organize site records and reports by county. All of the counties that are covered in this overview are listed by state in Table 1.

Table 1.
Counties for Each State Involved in the Present Work

New Mexico	Colorado	Texas
Bernalillo	Alamosa	Brewster
Catron	Chaffee	Culberson
Chavez	Conejos	El Paso
Cibola	Costillo	Hudspeth
Colfax	Custer	Jeff Davis
Dona Ana	El Paso	Pecos
De Baca	Fremont	Presidio
Eddy	Hinsdale	Reeves
Grant	Huerfano	Terrell
Guadalupe	Lake Harding	Las Animas
Hidalgo	Mineral	
Lincoln	Pueblo	
Los Alamos	Rio Grande	
Luna	Saguache	
McKinley	Teller	
Mora		
Otero		
Rio Arriba		
Sandoval		
Santa Fe		
San Juan		
San Miguel		
Sierra		
Socorro		
Taos		
Torrance		
Valencia		

The area under consideration is enormous, and some subdivision is necessary in order to fully understand the complexities of the archeological record. The south-central Colorado portion of the study area has been divided into three subregions or study units to facilitate the discussion of cultural development in rather distinctive environmental zones. The Mountain study unit refers to the rugged terrain at elevations of ca 2,500 m or greater. Discussion of the San Luis Valley study unit focuses on developments in the unique plainslike environment locked within the Rocky Mountains. The Front Range study unit is a mixture of eastern foothills, extensive tablelands, and high plains that characterize the east slope of the Rocky Mountains in Colorado.

For the core area of New Mexico, there exist subdivisions that are based upon Bureau of Land Management (BLM) and U.S. Forest Service (USFS) districts within the state. These agencies, and others, have produced several regional archeological overviews that follow these district boundaries (Table 2). While the areal extent of these overviews largely reflects the management districts utilized by the agencies, they also make allowances for generally agreed upon cultural areas.

In preparing the New Mexico archeological state plan, Stuart and Gauthier (1984:3) generally conformed to the preexisting BLM and USFS divisions, with some modification. In this work, we basically follow Stuart and Gauthier and use the following subdivisions: San Juan Basin, Upper Rio Grande, northeast New Mexico, central New Mexico, southeast New Mexico, west-central New Mexico (Mount Taylor/Socorro), and southwest New Mexico (Mimbres/Jornada) (Figure 2) . This division differs from that used by Stuart and Gauthier only in that we consider the San Juan Basin, the

Table 2.
Some Archeological Overviews of the Study Area

	New Mexico	
San Juan Basin	Breternitz and Ash 1984	
	Magers 1979	
	McAnany and Nelson 1982	
Upper Rio Grande	Cordell 1979	
	Pratt 1986a, b*	
Northeast	Camilli and Allen 1979	
	Levine and Tainter 1982	
	Pratt 1986a, b*	
	Sebastian et al. 1986	
	Winter 1986	
West-Central	Berman 1979	
	Breternitz and Ash 1984	
	Tainter and Gillio 1980	
Southeast	Camilli and Allen 1979	
	Sebastian et al. 1986	
Central	Camilli and Allen 1979	
	Levine and Tainter 1982	
	Pratt 1986*	
	Sebastian et al. 1986	
	Winter 1986	
Southwest	Breternitz and Doyel 1983	
	LeBlanc and Whalen 1980	
	Lekson 1984	
	Wilson 1985*	
Statewide	Stuart and Gauthier 1981	
	Colorado	
Cassells 1983	Eighmy 1984	Mehls and Carter 1984
	Texas	
Biesaart et al. 1985	Malouf 1985	

Note: In some cases, these are actual overviews; in other instances they are works with excellent regional summaries. Several works cross-cut the subdivisions used in this study.

* - denotes an overview that primarily deals with history

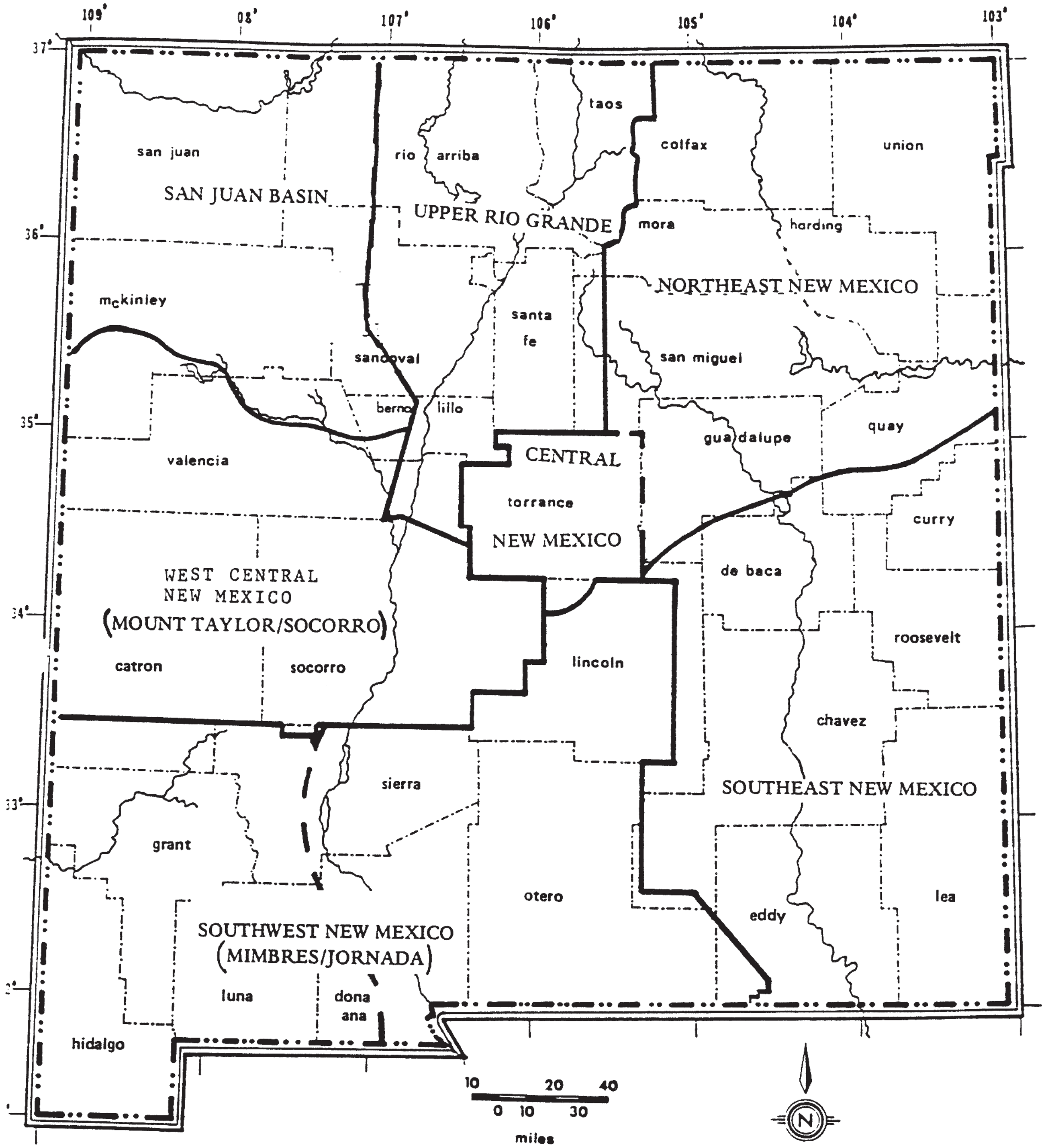


Figure 2. Subregions within the New Mexico portion of the study area (from Stuart and Gauthier 1984:5)

Upper Rio Grande, and the northeast and central portions of New Mexico separately.

The Trans-Pecos portion of the study area has been defined as follows. The northern boundary follows the Texas-New Mexico border, from the Rio Grande on the west to the Pecos River on the east. The eastern boundary is formed by the course of the Pecos River for most of its length. Where the southeast trending river intersects the western border of Val Verde County, the regional boundary turns to the south and follows the county line until it intersects the Rio Grande. The southern and western boundaries are defined by the course of the Rio Grande. Trans-Pecos also has been subdivided into three sections corresponding to major physiographic and cultural zones: the Plains, Puebloan, and Interior subregions.

STUDY OBJECTIVES

The primary aim of this study is to produce a document that summarizes present knowledge of the archeological record in the Basin and Range study area. This document is meant to be integrated into the larger study of the Corps of Engineers' Southwestern Division being prepared by the Arkansas Archeological Survey. The present document is intended to be factually complete, yet free from technical jargon so that it is comprehensible to a wide range of nonspecialists. We will summarize pertinent data, identify information gaps, and present theoretical issues in a balanced fashion.

The focus of this study is on prehistoric archeology. Historic archeology involves a set of theoretical issues and methodological techniques that differ substantially from those used in prehistory. Because the authors of this document are prehistorians, relevant historic materials and archeology will be discussed, but only in a summary fashion. The historic archeology of the study area is complex, and a complete discussion of the issues would require substantial input from historical specialists. Such an undertaking was beyond the scope of the present study.

The following objectives have structured this report:

1. **Archeological Perspective:** One chapter of this work is devoted to a brief summary of the history of archeological research in the study area. This summary is intended to provide a conceptual framework for understanding the current state of archeology in the study area.

2. **Synthetic Overview:** The major portion of this work (five chapters) is devoted to an overview of the archeology of the study area. This overview will include a discussion of the archeology in each of the subregions defined above. While these discussions will not be all-inclusive, they will provide readers with enough information so that they will know which sources to consult for additional detail.

3. **Bioarcheological Survey:** Three chapters of this document are devoted to an assessment of the bioarcheological data base for the study area. The history of bioarcheological research in the study area is reviewed, and present research issues and concerns are summarized. Bioarcheological resources for each period and adaptation type (see below) are identified, and the significance and limitations of the data base are discussed.

4. **Adaptation Types:** The results of the cultural/historical overview will be summarized and presented within the framework of Adaptation Types (cf. Fitzhugh 1975). An adaptation type is a nonspecific unit used to categorize broad relations between technology, human adaptation, and environment. The chief reason for using adaptation types is that they are not necessarily chronologically or geographically restricted; rather, they are widely applicable and thus can serve as useful comparative units. The adaptation types devised for the study area are similar, though not identical, to the adaptation types used for other regions in the Corps of Engineers' Southwestern Division. This is intentional and should serve to emphasize broad similarities between regions without masking the cultural diversity.

5. **Current Issues:** This study also examines some of the major issues that challenge archeologists working in the study area. We will identify research gaps, specific problem orientations, and public issues that must be addressed in order to protect and understand cultural resources in the region.

6. **Annotated Bibliography:** This work is not intended to serve as a detailed guide to the archeology of the project area, therefore, references within the text will reflect the specific topics discussed. Another objective of the study, however, is to produce a major annotated bibliography of significant works relating to the archeology of the study area. This bibliography will be incorporated within the larger annotated and computerized bibliography prepared by the Arkansas Archeological Survey for the entire Southwestern Division of the Corps of Engineers. The end result will be a massive, systematically collected compilation of archeological literature unmatched elsewhere in the United States.

The purpose of the annotated bibliography is to provide a listing of the significant works relevant to the project area. While the annotated bibliography for the project area will be comprehensive, it will not include every single article, book, or monograph ever written about the region. Given the rich history of archeological research in the area, literally thousands of reports have been produced. Several bibliographies do exist for the area (e.g., Anderson 1982; Chaco Center 1972; Davis 1978, 1979, 1980; Green 1977), but they are limited in their scope.

In preparing the annotated bibliography, we have referred to traditionally published documents, to state records, and, significantly, to the vast amount of gray literature that is available. By gray literature we refer to those studies, largely prepared as cultural resource management (CRM) reports, that have not been widely distributed or published. Literally thousands of such documents exist, ranging from one page summaries of well-pad surveys to multivolume works detailing comprehensive excavation projects. The distribution of knowledge in Southwestern archeology constitutes a major problem, one that will be addressed in the text of this report. Our annotated bibliography is an attempt to isolate some of the more significant gray literature in order to let interested parties know of its existence.

COMPLEXITY OF THE STUDY AREA

In order to fully appreciate the magnitude of archeological research in the study area, especially in New Mexico, it is important to consider several variables. The study area is incredibly rich in its archeological heritage. A series of factors and events have combined to produce a wealth of material culture and enormous numbers of sites of prehistoric and historical significance. Marc Simmons (1977:12) perhaps best characterizes the diversity of New Mexico when he notes that "if one looks for a predominant theme running like a thread through all New Mexico's history, it can readily be found in the collision and mingling of cultures." While this comment is primarily directed at New Mexico's history, it is just as relevant to prehistory.

The arid environment that characterizes much of the Southwest has served to preserve the remains of cultural events that otherwise might have been obscured through time. This fact, plus over 10,000 years of continuous occupation and cultural interaction have resulted in a staggering number of archeological remains. Based on known information it has been estimated that over 1.5 million archeological sites exist is the Southwest (Bassett 1986:22)! These estimates are just that and should not be considered definitive. Perhaps a better measure of the density of archeological remains in the region is the number of sites in the Museum of New Mexico's, Laboratory of Anthropology, Archaeological Resource Management System (ARMS; the centralized computer-based repository for site information from the state). At the time of this writing, ARMS contained information on over 62,000 sites. The actual figures are not important here. What is important is to realize that the study area represents one of the richest archeological preserves in the world.

In addition to the sheer number of sites, it also must be realized that the Southwest, and especially New Mexico, served as the setting for the development of much of American archeology and anthropology. Many of the major figures in both disciplines—Kidder, Boas, Cushing, Fewkes, and others—had their professional beginnings in the Southwest. The region was the setting for much of the early European exploration of North America, and figured significantly in the development of America's rich western heritage. Thus, historic archeology, ranging from the few pieces left by the Spaniards to ethnoarcheological research involving current residents also is plentiful. The Southwest has been, and remains, a leading contributor to the increasing sophistication of archeology and anthropology.

Most researchers writing of the Southwest have cautioned their readers that it is impossible to include every reference or site in their discussion. In an excellent work on New Mexico history, M. Simmons (1977:xiii) notes "well-informed readers will soon discover that some prominent name and famous episode from the past has been omitted ....I have chosen to be selective rather than inclusive." Paraphrasing for the present work, many will note the omission of some sites or archeologists here. Such was intended and unavoidable. It is important to realize, also, that this work does not cover some very significant portions of the Southwest, such as the entire state of Arizona and southwestern Colorado. Thus, except for comparative illustration, we do not discuss the substantial developments in these areas.

In this work we hope to provide the reader with a general appreciation for the archeology of the study area, and to spark an interest in some of the problems that face researchers and managers working in the region. We also hope to increase public awareness of the archeological heritage of this rich area.

If the study area is as rich as previously indicated and has had such a long history of research, then surely general synthetic works must exist that can be consulted by the interested reader. Until quite recently, this was, in fact, not true. Many archeologists have, only partly in jest, stated that the best synthesis of Southwestern prehistory remains A. V. Kidder's classic *Introduction to the Study of Southwestern Archaeology* published in 1924.

Fortunately, the situation has changed somewhat, and recent years have witnessed the production of some excellent summaries. Most of these are regionally biased and/or restricted (such as the BLM or USFS overviews referred to earlier). However, two works stand out. They should be read and consulted simultaneously by anyone serious about Southwestern archeology. Both studies represent massive amounts of data synthesis and careful integration of these data with contemporary archeology. Both volumes address contemporary research and management issues, and both contain massive bibliographies.

The first study is Stuart and Gauthier's *Prehistoric New Mexico—Background for Survey* (1980, revised 1984). This volume presents the New Mexico state plan for the management of cultural resources, and is full of useful and interesting data and discussion. While not without critics, it is nonetheless a masterful synthesis of the current status of New Mexico archeology.

The second volume is more general in scope and deals with the prehistory of the Southwest as a whole. This is Cordell's *Prehistory of the Southwest* (1984). Cordell has attempted to synthesize the entire region in one volume; in doing so, she has been forced to make concessions, but the work nonetheless represents the most recent comprehensive treatment of the Southwest.

STRUCTURE OF THE REPORT

This report is structured as follows. After this introductory chapter, Chapter 2 provides a brief overview of the environmental context of the project area. Note that appropriate paleoenvironmental concerns are addressed in subsequent chapters. Chapter 3 examines the changing perspectives of archeological research, from its beginning to the present. The next five chapters summarize the cultural history of the project area. These chapters each contain three parts. The first is a broad synthesis of the period under consideration; the second is a precis characterizing salient aspects of the period; the third discusses the period by each subarea, summarizing the cultural history and noting any particular research gaps or problem areas that may exist. Chapters 9-11, authored by Stodder, discuss in detail the present state of the bioarcheological resources of the project area. Chapter 12 introduces and integrates the adaptation type concept with the existing cultural sequences. Finally, Chapter 13 is a discussion of several current issues concerning the archeology of the project area, including both management and research concerns.

A few words are necessary about the order of presentation in the chapters providing the archeological sequences in the project area. Ideally, these would be discussed by natural environmental breakdowns and would ignore state boundaries. This, however, was not a practical solution. We are dealing with the archeology of three states, and archeological materials have been recorded differently in each. This has resulted in variable interpretations and classifications. Additionally, the sections on each state in this report were authored by different people, therefore it is logical to present the discussion by state. What we have done is try to keep this as consistent as possible. We present the regional discussion by state, generally moving in a north to south and west to east direction. Therefore, we initially begin with the subregions of Colorado, starting with the Mountain region, moving to the San Luis Valley, and concluding with the Front Range. Then attention is directed to New Mexico, which forms the bulk of discussion. We begin with the northeast region of the state since this forms the closest link with the Front Range of Colorado. We then move west to the Upper Rio Grande Valley and the San Juan Basin. The West-Central region is considered next, followed by Central, Southwest, and Southeast New Mexico. Finally, attention is turned to the three subregions of Trans-Pecos, starting with the Puebloan region, followed by the Interior and Plains regions. Authorship of each section, when it is by someone other than the principal author, is noted.

ENVIRONMENTAL CONTEXT

Alan H. Simmons (with Douglas D. Dykeman and Patricia A. Hicks)

The project area, encompassing much of the southwestern United States, covers one of the most diverse environments in North America. It ranges from harsh desert to alpine meadows and includes virtually everything in between. Man's relationship to that environment is a pivotal focus of much contemporary archeological research. The natural environment imposes certain constraints within which human adaptations can occur, thus a clear understanding of the environment is crucial for comprehending human use of a given region. A group's ability to cope with the environment is partially dependent upon its level of organization, its technological sophistication and its population size, but the environment remains a constant in conditioning human adaptations. To one degree or another, it influences human responses, regardless of technological achievement. This is true today and was even more pertinent in the past.

This chapter is composed of two major sections. The first summarizes major environmental characteristics of the entire Southwest, while the second briefly discusses each subregion in the project area. Numerous environmental studies are available for the Southwest. Our intention here is to provide only the most general characterization of the region, and to do these, we rely on the environmental summaries of two archeological works. Cordell (1984:19–48) provides an excellent and concise summary of the Southwest's environmental context, and we abstract largely from her in the first section of this chapter. Much of the information for the second section, especially as it relates to New Mexico, is derived from Stuart and Gauthier (1984).

ENVIRONMENTAL CHARACTERISTICS

Physiographic Provinces

The project area includes all of New Mexico except the extreme eastern counties, portions of south-central Colorado, and the Trans–Pecos region of Texas. This large area encompasses a tremendous amount of physiographic diversity, and portions of four major physiographic provinces occur (Figure 3). These provinces are:

- Colorado Plateau
- Basin and Range
- Southern Rocky Mountains
- Great Plains

The western and southern parts of the Southwest fall within the Basin and Range province. This province covers a greater area than just the Southwest, extending from about Agua Caliente and San Luis Potosi in Mexico to parts of Idaho and Oregon. The Basin and Range province is characterized by a series of narrow, rugged mountain ranges separated by structural basins. These ranges are generally parallel and are north-south trending. In the southern portion of this province, which includes parts of the study area, less than half of the surface area is mountainous. Much of this area is very dry and internal drainage is common, resulting in ephemeral lakes or playas. Part of this province, however, is drained by the Rio Grande, Gila, Colorado, Yaqui, and Conchos rivers. Land surfaces within the Basin and Range province consist of gravel fans rising from valleys to the base of surrounding mountains, dry lake beds or river floodplains in the central portions of the basins, and rugged mountains.

The central and north-central part of the Southwest falls within the Colorado Plateau province. As with the Basin and Range province, part of the Colorado Plateau extends outside of the Southwest to the north. The Colorado Plateau is characterized by high elevations with most of the land surfaces higher than 1,500 m and some mountain peaks exceeding 3,650 m. The plateaus contain extensive areas of nearly horizontal sedimentary rock formations, but there are also down-warped basin structures, such as the San Juan Basin, and elevated igneous structures. Aridity is also a feature of the Colorado Plateau province. The principal drainage is through the Colorado River and includes tributaries of the Colorado such as the San Juan and Little Colorado rivers. Most of the rivers are deeply entrenched and land surfaces often consist of nearly flat plateaus, mesas, and tilted plateaus, or cuestas. Some volcanic areas contain obsidian, an important prehistoric resource.

Part of the Southwest is included within the Southern Rocky Mountain province. This includes the San Juan Mountains on the west slope and the Sangre de Cristo Mountains on the east. Between these two groups of ranges are the San Luis Valley in the north and the Rio Grande Valley to the south. Elevations within this province range from about 1,520 m to over 4,260 m. The mountains affect weather patterns and provide a significant watershed for large areas of the Southwest. Major drainages include the Rio Grande and its tributaries to the east and the Dolores and San Juan and their tributaries to the west.

Parts of the study area also fall within the Great Plains province. These include the Pecos Valley, the Llano Estacado, and the Raton sections. Elevations in this province are lower

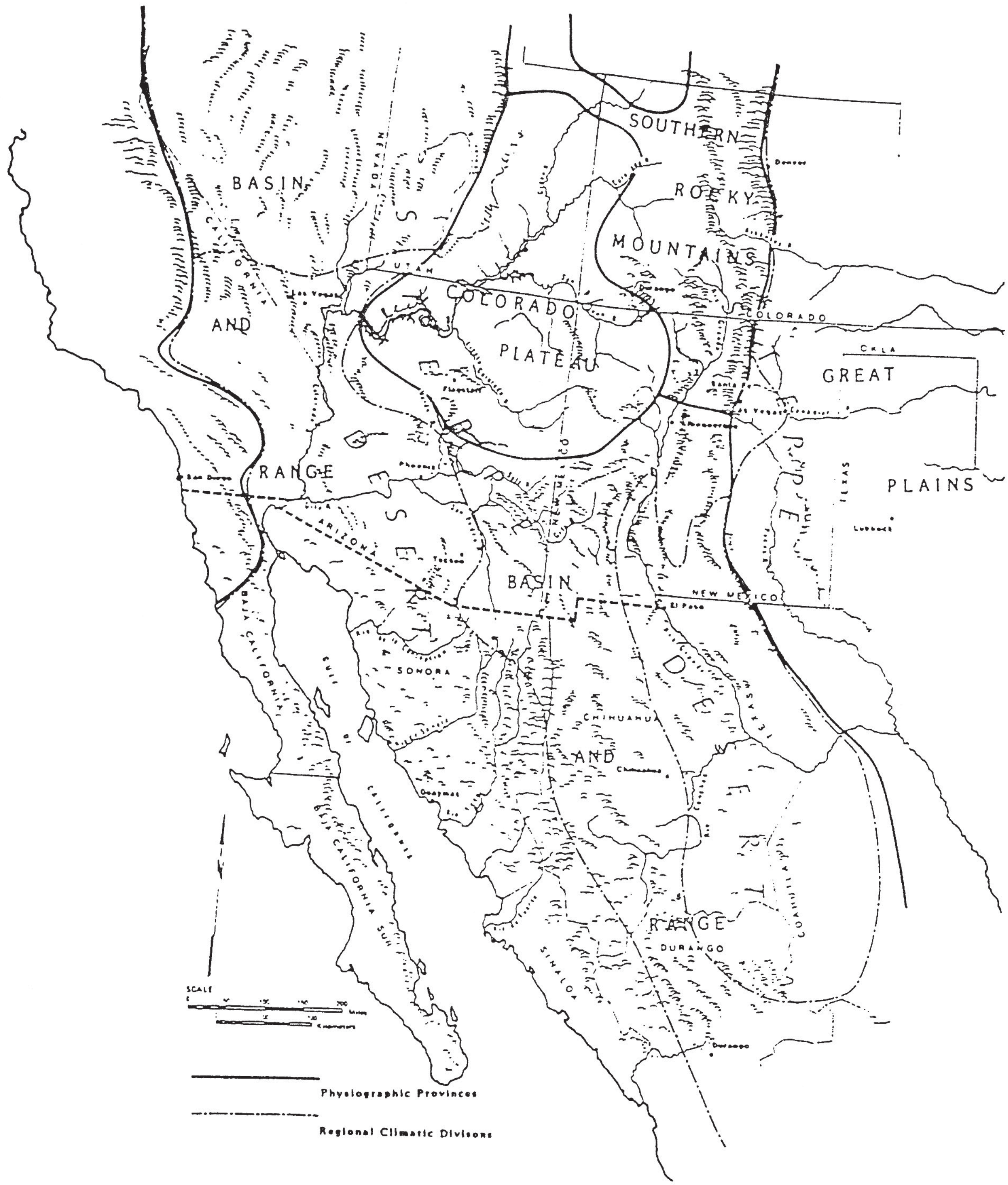


Figure 3. Major physiographic provinces and regional climatic divisions (Cordell 1984:22)
Map by Charles M. Carrillo

than elsewhere, ranging from ca 1,800 m to over 2,100 m in the Raton section to ca 600 and 1,500 m in the Llano Estacado. Topographic relief generally is slight. Important drainages include the Cimarron and Pecos rivers.

Climate

If one employs Bailey's (1980) climatic domain scheme, all the Southwest falls within the Dry Domain. Such a classification is of little practical use in understanding human adaptations, since roughly one quarter of the Earth's land surface is included in this domain. However, the scarcity of water that characterizes the Dry Domain is, and always has been, a key variable conditioning human adaptations. In this sense, much of the project area is considered a marginal environment.

The western portions of the Southwest are characterized by a biannual cyclonic rainfall pattern. The eastern portions, however, which include the present study area, have a quite different pattern. In much of the study area, there is a single maximum amount of rainfall in the late summer months. The amount, however, varies considerably and is largely dependent on the moisture content of the air and the height and mass of mountains. In general, large mountain masses act as catchment areas for precipitation. The Southern Rocky Mountains, the Mogollon Mountains, and the central mountains of Arizona, accordingly, receive more rainfall than the smaller mountain ranges within the Basin and Range province.

The Southwest is divided into two regional climatic zones based on average yearly precipitation. The desert division receives less than 20 cm of annual precipitation, the steppe division generally less than 50 cm. As Cordell (1984:26) notes, however, average precipitation can be very misleading in that yearly deviations can be extreme and that not all precipitation is useful for vegetative growth.

An important climatic variable affecting human occupation in the Southwest since at least the end of the Archaic period is the length of the growing season and temperature and humidity ranges. These are critical for successful agriculture. Generally, maize, the major Southwestern cultigen, is grown in the region under conditions of inadequate moisture. This requires a longer growing season than normal. Cordell makes two general observations about temperature in relation to agriculture. In many areas of the Southwest, daily temperature changes are greatest in the spring, when the germination of seeds may be endangered. In addition, variability from year to year in the length of growing season may be extreme (Cordell 1984:27). An excellent discussion on this topic that directly examines agricultural productivity and growing season may be found in Cully et al. (1982). In any event, it is important to realize that the Southwest is characterized by a very unpredictable climatic regime, and that in many areas the growing season is marginal at best.

Natural Vegetation

The natural vegetation is significant to human adaptation for at least two reasons. First, many of the plants were used by human groups as food or raw material sources. Second, the natural vegetation provides a habitat for animals, which were of equal importance to humans. Since agriculture in the Southwest was always a risky business, hunting and gathering wild resources were important throughout prehistoric use of the area. Most descriptions of plant communities in the Southwest use Bailey's (1980) delineation, which, for the Southwest, consists of seven vegetation provinces:

- American Desert
- Chihuahuan Desert
- Mexican Highlands Shrub Steppe
- Upper Gila Mountains Forest
- Colorado Plateau
- Rocky Mountain Forest
- Great Plains Shortgrass Prairie

Most prevalent in the American Desert province are creosote bush–bursage plants. Creosote bush covers large areas and is widely distributed. Also common is cholla cactus. On rocky slopes, vegetation consists of paloverde, agave, sotol, ocotillo, and saguaro, with bitterbrush as a common shrub. Chamiso and creosote occur below ca 900 m in the Mohave Desert. Along the northwestern edge of the province the Joshua tree predominates, with a belt of juniper and pinyon along the higher northern edge. Interior basins are generally saline and support salt-tolerant plants such as mesquite, arrowweed, and pickleweed. The American Desert province occurs primarily in the western portion of the Southwest, and thus is outside of the present study area.

The Chihuahuan Desert province consists of short grasses and shrubs. Creosote once again covers extensive areas, and mesquite dominates in places with deep soils. Ocotillo, agave, yucca, and sotol occur on slopes. Mountains in this province may support a belt of oak and juniper woodland if they are high enough. On some of the higher mountains, pinyon grow interspersed with oak. Cottonwoods are common in riparian environments.

Between the American Desert and the Chihuahuan Desert provinces is the Mexican Highlands Shrub Steppe province. At its lower elevation, plants such as saguaro, paloverde, and creosote are characteristic. Grasses cover the high plains of this province, and open stands of mesquite, yucca, cholla, and other shrubs and cacti are common. A submontane zone on the hills and lower slopes of mountains contains several species of oak and some juniper. In the higher mountains, pines occur along with oak and, in some cases, Douglas fir and white fir grow at the highest elevations.

In the Upper Gila Mountains Forest province in Arizona and New Mexico, vegetation is primarily controlled by elevation. Below 2,100 m, mixed grasses, chaparral brush, oak–juniper, and pinyon–juniper woodlands occur. From ca 2,100 to ca 2,400 m, the vegetation is an open forest of ponderosa pine, with pinyon and juniper on south-facing slopes. On the dry rocky ground above ca 2,400 m, Douglas fir and aspen occur, along with limber pine.

The Colorado Plateau province contains large expanses of bare rock. At low elevations, arid grasslands are extensive, though not necessarily dense. Sagebrush is common in locations with relatively deep soils. The most extensive vegetation zone in this province is the pinyon–juniper woodland, which is generally open, with grama and other grasses, herbs, and shrubs occurring among the trees. Above the pinyon–juniper woodland, there is a montane zone. In the southern portion of this zone, ponderosa pine is dominant and may be associated with Douglas fir. In the northern part of the province, lodgepole pine and aspen are the dominant trees in the montane zone, and at the highest elevations, Engelmann spruce and subalpine fir are characteristic.

The Rocky Mountain Forest province has several zones based on altitude. The woodland zone adjacent to the Colorado Plateaus has extensive areas of pinyon and juniper; ponderosa pine also occur depending on the direction of the exposure. Rocky slopes may contain dense stands of mountain mahogany and scrub oak; sagebrush and grasses cover large areas and can extend to the ponderosa pine and Douglas fir forest. Above this forest, a subalpine vegetation zone is dominated by Engelmann spruce and subalpine fir. This is succeeded at even higher elevations by treeless alpine meadows.

The Great Plains Shortgrass Prairie province occurs in only a relatively small portion of the eastern Southwest. Characteristic grasses such as grama and buffalo grass are a ground cover for sunflower and locoweed, which are typical plants in this province. Scattered pinyon and juniper occur over some of the area, particularly on slopes near the foothills of the southern Rockies. Riparian plants are found along the limited waterways.

Many of the plants that characterize these provinces are found throughout the Southwest, but they may be more abundant in one province than another. The density and particular configurations of major plant groups depend on elevation, direction of exposure, and soil conditions (Cordell 1984:30–31).

Fauna

For most of his existence in the Southwest, man has relied to a great degree upon native fauna as well as flora. In dry areas, animals generally exhibit considerable flexibility in behavior patterns. This, combined with their mobility, allows them to use the seasonally and spatially heterogeneous resources available. Cordell (1984:32–33) notes that there are two generalizations about the differential distribution of animals in the Southwest that are useful to consider. First, there generally is more diversity in large body sized animals in the mountain and plateau areas and more diversity in the smaller body sized animals in the lower desert areas. Second, the differences in the distribution of animals may relate more to their specific behavioral responses to predators than to their food requirements. In this context, it should be realized that smaller animals generally comprise the bulk of faunal remains recovered from archeological sites. There are some notable exceptions though, especially on both extremes of the time range of human occupation of the Southwest (i.e., the Paleo-Indian and protohistoric periods).

REGIONAL DISCUSSION

This section briefly characterizes salient environmental features of each subregion of the project area. Discussion is arranged in a general north to south trend, following the presentation of archeological materials in subsequent chapters. Authorship of each section is provided when someone other than the principal author prepared a section.

South-Central Colorado (Douglas D. Dykeman)

Mountains

The Mountain subregion of the south-central Colorado study area consists of the high terrain that forms a “horseshoe” area surrounding the San Luis Valley. It extends from the Colorado–New Mexico border north to Leadville, Colorado. The western boundary is the Continental Divide and the eastern boundary extends in an irregular line from Pikes Peak southward across the Arkansas Valley west of Canon City, Colorado, and ultimately to the headwaters of the Apishapa River.

The Mountain subregion is characterized by massive ranges and steep narrow valleys at elevations generally exceeding 3,000 m. The highest peaks in the area are over 4,200 m high. Rising to elevations in excess of 3,600 m along the Continental Divide are the San Juan and La Garita Mountains. These are connected to the magnificent “fourteeners” (the peaks over 14,000 ft) of the Sawatch Range via a massive 3,600 m ridge called the Cochetopa Hills. The Sawatch Range, its “Ivy League” peaks named Harvard, Columbia, Yale, and Princeton, extends northward to Tennessee Pass near Leadville. At this point, the area extends east and then south, encompassing another massive ridge that divides the Arkansas River Valley from South Park. The study region excludes South Park by skirting its southern boundary and extending northeast to the Rampart Range, located near Colorado Springs. From this point, the boundary winds southward, incorporating Pikes Peak and the Wet Mountains along the Front Range, and the Sangre de Cristo Mountains and Culebra Range on the east side of the San Luis Valley. The western mountains of this subregion are drained by a series of small creeks terminating in the San Luis Valley. The southern portion of the area is drained by the upper reaches of the Rio Grande River, which eventually flows southwest from the San Luis Valley. The eastern portion of the area is drained by numerous creeks and small rivers comprising the Arkansas River Basin.

San Luis Valley

The San Luis Valley comprises this subregion, which extends northward to Ponca Pass in the vicinity of Villa Grove, Colorado. For the purposes of this study, it extends southward to the New Mexico–Colorado border near Antonito, Colorado. The western limit of the valley is in the vicinity of Del Norte, Colorado, and the eastern limit encompasses Great Sand Dunes National Monument.

The San Luis Valley is a massive basin filled with a thick layer of sandy sediments deposited during the Pleistocene. The resultant gentle topography ranges from ca 2,300 m to over 2,400 m in elevation, and the rich soils are considered prime agricultural land.

Mountain ranges enclose the San Luis Valley on the west, north, and east. The Rio Grande River drains the southern portion of the valley and exits to the south into New Mexico. Sauguache and San Luis creeks drain the northern part of the valley, but disappear into the deep sands before reaching the Rio Grande. The native vegetation consists of sagebrush and grasslands.

Front Range

The Front Range subregion extends from the vicinity of Colorado Springs southward to the Colorado–New Mexico border south of Trinidad, Colorado. To the west, this area includes the Arkansas River Valley below 2,400 m in elevation. The southeast corner of the region is in the vicinity of Mesa de Maya, and the northeast corner is ca 60 km east of Colorado Springs in the vicinity of Rush.

The foothills, tablelands, and western margin of the plains in southeastern Colorado constitute the Front Range subregion. The western portion consists of the foothills of the Rocky Mountains, including the lower slopes of the Rampart Range, Pikes Peak, and the Wet Mountains. Near the Colorado–New Mexico border the Park Plateau and Chaquaqua Plateau extend eastward well onto the Great Plains. Massive basaltic mesas dissected by small rivers characterize the terrain.

The north and central portions of this subregion form the western margin of the Great Plains. This area is the drainage basin of the Arkansas River, which consist of low rolling hills and a few low mesas and cuestas. Five small rivers, the Charles, Huerfano, Cucharas, Apishapa, and Purgatoire flow northward to the Arkansas, draining the foothills and the Park and Chaquaqua plateaus. Numerous small creeks also flow from the north to the Arkansas River.

New Mexico

Northeast

The Northeastern subregion includes all of Union, Colfax, and Harding counties, and portions of Mora and San Miguel counties. The boundaries of this area are the Colorado–New Mexico border on the north, the Oklahoma–Texas–New Mexico border on the east, Interstate 40 on the south, and the eastern boundaries of the Carson and Santa Fe National Forests on the west. The western portion of this subregion is characterized by a high mountain range, the Sangre de Cristos, with elevations up to nearly 4,000 m. From the mountains, numerous streams emerge, most flowing east for ca 30 to 50 km and then turning south. The major drainages in the region include the Pecos, Canadian, Ute, and Dry Cimarron rivers. West of the mountains are the Las Vegas and Raton plateaus. These are primarily flat or rolling plains with several canyons and mesas. The plateaus are bounded to the southeast by the Canadian Escarpment with its lava-capped mesa and sharply entrenched streams (Stuart and Gauthier 1984:294).

Upper Rio Grande Valley

In this work, we are using Stuart and Gauthier's (1984) classification of the *Upper* Rio Grande Valley. Parts of what Cordell (1979a) considers the *Middle* Rio Grande also are included here. This subregion includes portions of the Southern Rocky Mountains (Sangre de Cristo, Brazos uplift, and the Jemez Mountains), the Rio Grande Rift, and the Chama Basin, part of the Colorado Plateau. The most important river in the Rio Grande Valley, the Rio Grande, enters the San Luis Valley near Del Norte, Colorado, and continues south-southwest. Principal tributaries of the Rio Grande within this subregion include the Red River, Taos Creek, Embudo Creek, Rio Santa Cruz, Rio Pojoaque, Rio Santa Fe, Rio Galisteo, all on the east, and the Rio Chama and Rio Jemez on the west (Cordell 1979a:5–6). Parts of this subregion, such as the Cochiti Reservoir area, are situated at the interface of one of the most diverse regions in North America (Chapman 1979b:75). When compared with many other parts of the project area, the Rio Grande subregion provides greater variety in game animal habitat, more diverse vegetation, more favorable rainfall patterns, relatively close proximity of crop-growing and game-bearing areas. This supports a mixed subsistence base with horticulture, where practicable, supplemented by wild food resources (Cordell 1979a:7).

San Juan Basin

The San Juan Basin comprises a good portion of northwestern New Mexico. It is a structural subunit of the Colorado Plateau and consists of an expanse of broad plains, sharply and frequently dissected by mesas and buttes of relatively low relief. These are surrounded by higher mountains and plateaus. Elevations within the central part of the San Juan Basin rarely exceeds 150 m, while at the periphery, relief of 900 m is not uncommon. The term *basin* is somewhat misleading since it implies low elevation; the entire San Juan Basin is quite high. Its interior elevation averages 1,800 m, and this accounts for much of the Basin's several climate and abbreviated growing seasons (Judge 1982:8).

The San Juan Basin is elliptical in shape and is roughly 160 km in diameter. It is bounded on the east by the Nacimiento Uplift and the Archuleta Arch and on the north by the San

Juan Dome. The Hogback Monocline and the Four-Corners Platform constitute its western boundary. The Chaco Slope arbitrarily defines the southern limits of the Basin proper. The San Juan Basin is located in the Navajo Section of the Colorado Plateau (McAnany 1982). The San Juan River is a major drainage, and is located in the northern part of the San Juan Basin. The Chaco River is a major interior drainage.

West-Central

In the west-central New Mexico subregion, the Colorado Plateau province meets the Basin and Range province. The area is characterized by a remarkable topographic diversity, with elevations ranging from ca 1,370 m to over 3,000 m. In the upland areas there are substantial forests. In the lower forest elevations, these include mixed pinyon–juniper with some Ponderosa pine. As elevations increase, the Ponderosa also increases. In the upper zones, spruce and fir dominate, and in the highest regions, Alpine complexes are dominant. The lower elevations of eastern and central Socorro County consists primarily of the grassy Plains of San Agustin, an internal basin characterized by high erosion and poor drainage (Stuart and Gauthier 1984:119).

Central

The Central subregion is located at the approximate geographic center of New Mexico. Major landforms in this area include the east slope of the Manzano Mountains, the Estancia Basin, Chupadero Mesa, and the northern end of the Gallina Mountains. Elevation and vegetation vary most on the west side of the subregion. The highest peaks in the Manzano Mountains are over 3,000 m. From the Manzanos, the terrain slopes to the east, occasionally cut by several eastward-flowing, entrenched drainages. Approximately 50 km east of the crest of the Manzanos is the Estancia Valley (or Basin), which includes the Salina (or Laguna del Perro) salt lakes. The southern portion of the central subregion is dominated by Chupadero Mesa and the northern end of the Gallina Mountains. Chupadero Mesa, an elevated area around 2000 m, is forested with pinyon and juniper. East and north of the Estancia Basin are large expanses of plains occasionally interrupted by mesas. For the most part, however, this is an area of low topographic relief. Drainages here flow east, the most important being the Pintado (Stuart and Gauthier 1984:319).

Southwest

There are two broad environmental subdivisions within the Southwest subregion: the Mimbres/Mogollon highlands and the Jornada. The northern portions of the Mimbres/Mogollon area are characterized by extensive upland valleys and mountain ranges rising to over 3,000 m. From west to east these form a series of basins and ranges defined by the Upper San Francisco, the Upper Gila, and the Upper Mimbres drainages. These are cool and well watered uplands where vegetation zones, growing season, and temperatures vary markedly with altitude and exposure. Moving south, these rugged uplands open up into a classic semidesert basin and range topography with lower, poorly timbered mountains and desert floor. Rivers such as the Mimbres gradually disappear into the sandy plains of the desert floor. From the perspective of human adaptations, there is considerable geographic, climatic, and vegetational diversity in this subregion (Stuart and Gauthier 1984:175).

The eastern portion of this subregion is referred to as the Jornada area, which also extends into the southeastern subregion. The lower areas are hot and dry and include the Lower Rio Grande Valley, the Tularosa Basin, and the Jornada del Muerto. Upland areas are less extensive and open either into large internal basins or onto the plains to the east. Major drainages are the Rio Grande, the Rio Bonito, and the Tularosa and Sacramento in the Sierra Blanca–Sacramento mountain system. This latter area is well-watered and densely forested (Stuart and Gauthier 1984:210).

Southeast

The southeast subregion is bounded on the west by the eastern flanks of the Sacramento and Guadalupe Mountains. To the south and on the east, it is bounded by the borders of Texas, and on the north it is bounded roughly by a line drawn from the junctures of Torrance, Guadalupe, and Lincoln counties northeastward to Quay County at the Texas border. The western portion of this subregion is characterized by extensive uplands that join the Guadalupe and Sacramento ranges. Maximum elevation reaches ca 2,000 m. These upland areas open into the Sacramento Plain, which is characterized by mixed grassland zones and some woodlands. Continuing east, the Diamond A Plain slopes down towards the Pecos Valley and is characterized by mixed grassland zones. The Pecos Valley, bisecting southeastern New Mexico from north to south, ranges in elevation from ca 1,000 m in the north to ca 850 m near the Texas border. Moving east of the Pecos Valley, elevations again increase, although not dramatically. The eastern margins of the Pecos drainage are referred to as the Mescalero Plain and are characterized by desert grasslands. The easternmost section of southeast New Mexico, known as the Llano Estacado, is characterized by extremely low relief, internal drainage, elevations ranging from ca 1,150 m to over 1,500 m, and mixed grassland communities. It is separated from the Mescalero Plain by the Mescalero pediment, a topographic feature varying from ca 150 m to low, dune-covered ridges. Portions of this pediment are substantially eroded (Stuart and Gauthier 1984:259).

With the exception of the eastern flanks of the Sacramento–Guadalupe Mountains, there is little elevational variance in this subregion. Nonetheless, the region receives greater rainfall than does the San Juan Basin or portions of southwestern New Mexico. In general, the climate is similar throughout this subregion and is characterized by dry winters and heavy rainfall during the late summer. A number of permanent streams, such as the Hondo, crosscut southeastern New Mexico from east to west flowing into the Pecos River. As one moves eastward, however, onto the Llano Estacado, water becomes increasingly scare. In historic times, substantial buffalo populations are known to have inhabited at least the northern areas of southeastern New Mexico (Stuart and Gauthier 1984:261).

Trans–Pecos (Patricia A. Hicks)

Much of Trans–Pecos area is located within the northern reaches of the Chihuahuan Desert. Although on the surface the area appears to be a harsh wasteland, the region in fact contains an abundance of plant and animal resources sufficient to maintain a human population. Plant resources in Trans–Pecos are distributed in response to climate, topography, and soils (Marmaduke 1978:9). Today, forest and parklands of pinyon and oak, and an assortment of grasses, are found at elevations between ca 1,525 m and 2,590 m in the region's mountain ranges. Along the lower slopes of the mountains, the forests grade into a diversified biotic zone ranging from juniper grassland to desert scrub. Mallouf (1985:6) notes that the foothills and lower mountain slopes between ca 975 m and 1,675 m are major sources of perennial and intermittent springs, vital keys to survival in this arid country. Plants common to the foothills include agave, sotol, and yucca, all of which were important as food sources. The lower foothills and the basins in the region generally occur at elevations between 550 m and 1,065 m. These areas are characterized by a desert shrub environment containing succulent and semi-succulent species. The dominant shrub is creosote bush, but species of economic significance such as Texas persimmon, agave, sotol, yucca, ocotillo, and prickly pear also occur (Mallouf 1985:9). The Rio Grande and Pecos rivers are the only perennial streams in the region. The rugged canyons of the riverine environment, and the talus slopes immediately adjacent to them, contain many species of useful plants, including mesquite, wild grape, willow, carrizo–cane, cottonwood, agave, sotol, and assorted cacti.

The foregoing refers to all of Trans–Pecos in general terms. The following briefly characterizes each subregion.

The western portion of the study area includes parts of the Mexican Highlands and Sacramento sections of the Basin and Range province (Fenneman 1931:328; Hunt 1974:484–485, Figure 16.1). In general, the area is characterized by rugged low mountain ranges interspersed with dry intermontane basins (Mallouf 1985:5). That portion of the Basin and Range province that lies within the overview area has been subdivided into Puebloan and Interior subregions to aid in the discussion of the different adaptations that characterized the area during the Late Prehistoric period.

Puebloan

The Puebloan subregion includes the El Paso area and the Hueco Bolson in the northeastern portion of Trans–Pecos, and the Rio Grande Valley and some of its major tributaries to the south in the La Junta district. The section boundaries are described by the Rio Grande Valley on the west and the state line on the north from the Rio Grande to the Hueco Mountains on the east. The eastern boundary follows the Hueco and Quitman mountains to the south, intersecting the Rio Grande at the eastern margin of the Hueco Bolson where it passes into Mexico. Because so little research has been undertaken in this area, this boundary should be considered tentative, based as it is on cultural rather than physiographic factors (however, see Lehmer 1958:110, Figure 1, for a precedent). From this point, the boundaries of the section are defined by the valley of the Rio Grande, terminating at a point approximately 16 km downstream from Redford, Texas. In the La Junta area near Presidio, Texas, the Puebloan subregion includes the valleys of the Rio Concho and Alamito Creek to points 60 km upstream from their confluence with the Rio Grande.

Interior

The Interior subregion is that area of the Basin and Range province that lies between the Plains and the Puebloan subregions. Mallouf has described the area as "a region of dramatic topographic relief, containing rugged mountains, plateau grassland, extensively dissected alluvial fans *(bajadas),* volcanic outcrops, massive limestone canyons, deep alluvial valleys, flat topped mesas, undulating dune fields, and seemingly interminable saline flats" (Mallouf 1985:5). In the northeastern portion of the section is found Guadalupe Peak, the highest point in Texas at 2,667 m. The southern portion of this area encompasses that part of Texas known as the Big Bend. The west-central portion contains the Marfa Plain and Presidio Flat. To the east of the Hueco Mountains, in the northwest portion of the section, is the Diablo Plateau, while the Salt Basin is further to the east. Some of the most rugged mountains in the country occur in the Interior subregion. These include the Guadalupe Mountains in the north, the Davis Mountains in the central part of the subregion, the Chisos Mountains in the Big Bend country to the south, and the Quitman, Eagle, and Chanati mountains paralleling the Rio Grande in the west.

Eastern Trans–Pecos: The Plains Subregion

The eastern third of Trans–Pecos is included within the Great Plains province (Fenneman 1931:47–54; Hunt 1974:326–327, Figure 13.1). The Plains subregion includes the southern portion of the Pecos division of the Southern Plains, the Toyah Basin, and the highly dissected Stockton Plateau. It is bounded on the north by the Texas–New Mexico border, on the east by the Pecos River, and on the south by the Rio Grande. The western boundary is defined by the eastern slopes of the Guadalupe, Delaware, Apache, Barilla, and Glass mountains in the northern and central portions of the study area. The southwestern boundary is defined by the breakdown of the Stockton Plateau.

SUMMARY

The Southwest is characterized by a highly diverse environment. The general aridity of the region limited the natural productivity and affected the reliability with which some resources occurred. This aridity has posed, and continues to pose, a challenge for people living in the Southwest. Somewhat ironically, it also has been an important factor in the generally excellent preservation of archeological remains throughout the Southwest (Cordell 1984:46). This has provided researchers with environmental and cultural information that is unrivaled anywhere else in North America (with the possible exception of the Great Basin).

While the aridity of the area has helped to preserve the archeological record, it also has been responsible for promoting some of its destruction since these desert and semidesert environments are relatively fragile, and small and short term disturbances can have disproportionately great effects. This type of environment recovers from disturbances at a slow rate. Numerous natural processes, such as erosion, arroyo cutting, gullying, and aeolian deflation can destroy archeological remains.

Human activity, however, is by far the greatest impact on archeological resources. Resource development and the large population growth of the Southwest are principal factors involved in the current deterioration of archeological resources (Cordell 1984:46). To this we only add that the fragile nature of much of study area has enhanced its susceptibility to damage from careless human activities.

In concluding this chapter, we should note that in a sense the excellent preservation generally evident in much of the Southwest has biased our views of archeology in the region. Preservation is so good that there has perhaps been a tendency to overemphasize the special nature of past human achievements in the region. This, however, may be more apparent than real, in that in other regions of the United States the archeological record has deteriorated more rapidly than it has in the Southwest. Regardless, as the following chapters will demonstrate, the area represents one of the richest archeological preserves in North America. But, it is necessary to maintain a balanced perception, realizing that the environmental setting of the project area is one conducive to excellent preservation and thus may have allowed a bias to enter our perception of the archeological record.

HISTORY OF ARCHEOLOGICAL RESEARCH

Alan H. Simmons

Archeology in the United States did not become a formal discipline until the late 1800s, but it has had a colorful history, both before and after this time. The purpose of this chapter is to briefly examine major patterns in the history of archeological research in the project area. Several classifications of the history of archeology in North America exist, and we will follow a modified version of that presented by Willey and Sabloff (1974). Additional recent overviews of American archeology may be found in Dunnell (1986) and Jennings (1986). Several summaries of the history of Southwestern archeology also exist (e.g., Cordell 1984:49–119; Lister and Lister 1968, 1981; Rohn 1973). The periods defined by Willey and Sabloff, slightly modified for use here, are:

- Speculative Period, 1492–1840
- Classificatory–Descriptive Period, 1840–1914
- Classificatory–Historic Period:
  The Concern with Chronology, 1914–1940
- Classificatory–Historic Period:
  The Concern with Context and Function, 1940–1960
- Explanatory Period, 1960–1980
- Cultural Resource Management Period, 1970–1980
- Contemporary Period, 1980–present

We have retained their original terminology except for modifying the last period to more accurately reflect the present situation in the Southwest. We supplement their Explanatory period with a complementary Cultural Resource Management period ending both of these rather arbitrarily at 1980 and adding a new category simply termed the Contemporary period. Technically we should perhaps present the Explanatory and Cultural Resource Management as a "facies" since they share the same chronological span. However, for the purposes of illustration we retain this classification.

THE SPECULATIVE PERIOD (1492–1840)

Interest in archeology developed during the long Speculative period, but all archeological data collected during this time, with a few exceptions, was incidental to other activities (Willey and Sabloff 1974:21). The first explorers of North America came across the remains of ancient Native Americans, and, while not overly interested, they did speculate on their origins. Willey and Sabloff (1974:21–22) note that three trends characterized this period. The first related primarily to the sixteenth and seventeenth centuries and consisted of the chronicles of the Spaniards. The second trend began in the eighteenth century, gaining strength in the nineteenth. It consisted of accounts by explorers who described ruins in their reports. The third trend foreshadowed the beginnings of the Descriptive–Historic period. It involved the efforts of a few individuals who had archeology as their primary concern. These people, who actually undertook archeological surveys and excavations, can perhaps be best described as avocational archeologists. They started a trend that expanded with the general interest in archeology late in the nineteenth century.

In the project area, this period is first represented by the Spaniards who entered the region. The initial presence of Europeans in the project area was not due to an organized expedition, but rather had more ignominious origins. It was represented by the wanderings of the Cabeza de Vaca party in Trans–Pecos in 1535. They had been shipwrecked off the Gulf Coast seven years earlier and captured by local Natives. Having escaped, they made their way across the southern portions of Trans–Pecos prior to returning to Mexico (Kelley 1952b:263; Tyler 1975:22).

The first organized incursion into the project area was the de Niza expedition, which first came within sight of the Zuni Pueblos in 1539. The next year the Coronado expedition entered the same area, beginning the exploration of much of the Southwest and setting the stage for subsequent colonization.

These early explorers often wrote of the Natives they encountered, and their chronicles form a valuable component of the history of the project area. While they also recorded some ruins, there were no attempts to systematically examine archeological remains. This was true throughout the Speculative period in the Southwest, with little concern for investigating the abundant remains dotting the landscape. Of course, many of the pueblos still were occupied, and a substantial nomadic population also existed. Thus the early Spaniards had more pressing concerns with contemporary Native groups, and this left them little time for speculation on the remains they encountered.

THE CLASSIFICATORY DESCRIPTIVE PERIOD (1840–1914)

The Classificatory–Descriptive period is characterized by a distinct change from the preceding period in that the principal focus was on the description and basic classification of archeological materials, especially architecture and monuments. Throughout this period, archeologists attempted to turn archeology into a systematic and scientific discipline. Although they failed in this task, they did lay the foundation for the twentieth century (Willey and Sabloff 1974:42).

Throughout this period, there was an increase in the discovery and description of antiquities as the United States expanded westward. Most of these early studies were sponsored by the U.S. government, universities, museums, and scientific societies. Archeology was taught in universities and became both an established vocation and a recognized avocation (Willey and Sabloff 1974:42).

This was an active period in the Southwest. Acknowledgment for first recording Southwestern antiquities is usually given to the U.S. Army's reconnaissance and topographic mapping expeditions into the newly acquired southwestern territories. The earliest descriptions were by Emory (1848) and Simpson (1850), and Emory has been given credit with beginning the study of Southwestern archeology (Goetzman 1959, 1967:255–256, 325–326).

Later studies involved individuals from the Bureau of Ethnology and members of private expeditions, such as James Stevenson, the Mindeleffs, the Wetherills, A. Bandelier, F. H. Cushing, J. W. Fewkes, B. Cummings, E. L. Hewett, and G. Nordenskiold. Cushing, leading the Hemenway Expedition, helped pioneer the direct-historical approach (Willey and Sabloff 1974:59–60). In its simplest terms, the Direct Historical Approach refers to working back into prehistoric times from documented historic periods. Archeologically, this involves the investigation of sites known to have been occupied in early historic times. Excavation produces artifacts that can, thus, be associated with identifiable ethnic groups. Using this information, the archeologist may then study other sites in the region whose artifact assemblages show stylistic overlap with the historically defined complex, but whose origins go back to prehistoric times (Willey and Sabloff 1974:114).

While these early American explorers were not archeologists, they recorded, mapped, and sometimes excavated a tremendous number of ruins throughout the Southwest. Their maps and notes remain valuable documents, not only in a historic sense but also because of their excellent detail.

THE CLASSIFICATORY HISTORY PERIOD

The Concern with Chronology (1914–1940)

During this period archeology developed as a scientific discipline. This occurred within the context of anthropology, with archeology being considered one of its subdisciplines. Placing North American archeology within anthropology marked a major departure from Old World archeology, which always had been more closely allied with the geological sciences. In the New World, however, the presence of living Natives and the use of the direct historical approach contributed to archeology's placement in anthropology. Despite (or because of?) this association, archeology was well enough established to justify the formation of the Society for American Archaeology in 1934.

Archeologists' primary concern during this period was with chronology. During this time, stratigraphic excavation developed as the primary means of chronological control. In fact, some of the earliest work with stratigraphy occurred in the Southwest in the Galisteo Basin. The principles of seriation, allied to stratigraphy, were initiated as well. The classificatory studies begun during the previous period were now aimed towards stratigraphic and seriation procedures, and more attention was turned to artifacts. In addition to artifact classifications, archeologists began to develop cultural classifications, and cultural–historic sequences were formulated, even though they were based on limited data. Finally, this period was characterized by a continued refinement in field methods (Willey and Sabloff 1974:88–89).

A major goal of this period was in regional synthesis using stratigraphic and seriation methods, pottery and artifact typology, culture unit classification, and the direct historical approach (Willey and Sabloff 1974:115). A significant event occurred in 1926, with the discovery of the Folsom site and the documentation of man's antiquity in the New World. With the establishment of a considerable antiquity, arguments for in situ cultural development were strengthened. Finally, another major event, not related to research but having a major effect on the profession was directly tied to the Great Depression. During the 1930s, the New Deal make-work agencies produced scores of cheap labor for archeology through the Work Projects Administration (WPA) and Tennessee Valley Authority (TVA), resulting in a new work force. Coupled with this development were the initial stirrings of concern with development and salvage archeology (Fowler 1986:145).

Cordell (1984:51–53) singles out three individuals whose impact on Southwestern archeology during the early parts of this period is still felt. The first is Nels Nelson (1914, 1916) and his demonstration of the values of systematic stratigraphic excavation. In his work in the Galisteo Basin, Nelson, concerned with showing the chronological order of ceramics for the Rio Grande area, conducted test excavations at a number of sites. In particular, his excavations at San Cristobal pueblo, which had been abandoned early in the historic period, demonstrated the sequential order of ceramic types. The second individual, A. Kroeber (1916), combined the direct historic approach and a frequency seriation of ceramics from surface collections. The third person, L. Spier (1917), refined Kroeber's approach and combined seriation with stratigraphic methods.

According to Cordell, "these three contributions marked a turning point in Southwestern archeology. They demonstrated that sites could be ordered relative to one another along the temporal dimension, that the principles of stratigraphy derived from geology could be applied to archeology, and that ceramics were sensitive indicators of temporal changes" (Cordell 1984: 53). Between 1914 and 1927, others also applied these methods of direct historical approach, stratigraphic excavation, and ceramic seriation to various Southwest excavations.

The first Southwestern archeologist to make use of the stratigraphic method on a large scale was A. V. Kidder, often considered the father of Southwestern archeology. Using the principles established by Nelson, Kroeber, and Spier, Kidder undertook an ambitious project, the R. S. Peabody Foundation for Archaeology's investigations at Pecos Pueblo in the Rio Grande Valley. Kidder worked at Pecos from 1915 through 1929. He was interested in Pecos because it had been continually occupied, until 1838, allowing him to apply the direct historic approach. In 1924, he published the first comprehensive synthesis of Southwestern archeology (Kidder 1924), using data from the Pecos excavations and from other studies. This book remains a classic (Cordell 1984:53–54).

In August of 1927, Kidder invited several Southwestern archeologists and other interested individuals to his camp at Pecos to discuss fundamental problems of Southwestern archeology. This was the first Pecos Conference, which has now become an annual ritual for Southwestern archeologists. Those attending the first conference included luminaries who laid the foundation for Southwestern archeology: Neil Judd, Jesse Nusbaum, A. E. Douglass, Frank Roberts Jr., Earl Morris, Sylvanus Morley, Walter Hough, Mr. and Mrs. C. B. Cosgrove, C. Amsden, B. Cummings, and E. Haury. The conference produced the first conceptual framework for organizing Southwestern archeological data: the Pecos Classification. Its enduring impact on Southwestern archeology is illustrated by the fact that it still is used as the basic terminology for the northern Southwest (Cordell 1984:53–59).

This was in a sense the classic period of Southwestern archeology. While much of the work conducted is generally considered poor by today's standards, several projects defined the outlines of Southwestern prehistory. Research concentrated on the large and spectacular sites of the Southwest, such as Mesa Verde and Chaco Canyon, but less impressive ruins also were investigated. Nearly all projects were restricted to large Puebloan ruins containing impressive architecture, although there was some attention paid to early man sites as well. In the present project area, most activity occurred in northwestern and west-central New Mexico.

The Boasian concept of historical particularism was important during this period. This concept involved the definition of unique qualities and attributes of specific cultures, and was not concerned with regional comparisons or general trends of universal development. The "stratigraphic revolution" in the Southwest was carried out by men trained in this Boasian tradition (Cordell 1984:81). This school of thought dominated much of the research conducted during this period. It also documented the complexity of Southwestern archeology, which became increasingly apparent with each new excavation. Several elaborate (and often confusing) new classification systems were developed. Some were in critique of the Pecos Classification, such as the Gladwins' (1934) biological model consisting of roots, stems, branches, and phases; many became nearly obsessed with regional variation. All of these events left a lasting impression not only on Southwestern archeology but also on North American archeology as well.

The Concern with Context and Function (1940–1960)

Willey and Sabloff (1974:131) believe that during much of the Classificatory–Historic period archeologists were relegated to a second-class status by the anthropological profession. It was felt that archeologists really had little to contribute to theory and were not in the vanguard of contemporary thinking. This began to change during the late 1950s with a critical reexamination of the aims and procedures of archeology. Associated with this was the development of new experimental trends involving contextual and functional studies. This was a time of transition for American archeology (Willey and Sabloff 1974:131).

Three prevailing topics characterized this period: the proposition that artifacts could be understood as the material remains of social and cultural behavior, the developing concern with settlement patterns, and the relationship of man to his environment. This period also witnessed the generation of archeological syntheses that went beyond pure description and attempted to examine cultural evolutionary processes. During this period, interdisciplinary research and the use of more scientific methods, including radiocarbon dating also was initiated (Willey and Sabloff 1974:132, 156–160). One of the seminal works reflecting these new trends, as well as sharply criticizing the discipline, was Walter Taylor's (1948) *A Study of Archaeology*. Another major work was Willey and Phillips' (1958) influential *Method and Theory in American Archaeology*.

Thus, the principal innovations during this period involved contextual and functional interpretations. Data recovery techniques were refined, and attempts were made to view archeological materials from the perspective of cultural evolution (Willey and Sabloff 1974:174–177). Despite these advances, however, the majority of archeological research throughout the country followed traditional patterns.

In the Southwest, this period witnessed extensive exploration of ruins. By and large, sites were approached with traditional methods, and one has a sense that some of the earlier innovations largely pioneered in the Southwest (such as the stratigraphic revolution) were not extensively used. On the other hand, a tremendous amount of descriptive data were gathered and the general framework of Southwestern prehistory was filled out.

Two events merit notice here. For the first time, more attention was directed to the nonspectacular sites of the Southwest. This included the investigation of Paleo-Indian sites and the initial study of Archaic materials. Less impressive Puebloan remains also were investigated. While attention still focused on major sites, a more balanced view of the entire range of archeology was achieved.

Secondly, salvage archeology intensified in much of the Southwest. This occurred throughout much of the United States as people realized that archeological sites were being destroyed by development. Certainly the Smithsonian's River Basin Surveys in the Midwest exemplify this trend. In the Southwest, too, major salvage projects were conducted (e.g., Wendorf 1954a, b, c), often quite literally in the shadow of bulldozers. Most of these investigations were undertaken by archeologists associated with universities or museums. The full impact of salvage archeology was to be realized in the near future.

THE EXPLANATORY PERIOD (1960–1980)

It is here that we modify Willey and Sabloff's chronological order of the history of American archeology. We terminate the explanatory period at 1980, while they extended it to the present (although their work was published in 1974). With this aside, the Explanatory period represents one of the most profound changes to ever occur in North American archeology.

This period is inextricably tied to the so-called *New Archeology*. Willey and Sabloff (1974:183) state that the three basic approaches and characteristics of the new archeology are: an emphasis on cultural evolutionary theory, on systems theory, and on logic-deductive reasoning.

An extensive literature has grown up surrounding the Explanatory period. Some of it is thought-provoking; much of it is redundant or states the obvious. It is not appropriate here to consider this literature, but the writings of Lewis Binford, whom many consider the father of the New Archeology, are seminal. The impact of the new archeology has recently been summarized by Binford (1986).

With the emergence of the new archeology, the Southwest once again took the lead in developing archeological method and theory. Many of the new theories were tested against the backdrop of Southwestern archeological sites, and examples will be cited throughout this volume. One aspect of the new archeology is its willingness to use innovative, and sometimes controversial, techniques for data recovery and analysis. Many of the state-of-the-art contemporary techniques now in common usage were pioneered in the Southwest.

At roughly the same time that the new archeology was in vogue (ca early 1970s), a related development was occurring. This forced a schism within the discipline that is only recently becoming narrower.

THE CULTURAL RESOURCE MANAGEMENT (CRM) PERIOD (1970–1980)

We have identified another partially contemporary, but often philosophically quite separate, period of American archeology history. This is the Cultural Resource Management, or CRM, period. As used here, this period reflects that time roughly between the late 1960s to the early 1980s that is represented by massive data recovery projects. While we make no attempt at a synthesis of the development of CRM archeology and its positive and negative impacts, numerous publications address this issue; Brose (1985), Dincauze (1988), Fowler (1982, 1986), Knudson (1986), and Lipe (1978a, 1984) provide recent examinations of the topic.

As Knudson (1986:400) points out, the term CRM was invented by archeologists working in various federal agencies in the early 1970s (Lipe and Lindsay 1974). The term was devised partially in defensive response to the negative connotations of salvage archeology. During the 1960s, when the new archeology was formulated, the amount of salvage archeology rapidly increased throughout the United States. With the development of specific federal (and state) legislation, archeology conducted in response to federally funded construction projects evolved into a quite elaborate subset of archeology: CRM. As it stands today, the United States has one of the most sophisticated systems in the world for dealing with its cultural heritage (e.g., Wilson and Loyola 1982; Wilson 1987). The growth of CRM archeology, however, has not been without severe difficulties.

We previously mentioned that a schism developed in the profession in the early 1970s. This is a complex issue, but can be boiled down to the split between academic and private archeologists. Prior to this time, most archeology, whether salvage or pure research, was conducted by archeologists associated with either universities or museums. Given the number of archeologists produced by graduate schools and the tightening up of the academic marketplace, many individuals formed private consulting firms. When federal legislation mandated cultural resource studies, a plethora of money became available for archeological investigations. This classic period of CRM archeology witnessed millions of dollars being spent on scores of projects. Never before had so much funding been available for archeology. There simply was too much work for the universities to handle, and private archeological consulting firms blossomed.

Unfortunately, research integrity did not necessarily go hand in hand with increased funding. Suffice it to say that a considerable amount of animosity developed between academic archeologists and private practitioners. While it would be an oversimplification to say that the academic archeologists largely practiced new archeology (which many would stoutly deny) and the private firms conducted traditional (or worse) archeology, there is some truth to this.

Coupled with these developments was an emergence of "mercenary archeology." Although funds were widely available, the proliferation of archeological firms generated a very competitive environment. In many cases, lowest bids overrode concerns about the quality of research. Archeology for profit became a common practice, and the practice of underbidding became far more common that most of us would like to admit. Not all of these activities were confined to the private firms—universities also participated.

These variables combined to create a highly charged atmosphere during the 1970s. Nowhere was this more apparent than in the Southwest, where extensive economic development resulted in scores of archeological projects, some of very large scale proportions. Although stories of underbidding and other less than savory aspects of the profession are legendary in contemporary Southwestern archeological folklore, a tremendous amount of data were recovered, and the literature exploded. Much of this, however, was represented by the so-called gray literature—limited distribution reports going only to a few agencies. In any event, the sheer abundance of data at times seemed overwhelming.

While it may appear that the CRM period was largely a negative one, this is not the case. Despite numerous ethical and methodological problems, the CRM period has had a lasting and positive impact on contemporary archeology. Three aspects deserve particular note. The first is simply that our understanding of local cultural–historical sequences increased dramatically with the flurry of projects. Second is the greatly increased use of nonarcheological specialists on projects. While interdisciplinary study was becoming commonplace even in the 1950s, many CRM projects explicitly called for the input of a variety of scholars from other disciplines. These included geomorphologists, for example, and other environmental specialists in an attempt to reconstruct past environmental conditions. Third, and perhaps most importantly, CRM investigations were required, by law, to study all aspects of the past record of an area, not just those interesting to a particular archeologist. Significantly, the entire range of human behavior within a given project area was examined for the first time. This included study of site types, such as lithic scatters, that previously had been all but ignored. The cultural period to benefit most from this was the Archaic, whose sites often are apparently nondescript. Once such sites were systematically investigated, however, their significance became apparent.

THE CONTEMPORARY PERIOD (1980–PRESENT)

We propose a new period to reflect the current status of archeology. Both CRM and new archeology bandwagons have slowed considerably, the former due to decreased funding and the latter due to lack of interest in what had become increasingly redundant rhetoric. The discipline presently is settling into a pragmatic phase, and while many of the old problems, biases, and animosities remain, a considerable amount of good research in being conducted. Today, archeology is benefiting from the innovation of the preceding periods, and it is not uncommon to see a CRM project employing many of the concepts of the new archeology.

Since CRM archeology still accounts for most of the archeological research in the United States today, some may find it odd that we terminated the period in 1980. This admittedly is an arbitrary date, but we chose to end the period because in recent years the level of available funding has dropped dramatically. Many private archeological companies have gone out of business and many universities no longer have CRM programs. Despite this, the United States still has an incredibly wealthy CRM program compared to other nations. It is concerned not only with archeology but with all aspects of our cultural heritage. The system operates much more smoothly now than in the past; this is ensured by a firmly entrenched federal and state bureaucracy. While at times this bureaucracy's efforts can seem counterproductive, anyone practicing archeology in the United States should be grateful that the nation has had the foresight to protect its cultural resources in a systematic fashion. Gone, we hope, forever, are the days when salvage archeology was precisely that. Projects now usually are conducted using a phase approach. Cultural resources are identified and actions are taken for their protection well before actual construction. To be certain, there are lapses, but, in general, projects now are well planned.

The academic animosity to private contractors still exists, but it has abated. While bad work still occurs, it is rarer. It has become apparent that the division between pure research and CRM is artificial. While some disagree, the bottom line really comes down to those *doing* the research rather than to those *paying* for it. There are good and bad practitioners in both the academic environment and the private sector. Fortunately, the former far outnumber the latter.

In the Southwest today, as elsewhere in the United States, the majority of archeological investigations are inextricably tied to CRM. However, the days of mega-bucks projects are gone, probably forever. The primary concern now is simply to better understand, using the varied array of modern techniques available, the fascinating story of past human occupation in one of the most intriguing areas of North America.

EARLY MAN IN THE SOUTHWEST—THE PALEO-INDIANS

Alan H. Simmons (with Douglas D. Dykeman and Patricia A. Hicks)

SYNTHESIS

There are two glamour periods in Southwestern archeology. The first is the Formative Puebloan period, with its spectacular architectural remains. The second is at the other end of the temporal spectrum, and relates to man's first appearance in the Southwest (and in the Americas). This latter period is the subject of the present chapter.

Early man studies have a certain mystique to them. Perhaps symptomatic of the discipline of archeology as a whole, there is a fascination with the earliest or oldest evidence of human occupation of any given region. Accordingly, a considerable amount of research attention has been devoted to what are generally termed Paleo-Indian Studies.

The Paleo-Indian period (ca 10,000–5000 B.C) occurs throughout North America. These earliest occupants presumably entered the continent from the Bering Strait region in Alaska, traveling across either a land bridge or ice-sheet linking Siberia with North America. From there, they spread widely and rapidly, in many instances presumably following the large, and now extinct, megafauna that formed a major portion of their diet. The Paleo-Indian period represents a widespread adaptation characterized by mobile groups of hunters and gatherers who rarely stayed in one locale for any length of time. Earlier manifestations of the Paleo-Indians appear to have shared a similar technology, and terms such as Clovis or Folsom frequently are applied on a continental-wide basis. Later Paleo-Indian groups, however, display regional diversity, and this is reflected by a plethora of local terms.

Despite years of research, our understanding of Paleo-Indian adaptations is far from clear. Paleo-Indian archeology presents the researcher with several specific problems relating to both data recovery and interpretation. Many of these will be addressed in some detail in this chapter. Some of the more significant issues relate to chronology, site preservation and survey bias, terminology, site composition, and economic reconstruction. These are all topics that have generated a considerable amount of professional discussion.

One of the most vexing issues in early man studies is related to one of the most fundamental aspects of archeological inquiry: chronology. Specifically, the entry of man into the New World remains a controversial topic. In the early years of the development of American archeology, there was considerable debate on the antiquity of man in the New World, with very little evidence suggesting an entry older than a few thousand years. With the discovery of the Folsom site in New Mexico, however, man's presence in North American was pushed back to ca 10,000 years. As early man research accelerated in the twentieth century, the classic Paleo-Indian sequence became well-documented throughout the continent. Despite a few unsupported claims, there was no evidence for human occupation earlier than approximately 12,000 years ago. There has been a recent renewed effort, however, to document much earlier occupations. These generally are termed pre-Paleo-Indian studies, and proponents have attempted to demonstrate that man was, in fact, present in the New World far earlier than previously believed. Although pre-Paleo-Indian sites still are poorly documented, the evidence for early occupation presently is stronger than it ever has been. This topic is briefly reviewed in the present chapter.

Putting aside the question of when man entered the New World, there are several more basic issues with which researchers working with Paleo-Indian materials must deal. Two of these involve site preservation and survey bias, both of which are interconnected problems. By virtue of both their age and the nature of Paleo-Indian adaptations, such sites often are difficult to detect archeologically. Paleo-Indian sites represent the remains of small groups of hunters and gatherers. These do not often result in large sites containing abundant amounts of material culture. Frequently, the only artifactual materials preserved are chipped stone tools and related waste materials. In some instances, faunal materials also are preserved, and indeed, sites containing such remains have been the focus of Paleo-Indian research. Geologic processes also have obscured the remains of Paleo-Indian activity, making site location a difficult task. Accordingly, many archeological surveys may reflect biases in that Paleo-Indian sites generally reflect low visibility archeological occurrences, and if a survey is not attuned to this, such sites may be missed.

As will become apparent in this chapter, Paleo-Indian terminology is far from clear. The data base reflects the ephemeral nature of Paleo-Indian remains, and terminology often has developed on a site-specific basis. This has tended to lead to confusion in the meaning of terms and the identification of presumed diagnostic artifacts.

The composition of Paleo-Indian sites is poorly understood. There has been an understandable research bias towards investigating those sites containing relatively well preserved materials. This has led to an overemphasis on presumed kill or butcher sites. While these undoubtedly form important components of the Paleo-Indian record, they are perhaps not typical of Paleo-Indian remains. We know little of the composition of other types of Paleo-Indian sites. This has led to a widely held misconception on the nature of Paleo-Indian economy.

The most commonly held perception of Paleo-Indian economy is that these people were big-game hunters, relentlessly stalking now extinct forms of mammoth and bison across the continent. This focal hunting adaptation has strong supporting evidence in the form of excavated kill and butcher sites. There is no doubt that extinct megafauna were a major component of the Paleo-Indian diet. However, several researchers believe that this interpretation has been exaggerated. Based on comparisons with modern hunters and gatherers, as well as on common sense, it is unlikely that megafauna were the sole determinant of Paleo-Indian life. A more balanced perspective incorporates the hunting of smaller fauna and the gathering of wild floral resources into the Paleo-Indian world. As archeological data recovery becomes more refined, it is likely that evidence for a broader based economic spectrum will be retrieved. The investigation of sites other than megafauna oriented occurrences also will help round out the picture. This entire issue will be treated in some detail in this chapter as it relates specifically to the project area. We will see that available evidence suggests it is incorrect to view Paleo-Indian economy as one adaptation; rather, considerable diversity is reflected in the record, depending upon what Paleo-Indian phase is being investigated.

These and other issues form the core of this chapter. They are discussed as they generally pertain to the Southwest. Following the period discussion, we turn our attention to Paleo-Indian occurrences within the specific subregions of south-central Colorado, New Mexico, and Trans–Pecos that comprise the study area. This discussion can be best begun with an examination of the Pre-Paleo-Indian controversy.

PERIOD DISCUSSION

The Pre-Paleo-Indians—Fact or Fiction?

Man's initial presence in the New World has been, and remains, a question of some controversy. With the discovery in 1924 of the Folsom site in northeastern New Mexico (Cook 1927; Figgins 1927), claims for man's antiquity in North America were supported. Subsequent discoveries have allowed for the indisputable documentation of the Paleo-Indian period, which places man in North America as early as ca 12,000 years ago. There have, however, also been claims of greater antiquity than the Paleo-Indians, or for a pre-Paleo-Indian stage. Such a period frequently is referred to as the pre-projectile point period, since most sites do not contain the diagnostic points that largely define various Paleo-Indian groups.

Pre-Paleo-Indian sites generally fall within two groups: sites pre-dating the Paleo-Indian period by a few (up to ten) thousand years, and sites predating Paleo-Indian occurrences by several (over ten) thousand years. Proponents of sites falling in the latter category often postulate the presence of human forms earlier than modern man (i.e., *Homo sapiens sapiens*), and Neanderthals are most frequently cited as being responsible for their creation. Neanderthal (*Homo sapiens neanderthanensis*) is dated throughout the Old World as early as 100,000 + years ago, and continued to exist until ca 40,000 years ago, when truly modern forms appeared. Therefore, claims for such sites in the New World usually require an occupation of at least 40,000 years ago.

The other early scenario includes the arrival of *Homo sapiens sapiens*, presumably across the Bering Strait, or Bering Land Bridge (i.e., Beringia, in Alaska some 20,000 years ago). The Bering Land Bridge, which most scholars consider the probable route of man's entry into the New World, regardless of his antiquity, has been open several times in the past. One study (Hopkins 1967) indicates that it was passable between ca 23,000 and 8,000 B.C. Another (Stalker 1980) suggests that it was passable between 17,000 and 18,000 B.C. and after 12,000 B.C. (Cordell 1984:122).

Of the two scenarios described above, the second is by far the more credible. There is, however, no clear and indisputable evidence lending defensible support to either claim. Early man sites, representing the activities of mobile hunters and gatherers, tend by their very nature to consist of ephemeral archeological remains. Compounding this problem of archeological visibility are poor preservation and geologic processes that tend to obliterate or conceal older sites.

Citing Haynes (1969), Cordell (1984:122–123) offers a reasoned argument against such early claims, noting that to be accepted, certain minimal criteria must be met. These include clear evidence for the presence of man (either skeletal, obvious artifacts, or obvious and datable cultural features). These should "be in their original depositional context in undisturbed deposits, where their stratigraphic position and minimum age can be determined" (Cordell 1984:122). Such criteria cannot be met for most claimed pre-Paleo-Indian sites in North America; no sites in the Southwest meet these criteria.

Omitting what some have perhaps uncharitably called the lunatic fringe, the list of sites in the Americas that may meet these criteria is dismally low. In Chile, Dillehay's (1987) recent excavations at Monte Verde have provided some of the best documentation for early habitation of the Americas. The lower levels of this site have been radiocarbon dated to ca 32,000 B.C. These levels are associated with fractured pebbles that presumably have been worked by humans, although scholarly reception of this claim has been mixed. More impressive is the exceptionally well-preserved component of Monte Verde that dates to ca 11,000 B.C., or roughly 13,000 years ago (B.P., or before present). Not only were stone and wood tools and animal remains recovered, but there also is good evidence for dwellings. Monte Verde certainly does not represent the oldest claimed early site, but it is one of the best reported and supported instances. Although the dates from the well preserved levels are not pre-Paleo-Indian, the site is sufficiently sophisticated to suggest some antecedent development. Furthermore, its location in South America suggests some antiquity for colonization further north, assuming that Monte Verde's occupants originally passed through North America to reach Chile. Of all the claims put forth, Dillehay's investigations at Monte Verde represent perhaps the most convincing for early occupation of the Americas.

Of those few sites in North America that may meet the criteria described above, Meadowcroft Shelter in Pennsylvania (Adovasio et al. 1978, 1980) is perhaps the best known, with a claim of some 18,000 years of antiquity. Meadowcroft, though, is not without its critics (e.g., Haynes 1980b; Mead 1980). Other sites have been claimed to represent pre-Paleo-Indian occupation, and many are summarized in Bryan (1986), where individual articles discuss sites in both North and South America. In addition, the recently launched journal *Current Research in the Pleistocene* focuses on pre-10,000-years-ago occupation of the Western Hemisphere and promises to keep the discipline abreast of new developments. Finally, for well reasoned, popular discussion of early human occupation in the Americas, the journal *Natural History* has recently (1986–1987) run several interesting articles on the subject.

In the Southwest proper, there are few sites that can be claimed as possibly antecedent to the Paleo-Indian. Discounting the obviously exaggerated and totally unsubstantiated claims made by Goodman (1980) for Neanderthals in northern Arizona, there are two candidates that frequently have been nominated for early status. Both are in the present study area, in New Mexico. These are Sandia Cave and the Lucy site.

Sandia Cave (Hibben 1941) has generated the most controversy. The site, located just north of Albuquerque, contains several layers of cultural materials. The Sandia level consists of presumably diagnostic Sandia points as well as mammoth, bison, mastodon, horse, and camel. Radiocarbon dates ranging from 33,000–15,000 B.C. have been claimed for Sandia (Crane 1955, 1956; Hibben 1955), but several questions have arisen concerning their validity as well as the association of artifacts with extinct fauna. Several scholars have questioned the antiquity of Sandia (e.g., Bryan 1965; Haynes 1967; Irwin 1971), with Stevens and Agogino (1975) providing the most detailed critique. In addition, Judge (1972:7) has questioned whether or not Sandia points are, in fact, projectile points at all, suggesting that they might have functioned as knives. He continues to note that the few specimens from the site that are definite projectile points are leaf-shaped bipoints. All told, most scholars would view Sandia as Paleo-Indian (Cordell 1984:128–129), and claims for greater antiquity must be regarded with extreme skepticism.

The Lucy site is located in the Estancia Basin of New Mexico (Roosa 1956a, b). Although it contains Sandia points, it also has Clovis and Folsom Paleo-Indian artifacts as well as Archaic materials. The assemblage is mixed, and the site has been subject to considerable deflation (Cordell 1984:129), so claims for its antiquity cannot be supported.

A few other sites, all undated, merit brief attention. Los Encinos (Bryan 1939) in north-central New Mexico contains crude artifacts similar to European Lower Paleolithic materials (i.e., by implication, in excess of 100,000 years). Similar artifacts are known from Tolchaco in north-central Arizona (Bartlett 1943), and indeed, a Tolchaco complex has been claimed by some as reflective of pre-Paleo-Indian sites. Most researchers, however, consider Tolchaco materials as quarry sites reflecting a long span of specialized use, but *not* dating to any great antiquity (cf. Keller and Wilson 1975).

Finally, in his Paleo-Indian overview, Judge (1974:8) notes that Hermit Cave (Ferdon 1946), located in Southeastern New Mexico on the eastern slope of the Guadalupe Mountains, may contain pre-Paleo-Indian materials. This site contains Archaic and Puebloan deposits, but it also has extinct fauna, such as mammoth and dire wolf, in supposed associated with a hearth yielding dates of 11,850 ± 350, 12,270 ± 450, and 12,900 ± 350 B.C. If this association is correct, it would predate the earliest dated Paleo-Indian materials (i.e., Clovis) by several hundred years; Judge believes that Hermit Cave is a relatively strong contender for a pre-Clovis occupation.

All told, however, the evidence for pre-Paleo-Indian occupation in the Southwest, and North America for that matter, is not robust. Many claims have been made; most do not stand up to critical scrutiny. Overall, such claims have more form than substance.

The Paleo-Indian Complexes

With the issue of pre-Paleo-Indian acknowledged, if not resolved, let us now turn attention to the much better documented Paleo-Indian period. The criteria cited earlier for the acceptance of a site as authentic also apply to Paleo-Indian occurrences. Paleo-Indians were mobile hunters and gatherers, and their remains do not usually leave a pronounced mark on the archeological landscape.

Much of our detailed knowledge on the Paleo-Indian period comes from the Great Plains, where sites are more common than they are in the Southwest. Thus, the Southwest cannot be considered in a vacuum and in the following discussion we will refer to the former area as appropriate. Several authors have synthesized and summarized the Paleo-Indian period in the Southwest; these include, chronologically, Howard (1935), Sellards (1952), Wormington (1957), Wilmsen (1965), Haynes (1969), Judge (1973, 1974), and Cordell (1984:121–151). In the present summary, we rely heavily on the last three works. Although somewhat dated, Judge (1973) is frequently cited and provides an excellent and thorough discussion relevant to the study area, and the reader is referred to him for additional information. Figure 4 shows the location of some major sites mentioned in the text.

Terminology and Typology

Classification of cultural materials, especially when they are not abundant, presents a problem to archeologists. Several classificatory schemes have been proposed by various researchers working with Paleo-Indian materials, and considerable confusion has resulted. Judge (1974:3–4) provides welcome clarification on the plethora of terms that has resulted in Paleo-Indian studies. He suggests a classification system that maintains logical consistency in the various criteria used to create analytic categories. Judge's system is based largely on variation in the shape of projectile point bases, which are the most diagnostic of Paleo-Indian artifacts. His description of basal morphology is based on two criteria—thinning techniques and the direction of smoothing.

Thinning techniques refer to methods by which the basal portion of a projectile point preform is reduced to the desired hafting thickness. Two basic thinning methods often observed include the removal of vertical flutes perpendicular to the base and the removal of lateral flakes perpendicular to the edge. The direction of smoothing refers to the way in which lateral edges of the point base are abraded as a final step in the manufacturing process.

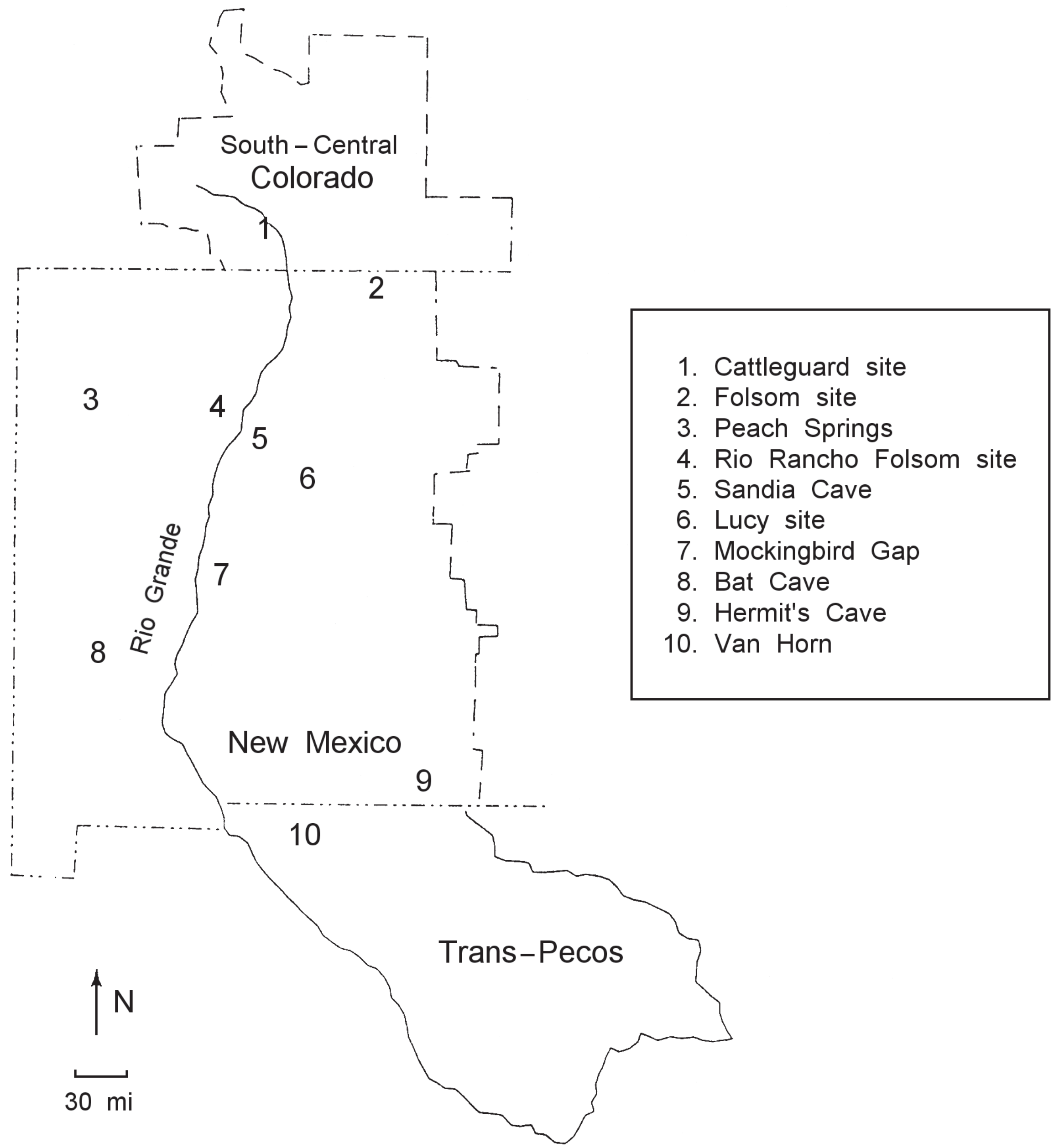


Figure 4. Location of some of the Paleo-Indian sites mentioned in the text

Using these two criteria, Judge has classified Plains and Southwest classic Paleo-Indian projectile point types into four series (Figure 5):

1. **Fluted Point Series:** Basal thinning accomplished via the removal of a vertical flute, or multiple flutes. This results in a biconcave cross section. Abrasion is achieved parallel to the lateral edges of the base (e.g., Clovis; Folsom).

2. **Laterally Thinned Series:** Thinning is accomplished by lateral (or transverse) flaking, resulting in a thin convex or plano-convex cross section. Smoothing is done parallel to the lateral edges (e.g., Plainview, including Plainview, Meserve, and Milnesand types; Midland; Frederick).

3. **Constricted Base Series:** Thinning is achieved by lateral flaking (sometimes of the collateral type) in combination

with intentional tapering to produce a relatively narrow base. The resulting cross section is thickly convex at the base. Smoothing is obtained parallel to the lateral edges (e.g., Hell Gap; Agate Basin).

4. **Indented Base Series:** Thinning is accomplished by lateral (often collateral) flaking. Cross sections range from relatively thin convex to a thick diamond shape. Smoothing is carried out in a direction perpendicular to the lateral edges of the base. Basal indentation is a function of lateral flaking or perpendicular smoothing, or both. In some instances, basal indentation is slight (e.g., Firstview, including Firstview, San Jon, and Portales complex types; Cody, including Eden and Scottsbluff types) (Judge 1974:4–5).

At this point, it is useful to note another term frequently seen in the literature. This is the *Plano* phase or period. It was defined by Mason (1962) and represented a relatively generalized tradition for the West. Unfortunately, Plano has become a catch-all category, and to be a useful construct it requires

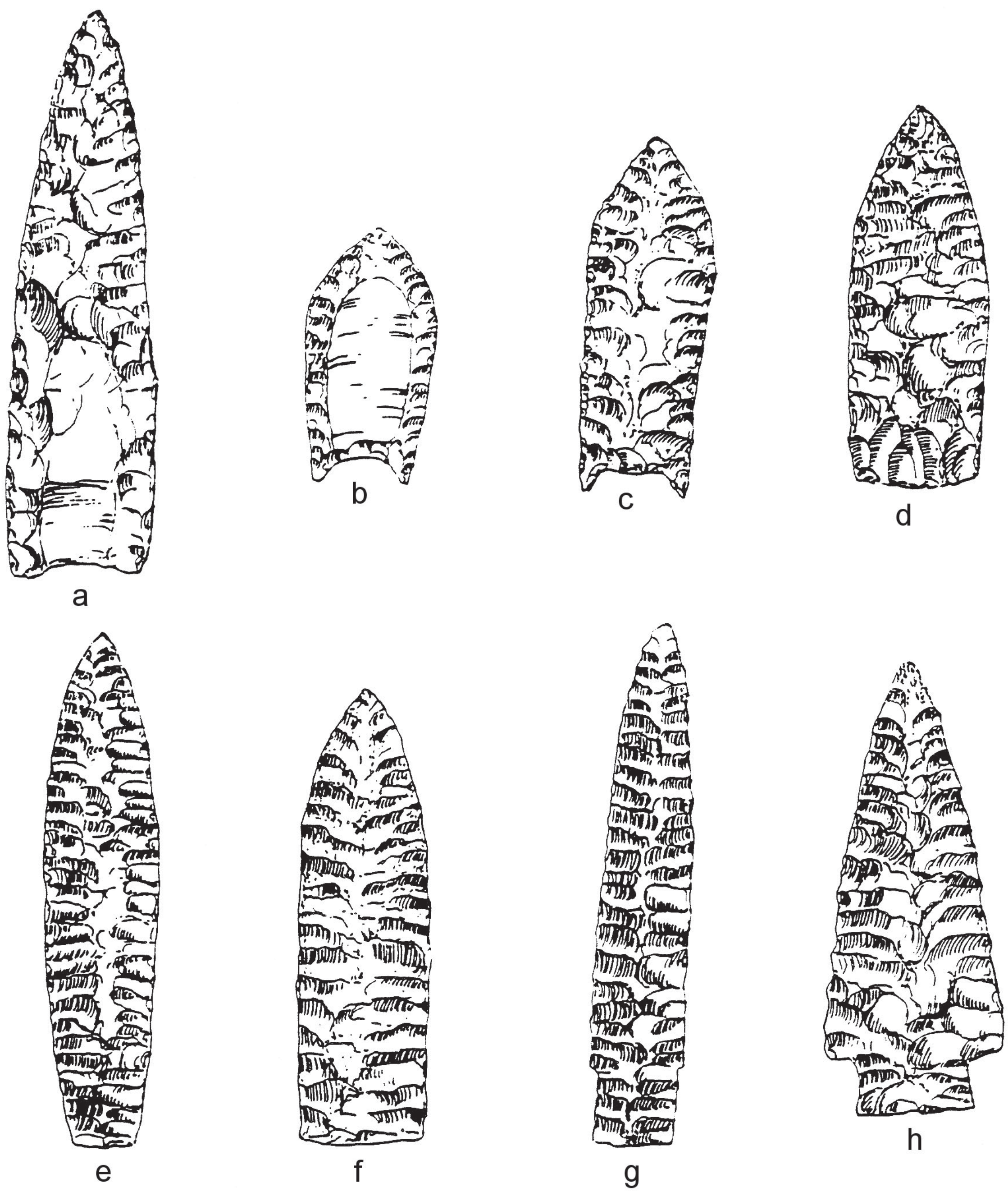


Figure 5. Characteristic Paleo-Indian projectile point types: a. Clovis Type 1; b. Folsom; c. Midland; d. Milnesand (Plainview complex); e. Agate Basin; f. Firstview; g. Eden (Cody complex); h. Scottsbluff Type 2 (Cody complex) (Cordell 1984)
Illustrated by Charles M. Carrillo

additional research. The Plano period is generally dated to between ca 8000 and 5000 B.C. Midland and Plainview projectile point types often occur near the beginning of Plano, while Cody complex styles occur towards the end of the period (Judge 1973:71).

Judge's (1974) discussion considers 101 Paleo-Indian sites from the Plains and Southwest areas. Since the time of Judge's summary, other Paleo-Indian sites have been reported, although few have been investigated in detail. In addition to investigations at actual *sites*, surface collections of Paleo-Indian materials and isolated Paleo-Indian finds are known from virtually every state in the Southwest (and Plains) (e.g., Agenbroad 1967; DiPeso 1953; Judge 1973; Ortiz and Taylor 1972; Wendorf and Hester 1962; Wormington 1962). Many of the Paleo-Indian and related sites fall outside of the present study area, being located in southern Arizona or the Plains. For example, the western San Dieguito, characterized by Lake Mohave and Silver Lake projectile point types (Warren 1967) is outside of the study area, but is of general interest due to its possible relationship to the development of later Archaic groups (cf. Irwin–Williams 1979:33–35). Two of the most famous Paleo-Indian sites are located in the overall study area, though. These are Folsom (Cook 1927; Figgins 1927; Sellards 1952) and Blackwater Draw (Hester 1972; Wendorf and Hester 1975).

Cordell's (1984) work provides the most recent synthesis of Paleo-Indian occurrences in the Southwest. She has provided a useful breakdown of Paleo-Indian complexes, as summarized in Table 3. She and Judge (1974) give very useful syntheses, and the reader is referred to both works for additional detail. What this research has demonstrated is that there is a considerable amount of diversity between Paleo-Indian complexes and that it would be an error to consider Paleo-Indian as one entity. The remaining discussion here focuses on specific issues relevant to the Paleo-Indian period, using both Cordell (1984:121–151) and Judge (1974) as guidelines.

Chronology

Radiocarbon dates for the earliest Paleo-Indian complex, Clovis, cluster between 9500 and 9000 B.C. The other complexes, when arranged in chronological order, are as follows: Folsom, Plainview, Agate Basin, Firstview, Cody, and Jay. Radiocarbon dates range from 9250 ± 400 B.C. at the Folsom site of Lindenmeier (Roberts 1935a, 1936; Wilmsen 1974:33) in Colorado to 5820 ± 240 B.C. at the Cody site of Lamb Springs in Wyoming (Cordell 1984:136). The Jay complex is believed to commence at ca 5500 B.C. It should be noted that Irwin–Williams (1973) considers Jay as the first phase of the Archaic, rather than as late Paleo-Indian. Additional discussion on this claim is provided in the next chapter. Stratigraphic information has also been used to order Paleo-Indian sites. Unfortunately, only the Hell Gap site in Wyoming and Blackwater Draw, Locality 1, in New Mexico have sufficient stratigraphy and multiple occupations for the method to be very useful.

Paleoenvironment

Several environmental changes occurred during the Paleo-Indian period, and human adaptive strategies were undoubtedly tied to these. The best site-specific paleoenvironmental data come from two separate localities: Blackwater Draw and the San Pedro River Valley in southern Arizona, although information from other areas also is being accumulated. Some pertinent sources include Wendorf (1961, 1970, 1975), Wendorf and Hester (1975), Haynes (1970, 1975), Haury et al. (1959), Eddy

Table 3.
Southwestern Paleo-Indian Complexes and Diagnostic Artifacts (from Cordell 1984:128)

	Late	
Early	East*	West**
Sandia (?)—New Mexico	Folsom	San Dieguito (?)
two point types	Folsom, Midland points	Lake Mohave,
Clovis—Arizona, New Mexico	end scrapers, denticulates	Silver Lake points
two point types	bone: needles, disks, flakes	
bone: points, batons, punches,	Plainview	
foreshafts, scrapers	Plainview, Milnesand, Meserve,	
stone: end scrapers, gravers,	Belen points	
backed blades	Agate Basin	
Ventana Complex (?)—Arizona	Agate Basin points	
two point types	scrapers, notched flakes	
side scrapers, gravers, choppers	Firstview	
Sulphur Springs (?)—SW Arizona	Firstview, San Jon points	
no projectile points	Cody	
handstones, knives	Eden points, Scottsbluff points	
	(two types); Cody knife	
	Jay	
	Jay points ***	

Notes: (?) refers to chronological ambiguity.
*All are not necessarily represented in the present study area
Does **not include present study area
***Some (e.g., Irwin–Williams [1973]) do not consider Jay as Paleo-Indian

and Cooley (1983), Sayles (1983), and Mehringer and Haynes (1965). Cordell (1984:142) summarizes paleoenvironmental data, noting that available information suggests that the earliest specialized Paleo-Indian points (i.e., Clovis) follow a period of increased effective moisture. However, marked depositional changes correlate with the introduction or disappearance of the various Paleo-Indian complexes. In much of the Southwest, a major period of desiccation seems to coincide with the less-specialized Archaic complexes. The timing of this is not synchronous, occurring first in the south and west and later in the east and north. Present paleoenvironmental data do not confirm the idea that Clovis, Folsom, and Cody were particularly widespread because they coincided with favorable climatic conditions. However, if additional research documents the extent of changes coincident with the Lubbock Subpluvial in the eastern portion of the Southwest and the later changes postulated by Irwin–Williams and Haynes (1970) in the same area, this argument will be strengthened (Cordell 1984:142).

Site Types

Based on his research in central New Mexico and on other studies, Judge has identified different functional Paleo-Indian site types. These include maintenance, armament, base camp, processing, quarry, and kill sites (Judge 1974:31–32; Judge and Dawson 1972). Interestingly, most of the claimed kill sites studied by Judge did not conform to the expected kill site configuration. Judge suggests that many of these sites actually may represent either unsuccessful kill sites (cf. Hemmings and Haynes 1969) or processing sites. An unsuccessful kill site suggests "an attempted kill which resulted in either insufficient wounding to cause death, or unsuccessful pursuit of a wounded animal. In either case, when the animal [eventually] died there would be an association of projectile points with the remains which could lead to an erroneous interpretation of a successful kill" (Judge 1974:15). The implications of such an occurrence should not be lost on both researchers and managers: the association of points and megafauna do not necessarily reflect an in situ kill site.

It is important to realize that even at sites of Paleo-Indian antiquity, variation in artifact composition and patterning often is discernible with careful analysis. It is inadequate to merely record a Paleo-Indian site as such; rather, additional detail is required so that reasonable placement within a functional category is possible. By accomplishing this, interpretations beyond mere description of artifacts will be possible.

Site Distribution

Relative to other Paleo-Indian sites, Clovis sites are widely distributed in the Southwest; they are most abundant in the south and southwest regions. For example, over 30% of the Clovis sites examined by Judge in his analysis are located in the San Pedro valley of southeast Arizona. During the Folsom and Midland periods, more spatial restriction is observed. Folsom sites tend to cluster in the eastern Southwest, on the Llano Estacado, and on the western portions of the High Plains. The apparent lack of such sites in the western portion of New Mexico, however, may be due to inadequate archeological observation (cf. Stuart and Gauthier 1984:264).

Few distribution studies have been conducted for post-Folsom sites. Midland, Plainview, and Frederick complex Paleo-Indian sites tend to be concentrated throughout the Southwest and in the southern and central High Plains. Firstview, Alberta, and Cody complex sites appear to be concentrated on the northern and central High Plains, although Cody materials are relatively widespread. In short, a north–south distribution in site density can be observed, and Judge believes that this is significant (Judge 1974:31).

Settlement Pattern

Relatively little research has focused on Paleo-Indian settlement patterns; rather, most investigations have tended to be site specific. At least three exceptions are known, though: Judge's (1973) study of the Middle Rio Grande Valley in New Mexico, Broilo's (1971) survey of Paleo-Indian sites in the Blackwater Draw area, and Wendorf and Hester's (1962) study of the Llano Estacado in eastern New Mexico/western Texas.

These studies suggest that water sources, such as playas, streams, and springs, were critical variables in the determination of Paleo-Indian settlement patterns. For example, a relatively clear pattern can be observed with Clovis materials. Clovis sites tend to be consistently associated with playas in upland settings. Analysis of raw materials and of the manufacture of Clovis implements also shows that multiple resources were used, some from as far as 300 km away (Haynes 1980a).

Economy

Paleo-Indian subsistence economy has long been a major focus of investigation. At the onset, it will be useful to dispel a myth that is still common. Traditionally, Paleo-Indian economy has been regarded as one almost exclusively based on the systematic hunting of extinct big game. This view has many proponents (e.g., Jennings 1974:127; Wheat 1971:26; Wormington 1957:21), with several suggesting that the Paleo-Indians may have been responsible for the extinction of Pleistocene megafauna, such as the mammoth (e.g., Martin 1963, 1967, 1973). It is easy to see how such a viewpoint developed, considering that the first Paleo-Indian sites discovered were associated with remains of extinct fauna. Furthermore, given the capricious nature of archeological preservation and the antiquity of Paleo-Indian sites, economic data recovered from excavations tend to be biased towards better preserved items, such as the remains of large animals. Finally, Paleo-Indians have been assumed to be big-game hunters through inference: the most diagnostic Paleo-Indian artifacts are large projectile points. Such is the myth: Paleo-Indians were exclusive big-game hunters. When confronted with the facts, however, the scenario is less dramatic, if more realistic.

There is no doubt that Paleo-Indians were highly successful mobile hunters and gatherers, who at times exercised a focal strategy oriented towards the exploitation of megafauna. Recent reassessment of the limited Paleo-Indian economic and allied data suggests, however, that the exploitation of plants and smaller animals also were crucial components of Paleo-Indian adaptive strategies. As more critical examinations are undertaken, it is clear that Paleo-Indian economy was a complex system, and to characterize it either as big-game hunting or as generalized hunting and gathering is to vastly oversimplify.

A consideration of Paleo-Indian economy cannot be undertaken without a concomitant understanding of prevailing environmental conditions. As Judge (1974:32–33) and others (e.g., Cleland 1966) interested in Paleo-Indian economy have noted, focal adaptations, where an emphasis is placed on just a few resources, can be expected in areas of relatively low ecological diversity; that is, fewer resources, but more abundance. Conversely, a more broad-spectrum economic adaptation, emphasizing a variety of resources, could be expected to occur in areas of high ecological diversity; that is, more varied resources, but less abundance of any particular resource. Following this argument, Judge (1974:32) notes that, in general, the grassland-dominant High Plains and similar areas of the eastern Southwest exhibit less diversity than the intermontane areas of the Colorado Plateau and the Great Basin, for example. Accordingly, positing a focal economy is not an unrealistic proposition. Note, though, that resources throughout the Southwest never have been overly abundant. This environmental characteristic of the Southwest has structured human adaptive strategies in the region ever since its initial occupation.

In Judge's (1974) review of Paleo-Indian complexes, he notes that the earlier Paleo-Indian groups colonized much of North America prior to, or just after, the Wisconsin glacial maximum. Adaptations south of this ice sheet would have been to near full glacial climatic and vegetational conditions, involving a minimum of open plains–grasslands areas. Accordingly, economic systems would have involved adaptations to a high-diversity habitat, resulting in diffuse or broad-spectrum economies. Given this adaptation, it is likely that habitat ranges would have been located in areas of relatively pronounced topographic and ecological diversity, such as the intermontane west, where a more efficient generalized subsistence strategy could be realized. Following this argument, the lack of early Paleo-Indian sites in low diversity areas of the Southwest, which are common to much of the current study area, is not surprising, since this early period would have been characterized by groups with diffuse economies adapted to high diversity environments (Judge 1974:32–33).

The situation is dramatically different when viewing the later classic, Paleo-Indian complexes. Following a model derived from nonhuman ecology, Judge suggests that a focal economy can be generally defined in terms of an annual settlement and site pattern distribution that is determined by the behavior and location of a given megafauna. Although there is no doubt that small animals and plants were important components in the diet of late Paleo-Indian peoples, there is good evidence that their settlement patterns were structured around the distribution and behavior of specific large mammals. Accordingly, their economies were specialized or focal (Judge 1974:33). Note that this statement makes the distinction between the traditional view of sole big-game hunters and the more currently acceptable perspective of a broad economic system that involved the exploitation of a variety of plants and animals, but that also was largely structured by the distribution of specific megafauna.

A point made earlier needs to be reiterated here. It is a mistake to consider Paleo-Indian as one adaptation. Changes through time can be observed, especially during the later Paleo-Indian phases. These can now be briefly considered.

As noted previously, Judge (1974) has developed a site typology for Paleo-Indian sites that allowed him to characterize aspects of Paleo-Indian adaptation. This typology is based on frequencies of projectile points and scraping tools, mean number of artifacts, completeness of projectile points, and the presence of faunal materials. Judge was able to document camp sites, kill sites, processing sites, and quarry sites. Of particular interest is the observation that kill sites belonging to early Paleo-Indian complex (i.e., Clovis) did not conform to expected patterns, that is, those that are observed at later Paleo-Indian kill sites. Rather, reported Clovis kill sites better fit the pattern of processing sites, or the unsuccessful kill sites discussed earlier. The implications of these observations are interesting, in that they partially suggest that scavenging on the part of Clovis groups may be a more accurate reflection of the behavior represented at these sites. The scavenging argument is more fully developed by Sanders (1980), who proposed both scavenging and cropping (i.e., culling) activities on the part of Clovis peoples.

Cordell (1984:145) believes that Clovis adaptations were characterized by an apparent lack of constricted mobility. This and the association of Clovis sites with playas indicates abundant surface moisture, making water and forage available to the game Clovis people hunted. Paleoclimatological reconstructions that indicate climatic equability or a lack of seasonality during Clovis times support this view. Plentiful water and abundant forage would allow the wide distribution of large game animals with their movements being less restricted by environmental constraints than at later times (Broilo 1971; Duncan 1971). Cordell (1984:145) continues to observe that whether or not Clovis hunters practiced a strategy that combined cropping animals with effective scavenging, environmental reconstructions and the anomalies in Clovis kill sites suggest that there would have been a very high risk in focusing on mammoth as the major game animals. She feels that plant foods must have been an important part of the economy because of "(1) the environmental reconstructions indicating a lack of seasonality and widely distributed and abundant resources, (2) the distribution of artifacts in diverse topographic settings, and (3) the analogies to modern hunters and gatherers" (Cordell 1984:145).

Judge's (1974:33–34) reconstruction of Clovis subsistence generally is in line with Cordell's interpretation, although it varies in details. He notes that the variety of large and small mammals is much greater at Clovis sites than at those of later Paleo-Indian groups suggesting Clovis groups as being more eclectic hunters than generally imagined. He continues:

> This permits the proposal of a rather simple explanation of Clovis subsistence. In view of the possible increase in grassland areas,...habitat carrying capacities relative to broad spectrum adaptations would have decreased, while at the same time faunal abundance on the Plains and grassland areas of the Southwest

> would have increased. Under these conditions, a transition to a low diversity habitat, focusing on a variety of megafaunal species, could be anticipated. Thus the classification of the Llano complex as transitional from the diffuse subsistence pattern of the Middle Paleo-Indian to the focal, highly specialized economies of the Late Paleo-Indian Period (e.g., Folsom) is offered here as worthy of further consideration. (Judge 1974: 33–34)

By the end of the Clovis period, the mammoth and other large fauna became extinct throughout North America. Interesting, however, is the association at some later Paleo-Indian eastern Southwest sites of both extinct fauna (mammoth, large forms of bison) *and* modern fauna. In the western Southwest, post-Clovis Paleo-Indian sites are associated solely with modern fauna. This apparent dichotomy needs to be addressed by future research.

The role that humans played in this mass extinction is one of considerable controversy in the archeological literature (Cordell 1984:145–146). Martin (1973) and others (e.g., Sanders 1980) view humans as directly responsible, while other researchers do not feel that man played a key role. Guilday (1967), for example, believes that habitat destruction, range restriction, and competition were more likely causes of megafauna extinctions. It is likely that this controversy will continue for some time, and final resolution is unlikely. Cordell (1984: 146), however, tends to favor the nonhuman argument for extinction, noting that paleoenvironmental evidence supports only a limited human role, if any at all, in these extinctions.

If the subsistence data from the Clovis period are equivocal, the succeeding Folsom period offers slightly more solid information, suggestive of a clearer focalized strategy with a single species, bison, being the prime resource involved. This pattern appears to continue in post-Folsom Paleo-Indian complexes as well, with an even more pronounced emphasis on bison. Many workers have posited a mosaic vegetational pattern for Folsom times, suggesting that bison might have been dispersed into small herds rather than aggregated into larger ones. If one suggests a specialized Folsom adaptation to a dispersed megafauna (i.e., bison), several implications are apparent. For example, progressive depletion of dispersed herds would require high mobility and associated selection for efficiency in lithic technology (Judge 1970, 1973, 1974).

Beginning approximately 10,000–11,000 years ago, bison become increasingly common in the archeological record. The expansion of bison can be attributed to the expansion of shortgrass prairies brought about by a relatively rapid climatic shift, the extinction of potential predators, and the expansion of the bison niche to include midgrass stems, a feeding strategy made possible after the extinction of mammoth, horses, and camels (Cordell 1984:146; Guthrie 1980; Judge 1974:34).

Following the Folsom complex, bison are even more abundant in the archeological record. Several researchers (e.g., Judge 1974:34–35; Wendorf 1970, 1975) have suggested that during Folsom times, bison occurred in smaller herds, and that during post-Folsom times, following the increase in a habitat favorable to bison, larger aggregated herds became more common. Archeologically, this is reflected by the presence of more bison in post-Folsom kill sites, in some instances suggesting communal kills, such as at the Olson–Chubbock site in Colorado (Wheat 1972). In Judge's analysis of several sites, he notes that the mean number of bison represented at Folsom sites is 15.25 (with 23 the maximum). If Midland, Plainview, and Frederick complex sites are added, the average is 29 bison per site. The mean for the later Paleo-Indian complexes, reflected in the Constricted base and Indented base projectile point typology discussed earlier (i.e., Agate Basin, Hell Gap, Firstview, Alberta, and Cody complexes) is 128.8 bison per site (Judge 1974:34). While many biasing factors may have affected these numbers, the trend they suggest is clear. By and large, the sites containing large numbers of bison do not occur in the present study area. Rather, they are more common in the High Plains.

Summarizing Late Paleo-Indian subsistence strategies, Judge states the case succinctly:

> In any case, within the general context of focal economies, Late Paleo-Indian subsistence strategies may have involved the exploitation of both dispersed and aggregated herds of bison. Thus distinctions within this period may best be understood in terms of variation in megafaunal density and distribution. Such variation may have been temporal, seasonal, or a combination of both, and the possibility of distinguishing Paleo-Indian technology and typology in seasonal, as well as temporal and spatial, terms should be given serious consideration. (Judge 1974:35)

Cordell (1984:148–149) notes that in the Southwest, especially in its eastern areas which, in general, are much more arid than the Plains and the intermontane region, the lack of diversity in Paleo-Indian complexes may reflect conditions of local and regional aridity. Thus, in these areas intensive bison hunting may not have been an appropriate strategy simply due to the lack of animals in sufficient quantities.

In summary, there has been more speculation on Paleo-Indian economy than there has been actual documentation. It is clear that during much of the time encompassed by the Paleo-Indian phases, the hunting, and possibly scavenging, of megafauna was a key focus of economic activities. It was not, however, the sole focus, and even the specialized groups relied heavily on plants and smaller animals as well as on megafauna. In general, earlier Paleo-Indian complexes (e.g., Clovis) suggest a more diverse economic strategy, while later complexes, beginning with Folsom, indicate a more focal strategy emphasizing the procurement of bison. Paleo-Indian occurrences in the Southwest, however, are relatively rare and more detailed and precise data come from adjoining areas in the Great Plains and High Plains.

Population Dynamics and Social Structure

Due to the ephemeral nature of most Paleo-Indian sites in the Southwest, very little precise information is available regarding group structure, population size and density, and social organization. Cordell (1979a:17–22, 1984:149–150) provides some relevant information, but in general we know painfully

Table 4.
Summary of Southwest/Plains Paleo-Indian Complexes (abstracted from Judge 1974)

Complex	Site Types	Distribution	Fauna
Clovis	processing; kill; "unsuccessful kill"; camps	southern Plains; Southwest, esp. SW AZ; largely streams and marshy ponds	wide variety, including extinct megafauna (e.g., horse, camel, mammoth)
Folsom	processing; kill; camps	south-central and southern Plains; largely associated with ponds and streams	variety (e.g., antelope, birds, canids, cervids); but not as wide as Clovis; bison (*B. antiquus*)
Midland	camps; processing	northern Plains; Llano Estacado; SW & E NM	limited; bison, antelope
Plainview	camps; processing; quarry; kill	central Plains; central NM ("Belen")	bison emphasis
Frederick	camps; kill; quarry	north-central, central TX (Levi site) none published for SW proper	bison; other large and small mammals (e.g., deer, antelope, cervids, canids)
Agate Basin	camps; milling sites	northern Plains; Blackwater Draw variant is southernmost site; surface finds from southern Plains	bison; deer and small mammals
Hell Gap	kill; camps	northern Plains	bison; limited canids, cats, birds and reptiles, antelope, deer, small mammals
Firstview	kill	central CO; eastern NM	bison emphasis
Alberta	processing; kill; camps	northern Plains	bison emphasis
Cody, Eden, Scottsbluff	camps; kill; quarry	widespread; central and northern Plains; central NM, other SW locales	bison emphasis; variety of other including antelope, deer, canids, birds, reptiles

little of these facets of Paleo-Indian life. We can assume that overall population densities were low during Paleo-Indian time, and that Paleo-Indian groups consisted of small family bands that might have joined with other groups on a seasonal basis. Beyond that very gross characterization, little more can be said, although some studies have attempted to examine these elusive elements of the archeological record (e.g., Gorman 1972; Wilmsen 1972, 1974).

Questions relating to human dynamics and social structure are important ones, but ones also among the most difficult to answer archeologically. This is particularly true for hunters and gatherers, and frequently modern ethnographic analogy is used for comparative purposes. While this is insightful, such approaches must also be viewed with caution, since direct analogues from modern groups to prehistoric ones are usually not possible. We can hope that future studies, using more precise analytical procedures, may be able to add some insight into these elements of Paleo-Indian life.

Summary

The Paleo-Indian period is one that has been intensively studied for several years. Despite this, however, our data are woefully inadequate to address all but the most basic and general of questions regarding the lifeways of these peoples. While interest in the Paleo-Indians has always been high, largely due to their presence in all probability reflecting the first human occupation of North America, associated archeological data have not been adequate enough to provide precise interpretations.

While the questions posed by Paleo-Indian adaptations to the Southwest are fascinating, their answers are frustratingly difficult to provide. Paleo-Indian archeology is burdened with several problems, including low site visibility, poor preservation, poor exposure of appropriate landforms, imprecise chronology, and a lack of thoroughly excavated stratified sites (cf. Cordell 1984:151). Additional interdisciplinary research is crucial if we are to begin to fill in the intriguing framework that earlier studies have defined. While immense data gaps exist, this framework is coming into clearer focus. Table 4 provides a concise summary of the Paleo-Indian complexes known from the Southwest (and, for comparison, the Plains). Although it is based on Judge's dated (1974) synthesis, it does provide an accurate overview of the period.

Currently, there is no convincing evidence in the Southwest for the purported pre-Paleo-Indian complex. Even during the classic Paleo-Indian periods, occupation apparently was not extremely dense throughout much of the Southwest; rather, the Great Plains appears to have been a more favored locale for Paleo-Indian settlement. Following the earliest well documented Paleo-Indian complex (ie., Clovis), there is a divergence of Paleo-Indian complexes in the Southwest, but there is no good evidence for more than limited human use of the central-southern Southwest until the beginning of the much later Archaic cultures (Cordell 1984:149). While this gap may be more apparent than real, currently available data are inadequate to resolve this. Future studies must be directed to determining whether there is, in fact, an actual post-Clovis, pre-Archaic gap. These studies will have to focus on both precise data recovery from archeological contexts and detailed environmental studies of paleoclimate and vegetational structure. Likewise, the same comments apply to all Paleo-Indian investigations, not just those relative to the later manifestations.

The Paleo-Indian period represents a complex series of cultural processes. No single Paleo-Indian cultural definition is appropriate, and during its considerable time span, both regional and temporal diversity can be discerned. A variety of adaptive strategies were in operation during Paleo-Indian times, and in many instances different emphases are apparent throughout the period. Economic strategies with consequences for group mobility and population growth become increasingly important through time. An understanding of the Paleo-Indian period, especially its later phases, provides much of the context for understanding the major developments that occurred during the subsequent Archaic period (Cordell 1984:151).

REGIONAL DISCUSSION

Colorado (Douglas D. Dykeman)

Mountains

To date, Paleo-Indian discoveries in the Mountain study area have been limited to surface finds of lanceolate projectile points and individual hearths dated to this stage (Black 1986; Guthrie et al. 1984; Nelson 1969; Nelson and Breternitz 1970). This type of information does not lend itself well to the interpretation of Paleo-Indian cultural patterns. It has been suggested, however, that the environment of the mountains is not conducive to the subsistence strategies usually employed by Plains Paleo-Indian populations (Black 1986). The game drives and jumps used to kill herd-oriented megafauna on the Plains may not have been as efficient in the broken terrain of the mountains. Instead, the procurement of individual animals in natural traps such as bogs and marshes or surround-and-kill methods may have been more effective. In addition, the procurement of vegetal foods may have played a greater subsistence role in mountain environments than elsewhere.

There is little evidence of human use in this area during the Clovis and Folsom phases. Guthrie et al. (1984) notes surface finds of Clovis and Folsom projectile points; however, upon closer examination these nearly always occur in the San Luis Valley or large mountain parks that have plainslike environmental characteristics. In this report, we have purposefully separated such environmental zones from the Mountain Study Region in recognition of distinct cultural developments in vastly different environmental settings. Though Clovis and Folsom remains may yet be found in rugged mountain settings, the current state of our knowledge indicates little or no occupation during these periods.

Plano-related materials represent terminal Paleo-Indian in the Mountain Study Region, and unlike the Clovis and Folsom phases, there is some evidence of use in mountain environments. Nelson (1969) reports two finds in Chaffee County representative of Plano materials. These surface finds consisted of a Hell Gap point and Cody complex materials. In the Gunnison Basin, located west of the study region, a number of diagnostic projectile points attributed to the Plano have been found (Guthrie et al. 1984). Black (1986) recovered a Milnesand point at the Runberg site (5CF358). This point, along with another point fragment and a hafted knife, is considered to be evidence for use of high altitude environments during the Plano (Black 1986; Guthrie et al. 1984). Burns (1981) documents Plano projectile points from Rio Grande National Forest, and Buckles (1973) found lanceolate points in the Upper Arkansas River Valley.

Currently, the evidence for Paleo-Indian utilization of the mountains is spotty and of little interpretative value: With continued archeological research in the region, a clearer picture of Paleo-Indian settlement, subsistence, and lifeways may emerge.

San Luis Valley

The only evidence of Clovis phase Paleo-Indian occupation of the San Luis Valley is from surface finds. Nelson (1969) reports two Clovis points found in Alamosa County in 1968. Nelson and Breternitz (1970) report five additional Clovis finds in the same area in 1969.

The best evidence of occupation during the Folsom phase comes from two localities in the eastern San Luis Valley. Hurst (1941, 1943) collected 14 Folsom points and several formal tools from the Linger site. These items were found in apparent association with the bones of an extinct form of bison, tentatively identified as *Bison taylori.* Wormington (1957) suggests that these faunal remains actually are *Bison antiquus;* however, the deteriorated state of the remains precludes accurate identification. The Linger site recently has received additional attention from the Smithsonian Institution (Dawson and Stanford 1975). At a nearby blowout, Worman discovered the remains of five extinct bison and two Folsom points (Wormington 1957). These finds are interesting because of their context in sand dunes instead of in alluvial deposits as is the case on the Plains.

The Cattleguard site is another Folsom find in sand dunes near Great Sand Dunes National Monument (Emery and Stanford 1982). This site has yielded a variety of artifacts apparently related to a Folsom tool kit. These are in association with an extinct form of bison. Additional investigation at the site has continued in recent years.

Other potentially stratified Folsom deposits occur in the San Luis Valley at the Zapata and Redding sites in northeastern Alamosa County (Guthrie et al. 1984). In addition, Nelson (1969) and Nelson and Breternitz (1970) document 16 Folsom points discovered in surface contexts in Alamosa County and one surface find in Conejos County.

Evidence for Paleo-Indian occupation during the Plano phases consists of numerous surface finds of oblique-parallel and parallel flaked points in the San Luis Valley (Dykeman 1982). The majority of these items were found in Alamosa County, which prompted Nelson and Breternitz (1970) to consider this area as one of the richest, untapped regions for Paleo-Indian research. Nelson (1969) and Nelson and Breternitz (1970) reported 35 surface finds of Plano projectile points in the area. The point styles represented in the collection are Agate Basin, Cody complex, Meserve, Midland, Plainview, Alberta, and Frederick.

Front Range

There is very little information about the Paleo-Indian period in the Front Range study region. This is due more to a lack of investigations on the part of archeologists than a lack of Paleo-Indian sites: the focus of Paleo-Indian studies has been in the northern section of Colorado (see Eighmy 1984).

On the west side of the study area, Gooding and Hand (1977) have reported two Paleo-Indian sites in Arkansas Canyon. Both contained evidence of Agate Basin complex materials, indicating use during the Plano phases.

Other Paleo-Indian manifestations in the study region are limited to surface finds, the majority of which are located in the plains environment of Pueblo County. Clovis points (23 items) have been surface collected from Pueblo and Las Animas counties (Nelson 1969; Nelson and Breternitz 1970), and Folsom points (12 items) have been surface collected from Pueblo County. Plano-related projectile points discovered in the region include Plainview (34 items), Agate Basin (28 items), Cody complex (25 items), Meserve (4 items), and Hell Gap (8 items). These were collected in Pueblo, Las Animas, and El Paso counties. The distribution of Paleo-Indian surface finds indicates a preference for site location in plains-like environments. The high frequency of diagnostic materials might indicate substantial use of the area by Paleo-Indian groups; however, these indications have not been followed up by excavations or other intensive analysis by archeologists.

New Mexico

Northeast

Moving south and east from the Colorado Front range we enter northeastern New Mexico. This region of New Mexico has not received the degree of archeological attention that other portions of the state have. Consequently, our knowledge of the archeological record of this section of New Mexico is incomplete. Despite this research lacuna, a fair number of Paleo-Indian sites are known for the region, including the type site for the Folsom complex. The majority of documented Paleo-Indian sites in northeastern New Mexico are much more closely affiliated with the Paleo-Indian occurrences in the Great Plains, and our colleagues at the University of Oklahoma will deal with them more fully. We can, however, briefly summarize the Paleo-Indian period in northeastern New Mexico.

Despite the documentation of several Paleo-Indian sites in the area, only two have been excavated. These are the Folsom site and an unrecorded site near Sapello. In addition, the San Jon site, immediately south of our defined boundaries for northeastern New Mexico, has been excavated (Stuart and Gauthier 1984:294).

Only nine Paleo-Indian sites have been recorded in the Laboratory of Anthropology site survey files for the area as of Stuart and Gauthier's 1984 synthesis. Other Paleo-Indian sites are known, however. For example Baker and Campbell (1960) reported eight sites with Clovis, Folsom, San Jon, Plainview, Milnesand, and Meserve projectile points. At the Pigeon Cliffs site, Steen (1955) recovered a reworked Clovis point. Campbell (1969, 1976) has noted that Folsom points are known from the eastern boundaries of Rato Mesa; Plano points also were noted for the area. In the Cimarron area, Folsom points have been found by collectors, and Hammack (1965) reported a Folsom occupation from Ute Dam near Newkirk. Anderson's (1975) survey near the Folsom type site reported an isolated Plainview point and also noted that Scottsbluff and Alberta, and possibly Firstview, projectile points have been found in the Mesa de Mayo area (Stuart and Gauthier 1984:294–295). Overall, Stuart and Gauthier (1984:262) have compiled 25 Paleo-Indian sites for the greater northeastern New Mexico region, although, as previously noted, only nine were actually recorded in the Laboratory of Anthropology files.

Stuart and Gauthier (1984:295–300) note that two north–south bands of Paleo-Indian occurrences are known for the northeastern New Mexico area, suggesting that geography and possibly elevation are important variables in Paleo-Indian site placement. The eastern band generally parallels the Canadian Escarpment (ca 1,500 m) and the western band follows the Sangre de Cristo Mountains (ca 2,100 m). They also note that the higher elevation band consists of Clovis, Folsom, Plainview, and Cody artifacts, while the lower elevation band consists of Clovis, Folsom, Plainview, Cody, San Jon, Milnesand, and Meserve materials. They attempt to relate this distribution to subsistence activities, with the more specialized forms occurring in the Plains area and the more generalized forms being more widespread, reflecting a more diverse economic strategy.

Upper Rio Grande

As we move west, we enter the Upper Rio Grande region. Coupled with the San Juan Basin, this area is perhaps the most intensively surveyed portion of the state (Stuart and Gauthier 1984:60). Despite this, however, few Paleo-Indian remains are known for the northern section of the region. A few isolated Paleo-Indian points have been noted in the upper Rio Grande, but no major areas of Paleo-Indian activity are known north of La Bajada hill (Stuart and Gauthier 1984:46). Stuart and Gauthier (1984:47) have hinted that the lack of Paleo-Indian remains may reflect a survey bias in that there simply may have been less interest in recording such sites or that in the more heavily wooded Upper Rio Grande visibility of Paleo-Indian remains is low, thereby accounting for their scarcity in the literature.

In contrast to the situation in the northern section of the Upper Rio Grande, the southern area contains abundant Paleo-Indian remains. We know this largely due to Judge's (1973) extensive survey of the Middle Rio Grande for Paleo-Indian remains in the area between, roughly, Bernalillo and Belen. Judge located 59 Paleo-Indian sites and isolates. Only one site, Rio Rancho (Dawson and Judge 1969) was excavated, but the results of his survey suggest that Paleo-Indian remains *can* be located if systematically sought.

The Sandia site is also located in the Upper Rio Grande area, in the Sandia Mountains. The problems of interpretation with this site have already been addressed and do not need to be repeated here.

Considering the relative abundance of Paleo-Indian remains in the southern Rio Grande area, the scarcity of such remains in the upper reaches of the Rio Grande is notable. Certainly a management priority for the Upper Rio Grande is to conscientiously *look* for Paleo-Indian remains to determine if their apparent absence is artificial or not.

San Juan Basin

Of all the areas in New Mexico and the remainder of the study area, the San Juan Basin has witnessed the most active recent archeological investigation. Literally hundreds of projects have occurred in this vast region of northwestern New Mexico over the past 10 years, ranging from small scale surveys to major excavations. The vast majority of these projects have been in direct response to the surge of energy-related projects in the San Juan Basin and associated cultural resource management legislation. Despite this flurry of research activity, the population of Paleo-Indian sites in the San Juan Basin has not increased appreciably.

Surprisingly few Paleo-Indian sites are documented for the San Juan Basin, and none have been thoroughly excavated. In a recent systematic compilation of computerized site file data (i.e., the San Juan Basin Regional Uranium Study, or SJBRUS, Wait 1982), only 13 Paleo-Indian and one transitional Paleo-Indian/Archaic sites are documented for the entire Basin (Judge 1982:19). Despite this paucity, however, a wide range of Paleo-Indian complexes is represented (Table 5). Stuart and Gauthier's (1984:262) discussion cites 94+ reported occurrences in the greater vicinity. This, however, includes 59 Paleo-Indian sites reported by Judge (1973) in the Middle Rio Grande Valley.

Clovis materials are known from the Coal Gasification Project (CGP) survey along the Chaco Wash in the central portion of the Basin (Chapman 1977a:401) and portions (Block X) of the massive Navajo Indian Irrigation Project (NIIP) area, south of Farmington (Anderson, cited in Judge 1982:56), while Folsom points have been found by numerous surveys. These include the Navajo Reservoir area (Dittert et al. 1961:172), Chaco Canyon (Hayes et al. 1981a; Judge 1972), Block X of the NIIP (Anderson, cited in Judge 1982:56), the CGP area (Chapman 1977a:401), near Farmington (Hadlock 1962), and possibly in the Star Lake–Bisti region (Huse et al. 1978).

A Midland point was recorded in the Black Lake area north of Chaco Canyon (Biella and Chapman, cited in Judge 1982:23). Plano points are known from the CGP area, Chaco, Bisti–Star Lake (Judge 1982:23), and Blocks IV and V of NIIP (Elyea et al. 1979), who report a total of five Paleo-Indian localities in the Gallegos Wash region.

Cody points have been reported from the El Paso Coal Company (EPCC) survey (Sessions 1979:45), Block X of NIIP (Anderson, cited in Judge 1982:56), and Star Lake–Bisti and Star Lake itself (Wait 1976b). The Bureau of Indian Affairs (BIA) Timber Survey by Broster (cited in Stuart and Gauthier 1984:263) reported 16 Paleo-Indian sites and localities on Cebolleta Mesa and Stone Lake on the Jicarilla Indian Reservation. Finally, a number of Paleo-Indian points from various complexes have been reported near Grants on Acoma Tribal Lands. Based on the recovery of points and fragments, these suggest Clovis, Folsom, Midland, and Cody occupations. Interestingly, all are at an elevation of between 2286 and 2438 m above sea level (Stuart and Gauthier 1984:28). Given this wide distribution of Paleo-Indian point types, the absence of Agate Basin and Hell Gap types is notable.

Although the above sounds like several Paleo-Indian sites are known for the San Juan Basin, this is misleading (but see discussion in Stuart and Gauthier 1984:262–266), and only one area in the San Juan Basin has National Register properties containing Paleo-Indian materials. This is the Gallegos Wash District (Stuart and Gauthier 1984:79). The majority of Paleo-Indian occurrences are isolated artifacts, and Paleo-Indian *sites* with substantial intact deposits are not known. Remember that only 14 actual Paleo-Indian *sites* have been recorded in the Basin proper, as of Judge's (1982) survey. One potential reason

Table 5.

Tentative Chronological Framework for the Paleo-Indian Complexes in the San Juan Basin (modified from Judge 1982:22)

Dates	Complex	Other Names
10,000 B.C.		
	Clovis	
9,000 B.C.		
	Folsom	
8,000 B.C.	Plano (Plainview Related)	Plainview, Midland, Milnesand, Belen, Meserve
7,000 B.C.		
6,000 B.C.	Cody	Firstview, Eden, Scottsbluff
5,000 B.C.	Jay	Early Jay, "J," Middle Jay

for this lack of sites may be environmental. Most recorded Paleo-Indian sites in the Basin have been exposed in areas of substantial erosion; the significance of this is that many Paleo-Indian sites in the Basin simply may be buried (Stuart and Gauthier 1984:28).

Realizing the limited sample, Judge (1982:29–31) has attempted to interpret Paleo-Indian site distribution in the San Juan Basin. The known distribution extends from the southeast portion of the Basin diagonally to the northwest. The major exception to this pattern is the Paleo-Indian site at Peach Spring, in the south end of the Basin (Broilo, cited in Stuart and Gauthier 1984:28).

Judge notes that of the Paleo-Indian sites known in the Basin, few contain more than one type of projectile point. This is at variance to sites outside the Basin, where multicomponent Paleo-Indian sites are common. Our limited information suggests that Folsom finds dominate the Paleo-Indian inventory of the Basin, but Judge cautions that this may be due to a sampling bias (e.g., Folsom points are very diagnostic and readily identifiable).

The distribution of Paleo-Indian sites with relation to environmental zones is equally tenuous. There has been the suggestion that they tend to be associated with upland sand dunes (Huse et al. 1978:35; Reher 1977c:29), a pattern clearly demonstrated in the succeeding Archaic period. At Chaco Canyon, a Folsom Paleo-Indian site on a mesa overlooks Escavada Wash. The Peach Springs site location is closer to the norm described by Judge (1973) for the Middle Rio Grande valley in that it is located adjacent to an extinct playa (Judge 1982:29).

Principal gaps in the San Juan Basin occur in the southern, southwestern, and northeastern portions. It is interesting to note that both the extreme southern and northeastern parts of the Basin are highly diverse topographic settings; this may not have been an attractive environment to Paleo-Indian groups with focal economies emphasizing megafauna, which tend to prefer open plains-like areas. On the other hand, the lack of sites in these areas may simply reflect either inadequate survey or the inability to recognize Paleo-Indian sites in high diversity areas (Judge 1982:31).

Summarizing for the San Juan Basin, current evidence is sketchy and subject to modification as additional projects are undertaken. The present situation, however, suggests Paleo-Indian occupation at high altitude locales between ca 9000 and 10,000 B.C. An apparent hiatus exists in the Basin between ca 8000 B.C. (Folsom–Midland) and ca 6600 B.C. (Cody) (Stuart and Gauthier 1984:29–31). This is largely due to the absence of Firstview (or Cody) complex Paleo-Indian remains. Note, however, that Judge (1982:23) does cite the presence of both Plano and Cody materials in the San Juan Basin. Belen Paleo-Indian materials from the Middle Rio Grande Valley also may be evidence of occupation during this time (Judge 1973; Stuart and Gauthier 1984:29)

The termination of the Paleo-Indian period is open to question, and data from the San Juan Basin contribute little to its resolution. Basically, the problem boils down to whether or not a gap exists between the Paleo-Indian and Archaic periods. Key to understanding this gap is whether or not the Jay phase is Paleo-Indian (Judge 1982:23) or Archaic (Irwin–Williams 1973). This issue is discussed more fully in the next chapter.

West-Central

While west-central New Mexico contains some of the most interesting archeological remains in the state, these date to periods later than the Paleo-Indian. Surprisingly few Paleo-Indian sites have been documented in the two districts (Mount Taylor and Socorro) that make up west-central New Mexico. This is especially surprising considering the substantial Archaic occupation that has been documented at Bat Cave and elsewhere in the region.

In their review of sites on the state or National Register in west-central New Mexico, Stuart and Gauthier (1984:149) note that there are no recorded Paleo-Indian sites in the northern, Mount Taylor, district. Tainter and Gillio (1980:24–41), however, do cite some sites and isolates from the area. Only three sites are known for the southern, Socorro, unit. These are Mockingbird Gap, Ake, and an apparent late Paleo-Indian component at Bat Cave (Stuart and Gauthier 1984:149).

The Ake site (Beckett 1980) is multicomponent, containing Paleo-Indian, Archaic, and Mogollon occupations. The Paleo-Indian occupation is Folsom, and in addition to Folsom artifacts, the remains of bison and muskrat were recovered. Paleo-Indian remains from Bat Cave, as well as the more famous Archaic remains, are the subject of considerable controversy. Finally, the Mockingbird Gap site yielded 150 Clovis points, as well as a possible structure.

Central

The relatively small area near the geographic center of the state that forms the Central New Mexico region contains two well known Paleo-Indian sites. These are the Lucy site and Manzano Cave. The ambiguities present in the Lucy site have been discussed previously, and the mixing of Paleo-Indian and Archaic materials only needs to be reiterated here. Manzano Cave (Hibben 1941; Wormington 1957) is another multicomponent site with Paleo-Indian and Archaic artifacts, as well as a Sandia point (Stuart and Gauthier 1984:319).

Haynes (1955) has reported other Paleo-Indian sites in Central New Mexico, with nearly the entire sequence being represented. However, most Paleo-Indian points were found by private collectors and are not well reported. There also appear to be two major Paleo-Indian site clusters located at the north and south ends of prehistoric Lake Estancia. These are primarily Folsom sites (Lyons 1969), but Clovis, Sandia, Milnesand, and Agate Basin points are reported as well.

Paleo-Indian remains also are common east of Lake Estancia, generally in elevated areas. Most appear to be located against mountains or mesas and on mesa tops. Clovis, Sandia, Folsom, Milnesand, and Midland point types are reported (Stuart and Gauthier 1984:321).

Southwest

Once again, there are few documented Paleo-Indian sites in this large region. In the Jornada subregion of southwestern New Mexico, some Llano complex materials are known, but overall we have little information on either Paleo-Indian or Archaic occupation of the region (Beckett and Wiseman 1979; Stuart and Gauthier 1984:211). In the Mimbres region, two Paleo-Indian sites have been recorded (Stuart and Gauthier 1984:227).

Southeast

A considerable Paleo-Indian occupation is documented for southeastern New Mexico (Camilli and Allan 1979; Wendorf and Hester 1975); indeed, Stuart and Gauthier (1984: 262) note that the area often is considered Paleo-Indian Country by many archeologists. Major Paleo-Indian sites include Blackwater Draw (two localities), Milnesand, Burnet Cave, the Elida site, and Hermits Cave. These span a chronological period between ca 10,000 and 5500 B.C., and at Hermits Cave a possible pre-Clovis occupation has been claimed (Stuart and Gauthier 1984:261). In Roosevelt County, Clovis, Folsom, and Midland materials are known (Broilo 1973a). Stuart and Gauthier (1984:262), culling through available data, tally 106 Paleo-Indian sites for southeastern New Mexico, primarily located along the eastern escarpment of the Guadalupe chain in the west or along the Mescalero pediment and adjacent Llano Estacado.

Trans–Pecos (Patricia A. Hicks)

Puebloan

The Puebloan subregion of the Trans–Pecos is somewhat better known archeologically than either the Plains or the Interior areas (see below), particularly with regard to the Late Prehistoric period. The developments that occurred during this period are distinctly different from those in other areas of the Trans–Pecos. The evidence indicates that the section was occupied during the Paleo-Indian stage (ca 10,000–6500 B.C), throughout the Archaic stage, and later by semi-sedentary/sedentary agriculturalists, as well as by more nomadic hunting and gathering groups.

The occurrence of Paleo-Indian materials in the Puebloan subregion appears to be restricted to the southern Mesilla Bolson immediately west and north of El Paso, and the Hueco Bolson to the east and northeast. One site is noted southeast of El Paso, west of the Finlay Mountains in the eastern Hueco Bolson (Sommer 1974:134). References to Paleo-Indian materials in the area are primarily to isolated finds and occasionally small camps; no large habitations or kill sites are known. The recovered materials all date to the Late Paleo-Indian period.

Few of the Paleo-Indian sites known in the area have been reported by professional archeologists. Two isolated finds of fragmentary Folsom projectile points are noted by Whalen (1978:14) for the western portion of the Hueco Bolson. A single fragmentary Folsom point was recovered from the surface of a sand dune south of El Paso. Ceramics were also present at this site, and there was no indication of buried deposits (Anderson and Carter 1981:28). Kegley (1980:2) makes a vague reference to Paleo-Indian projectile points having been found in the vicinity of Hueco Tanks State Park. As of 1985, only two Paleo-Indian sites were listed in the records of the Texas State Archeologist for El Paso County, while none were on file for Hudspeth County (Biesaart et al.1985:132–133, 149). Local amateurs have reported several isolated finds and small camps, including one Folsom point from the eastern portion of the Hueco Bolson (Brook 1968) and another in possible association with six snub-nosed scrapers on a terrace east of the Rio Grande (Quimby and Brook 1967). Sommer (1974:134, 136) indicates that seven sites to the north and east of El Paso are reported to have Early Man material. Another site southeast of El Paso produced one Meserve projectile point and "other strange points" (Sommer 1974:135).

On the whole, information regarding the Paleo-Indian stage in the Puebloan subregion is scanty at best. Because the majority of the Paleo-Indian finds in this area have been made by amateurs, little information is available regarding their context. As a result, settlement system data are limited. Betancourt (1981:38) notes that most of the Paleo-Indian materials have been found near the margins of playas. There also appears to have been a tendency to locate near sand dunes and on broad terraces overlooking the Rio Grande Valley (Anderson and Carter 1981:28; Quimby and Brook 1967). This limited information suggests that big game hunting, similar to that documented for the Plains, was one component of the subsistence system. In the Puebloan subregion, as in the rest of the Trans–Pecos, basic questions regarding temporality, cultural affiliation, and settlement and subsistence still need to be addressed.

Interior

There are segments of the Interior subregion of the Trans–Pecos region that are relatively well known archeologically, as some of the earliest work that was undertaken in the Trans–Pecos was performed in this area (e.g., Coffin 1932; Sayles 1935; Smith 1938). Much of this early research focused on excavation in the larger caves and shelters of the region, although some extensive survey also was conducted (i.e., Kelley et al. 1940). The accumulated evidence indicates that the Interior subregion was occupied from Paleo-Indian times to the present.

Available information regarding the Paleo-Indian occupation of the Interior subregion is limited in its scope. The majority of the known Paleo-Indian materials are found in Guadalupe National Park in the north (Bradford 1980; Katz 1978) and in Big Bend National Park in the south (Mallouf 1981), both of which have been intensively studied. With the exception of a major cluster of sites in the vicinity of Van Horn, Texas, and isolated projectile point finds in the northern Baylor and southern Davis Mountains, Paleo-Indian occupation of the central portion of the Interior subregion remains unknown.

Pollen evidence indicates that when Paleo-Indian groups first arrived in this area between 10,000 and 9000 B.C, the higher mountain ranges contained a conifer forest of ponderosa pine, Douglas fir, and spruce. The mixed woodland community, which today is confined to elevations above 1500 m, was depressed to elevations as low as 600 m in the eastern Big Bend (Mallouf 1985:16). In the Maravillas Canyon area of the eastern Big Bend, packrat middens dating to this period contain plant species commonly associated with the Chihuahuan Desert life zone. These data suggest that the area may have served as a refugium for desert vegetation during the last period of glaciation (Mallouf 1981:135; Wells 1966). The resultant mixing of the two communities may have had some significance for the human inhabitants of the region, a point that will be addressed shortly.

There are at least two reported finds of Clovis projectile points from the interior subregion. One was collected in Big Bend National Park (Sommer 1974:134–135). Another was collected from a site near Van Horn, Texas (Lindsay 1969:103). Possible explanations for the absence of a significant amount of Clovis material in the Trans–Pecos are discussed in the Plains section (see below).

The Late Paleo-Indian period in the Interior subregion is represented by surface and excavated finds of Folsom, Plainview, Golondrina, Angostura, and Meserve projectile points (Mallouf 1985:97, Figure 39; Sommer 1974:134–135). Folsom materials tend to be confined to the northern half of the area. Folsom projectile points have been recovered from surface contexts in the southern Guadalupe Mountains (Katz 1978; Mallouf 1985:97, 99, Figure 39), and the northern Baylor Mountains (Mallouf 1985:97, Figure 39).

The area around Van Horn appears to have been a favored location for Folsom and later Paleo-Indian groups. Hedrick (1975:63–64) reports a Folsom point from a sand dune site along a small tributary of Sacaton Draw. The informal survey conducted by Sommer (1974:134–135, Figure 6) revealed four sites where Folsom materials were recovered. One was identified as a kill site. At another site, three Folsom projectile point fragments were recovered, while two Folsom points were collected from a third. The fourth site has been referred to as "a major Folsom habitation site" (Mallouf 1985:98). This site is located south of Van Horn on a terrace of Wild Horse Draw (also known as Chispa Creek and Van Horn Creek; Betancourt 1981:38) and was excavated during the 1950s and 1960s by the University of Colorado (Lehmer 1958:122; Lindsay 1969:103). Dense concentrations of Folsom material were found at three locations within the site's boundaries. Several Folsom projectile points were found in situ, and almost 100 additional points were collected from surface contexts. Other artifacts include channel flakes, crude blades, 500 scrapers, knives, and numerous gravers (Lehmer 1958:122; Lindsay 1969:103). A report on this work remains unpublished. Considering the paucity of professionally excavated Paleo-Indian data in the Trans–Pecos, this site stands out as *highly significant*.

Lanceolate form projectile points have been found throughout the Interior subregion. Midland, Plainview, and Meserve points have been recovered in Guadalupe Mountains National Park (Bradford 1980:6; Katz 1978; Mallouf 1985:99). Plainview and other Late Paleo-Indian forms have been reported from the Van Horn area, and Golondrina and Meserve points have been recovered along the western flank of the Davis Mountains (Mallouf 1985:97, 98, Figure 39). Sommer (1974:134–135) reports three sites in Big Bend National Park containing Plainview points and one site from which both Plainview and Golondrina points have been recovered. Other lanceolate forms recovered from the Big Bend region include points of the Angostura and Meserve types (Mallouf 1985:96; Marmaduke 1978:111–114, 121–125).

Mallouf (1985:99) has summarized current understanding of settlement system data in the region. Lanceolate form projectile points from the Big Bend are most frequently found in association with later Archaic materials in foothill and basin environments. In the Davis Mountains, at elevations that would have been heavily forested during the Paleo-Indian period, lanceolate points have been recovered from alluvial terraces along the canyons. Lanceolate projectile points have also been recovered from high elevations in the Guadalupe Mountains (Katz 1978). Paleo-Indian sites in the Van Horn area tend to be located along the shores of old playas (Mallouf 1985:99) and creek terraces. Marmaduke reports that work in the Bear Creek area resulted in the collection of lanceolate points from the surface of a valley hearth field (1978:92), a hillslope (1978:125), and a rockshelter excavation, where an Angostura point was found in association with Late Prehistoric materials (1978:111–114). Taken as a whole, this information suggests that the Paleo-Indian inhabitants of the area were probably to some degree reliant on the hunting of large game animals such as bison, but that smaller game such as big horn sheep and deer were being pursued in elevated locations in the mountains. Marmaduke (1978:14) notes that antelope were present in the past at lower elevations throughout the Trans–Pecos.

Mallouf (1981:133, 1986:70) indicates that for the Trans–Pecos as a whole, Paleo-Indian sites are found least frequently in the Big Bend area. The low frequency of Paleo-Indian sites in this area has led him to postulate that the broad-based hunting and gathering adaptation characteristic of the human occupation of the region was first developed in the eastern Big Bend (Mallouf 1981). The argument can be stated as follows: Based upon the analysis of packrat middens in Maravillas Canyon (Wells 1966), it appears that during the Late Pleistocene (ca 12,000 to 8000 B.C.; Mallouf 1981:141) the eastern portion of the Big Bend may have served as a refugium for plant species adapted to arid conditions. Because vegetation zones were depressed to lower elevations in response to cooler and moister climatic conditions, there occurred a mixing of woodland and desert scrub communities (Mallouf 1981:126–127, 135). Such mixing would have afforded human inhabitants easy access to woodland species such as pinyon pine, juniper, algerita, live oak, and prickly pear, in close proximity to more xeric species such as lechugilla, acacia, and sotol (Mallouf 1985:126–127). The high density and diversity of edible resources in a spatially restricted area may have been one factor triggering the very early transition from a nomadic hunting adaptation to a broader based, more localized hunting and gathering subsistence system (Mallouf 1981:133). Beginning ca 8500 B.C., drier climatic conditions forced the gradual withdrawal of woodland species from the area and encouraged the spread of Chihuahuan Desert species (Mallouf 1981:141). If this is in fact the case, then lanceolate projectile point forms found in the area are reflective

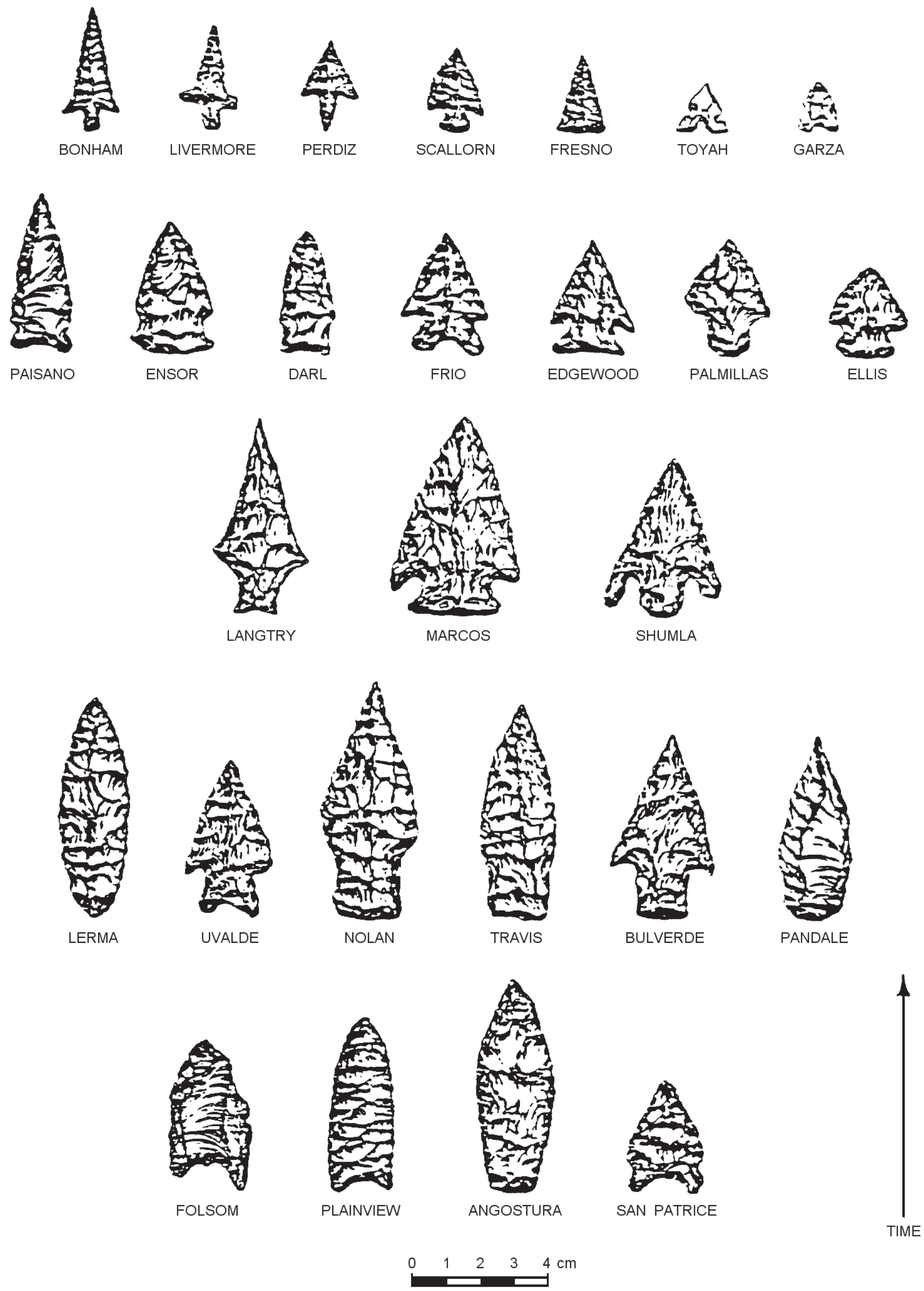


Figure 6. Examples of projectile point types found in the Trans–Pecos (after Mallouf 1985:24, Figure 13)

of a hunting and gathering rather than a big game hunting adaptation (Mallouf 1985:98). This scenario, largely hypothetical at this time, is worthy of additional research attention.

In summary, the Paleo-Indian stage in the Interior subregion remains poorly understood. Lanceolate projectile points have been recovered from a variety of different environments including playa edges, alluvial terraces at high and low elevations, basin valleys, hillslopes, and occasionally rockshelters. The sum of the settlement data suggests that the subsistence system may have been somewhat broader based than previously suspected. If Mallouf's (1981) hypothesis is correct, a localized hunting and gathering subsistence regime may have developed relatively early in the eastern portion of the Big Bend.

Plains

The Plains subregion is the least studied of the three Trans-Pecos subdivisions. It does, however, border the better known Central Texas region to the east, and the Lower Pecos region to the south. The archeological evidence from the Plains Section indicates that the area was used throughout the Prehistoric period, from Paleo-Indian times to the present.

Evidence for an occupation of the Plains subregion by Paleo-Indian groups comes from surface finds of projectile points that are stylistically similar to such artifacts from the Great Plains and Central and Southern Texas. At present there is no stratigraphic or radiocarbon data for a Paleo-Indian occupation of the area. This lack of temporal control, coupled with an absence of locally derived subsistence data seriously hampers attempts at interpretation on a regional level (Mallouf 1985:96). Although insufficient information exists to allow for the documentation of clear patterns of variation between the different Trans–Pecos subdivisions, there do appear to be more Paleo-Indian sites in the Plains subregion (Bandy 1980:6) than elsewhere. It is unclear whether this is a function of natural factors such as differential preservation and erosion or an actual reflection of the Paleo-Indian settlement system. This is a question of significance for the entire Trans–Pecos region that should be addressed by further research in the area.

Based upon data from analyses of pollen, packrat middens, and faunal remains from Trans–Pecos and adjacent regions, it is clear that the environmental conditions that prevailed during the late Pleistocene and early Holocene differed from those of today. In general, the climate was probably cooler and moister (Mallouf 1981:126; Marmaduke 1978:15; McNatt 1981:121). Around 9000 to 10,000 B.C., when the first Clovis groups may have entered the area, the environment of the Plains subregion was probably characterized by pinyon–juniper parkland, with the grassy understory more uniform in its distribution than at present. Springs and seeps were more prevalent in the area and certainly more reliable than those found in the region today (Mallouf 1981:132).

The early Paleo-Indian Clovis period is poorly represented in the Plains subregion. Currently, evidence for a Clovis occupation comes from the Hamilton Collection being curated by the Texas Historical Commission (Mallouf 1981:133). Notes and artifacts from this collection indicate that Clovis materials were recovered from one or more locations in the vicinity of Pecos, Texas. An informal survey of amateur archeological society members attending a 1973 conference on Early Man failed to reveal any information pertaining to a Clovis occupation of the Plains Section (Sommer 1974:134–136). Considering that amateur archeologists in the Trans–Pecos area are generally quite active and knowledgeable, the virtual absence of Clovis materials in private collections from the area is intriguing. It is possible that Clovis groups only inhabited the region on a very sporadic basis, or perhaps not at all. A total absence of Clovis occupation seems unlikely considering that materials dating to the period have been found in a wide variety of environments from Canada to Mexico. A second explanation for the lack of Clovis material is that there simply may be few areas in the region where sediments of Clovis age are exposed. It is also possible that the Clovis groups in the area were engaged in subsistence tasks that did not require the use of large fluted projectile points, and consequently, the remains of their activities have gone unrecognized. The paucity of evidence for a Clovis occupation of the Plains subregion, and of Trans–Pecos in general, is a situation in need of an explanation, and should be a major research priority for future investigators.

During the Late Paleo-Indian period (ca 8000 to 6500 B.C.) there appears to have been a gradual trend towards warmer and drier conditions, with the pinyon–juniper parkland slowly being replaced by an open grassland savannah (Marmaduke 1978:15). Although there is some indication that the precipitation regime was changing during this period, perennial water sources were probably still common in the region (Mallouf 1981:133). The grassland savannah apparently provided sufficient forage and water to support large herds of bison, as indicated by information recovered at Bonfire Shelter in Val Verde county to the southeast of the Trans–Pecos, where a herd of bison was driven off a cliff around 8000 B.C. (Dibble 1965; Marmaduke 1978:17).

The Late Paleo-lndian, period in the Plains subregion is represented by the occurrence of projectile points of the Folsom, Plainview, Golondrina, Meserve, and San Patrice types (Mallouf 1985:96–99). Folsom, Golondrina, and Meserve projectile points have been recovered from several areas west of the Pecos River near Iraan, Texas (Mallouf 1981:133, 1985: 98–99; Sommer 1974:134–135). In the vicinity of Pecos, Texas, a number of Folsom and Meserve projectile points have been recovered. The Hamilton Collection contains several projectile points similar to the San Patrice type that were apparently collected in the Pecos area (Mallouf 1985:99). Given this data base, little can be said concerning the subsistence activities and the settlement pattern of the Paleo-Indian groups that were present in the Plains subregion. Mallouf (1985:99) notes that the Paleo-Indian sites located near Pecos, Texas, are open camps most commonly associated with the margins of playas. This information and the data from Bonfire Shelter concerning the bison kill point to a hunting adaptation with some degree of reliance on large game. It is not clear at this time if generalized or focal hunting strategies similar to those postulated for the Great Plains were in place in the Trans–Pecos during the late Paleo-Indian period. Some use of shelters by Paleo-Indian groups is suggested by data from Bonfire Shelter (Dibble 1965) and Baker Cave (Word 1970), located to the southeast in Val Verde County. Mallouf (1981, 1985:98) has suggested that Golondrina, and projectile point types similar to Angostura, Meserve, and Lerma, and other lanceolate forms, may represent an early (pre-7000 B.C.) hunter–gatherer adaptation rather than one focused primarily on hunting.

On the whole, the information concerning the Paleo-Indian period in the Plains subregion is minimal. Little professional work has been undertaken in the area. This is reflected in the lack of Paleo-Indian sites in the files of the State Archeologist for Reeves, Pecos, and Terrell counties (Biesaart et al. 1985: 174, 179, 188). Consequently, very basic questions concerning the cultural affiliations of the groups that inhabited the region, temporality, and settlement and subsistence, still remain to be answered On the other hand, local amateur archeological society members seem to be aware of a number of Paleo-lndian sites in the area (e.g., Sommer 1974).

THE UNKNOWN ARCHEOLOGY OF THE SOUTHWEST: THE ARCHAIC

Alan H. Simmons (with Douglas D. Dykeman and Patricia A. Hicks)

SYNTHESIS

Following the Paleo-Indian period, a generalized hunting and gathering adaptation is documented throughout continental North America. These groups collectively are known, in archeological terms, as the Archaic. Despite several thousand years of occupation, these peoples left few and relatively unimpressive remains, and our knowledge of the Archaic period is just beginning to come into better focus. This is especially true in regions such as the Southwest, where more substantial archeological remains have occupied the attention of researchers.

In some parts of North America, Archaic adaptations continued up to European contact. In the Southwest, the Archaic can roughly be bracketed between ca 6000 or 5000 B.C. and about the time of Christ. But, as we will see in this chapter, some regions of the Southwest also witnessed a prolonged Archaic adaptation, continuing in some cases up to European contact.

Most researchers place the Southwest Archaic within the broad based Desert culture initially defined by Jennings (1957, 1964:152–153). The Southwest Archaic adaptation has been viewed as a diffuse strategy based on the exploitation of a wide range of plant and animal resources (Judge 1982:49). This differs from the preceding Paleo-Indian period, also characterized by hunting and gathering, in that the former focus on large game no longer was viable. That the Archaic is quite distinct from the Paleo-Indian is reflected archeologically by its material culture and site distribution.

In general terms, the Archaic in the Southwest refers to "a diversified subsistence strategy, relatively small residential and local groups, and a very high degree of seasonal residential mobility throughout each year within large territorial frames" (Baker 1981:163). These groups possessed an archeologically preserved material culture comprised largely of lithic artifacts and generally are considered as lacking ceramics.

The description provided above could cause one to believe that the Archaic was a homogeneous culture with little diversity. This is an incorrect interpretation. As more critical studies are undertaken, it is becoming clear that the Archaic was characterized by considerable regional and temporal diversity. Unfortunately, only the bare outlines of Archaic adaptations are known for most of the project area. While several individual sites have been studied, few synthetic treatments exist. The best defined synthesis is largely confined to northwestern New Mexico, where a detailed sequence has been identified. The validity of this sequence to other regions of the Southwest remains to be seen.

Several distinct phases within the Archaic are known. Each is characterized by a distinct artifact assemblage and differences in site size, composition, and distribution. While it used to be believed that there was little variation in Archaic sites, this is now known to be untrue. Recent studies have indicated that the Archaic occupants of the Southwest were highly adaptive and mobile hunters and gatherers who exploited a wide range of ecological zones in an efficient manner. The archeological signature of such activity is sometimes difficult to detect, but with the proper analytic methods it can be deciphered.

Several research issues form the core of Southwestern Archaic studies. One topic that has received a considerable amount of attention is the distinction between late Paleo-Indian groups and early Archaic cultures. Did the first Archaic groups represent a dramatic departure from the settlement and subsistence activities of their predecessors? Was there a substantial time gap separating the two? How distinct are their respective assemblages? Although these remain unanswered questions, they reflect the types of research presently being conducted.

Other issues concern the nature of Archaic assemblages, the composition of sites, and the manner in which Archaic groups exploited various ecological settings. These were not static issues during the Archaic. We know that in the five or six thousand year range encompassed by the Archaic, numerous changes in adaptation occurred.

One of the most significant, and controversial, issues involving the Archaic relates to the introduction of cultigens into the Southwest. The shift from economies based primarily on hunting and gathering to those reliant upon the domestication of a key suite of crops was one of the most dramatic events to occur in the study area. Once subsistence was under at least some degree of control, the stage was set for additional cultural advances. How, when, and why plants were initially cultivated in the Southwest remains a major research issue. Recent investigations have contributed substantially to the debate, and this promises to be a significant issue for some time.

For a long time, the Archaic represented the unknown archeology of the Southwest. This has dramatically changed and Archaic studies presently represent some of the most innovative research being conducted in the region. Despite this recent interest, however, our understanding of specific Archaic adaptations remains limited.

PERIOD DISCUSSION

Research Background

In order to better understand our lack of knowledge of the Archaic some background history is beneficial. Unlike the Paleo-Indian period, with its clues to the initial occupation of the New World, or the later Formative period, with its spectacular architecture and material culture, the Archaic traditionally has lacked research appeal and has received little attention until relatively recently. There are several reasons for this. Perhaps the most significant was a prevailing attitude that the Archaic simply was boring. Archaic sites by and large are represented by diffuse lithic scatters with poor preservation, and thus do not have the same appeal as do, say, a stratified Paleo-Indian bison kill or a Pueblo village. In a word, many archeologists felt that the Archaic lacked any interesting research problems and that Archaic sites were uninteresting to excavate. As such, the Archaic in the Southwest, where remains from other periods are plentiful and more impressive, was perceived of as a cultural backwater and thus became an archeological no-man's land.

Within this presumed cultural void, however, there was one glimmer of interest. This was in the search for agricultural origins in the Southwest. The domestication of a key suite of crops ultimately enabled subsequent cultural development in the region, and thus the initial appearance of cultigens, which ultimately derived from Meso-America, has long been of interest to researchers. During the late 1940s and 1950s, excavations at Bat Cave in west-central New Mexico produced evidence suggestive of an early presence of maize, or corn, in the Southwest (Dick 1965a). The initial manipulation of this cultigen was considered to have occurred as early as ca 3500 B.C. at Bat Cave, thus placing it firmly within the Archaic. As subsequent research has demonstrated, Bat Cave represented only a faint glimmer indeed; this will be discussed in more detail later in this chapter. However, claims for the origins of agriculture in the Southwest during the Archaic spurred considerable interest. This remains a hotly controversial topic.

By and large, though, the Archaic was not considered an important research endeavor. To be certain, there were a few archeologists who felt otherwise. Bryan and Toulouse (1943) and Renaud (1942a, 1946), for example, represent researchers who early on believed that there was some significance to Archaic materials. If one considers the greater Southwest, enough work was done to develop cultural sequences and regional variation within the Archaic. In general, though, these lacked much detail or precision.

Overall, little interest was expressed in the Archaic until the 1960s. At that time, C. Irwin–Williams initiated a long term research study in northwestern New Mexico entitled the Anasazi Origins Project. The project was a pioneering effort, for it clearly demonstrated that Archaic sites were, indeed, of major importance, both intrinsically and in terms of providing evidence for the initial appearance of cultigens in the Southwest, thereby providing a foundation for subsequent cultural development. The Anasazi Origins Project also resulted in one of the rare synthetic treatments of the Archaic, providing an enduring cultural–historical sequence that is still widely used, even outside of the area for which it was originally intended.

In spite of Irwin–Williams' efforts, however, she remained one of the few professional archeologists who expressed an active interest in the Southwestern Archaic. This situation probably would have continued had it not been for two related events. The first was, beginning on a massive scale in the early 1970s, the implementation of federal (and state) legislation requiring the documentation of all cultural resources in areas subject to impacts from development. The second event was the massive exploitation of some areas of New Mexico, such as the San Juan Basin, for energy resources.

Certainly large scale cultural resource management (CRM) projects occurred prior to this time—the River Basin Surveys in the Midwest are a good example—but the sheer magnitude of investigations undertaken in the Southwest was unequaled. Of significance to Archaic studies is that the various rulings mandated the documentation and protection of all cultural resources, not just those belonging to specific periods. Thus not only were large sites with substantial remains investigated, but so were cultural manifestations of more modest natures. The realization that all cultural resources are ultimately important for comprehending both prehistoric and historic adaptations in any given area has allowed for the much-needed emphasis on "small-site archeology" (cf. Doyel and Debowski 1980; Simmons 1981a, 1982a; Tainter 1979; Ward 1978) that presently is so common in American archeology.

With this new emphasis, a class of sites previously all but ignored suddenly was forced on archeologists working in the Southwest. This class is the lithic scatter that is so ubiquitous throughout the region. Lacking other diagnostic artifacts, lithic scatters frequently have been assumed to represent the remains of Archaic groups. This, unfortunately, is not such a clear dichotomy: aceramic does not necessary mean preceramic. That is, later, ceramic-producing groups may well have engaged in activities that did not involve ceramic use; their archeological remains could be confused with earlier peoples who lacked a ceramic technology.

Not unexpectedly, numerous problems rapidly emerged when researchers largely unfamiliar with this class of sites were suddenly required to do something with them. Although the once obscure Archaic has recently become a much more substantial focus of research attention, we still do not have a clear understanding of the Archaic. Even the establishment of essential base line data (cf. Judge 1982) is still to be accomplished, but the situation is vastly improved over that existing just a few years ago.

This chapter summarizes our knowledge of the Archaic in the project area. It includes discussion on several major research issues that archeologists presently are examining. Following this, attention is directed to specific problems confronting Archaic archeology in the Southwest. The concluding section presents regional summaries of the Archaic in the study area. Figure 7 shows the location of major sites mentioned in the text.

We should note that it may appear that a disproportionate amount of attention is directed to northwestern New Mexico in this chapter. This does not necessarily imply that this region witnessed a more intense Archaic occupation than elsewhere in the study area. Rather, it reflects the extraordinarily large number of CRM projects recently undertaken in northwestern New Mexico. Consequently, our knowledge of past human use of this area is greater than it is for other regions.

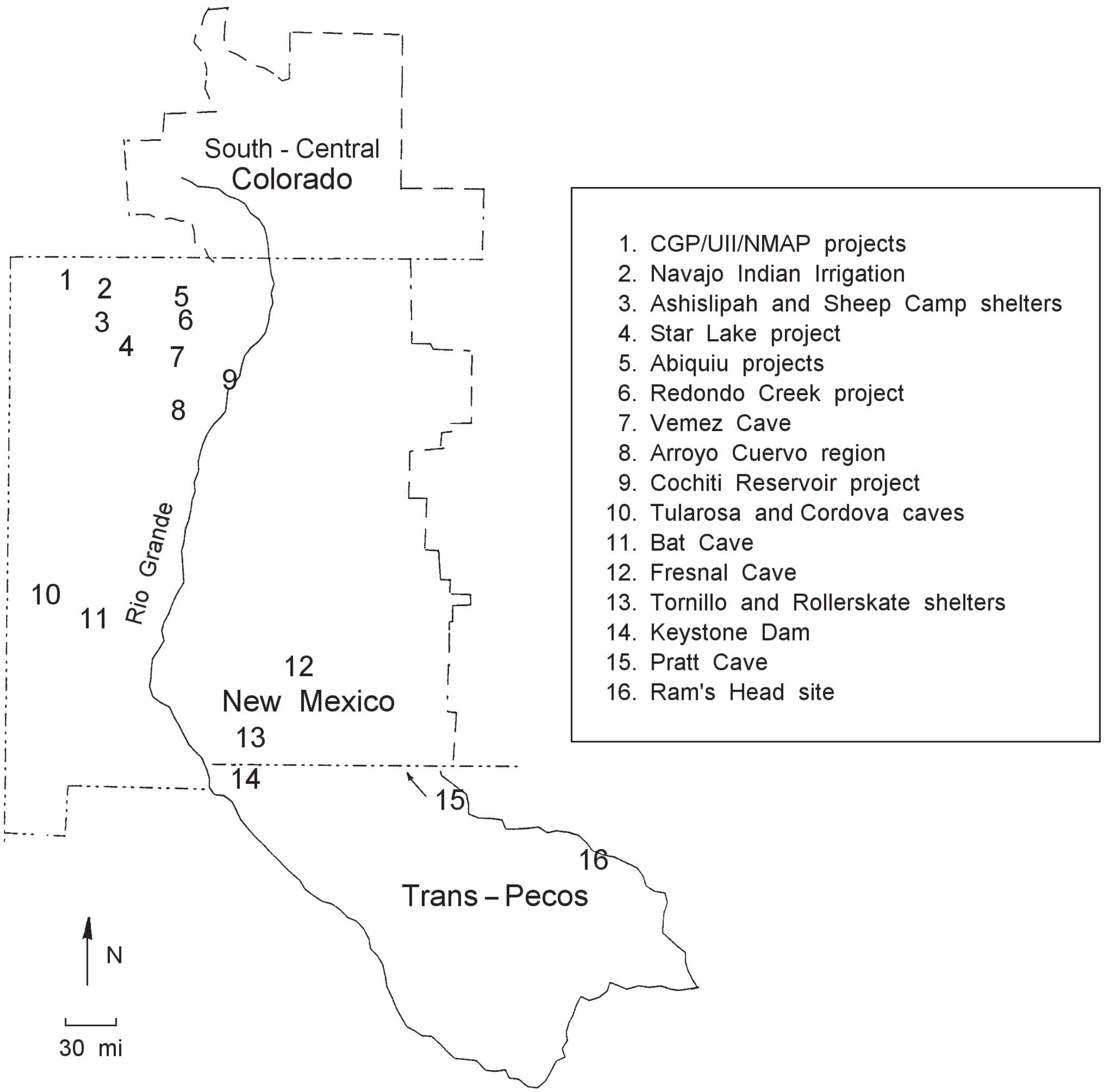


Figure 7. Location of some of the projects and Archaic sites in the overview area

Summaries of the Archaic, while rare, are more plentiful than in the recent past. Most are directed towards northwestern New Mexico. Classic sources include Irwin–Williams' work (1967, 1968a, 1968b, 1973, 1979). More recent summaries often occur in large CRM reports and overviews (e.g., Reher 1977a; Cordell 1979a:23–33; Elyea and Hogan 1983; Eschman 1983; Moore 1980a; Simmons 1984:5–17; Simmons and Dykeman 1982a; Vierra 1980a). Other synthetic discussions of the Archaic in the study area include Judge (1982) and Simmons (1981a). Cordell's excellent summary of Southwestern archeology has a substantial discussion on the Archaic as well as on the evidence for early cultigens in the area (1984:153–180). Unfortunately, her treatment of the latter is somewhat disappointing; otherwise, however, her discussion of the Archaic represents a thorough integration of a very diversified data base.

Paleoenvironmental Backdrop

The Archaic spans an enormous amount of time, during which environmental conditions were not static. Allan (1977), Bayham and Morris (1986), Gillespie (1981), Irwin–Williams (1973:31–33), Irwin–Williams and Haynes (1970), Judge (1982:7–15), Moore and Harlow (1980), and Cordell (1984: 164–165) provide interpretations of the paleoenvironmental context in which Southwestern Archaic groups lived. Unfortunately, our knowledge of paleoenvironmental patterns in the Southwest during the Archaic is incomplete.

The beginning of the Archaic coincided with environmental changes that occurred throughout the Southwest. Pollen (e.g., Oldfield and Schoenwetter 1975; Mehringer 1967), and fossil packrat midden (Van Devender et al. 1978) data from several localities suggest a decrease in effective moisture and the replacement of woodlands by desert species at about 6000 B.C., a time span correlating with the early Archaic.

The period from ca 5500 to ca 2900 B.C. was termed the Altithermal by Antevs (1955) and was characterized by hot and dry conditions. The nature of the Altithermal, however, is currently a subject of debate (e.g., Gillespie 1981; Martin 1963; Van Devender 1977), with some (Van Devender and Spaulding 1979) believing an increase in summer rainfall occurred in some parts of the Southwest. During the late Archaic a trend towards increased moisture is suggested; Antevs termed this the Medithermal (ca 2500–3000 B.C.). This is supported by a variety of geological (Powers 1939; Bachuber 1971), pollen (Hafsten 1961), and packrat midden and microtine rodent (Judge 1982; Neller 1976) evidence. Whether this was synchronous over the entire Southwest is not yet known.

Particularly significant is whether cultigens were introduced during a period of relatively favorable environmental conditions or during a period of adverse conditions. If one assumes that the Altithermal (or a suitable alternate term) was characterized by an adverse xeric environment, compared to the more mesic Medithermal, the date of the Altithermal–Medithermal transition in relation to cultigen introduction is extremely important. There presently is no consensus of opinion for the resolution of this problem; for example, Judge (1982:7–15, 46–50) and Irwin–Williams (1979:32) present opposing interpretations. Based on presently available data, however, it is likely that the adoption of cultigens occurred during periods of climatic fluctuation that were less severe than known for earlier periods (Cordell 1984:164).

Climatic changes undoubtedly occurred on regional and local levels, affecting different areas of the Southwest at different times. Moreover, despite these changes, some areas still would have represented semiarid environments, even with slightly more mesic conditions. One must be wary of equating slightly more moisture with a vastly improved environment; the distribution and abundance of economic resources may have increased with wetter conditions, but this change would have been more of degree than of kind. Although the specifics of our paleoenvironmental reconstructions are still being debated, it is clear that much of the Archaic coincided with unpredictable, semiarid climatic conditions and that Archaic adaptive strategies were focused on obtaining maximum yield from generally inhospitable environments.

Terminology and Typology

Although earlier discussion indicated that our knowledge of the Archaic is limited, enough information is available for researchers to have generated terminologies and typologies. Culturally, the Southwestern Archaic complex exhibits great regional and temporal diversity, allowing for archeologists to construct several local sequences to deal with and explain this diversity (Lipe 1978b). Indeed, it is during the Archaic that the Southwest begins to take on its distinct and unique identity.

While there are broad similarities between Paleo-Indian and Archaic adaptations, the latter is distinguished by an increased emphasis on plant resources. Furthermore, the animals hunted by Archaic people all represent modern species, whereas some species hunted by Paleo-Indians are now extinct. The implements used by Archaic groups reflect this economic base: grinding tools (manos and metates) are common, and projectile points generally were less specialized than Paleo-Indian points and may have been used both as darts and knives (Cordell 1984:154). It is these implements, especially the projectile points, that form the framework for Archaic typologies. As with the Paleo-Indian, however, the archeological visibility of Archaic groups is low. Cordell notes that:

> the archaeology of the Archaic suffers from many of the same problems of Paleo-Indian archaeology: The remains are ephemeral because they are those of mobile hunters and gatherers; sites are obscured by more recent geological deposition, and many undoubtedly were destroyed by ancient episodes of erosion; the artifactual remains at Archaic camps may include few, if any, temporally diagnostic tool types; and Archaic chronology and paleoenvironmental reconstructions are far less precise than is desirable. In addition, because the fauna associated with the Archaic are of

> modern form and because Archaic peoples emphasized plant processing, the antiquity of Archaic sites is not generally obvious to casual observers (Cordell 1984:154–155).

The construction of any archeological sequence relies upon well defined artifact typologies precise enough to document variation in assemblages making up individual phases. With few exceptions, this has been a critical problem with Southwestern Archaic studies. Until recently, Archaic typologies were not systematic, instead focusing primarily on projectile point morphology. This emphasis led to a neglect of other tools and a near total absence of information on non-tool chipped stone, such as debitage. Since projectile points are presumably diagnostic, it is not surprising that they were emphasized. However, projectile points make up only a tiny percentage of any assemblage, and the cursory treatment accorded other artifacts has not aided the construction of firmer typologies.

Irwin–Williams' (1973) typology was one of the few early studies that addressed non-projectile point artifacts in some detail. It, however, has never been fully published. With most other early studies, it is virtually impossible to extract much meaningful information on non-projectile point artifacts.

This situation is changing, albeit slowly. As indicated earlier, the abundance of CRM studies in many areas of the Southwest has demanded that more attention to given to Archaic sites. An unfortunate, but perhaps inevitable, byproduct of this is that archeologists were suddenly forced to deal with a type of archeology with which they had little firsthand experience. Archaic sites, comprised largely of chipped stone artifacts, presented a dilemma to many researchers. Comprehensive and systematic chipped stone studies do not have an admirable history in the Southwest (cf. Olszewski and Simmons 1982), and many researchers found themselves confronted with a data set with which they were ill-prepared to deal (Simmons 1981a:12).

This situation has largely been rectified as more sophistication has been brought into Archaic lithic studies. Numerous such studies now exist, and many illustrating both innovative thinking as well as a real attempt to deal systematically with large chipped stone assemblages. Notably, many of these illustrate a greatly increased emphasis on debitage studies. Some, but certainly not all, of the more interesting and comprehensive investigations include Anderson et al. (1983), Bearden and Anderson (1984), Baker and Heinsch (1981), Chapman (1977a, 1980, 1982), Hicks (1986a, 1987), Hogan et al. (1983), Holley (1982), Kerley and Hogan (1983), Laumbach (1980), Moore (1982, 1983), Powell (1983), Schutt (1980a, b, 1983), Schutt and Vierra (1980), Simmons (1980, 1982d, 1982g), Vierra (1980b), and Wait (1983). This is an impressive list, and certainly represents a quantum leap over what was available even 10 years ago. It does not, however, mean that we have a precise idea of exactly what an Archaic assemblage actually looks like. Rather, several alternative methodological strategies have defined a wide range of variation in Archaic materials. Whether this variation represents a cultural reality or is a result of differing analytical techniques remains to be seen. Certainly there is still a pressing need for coordinated studies using comparable methods.

Regional Archaic Sequences

Irwin–Williams (1967) has suggested that Archaic studies are appropriately pursued on two different levels. The first, an integrative level, attempts to link Southwestern Archaic materials to the generalized Archaic patterns observed throughout North America, with particular emphasis on the Desert Southwest (the Desert culture is another effort in this direction; Jennings 1957). Her second level of analysis is termed isolative, and seeks to identify those cultural traits and patterns of distribution that set one geographic region apart from another. At the isolative level of analysis data is organized in a way that is informative about culture history. Isolative analysis seeks to define prehistoric cultural groups, and cultural continuities and discontinuities. It is at the isolative level that most Southwestern Archaic traditions have been defined even though empirical and theoretical problems exist. These include a lack of diagnostic Archaic artifacts other than projectile points, the scarcity of well dated sites, and the lack of a theoretical framework from which to examine stylistic variation (Cordell 1984:156).

Irwin–Williams has been instrumental in developing a cohesive, integrative pan-Southwestern view of the Archaic, and has suggested that by ca 3000 B.C. four separate but interacting Archaic traditions can be identified. These are the Western, Northern, Southern, and Eastern traditions. Collectively, she termed this the Picosa culture, which is an acronym for three of the four traditions: Pinto Basin, Cochise; and San Jose. Although not all of the traditions are directly relevant to the region covered in this study, it is useful to briefly examine each so that a full appreciation of the Archaic can be realized. The following is abstracted from Cordell (1984:157–164), as well as from Irwin–Williams (1973, 1979) and Simmons and Dykeman (1982a:14–19).

The Northern Tradition

The northern tradition of the Picosa culture is the most relevant to the present study. This has been termed the Oshara tradition by Irwin–Williams (1973) and consists of six sequential phases. While the Oshara tradition was defined primarily on the basis of survey and excavation conducted in the Arroyo Cuervo area of north-central New Mexico, Oshara sites occur widely throughout the northern Southwest (Irwin–Williams 1973:2). They are known from the San Juan Basin, the Rio Grande Valley, the Plains of San Agustin, south-central Colorado, and southeastern Utah. Literally hundreds, if not thousands, of sites in northern New Mexico have been placed within the Oshara. This does not necessarily mean that the Oshara tradition represents a denser Archaic occupation than do other Archaic traditions in the Southwest. It may simply reflect the immense amount of recent work conducted in northern New Mexico.

Although much specific detail on the Oshara tradition remains unpublished, the Oshara represents the most complete synthetic treatment of the Southwestern Archaic currently available. Consequently, Oshara has been used by many researchers working in the Southwest, especially in its northern regions, to classify the Archaic. In the Oshara tradition synthesis Irwin–Williams concluded that:

> The long slow progress from small bands of hunters and gatherers to fully sedentary agricultural villages has been documented in the Arroyo Cuervo region of northwestern New Mexico. The repeatedly noted existence of very similar archaeological materials over a wide area of the northern Southwest suggests that events there may well have paralleled those investigated. Therefore the Arroyo Cuervo sequence is seen as a regional example of a larger scale cultural development which occurred between about 5500 B.C. and the early centuries of the Christian Era. The term *Oshara Tradition* is suggested here to refer to this phenomenon, in order to emphasize its essential unity, and to facilitate discussion and comparison. For example, greater differences can be expected between the developments of the Oshara Tradition and other major cultural traditions in the Southwest (Irwin–Williams 1967). Within the northern Southwest, however, the Arroyo Cuervo sequence may be expected to be wholly or partly paralleled by other regional developments, which will differ from it in detail but not in outline or direction (Irwin–Williams 1973:16–17).

Accordingly, several distinct Oshara variants are undoubtedly present in the northern Southwest. For example, the San Juan Basin Archaic has been proposed as one complex facies of the Oshara tradition (Simmons 1981a:13). On this level, the San Juan Basin Archaic and the Arroyo Cuervo Archaic both represent variants of the Oshara tradition. However, the situation is somewhat more complex than this. Within the San Juan Basin Archaic there exist identifiable subdivisions (e.g., the Chaco Archaic, the Star Lake Archaic, etc.).

It is useful to describe the Oshara phases proposed by Irwin–Williams in some detail. This is instructive since so much of the Archaic in the northern Southwest appears to reflect Oshara variants. Furthermore, researchers continue to use the Oshara phases as a baseline from which to make comparative statements. The following descriptions, however, refer specifically to the Arroyo Cuervo region.

Jay Phase (ca 5500–4800 B.C.). Irwin–Williams (1973) considers the Jay phase as the initial Archaic occupation of the region. This view, however, has not been unchallenged. Other researchers regard Jay materials as terminal Paleo-Indian (Judge 1982; Wait 1981). This is a complex argument, and it has at least three components to it: typological, culture history, and subsistence.

The typological issue revolves around projectile point morphology. Some investigators (e.g., Honea 1969) consider Jay points to be similar to the Paleo-Indian Hell Gap points and to represent a direct development from the Paleo-Indian Angostura phase on the Great Plains. As Judge notes:

> The relationship between these types [of projectile points] may be of more than passing interest owing to the marked morphological similarity between the Early Jay points and those termed Hell Gap (Irwin 1968) from the Great Plains. Although Irwin–Williams (1973:5) states that there are evidently no generic connections between these Early Archaic points and Paleo-Indian materials, she does not specify how the dates...for the Early Jay Phase were determined. Although this morphological similarity between Early Jay and Hell Gap may be superficial since the associated assemblages differ considerably, it should be kept in mind (Judge 1982:23). [However, see Irwin–Williams 1973, 1979, for counter discussions.]

The second issue relates to culture history. Irwin–Williams (1973) believes that the Cody groups represent the last Paleo-Indian manifestations in the northern Southwest and that these peoples moved north and east onto the Plains around 6000 B.C. She suggests that a short occupational hiatus may have occurred, followed by a movement of Archaic peoples whose origin was to the west. On the whole, Irwin–Williams sees no cultural continuity between Paleo-Indian and Archaic, whereas other researchers suggest precisely this.

A final issue relates to subsistence. Judge (1979, 1982) and Wait (1982) consider that both the Jay and subsequent Bajada phases represent a continuation of the Paleo-Indian focal hunting patterns, adapted to the exploitation of modern species. Later Archaic periods, beginning with the San Jose, represent, according to these authors, a true Archaic economy focused on broad spectrum hunting and gathering, with an emphasis on the latter. Irwin–Williams, on the other hand, believes that an early Archaic subsistence pattern can be initially observed during the Jay phase. This position is supported by recent work by Wiens (n.d.) that indicates ground stone may have been in use during the Jay phase in the San Juan Basin.

Acknowledging, but not resolving, this issue, we can briefly characterize the Jay phase. Following Irwin–Williams' argument, the Jay phase is the earliest manifestation of the Oshara tradition. In the Arroyo Cuervo region, most Jay sites occur in sand deposits on cliff tops, in a canyon-head environmental context. Other sites, apparently task-specific, occur on low mesas, in the Jemez Mountains, and near raw-material (primarily basalt) outcrops. Sites generally are small (less than 50 m^2) and exhibit low artifact density. In Irwin–Williams' opinion, many of the sites of this phase represent the reoccupation of favored localities that afforded access to a fixed group of microenvironments. She posits a mixed-spectrum hunting and gathering economy, which inhabitants adapted to year-round exploitation of local resources.

Principal Jay phase projectile point forms include large, slightly shouldered types. Other characteristic artifact forms are lanceolate, bifacial knives and side scrapers. Chipped stone technology includes the use of both hard and soft hammer percussion.

Other researchers have described materials from northwestern New Mexico, southwestern Colorado, northeastern Arizona, and southeastern Utah that are comparable to those characteristic of the Jay phase. These include the Rio Grande complex (Renaud 1942a) and the Moab complex (Hunt and Tanner 1960).

Bajada Phase (ca 4800–3200 B.C.). The Bajada phase is divided into early and late periods. Bajada phase settlement patterns appear to be similar to those of the Jay phase, but Bajada sites are more numerous. Base camps occur at canyon heads, and task specific sites are present on low mesa slopes, canyon rims and, rarely, near ephemeral ponds. Climatic evidence for this phase suggests considerably lower moisture than during the Jay phase (Antevs 1955; Haynes 1968; Mehringer 1967).

Irwin–Williams notes a shift in projectile point types during the Bajada phase. Early forms are distinguishable from Jay phase types principally by the presence of basal indentation and basal thinning, whereas late forms exhibit well defined shoulders and an overall decreasing length (Figure 8). Other Bajada artifacts include side scrapers, bifacial knives (rare), and large chopping tools. Irwin–Williams notes that, in comparison with the Jay phase, the quality of chipped stone technology declined, although both soft and hard hammer techniques still were in use. Groundstone is still rare. Small hearths and earthen ovens, filled with cracked cobbles, suggest some improvement over the Jay phase with respect to food processing.

As with Jay phase sites, Irwin–Williams believes that Bajada sites reflect multiple reoccupations. Site size remains approximately the same as during the earlier period. She posits an increasingly efficient adaptation to a broad-spectrum subsistence base.

San Jose Phase (ca 3000–1800 B.C.). San Jose phase sites are larger (100 to 150 m^2), exhibit denser concentrations of artifacts, and are more abundant than those of the preceding phases. Most are situated in canyon head locales, although task-specific sites continue to occur near ponds and elsewhere. Climatic data then available suggested a period of greatly improved effective moisture, dune stabilization, and soil formation (Haynes 1968; Irwin–Williams and Haynes 1970; Mehringer 1967). Irwin–Williams argues that these factors would have increased the number and reliability of springs and infers that this, in turn, may have accounted for a greater population density.

Continuity of projectile point types (Figure 8) is still evident, but there is an emphasis on serration and a relatively short stem-to-blade ratio. Through time, a trend develops in which overall length decreases, stems increasingly expand, and serration becomes more deliberate and defined. Heavy chopping tools and technically poorly made side scrapers dominate the tool kits. The well made side scrapers and bifacial knives noted earlier are rare, as is the soft hammer technique. Of significance is the appearance of groundstone implements, including shallow basin grinding slabs, simple cobble manos, and pounding stones. These suggest the possibility of an emphasis on plant resources. Intrasite patterning is more complex than was evident during preceding periods. Hearths are common, as are fire-cracked, rock-filled ovens. A series of irregularly

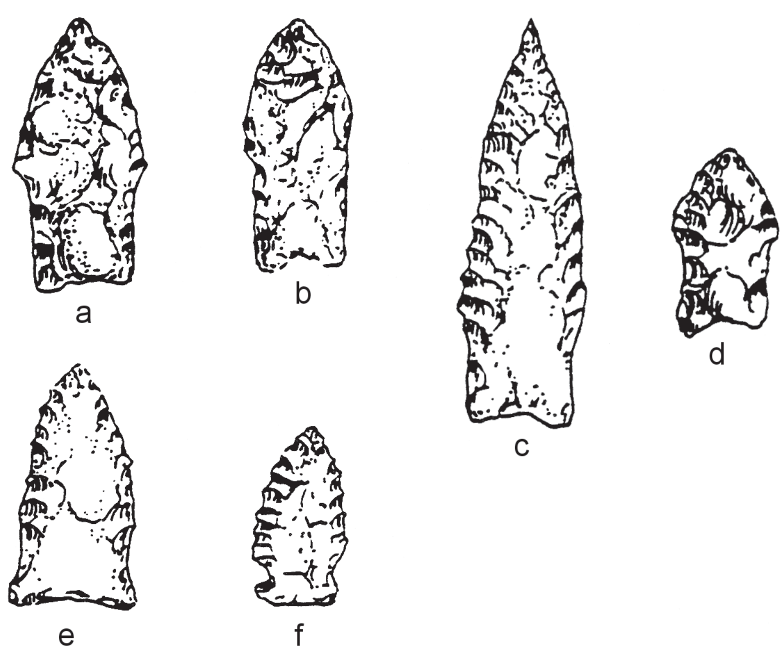


Figure 8. Some typical projectile point styles from the Oshara tradition. a–b. Bajada points; c–d. San Jose points; e–f. Armijo points (Cordell 1984) Illustrated by Charles M. Carillo

spaced postholes was recognized at one site. These suggest the presence of at least simple structures. The evidence indicates that San Jose phase groups successfully adapted to and exploited favorable local microenvironments. Resource exploitation appears to have been more systematic and intensive than during the preceding phases.

Bryan and Toulouse (1943) coined the term *San Jose* on the basis of work they conducted in western New Mexico. Similar materials include the San Mateo complex, defined by Dittert (Irwin–Williams 1973:9); the Apex complex (Irwin–Williams and Irwin 1966); the Rio Grande complex (Renaud 1942a); the Concho complex (Wendorf and Thomas 1951); the Moab complex (Hunt and Tanner 1960); the Aneth complex (Mohr and Sample 1959); and the Gallegos complex (Hadlock 1962).

Armijo Phase (ca 1800–800 B.C.). The critical difference between the Armijo phase and preceding phases is the addition of limited maize agriculture, suggested by maize pollen at three sites in the Arroyo Cuervo region. This, however, is a topic of considerable controversy, and will be addressed in more detail later in this chapter. Most Armijo sites exhibit a site distribution pattern similar to that evident of the San Jose phase, with base camps occurring on cliff tops in canyon head locales. Task-specific sites occur, however, near ephemeral ponds (rarely) and in the Jemez Mountains, where hunting and obsidian quarrying stations have been located. A new annual settlement round is recognized by Irwin–Williams. Larger sites believed to reflect seasonal population aggregation, best exemplified by Armijo Shelter, appear during this phase. Sites of this type are larger (300 to 450 m^2) than sites of the preceding periods and have denser artifact assemblages.

Some of the larger sites of this phase are also much more complex. Excavation of Armijo Shelter revealed several occupation floors and large, cobble-filled ovens. Many other sites exhibit irregular posthole patterns, heaps of fire-cracked rock, and evidence of specific local work areas. Artifacts include abundant groundstone and objects of apparent magico-religious or ideological significance.

Armijo projectile points (Figure 8) are "evolved late forms of the old serrated San Jose style with short widely expanding stems and concave or (later) straight bases" (Irwin–Williams 1973:11). Other artifacts include small bifacial knives, flake scrapers, drills, and choppers or pounders.

The Armijo phase is seen to represent the early development of a seasonal pattern of aggregation and dispersion. The use of maize as a partial subsistence source undoubtedly influenced this pattern, which in turn may have made possible the development of greater seasonal economic, social, and communal structure.

Materials similar to those of the Armijo phase occur widely throughout the northern Southwest. These include the Lobo complex (Bryan and Toulouse 1943), the Santa Ana complex (Agogino and Hester 1956), possibly the Atrisco complex (Agogino and Hester 1956), the Apex D complex (Irwin–Williams and Irwin 1966), and materials from southwestern Utah (Mohr and Sample 1959) and northeastern Arizona (Wendorf and Thomas 1951).

Transitional Stage—the En Medio Phase (ca 800 B.C.–A.D. 400). Irwin–Williams and others have postulated a transition period from the Oshara tradition to the Early Anasazi beginning in the En Medio phase. First recognizable during the Armijo phase, this transition represents a fundamental shift from an economy based primarily on hunting and gathering to one including agriculture, albeit on a limited basis. Concomitant with this is a gradual shift toward semisedentary village life that marks the beginning of the Anasazi/Puebloan period.

The En Medio phase in a sense represents the terminal Archaic. Late En Medio phase materials fall into what most archeologists term the Basketmaker II period (Brew 1946; Cummings 1910; Kidder and Guernsey 1919:192; Morris and Burgh 1954; O'Bryan 1950). When the Basketmaker terminology was originally developed by Kidder, he purposely left Basketmaker I undefined, anticipating that future research would fill in this gap. As more evidence becomes available, it is not unreasonable to suggest that the earlier En Medio phase materials may in fact represent the elusive Basketmaker I period.

This period is well documented for the northern Southwest. Archeologists have located En Medio sites in several environmental zones, but in the Arroyo Cuervo region, canyon head locales again appear to have been favored. Armijo Shelter continued to be a focus of occupation for maximal seasonal aggregations. To Irwin–Williams (1973:13–15), the En Medio phase reflects a new pattern of microenvironmental exploitation in the Arroyo Cuervo region, resulting in new site types. Principal in this new adaptation is a much more extensive utilization of dune ridges than was noted during previous phases. These dunes became the focus of many small (about 15 to 25 m^2), seasonal (probably summer) sites that generally have sparse assemblages but that often contain concentrations of fire-cracked rock and shallow storage pits. Groundstone artifacts and cutting tools dominate the assemblages of sites of these new types; projectile points, choppers, and knives are rare. This suggests that the economic focus of these sites was primarily the gathering and processing of several plant resources abundant on the dune ridges.

In general, data for the En Medio phase indicates the development of a seasonal economic cycle. Irwin–Williams views this as related to continued population growth. She believes that the cultural response to this increasing pressure was to broaden the resource base by including the seasonally productive dunes (Irwin–Williams 1973:14).

Artifacts from En Medio phase sites show considerable continuity from the preceding phase, although groundstone implements are much more abundant. Deep basin metates are common, as are cobble manos, and flat and trough metates begin to appear, as do flat metates. Chipped stone tools show improvement in quality, probably because of an increasing use and control of soft hammer percussion and pressure flaking. En Medio projectile points are variations of stemmed, corner-notched forms that, through time, exhibit increasingly longer barbs. Bifacial knives and drills occur, increasing in frequency through time. Flake scrapers and knives, pounders, and choppers continue in importance, comprising the bulk of the tool kit. Finally, Irwin–Williams' group recovered a few normally perishable artifacts that are similar to materials from Basketmaker II sites elsewhere.

Transitional Stages—the Trujillo Phase (ca A.D. 400–600). Discussion of the Trujillo phase is out of place in the context of a summary of the Archaic, but it is briefly summarized here since it represents the last phase of the Oshara tradition in the Arroyo Cuervo. The Trujillo phase, a local variant of early Basketmaker III, is a continuation of the En Medio phase, with two significant additions to the material culture inventory: the bow and arrow and plain grayware (Lino Gray) ceramics (Irwin–Williams 1973:13). Rockshelters still saw intensive use during this phase, and virtually all of the microenvironments in the Arroyo Cuervo were being exploited. An increasing reliance on agriculture is suggested by the presence of several Trujillo sites in slightly elevated locations within the wider valleys. These sites had to be located in close proximity to lands with high agricultural potential (Irwin–Williams 1973:15). As was true during the En Medio phase, the data indicate that a seasonal economic cycle was in place (Irwin–Williams 1973:14).

Southern Tradition

The southern phases of the Picosa culture includes the two later phases of the earlier Cochise tradition: the Chiricahua and the San Pedro. Many major sites occur in Arizona, thereby falling outside of the present project area. Chiricahua phase artifacts are known from Ventana Cave, the San Pedro River Valley, the Cienega Creek site on the San Carlos Reservation (Haury and Sayles 1947), all in Arizona, the Wet Leggett site (Martin et al. 1949) in western New Mexico, and from Bat Cave on the Plains of San Agustin in west-central New Mexico (Dick 1965a). Surface finds also have been reported from north-central and northeastern Arizona, the Moquino locality of northwestern New Mexico, and the Galisteo Basin of north-central New Mexico (Irwin–Williams 1979; Irwin–Williams and Beckett 1973; Lang 1977a, b). Chiricahua Cochise materials may extend into northern Chihuahua and Sonora in Mexico (Irwin–Williams 1967).

Chiricahua Cochise assemblages are often dominated by cobble manos, shallow metates, and numerous amorphous scrapers and choppers, all of which relate to plant processing. Projectile points are diverse and many are side-notched with concave bases. Other points include diamond shaped varieties and may be serrated or unserrated; some have short, contracting stems (Dick 1965a; Irwin–Williams 1967, 1979).

While dated to the Archaic, more precise dating of the Chiricahua phase is problematic. Several recent radiocarbon dates suggest that the Chiricahua phase ranged from ca 3500 to 1500 B.C. (Whalen 1971, 1975), thereby making it roughly contemporaneous with the San Jose and Armijo Oshara phases.

The Chiricahua phase is followed by the San Pedro phase. Materials come from the San Pedro River Valley, Cienega Creek, Ventana Cave, Bat Cave, Tularosa Cave, and other localities. Artifacts from the Casas Grandes area of Chihuahua (Rinaldo 1974) and from Sonora (Johnson 1966) are viewed as San Pedro variants (Di Peso 1979). Surface finds from northwestern New Mexico and the Rio Grande Valley area also are reported (Cordell 1979a).

Typical San Pedro projectile points are large, corner- or side-notched points with straight to convex bases. In some assemblages, points with bulbous convex bases and serrated points occur. Other chipped stone materials include a variety of scrapers and denticulates, bifacial knives, and choppers. Groundstone metates have a deeper basin than those of the Chiricahua phase, and mortars and pestles occur infrequently (Irwin–Williams 1967). Dates for the San Pedro phase are given as 1500 to 200 B.C. although the upper range is not firm (Whalen 1971, 1975).

While the Archaic Cochise tradition is primarily confined to the southern part of the Southwest, the presence of Chiricahua and San Pedro points in northwest and north-central New Mexico suggest some movements to those more northern areas. In the Galisteo area of the northern Rio Grande, for example, some authors have postulated an abandonment by Archaic groups belonging to the northern tradition (i.e., Oshara) with a subsequent re-occupation by Chiricahua and San Pedro groups (Cordell 1979a:32–33; Lang 1977a, b). The question of boundary fluidity and population movement in the Archaic is a complex issue, and has ramifications for subsequent cultural development. It also remains an unresolved issue (Baker 1981:164).

The Eastern Tradition

The easternmost tradition of the Picosa culture is not formally named, but it includes materials frequently referred to as the Hueco complex in southeastern New Mexico and the Coahuila complex of Coahuila and eastern Chihuahua in Mexico and west Texas (Irwin–Williams 1979; Taylor 1966). The eastern boundaries of the tradition are also not well defined. The issue of whether the Archaic of the region is more related to the Great Plains than to the Southwest is an important consideration.

Wooden artifacts are characteristic of the Coahuila complex (Taylor 1966) and the lack of similar material from sites north of the Mexican border makes it difficult to use these for specific comparisons. Although not frequent in Coahuila assemblages, projectile points include oval forms, types with contracting stems and strong barbs, and notched and stemmed points that have counterparts in New Mexico and Texas (Irwin–Williams 1979; Taylor 1966). In general, Archaic materials from the southeastern Southwest are usually considered ancestral to the Jornada Mogollon (Irwin–Williams 1979). Overall, the Archaic from this region is poorly documented.

An alternative scenario for Archaic materials in southeastern and south-central New Mexico has recently been proposed by MacNeish and Beckett (1987). Using data from recently excavated sites as well as previously existing information, they have proposed a Chihuahua tradition that contains elements of both the southern (i.e., Cochise) and eastern (i.e., Hueco) traditions discussed above. As of yet, little detailed information has been presented for the documentation of a new tradition in south-central New Mexico, but with additional research in the area, its position may become clarified and solidified.

Western Tradition

The westernmost tradition of the Picosa culture falls completely outside of the present study area. It is important to mention, however, since Irwin–Williams (1973:5) believes that the Oshara tradition was ultimately derived from western origins. This western variant is known as the San Dieguito–Pinto tradition. It is distributed from southern California to southern Arizona and north to southern Nevada in the Great Basin. Most sites are surface manifestations found at the ancient lake basins of southern California.

The San Dieguito–Pinto tradition includes the Pinto Basin and Amargosa phases, which appear to be derived from the earlier San Dieguito Paleo-Indian tradition. The most distinctive artifacts are Pinto Basin and similar points, which are generally straight-stemmed points with concave bases. Some points are shouldered, and serrated edges are common. Other tools include flake choppers and scrapers and scraper planes. Groundstone includes small cobble manos and shallow basin grinding slabs. Very few dates are available for the San Dieguito–Pinto tradition, since most sites are surface occurrences.

Chronology

The temporal range of the Southwest Archaic is not well known, and site dating represents a major gap in baseline data (Judge 1982:27–28). Archaic chronology has been largely determined by two methods: projectile point typology and radiocarbon dates. Both are less than perfect chronometric barometers, yet they represent our best attempts at placing the Archaic within a temporal framework.

Typology

Projectile point typology has played a key role in defining Archaic phases. Irwin–Williams' (1973) Oshara typology represents the most commonly used classification, and in general it does appear to be applicable to much of the study area. Eschman (1983:382) provides a thoughtful discussion of the problem, noting that correlating radiocarbon dates with particular point style, is risky. He cites several difficulties in point classification and concludes that the Oshara point typology should not be rejected but that it is provisional and that "point styles should be used to date sites only when no other means of dating is practical, and then with the understanding that this procedure results in only a tentative estimate of the occupation period" (Eschman 1983:382).

Adding to the problem of projectile point chronology is the fact that although numerous Archaic sites have been been recorded through survey, relatively few have been excavated. Thus even if sites can be identified as Archaic based on surface artifact configurations, it is a frustrating task to assign a specific phase to them. All too often the only data from survey that are available for chronological determination are presumed diagnostic points, and one must be cautious of a phase designation based on, quite frequently, the presence of a limited number of diagnostics. Relying on so-called diagnostic type fossils is something that researchers have been forced to do. This is not good; there are datable materials at many Archaic sites if proper methodological finesse is used to recover them (Simmons 1981a:14).

Chronometric Dating

Several years ago, few radiocarbon dates were available for the Archaic. As with other aspects of Archaic archeology, however, this situation has been dramatically altered. Over 70 dates are available for the San Juan Basin alone (Simmons 1981a:15, 1982c:820, 1984:211–215), with additional determinations commonly appearing with the publication of recent excavation results. Despite this increase in information, the majority of Archaic sites documented in the region are undated surface occurrences. While such sites are useful for assessing site distributions, they are less helpful in establishing absolute chronologies. Recent projects, however, have demonstrated that many apparent surface sites do contain buried, and datable, deposits (e.g., Simmons 1981a, 1982c).

Most radiocarbon dates fall within the late Archaic (i.e., San Jose, Armijo, and En Medio phases), while dates for the early Archaic (i.e., Jay and Bajada phases) are much rarer (Simmons 1981a:15–16). This pattern could suggest higher population density during the late Archaic. On the other hand, later sites tend to have better preserved datable materials and therefore may be introducing a bias factor into our conception of the Archaic temporal span. If one follows Irwin–Williams' (1973) original contention, however, there is an expectation of population increase during the late Archaic, especially after the Armijo phase and the initial introduction of domesticates.

Other chronometric means of dating the Archaic have been less successful than the radiocarbon method. One promising method was obsidian hydration (e.g., Baker 1981:167–169), but the results have not been consistent. The use of hydration for dating Southwestern Archaic sites has been questioned, and the method should be used with great caution. On the other hand, the more attention given to Archaic chronology, using as many methods as are available within the archeologist's repetoire, the better, even if initial results do not match what is anticipated.

An intriguing side issue resulting from recent radiocarbon dating of Archaic sites in the San Juan Basin has emerged. In some instances, dates have been obtained from presumed Archaic sites that appear far too late to belong to any defined Archaic phase (e.g., Eschman 1983:382–384; Simmons 1982c). In most cases, these dates, which may occur at the same sites with more traditional Archaic dates, have been dismissed as being contaminated or otherwise "bad dates" (e.g., Simmons 1982c; 1986:78). Eschman, however, has proposed an alternate scenario:

> We conclude, therefore, that these later radiocarbon dates are accurate and are associated with an artifact assemblage reflecting an Archaic hunter–gatherer adaptation. Based on this evidence, it appears that Archaic use of the UII lease [in the San Juan Basin] continued well into the Anasazi period. As the Anasazi began expanding into this area, these hunter–gatherers were probably displaced and moved into areas less suited to agriculture. However, they appear to have reoccupied their former range after its abandonment by the Anasazi (Eschman 1983:384).

Whether or not such a conclusion is warranted is debatable. For example, such sites could conceivably reflect non-agriculturalist Anasazi peoples rather than remnant Archaic folk. One can rapidly enter a semantic argument here, however. The point is, Eschman's scenario does open up some intriguing possibilities. Archeologists have tended to view the Archaic not only as a cultural stage based on hunting and gathering, but also as a chronological stage preceding the Anasazi/Puebloan development. Evidence is amassing that hunting and gathering was always important, even up to contact with the first Europeans in the Southwest. As such, if one views the Archaic as an adaptation rather than as a chronological period, it makes sense that later dates are appropriate. One must be cautious here of confusing artificially imposed archeological terminology upon a subsistence system that has exhibited remarkable durability (this issue is examined more thoroughly in Chapter 12's discussion on adaptation types).

Site Types

Low density Archaic sites are a subtle archeological phenomenon, and dealing with them and their presumed function represents a tremendous analytic challenge from both research and management perspectives. This is a critical task if we are ever to be able to classify Archaic sites as something beyond a lithic scatter. The following discussion addresses this issue, providing examples of typologies that have recently been proposed for Archaic sites in the study area. As with much of the discussion in this chapter, the empirical examples are drawn largely from northwestern New Mexico, since this is the scene of most recent and intensive archeological activity involving Archaic sites. Much of the following discussion is abstracted from Simmons and Dykeman (1982b:825–834).

We should note that in the following summary of site types, attention is directed almost exclusively to open air sites. Prior to the concentration on Archaic sites brought about by increased CRM studies, most work on the Archaic focused on caves or rockshelters. The reasons for this are obvious: such sites have a much better chance of containing preserved materials, they also are spatially discrete, facilitating excavation, and they frequently contain stratified deposits, thereby providing some chronological control. However, most CRM projects are located in areas where rockshelters are not common, and thus open air surface sites have become the focus of attention. It is with such sites that researchers have generated the typologies about to be discussed. Accordingly, most site typologies are based on the composition and distribution of the lithic materials that usually make up these sites. More refined typologies would be possible if more material culture survived at Archaic sites. Unfortunately, this is rarely the case. While hearths are relatively common, few more complex features have been identified on Archaic sites. Occasionally, other features have been recognized, such as pits, pithouses or pit structures, and, very rarely, pit burials. Before providing detail on Archaic site typologies that have been developed, it is useful to very briefly review evidence for sites that contain some of these features.

Archaic structures have been rarely documented. Most known ones occur in the southern portion of the project area, and belong to the Cochise Archaic, although Glassow (1980) has documented structures in northeastern New Mexico that conceivably could be considered very late Archaic, or Basketmaker II (i.e., the Vermejo phase—A.D. 400–700). The majority of these sites are late in the Archaic sequence, and generally consist of pit structures or early forms of pithouses (e.g., Martin et al. 1962). An eroded pit structure has been excavated in northern New Mexico at the Moquino site (Beckett 1973). This dated to ca 235 B.C., and thus is also late in the Archaic sequence (although there is some question as to this interpretation). Generally, these Archaic pit structures are circular or oval and relatively shallow. Interior features can include circular firepits, postholes, and subfoor pits (Minnis and Nelson 1980:86).

Pit features are more common at Archaic sites, and have been documented at several localities. These frequently are filled with fire-cracked rock, and many have functioned as ovens. Other pits have been interpreted as storage facilities. Windmiller (1973) recognized three categories of features in his study of the Fairchild site: hearths, storage pits, and milling stone caches. At the Moquino site, Beckett (1973) also identified three groups of features: hearths, rock ovens, and storage pits. Irwin–Williams (1967, 1973), in her construction of the Oshara tradition, recognized several types of features that supposedly characterize the various Archaic phases. Generally, however, features beyond hearths at Archaic sites are not well preserved, are difficult to identify, and the majority date to the later Archaic phases. One exception to this has been the documentation of well formed bell-shaped storage features, containing maize remains and dating to ca 900 B.C. These were located at a site near Chaco Canyon (Simmons 1982a:537–554, 1986:77). In short, though, features more complex than hearths are rare at most Archaic sites, and what the researcher is left with in most cases is simply chipped and ground stone artifacts. We can now turn attention to the various site typologies that have been generated that use these data as primary variables.

Judge Synthesis

Judge (1982) has provided a critical review of the status of aceramic archeology in the San Juan Basin. His comments also are applicable to the remainder of the study area. Judge considers that information on site types is one critical piece of the baseline data required to understand the Archaic. In a sense, he (Judge 1982:41–43) synthesizes several typologies and concludes that, minimally, the distinction between habitation sites and special-use sites is critical. Judge is acutely aware of the problems of using survey data (1982:41) and takes a cautious approach. On the basis of research in the Coal Gasification Project (CGP) and Bisti–Star Lake regions of the San Juan Basin, he further refines the habitation site/special-use site dichotomy by stating that the presence or absence of hearths is an important criterion, although he correctly cautions against equating the presence of hearths as necessarily reflecting habitation sites.

The use of this criterion is fraught with several problems. Excavation data do not always confirm the existence of hearths as recorded by survey. This was certainly the case with the Alamito Project near Chaco Canyon (Simmons 1982a), where none of the three excavated Archaic sites with definite hearths or pits were recorded by the survey as having such features. This also is indicated by the CGP/UII (Utah International, Inc.) mitigation report, which notes an inverse relationship between the number of hearths recorded during survey and the number of hearths actually revealed during excavation (Miller 1980: 441–442, Table 24.6).

Arroyo Cuervo

Irwin–Williams' classic study (1973,1979) recognizes base camps and at least two types of specific-activity sites: isolated hunting and/or gathering camps and quarry-workshop camps. In addition, she notes scattered chipping areas and isolated finds of projectile points. Towards the end of the Archaic (during the Armijo phase), she recognizes a new settlement type, represented by a "pattern of seasonal aggregation," best illustrated by Armijo Shelter. These sites are much larger than earlier sites (Irwin–Williams 1973:10). Finally, during the terminal Archaic (i.e., En Medio and Trujillo phases), small seasonal sites located on sand dunes become important (Irwin–Williams 1973:13). Site locations also figure prominently in Irwin–Williams' scheme. Several microhabitats apparently were utilized differentially through time, and it was not until the terminal Archaic that sand dune locale became significant.

Bisti–Star Lake

In an excellent discussion of site types and the problems inherent in survey data, Huse et al. (1978:50–70) define five site types. These are: hunting loci, milling loci, special-activity/temporary camps, campsites, and scavenged materials. Not all of these types, however, represent true sites; hunting and milling loci are, essentially, isolated artifacts, represented by projectile points and milling stones, respectively. This is the weakest link in Huse et al.'s typology, for they do not consider other situations that could account for the presence of isolated artifacts, a point also noted by Miller (1980:450). Moreover, the scavenged materials site type is of little practical utility in addressing actual Archaic situations. The special-activity/temporary camps defined by Huse et al. (1978:53) all are very small, averaging only 12.2 artifacts per site. The largest site of this type had 169 artifacts, including only two tools. Campsites are larger than special-activity/temporary sites and frequently contain hearths and several tool types. Huse et al. (1978:53–62) further consider variability within campsites and conclude that the total number of artifacts is not directly related to tool type diversity and is not a good indicator of site type. They also do not consider hearths to be primary indicators of habitation sites. They further conclude (1978:59–62) that no base camps occurred in the project area. This statement is contradicted, however, by their assertion that several of the En Medio phase sites in the project area "appear to be extensive base campsites" (Huse et al. 1978:67).

Star Lake

Wait (1976b; Wait and Nelson 1983) categorizes aceramic sites at Star Lake according to the habitation site/special-activity site dichotomy. Habitation sites are defined by an increased diversity of tool types, large numbers of artifacts, and more substantial and frequent hearths. As Miller (1980: 451–452) points out, this is an unsophisticated approach, but it may represent one of the more realistic typologies, considering the vagaries of survey data. The problem with hearth definition, as discussed above, clearly bears on Wait's typology.

El Paso Coal Company (SPCC)

In a survey of the Burnham–Bisti region on southwest Gallegos Mesa, Sessions and his colleagues (Anderson and Sessions 1979:61–80) defined eight site types. These are: habitation sites, secondary sites (divided into temporary camps, hunting camps, flora-processing stations, and undifferentiated limited-activity sites), quarry sites, and multiple component sites (comprised of two subtypes, functional and temporal components). Apparently, Anderson and Sessions (1979:63) consider habitation sites as base camps. Their typology is based on several variables, listed here in order of importance: number of artifacts, presence or absence of features, presence or absence of groundstone, site area, presence or absence of tools, presence or absence of cores, and presence or absence of projectile points.

Although Anderson and Sessions have attempted to deal with a complex problem in a creative and systematic fashion, there are problems with the classification. Perhaps the most important is that the typology relies heavily on number of artifacts and specific lithic-group identification (e.g., cores, tools). We question the utility of these criteria when evaluated solely on the basis of survey information. Sites located on sand dunes, as is common with many Archaic occurrences, are not accurately characterized by visible surface artifacts; there generally are many more artifacts than surface information suggests. Furthermore, the definition and identification of tools in an field situation is a difficult task; controlled laboratory conditions are necessary (Simmons 1979). Anderson and Sessions' typology is perhaps more relevant to excavation data. Nonetheless, he has provided comprehensive discussion, and if this typology can be employed by well trained individuals in a consistent fashion, it may reflect a realistic categorization.

Navajo Indian Irrigation Project (NIIP), Blocks VI and VII Survey

Reynolds (1980:1-6 to 1-7) provides an interesting discussion of the problem of sites, isolated occurrences, and isolated artifacts, addressing a very real problem of archeological survey. Unfortunately, there are difficulties with Reynolds' statistical manipulations of the survey data. Using cluster analysis and discriminate function analysis, he ultimately derives four site types: temporary sites, plant-procurement sites, plant-processing sites, and base camps. Regrettably, Reynolds neglects to define the variables used to develop this typology, providing instead only a list of what he considers critical variables (1980:5-6 to 5-7). Without definition of many of these terms, and recognizing that the tabulation of lithic variables is based on survey data, a base that is poorly defined and subject to severe bias, one must question the subsequent analyses. One can only wonder if the same site types could have been generated without the sophisticated, but perhaps inappropriate, statistical manipulations.

Reynolds also discusses lithic reduction and site function (1980:5-17 to 5-18). He believes he has evidence of specific activities at several sites, but the data does not necessarily confirm this. Reynolds' also feels that his methodology allows the classification of undiagnostic lithic scatters into temporal groups (1980:5-35). This is a surprising statement when one examines the supporting data (e.g., Table 5-9, discussion on pp. 5-32 to 5-35). After reading this discussion, the majority of the sites are still classified no more distinctly than possible Archaic or Archaic.

NIIP Blocks IV and V Survey

Elyea et al. (1979) define three site types for Blocks IV and V Archaic sites. These are: base camps, temporary camps, and special-activity areas. Base camps were recognized as those sites with enough artifacts to represent either longterm use or repeated occupation. Temporary (or special extraction) camps and special activity areas were defined by the presence of hearths, with scatters of fire-cracked rock present in some instances.

NIIP Blocks IV and V Excavation

Excavation of a sample of prehistoric sites located on Blocks IV and V of NIIP (Reynolds et al. 1984; Simmons 1980) tended to confirm, in a general sense, Elyea et al.'s (1979) survey classification of those sites. Unfortunately, the excavation report does not specifically address questions of site type on an integrative level. One point of interest, though, is that the majority of the large sites investigated appear to represent repeated occupations rather than single long term occupations. Accordingly, Elyea et al.'s (1979:50) definition of base camps should be reconsidered. That a site reflects repeated occupation does not necessarily indicate that it functioned as a base camp; rather, it merely represents reoccupation of a favored locale through time, without a necessary functional correlate.

NIIP Block II Excavation

Kirkpatrick's (1980a) study is significant in that it represents one of the first major excavation reports for Archaic sites in the San Juan Basin. Unfortunately, his treatment of site types is cursory. Using survey data, he notes two basic Archaic site types: lithic scatters with hearths and lithic scatters (Kirkpatrick 1980b:75). Apparently using this as a base line, Kirkpatrick (1980c:1535) later states that there are two functional site types: camps and special-use sites, the former apparently correlating with lithic scatters with hearths and the latter with lithic scatters. The excavated Archaic sites "were temporary camps, probably reoccupied on a seasonal basis during periods of gathering and processing plant resources" (Kirkpatrick 1980c:1532). Although both camps and special (or limited) use sites, as defined by survey data, were selected for excavation, Kirkpatrick (1980c:1535) feels that only one type, the seasonal campsite, was confirmed by the excavations. Although Kirkpatrick's treatment is simple, it, like Wait's (1976b), perhaps represents one of the more realistic, if conservative, approaches.

Other NIIP Studies

Large scale investigations on other NIIP Blocks have been conducted by the same institution (Navajo Nation Cultural Resources Management Program) and the same key personnel. These include survey and excavation on Blocks I, X, and XI (Gilpin et al. 1984), excavation of Blocks VIII, IX, X, and XI (Vogler et al. 1982), excavation on Blocks VI and VII (Del Bene and Ford 1982), and survey and testing on Blocks VIII, IX, X, and XI (Vogler et al. 1982), Accordingly, a degree of continuity and commonalty has been obtained, at least in the discussion of site types and function. The projects largely used a typology developed by Vogler (1982:28–29) consisting of three site types: base camps, satellite sites, and isolated occurrences.

Base camps refer to localities where a number of generalized activities occurred. These represent centralized loci of activities and can be considered centers of microcatchment zones. Resource procurement was not a primary function at base camps; rather, processing and storage occurred. Satellite sites are represented by localities where a limited number of activities presumably occurred. These generally were procurement and processing activities and involved both floral and faunal resources. Lithic raw material sources also are represented by satellite sites. Satellite sites do not show extensive use, are smaller in size, and do not contain as many artifacts as do base camps. Isolated occurrences are archeological reflections that indicate the occurrence of a single activity or event. In most instances, isolated occurrences are represented archeologically by only a single or a few artifacts (Vogler 1982:28–29).

As with many of the other Archaic site typologies, the NIIP classification is a simple one. It works well on a classificatory level, but less well on an analytic level. It also does not adequately address the re-occupation issue and tends to be too generalized.

Coal Gasification Project (CGP) Survey

Reher's (1977a) report on the CGP Survey represents one of the first systematic attempts to deal critically with Archaic sites in the San Juan Basin. As such, it inevitably has been subject to criticism as new data have become available (e.g., Eschman 1983:378). Reher (1977c:96–98) classifies Archaic sites into two types: campsites and limited-activity sites. A third type—base camps—was later added to account for a large site cluster (Eschman 1983:377). Campsites represent habitation sites, whereas limited-activity sites represent areas where plant and/or animal resources were procured and/or processed. A major criterion used in defining these site types is the presence or absence of hearths, although sites of both types can contain hearths. As pointed out earlier, this approach appears to be inappropriate in some instances. Reher established a continuum for these site types and was unable to define clear-cut distinctions between habitations and limited-activity sites, although habitation sites generally exhibited "more substantial and more frequent hearths, larger frequencies of artifactual items, and a more diverse tool assemblage" (Reher 1977c:98). In Reher's view, the diversity of artifact assemblages reflected at the habitation sites was a reflection of functional variability and not an indication of repeated occupation of a favored area.

Utah International, Incorporated (UII) Project

The UII report (Moore and Winter 1980) represents the first excavation phase in the CGP area. Although only four Archaic sites were excavated, Moore and Winter provide a much needed discussion and synthetic treatment of aceramic occurrences in northwestern New Mexico. While various aspects of their approach may be criticized, this volume represents one of the most sophisticated and complete treatments yet published of Archaic materials in the study area. Several authors in the volume discuss Archaic site types (Miller 1980; Moore 1980a; Vierra 1980a).

Using ethnographic data, Vierra (1980a) develops a generalized model for the Archaic of the Southwest. A basic premise of this model is that a hunter–gatherer settlement system consists of:

> a base camp surrounded by a foraging area within which task-specific sites are located. The base camp is a temporary habitational campsite which exhibits domestic activities....There are two types of base camps: a home base camp associated with a macroband occupation, and a limited base camp associated with a microband occupation....The task-specific site is a nonhabitational, or an extremely short term specialized campsite. It exhibits procurement and possibly limited processing activities. Types of task-specific sites include floral, faunal, quarry, sacred, and other sites such as wells.... Base camps are more archeologically visible than task-specific sites, which exhibit very little or no visibility (excluding some quarry sites). Therefore, base camps are more highly represented in the archeological record (Vierra 1980a:351).

Applying this typology to the UII excavation sample, Vierra (1980a:355) notes that food-processing, lithic-reduction, tool-manufacture, and tool-use activities are represented. Four patterns of intrasite spatial organization also are suggested: associations of groundstone and/or fire-cracked rock with hearths; lithic reduction, tool-manufacture, and tool-use loci; nonpatterned refuse areas; and activity/refuse areas. On the basis of these observations, Vierra feels that all sites were base camps, not task-specific sites. Vierra further believes that the sites are limited base camps as opposed to home base camps. He also feels that task-specific sites, with their low archeological visibility, are the correlates of isolated artifacts (1980a:356).

Although Vierra's treatment is relatively simple, his use of ethnographic analogy is appropriately cautious. The concept of a limited base camp is of considerable interest. In a sense, it suggests that what other researchers have called limited activity sites may actually represent limited base camps, and that true limited activity sites may in most instances be archeologically invisible. We question, however, the equating of task-specific sites with isolated artifacts, or localities, to use Reher's (1977c:96) term.

In Moore's (1980a) discussion of the San Juan Basin he refines Vierra's typology and makes the interesting statement that home base camps are dependent upon the existence of a reliable surplus of food resources and are not archeologically visible until the advent of maize cultivation (Moore 1980a:360). Moore then discusses the very real analytical difficulty of distinguishing repeated occupations of a site (i.e., limited base camps) from home base camps. Moore's equating of the archeological visibility of home base camps with maize cultivation is interesting, but also open to criticism. It is not supported by studies outside of the United States, in which the equivalent of home base camps, or even semisedentary communities, is documented with no evidence of agriculture as an economic base (e.g., Bar–Yosef 1971; Cauvin 1973; Henry 1973; Marks and Friedel 1977).

Moore (1980a:360–361) then discusses task-specific sites, again noting their low archeological visibility. He concludes that nearly all of the Archaic sites in the UII project area are limited base camps. Many of the larger of these reflect repeated occupations by microbands. Moore supports this by stating that a macroband site (i.e., a home base camp) would be expected to contain deep cultural deposits, a situation not encountered in the UII excavations. Although this may be true, it also would be equally true for limited base camps that were successively reoccupied.

Finally, Miller (1980) critically discusses settlement and subsistence in the UII project area and offers some interesting interpretations of the data, as well as a useful comparison with data from other regions. Building on Vierra's and Moore's discussion of Archaic site types in the UII project area, Miller concludes that the settlement system operant during this period "cannot be described solely by the habitation/special-use dichotomy" (Miller 1980:442). He believes that the Archaic settlement system of the study area consisted of ephemeral campsites and that favorable locales were probably returned to every few years.

Navajo Mine Archaeological Program (NMAP)

The Navajo Mine project (Hogan and Winter 1983) represented additional excavation in the CGP region. As such, it complements the earlier UII excavations. During this project, eight additional Archaic sites were excavated. These excavations strongly confirmed Vierra's and Moore's earlier conclusions, made during the UII project, that microband or limited base camps are the exclusive residential site type in the UII area. However, two of the eight sites excavated did not fall into this category. One represented a locality and the other was a quarry site (Eschman 1983:378). While lending overall support to the macroband/microband typology, the Navajo Mine data do suggest that at least some of the limited activity sites are not archeologically invisible.

Alamito

Excavation on the Alamito Coal Lease near Chaco Canyon included a detailed investigation of Archaic sites (Simmons 1982a). Using a series of lithic indices, a site typology was generated that allowed for a specific functional placement. These indices were based on the proportional occurrences of various classes of complete lithic assemblages (Simmons and Dykeman 1982b:834–841). All of the excavated Archaic sites were regarded as variants of limited duration camps. These are similar to the "limited base camps" defined by Moore (1980a:360). Within this category, however, a considerable amount of variation was detected. Applying the lithic assemblage indices to the Archaic sites, four distinct types were defined. These are: maintenance, hunting, plant-processing, and manufacturing sites. Two additional types also occurred, but these related specifically to isolates and not sites proper. These are: task-specific plant processing loci and task-specific hunting loci. The four site types are briefly defined below, summarizing from Simmons and Dykeman (1982b:842–844).

Maintenance sites suggest a variety of group activities. They are essential general-purpose sites where activities such as plant-processing, hunting, manufacturing, and cooking occurred. These sites contained a generalized tool assemblage, representing both hunting and plant-processing implements. They also contained several features, usually in the form of hearths.

Hunting sites were defined as limited duration camps with a hunting focus. These sites demonstrated a high hunting complex lithic index coupled with a low or nonexistent plant processing index. The tool class diversity index was moderate to high, reflecting a variety of chipped stone tools used for procuring and butchering game. Some of these sites contained hearths.

Plant processing sites were defined as limited duration camps oriented towards the processing of plant foods. These sites were characterized by a high plant processing index, a low hunting complex index, and a low tool class diversity index. Features were occasionally present at these sites.

Manufacturing sites are specialized loci that show an orientation towards chipped stone tool manufacture. Tool kits related to subsistence activities are poorly represented at these sites, if at all. Tools present in any quantity at these sites usually can be explained as artifacts broken during manufacture. Occupation of manufacturing sites is proposed to have been of very short duration; consequently features are rare.

Fifteen aceramic sites were excavated on this project. Four each fell within the maintenance, hunting, and plant processing sites, while the remaining three were manufacturing sites (Simmons and Dykeman 1982b:847).

Redondo Creek

Baker and Winter (1981) examined high altitude adaptations along Redondo Creek in the Jemez Mountains of central New Mexico. Numerous aceramic sites were excavated, resulting in the definition of three sites types subsumed within either limited home base camps and limited special-activity areas. The first type included assemblages with groundstone, evidence of formal tool preparation, and utilized flakes. The second includes sites with only evidence of tool production or tool maintenance. The third type included sites with little evidence of formal tool production (Baker and Heinsch 1981: 71–72). These definitions are all based primarily on lithic analyses (Baker and Heinsch 1981; Moore 1978; Vierra 1978).

Cochiti Reservoir

Cochiti Reservoir in the northern Rio Grande Valley was the scene of another major investigation involving the study of several Archaic sites (Biella 1979; Chapman and Biella 1977; Biella and Chapman 1977a, 1979a). The issue of site typology was not explicitly addressed in this study, but functional considerations were examined. Several activity classes were defined, including procurement, processing, consumption, storage, and maintenance activities (Biella and Chapman 1979b:8–12). Chapman noted that the size of Archaic sites in the Cochiti area varied tremendously, from 8 to 40,000 m^2. He also examined three variables related to Archaic site use: variability in the construction and use of hearths, variability in the manufacture and use of tools, and variability in the spatial distribution of hearths, tools, and tool manufacture by-products (Chapman 1977b, 1979a:65–72).

Site Type Summary

The examples provided above are by no means comprehensive. Virtually every study of Archaic materials includes some discussion of site types. Those summarized above, however, were selected because most represent some of the more innovative and sophisticated approaches yet taken to the problem of Archaic site definition.

The rather lengthy discussion on site typology has been necessary in order to illustrate two points. First, more researchers are critically examining Archaic sites with much more enthusiasm than was the case even a decade ago. This is a positive development, and is beginning to compensate for the earlier neglect of Archaic materials. The second point, however, is that it is clear that little consensus exists with regard to defining Archaic site types. This is a severe deficiency in what should be a basic element of baseline data, and we are forced to agree with Judge's assessment that despite recent emphasis on early sites, "our knowledge of the preceramic periods...is pitably meager" (Judge 1982:45).

In examining the several typologies that have been developed, one question that may reasonably be asked is, Was there really as much variability as these studies suggest? That is, are the frequently quite divergent typologies that have been generated for data within the same general region (e.g., the San Juan Basin) more a construction of varying archeological methods, or do they reflect a remarkably diverse Archaic site structure? This cannot be answered at present, but indications are that, despite some unfiltered archeological noise consisting of a general lack of comparable typological construction methods, a very complex set of sites types does exist. These reflect the broad spectrum economic base of the Archaic. What is certainly clear is that lumping all Archaic sites as lithic scatters, or even as base camps and limited-activity sites is totally inappropriate and inadequate.

Models of Archaic Settlement and Site Distribution

Unlike the Paleo-Indian period, where few sites are known, we have a considerable body of data for the Archaic. Not surprisingly, the majority of these come, once again, from northwestern New Mexico. Many projects there have been large scale investigations, thus settlement pattern and site distribution studies have been able to be undertaken. Perhaps the best way to examine Archaic settlement patterns in this study is to look at some of the various models that have been proposed for the region. These usually rely upon a consideration of Archaic subsistence strategies as site distribution determinants. Much of the following discussion is abstracted from Simmons (1982e, 1982f).

Most researchers regard the Archaic as a reflection of a primary hunting and gathering adaptation to localized environmental settings. Moore (1980a:358–359) cites Schroedl's more specific definition of the Archaic as "a state of migratory hunting and gathering cultures following a seasonal pattern of efficient exploitation of a limited number of selected plant and animal species within a number of different ecozones" (Schroedl 1976:11). The archeological reflection of this type of adaptation should be visible by an examination of settlement patterns and site distribution.

The anthropological literature on worldwide hunter–gatherer adaptive systems is considerable, and archeologists have become interested in articulating ethnographic information with archeological data. Perhaps signaling the beginning of this research orientation was the publication of the seminal work, *Man the Hunter* (Lee and DeVore 1968). This study inspired several ethnographically oriented examinations of prehistoric adaptations. These involved both theoretical and practical applications, including works by Binford (1978a, 1978b, 1980), Gould (1968, 1980), Gould and Yellen (1987), Yellen (1976, 1977) and portions of Bicchieri (1972) and Lee and DeVore (1976), to name but a few.

Although these studies have achieved a considerable degree of refinement, their application to adaptive strategies in the Southwest have been limited. Only recently have researchers attempted explicitly to apply ethnographically derived concepts to Archaic adaptation for the region. Many draw their inspiration from Beardsley's (1956) classic evolutionary model of restricted wandering and community patterning. Elyea and Hogan (1983:398–399), Miller (1980), Moore (1980b: 527–528), Simmons (1982e:884–890), and Winter (1980a) consider some of the more relevant models, and the reader is referred to these works for more detail.

One of the more general and regional models is Judge's (1982) summary discussion of aceramic sites in the San Juan Basin. He concludes that groups there favored upland dunes, elevated ridges, and/or mesas near water resources. He notes that differences within the Archaic indicate that both climatic and adaptive situations were complex and cautions against generalizing about an overall Archaic adaptation (Judge 1982:36).

Fortunately, some more detailed consideration has been given to Archaic settlement since the time of Judge's analysis (which, although published in 1982, was the result of a seminar held in 1979). This has not, however, resulted in any consensus of opinion. For example, we take issue with Winter's belief that:

> most researchers who have worked with Archaic sites in and around the [San Juan] Basin have assumed that the region was a relatively optimal resource zone that provided adequate sustenance for a foraging population. That is, ...they generally assume that the Archaic populations were existing within closed environments which provided more than adequate resources for survival (Winter 1980a:492).

As we interpret this, Winter is implying that most Archaic models are predicated on rather limited population movement, with seasonal rounds not exceeding a relatively limited territory. Winter goes on to cite Wait's (1976a, b) model for the Star Lake area as typical. Quite to the contrary, we find Wait's model the exception rather than the rule.

Briefly, Wait proposed an Archaic subsistence strategy in which microbands lived in an area rich enough to support year-round occupation. He suggested that seasonal movement of the microbands ranged no farther than a few kilometers between winter camps in the pinyon–juniper zone and summer lowland camps. Wait further argued that long distance movement was not possible and that Archaic social organization was incapable of dealing with such movement. Essentially, Wait's model involved limited seasonal movement within a fairly restricted area, allowing year-round occupation of that area.

Contrary to this, most other models of the San Juan Basin Archaic argue for only seasonal occupation of specific regions, citing environmental marginality as a factor that would have prohibited long term, extensive occupation of any one region (e.g., Baker and Sessions 1979; Kirkpatrick 1980a; Reher 1977c; Reher and Witter 1977; Sessions 1979). Many of these models are based on a consideration of vegetative diversity and site location (e.g., Baker and Sessions 1979; Reher and Witter 1977; Sessions 1979). Although each model differs, the basic theme of seasonal occupation remains constant.

Thus, there have been two principal approaches to explaining Archaic adaptations in the San Juan Basin, and, by extension, the entire study area. One, exemplified by Wait (1976b), proposes seasonal movement within, but year-round occupation of a relatively restricted area. The other approach considers the San Juan Basin as too marginal to have allowed year-round occupation within any given small region.

Some of the most sophisticated treatment of the Archaic in the Southwest to date has been by researchers associated with the long term CGP/UII/NMAP Project, which is located south of Farmington, New Mexico (Hogan and Winter 1983; Moore and Winter 1980; Reher 1977a). While not without dissenting opinions, their work represents a badly needed attempt to understand the Archaic from a perspective of human adaptation. This study also represents a long term commitment to research in the same area by essentially the same group of people. It is worthwhile to consider the way these researchers have viewed the Archaic through the duration of this project.

Certainly one of the most enduring Archaic models is the vegetative diversity model proposed by Reher and Witter (1977; Reher 1977c) during the initial stages (i.e., survey) of the CGP/UII/NMAP studies. A principal assumption of this model was that since Archaic hunters and gatherers used a wide variety of floral and faunal resources, their sites should be located in diverse environmental settings, which would give them access to a broad spectrum of resources. It was argued that Archaic sites would, accordingly, be located in regions of the greatest vegetative diversity, which, in the CGP area, represented areas associated with sand dunes. Reher and Witter (1977) further suggested that the diverse resource base area would have supported macroband base camps occupations during the summer, spring, and fall. Other Archaic residential and limited use sites were believed to have been the remnants of smaller groups exploiting other diverse resource areas.

Further research in the region tested the vegetative diversity model. Several authors claimed, based upon excavation as opposed to the less precise survey data, that the model was inappropriate (e.g., Eschman 1983; Elyea and Hogan 1983; Moore 1980a; Vierra 1980a). In a study outside of the San Juan Basin, Chapman (1979b) also tested the vegetative diversity model and found that it could not be supported in the Cochiti Reservoir region. Rather, he suggested methodological refinements that would consider vegetative diversity as but one variable. It would, however, be folly to completely reject the vegetative diversity model. Toll and Cully suggest that Reher and Witter:

> may in fact have been on the right track, but on the wrong scale. They proposed that high vegetative diversity (variety of exploitable plant species) was the primary factor conditioning the observed correlation of Archaic sites with dune locations. Another way of viewing this association is simply that dunes are the loci of two taxa (Indian ricegrass and dropseed) known to be emphasized in the local Archaic subsistence repertoire. Indeed, all evidence available to us now points to a narrow, rather than diverse, spectrum of utilized plant products. Vegetative diversity may be a good discriminating tool for predicting Archaic population flow in relation to resource procurement on a regional scale, however (Toll and Cully 1983:390–391).

In a related study, Vierra (1980b) discusses in some detail the Archaic of the area. He very properly notes a common misconception of Archaic adaptation: the often assumed, but rarely demonstrated, dichotomy of habitation sites and special-use, or nonhabitation, sites. Vierra thinks that this dichotomy may be inappropriate and instead posits the existence of three site types: home base camps, limited base camps, and task-specific sites (1980b:354–355) (see earlier discussion on site types). Vierra then develops an Archaic model based on ethnographic comparisons and concludes that home base camps associated with macrobands did not exist in the UII area. Rather, limited base camps, which he correlates with microbands, are the prevalent site type, although task-specific sites also were extant prehistorically but left little in the way of archeologically detectable remains. Finally, Vierra's attempt to understand the workings of the Archaic settlement system, as opposed to a purely descriptive treatment of settlement pattern, is important.

Moore (1980a) proposes a model based on a settlement pattern predicated upon the seasonal availability of various resources. He concludes that microbands inhabited the UII area for only short periods during late summer, when plant resource availability was at its peak. Moore also provides an important discussion of vegetative diversity, introducing water as a critical variable influencing site location as well as vegetation distribution. In considering environmental factors, Moore concludes that a number of related factors determined site location. Moore finally posits that Archaic peoples in the San Juan Basin may have participated in widespread, but informal, communication networks.

Miller (1980) presents a critical discussion of settlement and subsistence in the San Juan Basin, portions of which are devoted to the Archaic. He cites the lack of midlevel theory in most studies and offers suggestions for research directions. He also summarizes other major Archaic studies in the Basin.

Winter (1980a) offers a lengthy discussion of human adaptation in marginal environments. Although much of this is devoted to the Anasazi occupation of the UII project area, Winter does pay considerable attention to the Archaic as well. Relying heavily on the concept of marginality, he proposes a model of local Archaic adaptations that emphasizes a regional economic approach. Winter proposes that Archaic inhabitants of the area were dependent upon the existence of an "extended network exchange system" (Winter 1980a:511). Owing to the area's marginality, he feels that even the limited seasonal excursions into the region relied on outside support, stating that "it is likely that outside sources of food, clothing, tools, information and personnel were required to support even these temporary visits" (Winter 1980a:502). He concludes that Archaic use of the area was dependent on an extended network exchange system, and that survival was insured by seasonal movements across several habitats. The bounds of the system would have been defined by the availability of scarce resources, including food, information and people (Winter 1980a:511).

In the most recent phase of research in the CGP/UII/NMAP area (i.e., NMAP), Eschman critically examines earlier settlement models and is able to offer another refinement. He proposed a model based on vegetative abundance. Accordingly, "residences might have been preferentially located in areas where the plant communities were most abundant rather than in areas where the plant communities were the most diverse" (Eschman 1983:381). In the same volume, though, Toll and Cully (1983) discuss Archaic subsistence and settlement and conclude that exploitation was oriented towards a narrow spectrum of resources from the immediate environment.

Also in the same volume, Elyea and Hogan (1983) rely heavily upon Binford's (1980) (see below) hunter/gatherer settlement scenario for developing a regionally based model for the Archaic. They conclude that neither the restricted nor the nonrestricted models are adequate to address the organizing principles of Archaic settlement–subsistence systems. These conflicting interpretations are related primarily to the size of the annual range needed to encompass all of the seasonally available resources required during an annual cycle. Areas with major resource zones in close proximity would allow for a group's extended range to be smaller than in areas where the seasonal resource zones are more widely separated. They note that the difference in range sizes does not necessarily signify any essential difference in the settlement–subsistence strategy (Elyea and Hogan 1983:400).

Leaving the CGP/UII/NMAP area, Biella and Chapman, in an unpublished research design (1980) summarize elementary settlement models for the Archaic. Essentially, they envision three models, the last of which is a composite of the first two. Most researchers working in the Southwest have posited variants of the first two models that Biella and Chapman discuss. The first, and most popular, is that of a large base camp (macroband camp) surrounded by support, or task-specific, camps. Jochim perhaps best characterizes this settlement pattern: "a common response by hunter–gatherers is to place the base camp near the secure resources and to widen its catchment by establishing satellite extraction camps near the more mobile, high-prestige resource" (Jochim 1976:63).

A second, alternate approach, suggested by Vierra (1980b), involves the concept of limited base camps. In this model, task-specific sites are not important components; rather, the limited base camps, occupied by microbands, are the primary site type, and these are distributed across the landscape on a seasonal basis, in response to resource availability. Although task-specific sites may have been associated with limited base camps, these, according to Vierra, are no longer archeologically detectable.

The third model, which Biella and Chapman (1980:41) refer to as the "generalized desert hunter–gatherer model," is a synthetic construct that incorporates aspects of the first two models. This model posits several base camps, most of which are surrounded by task-specific and support camps.

All three models are based on seasonal movement. The arrangement and dispersal of specific site types are strongly correlated with seasonal availability of critical resources and with the extractive mechanisms by which Archaic groups exploited such resources. In many ways, the third model is the most satisfying, since it allows for a wide adaptive response and can account for most observable site types. As should be apparent from the preceding discussion, however, no one model will be applicable to the entire study area, and one must construct various explanatory devices in accordance with the patterning of the archeological remains extant within any given region.

One final model to be considered here relies heavily on Binford (1980). Although Binford's scenario is not directly applicable to the study area, variants of it have been incorporated into models used by some researchers (e.g., Elyea and Hogan 1983; Reynolds 1980:5-30 to 5-31). The last model to be considered here attempts to explain the initial incorporation of cultigens into the local economy (Simmons 1982e, 1986).

Essentially, Binford recognizes two distinct strategies that hunters and gatherers could have implemented. The first, foraging, is represented by residential bases and locations. These are the archeological equivalents of base camps, the hub of subsistence activities, and task-specific sites, where extractive activities are carried out (Binford 1980:9). Foragers map on to economic resources by moving consumers to the resources. Binford (1980:9–10) states that "foragers generally have high residential mobility, low-bulk inputs, and regular daily food-procurement strategies.... this type of system has received the greatest amount of ethnoarcheological attention." In contrast, the second strategy, collecting, is implemented by logistically organized groups who "supply themselves with specific resources through specifically organized task groups" (Binford 1980:10). Such strategies are represented by a more diversified archeological record, and in addition to residential bases and locations at least three other site types—field camps, stations, and caches—also occur. Frequently, sites reflecting a collecting strategy will be highly visible archeologically.

Although Binford's model may be difficult to apply critically to many archeological situations, it nonetheless has significant implications with regard to the manner in which we regard archeological assemblages. Of particular interest is the distinction that Binford (1978a:483, 1980:17) makes between coarse grained and fine grained resolutions. The former can represent either long term or repeated occupations of a site, whereas the latter represent an assemblage accumulated over a short time. This clearly has implications for many of the Archaic sites in the study area, especially with regard to macroband and microband base camps and task-specific sites.

Drawing on many of Binford's arguments, Simmons (1982e, 1986) recently has proposed a model for the middle to late Archaic of the greater Chaco Canyon region. This model of regional specialization, incorporating both foraging and collecting elements, was specifically developed to account for the initial introduction of cultigens into the area around 2000 B.C. In this model, maize was viewed as one supplemental resource used by small bands of Archaic people. The settlement pattern practiced by these people involved seasonal movement from open grassland areas to the more sheltered regions of nearby canyons to the west. This latter area was occupied during the winter, when rockshelters would have provided some protection against the harsh weather. The grassland area would have been occupied during the late spring and early summer, when several wild resources were plentiful. This is when maize was planted, to be harvested during the fall prior to the onset of winter. During the fall, the maize was processed and served as a supplemental survival resource during the winter, a time of resource scarcity. This adaptation is viewed as a successful adaptive strategy involving the optimal scheduling of a variety of resources.

Figure 9 schematically illustrates this model. In this model, the impact of limited horticulture is not considered to have dramatically altered the extant Archaic lifestyle. It was an efficient adaptation for over 2000 years prior to the intensification of maize use from a secondary to a primary resource.

The Concept of Marginality

All of the models discussed above have appealing elements. There is a pervasive theme in most that revolves around the concept of marginality. Some researchers have questioned whether or not this concept is entirely appropriate (e.g., Eschman 1983:381; Simmons 1982e:889–890).

On the basis of ecological concepts, a marginal environment is defined as "locations in which successful, permanent survival is impossible" (Winter 1980a:484); in terms of human occupation, a marginal environment is defined as "one that cannot support a permanent human population within its boundaries" (Moore and Harlow 1980:15). Such a definition of marginality may be useful for nonhuman species, but it is not necessarily and directly applicable to human groups. It does not consider the cultural buffer as strongly as it should and not enough weight is attached to cultural responses and perceptions of marginality. Certainly, one culture's concept of marginality may not be another's, as Winter (1980a:499) acknowledges; a marginal environment might have been perceived very differently within an Archaic adaptive strategy as opposed to an Anasazi one. The definition of marginality in the CGP/UII/NMAP volumes is further hampered by imprecise boundaries; that is, how large an area is being referred to? Thus, the use of marginality, as defined in Moore and Winter (1980), may be much too restrictive. It rests on assumptions that may not be applicable to human groups, and also assumes that permanent occupation could not take place in a marginal environment. Although this may well be the case in some instances, it requires documentation.

There appears to be a trend in much contemporary archeological research to regard any project area as marginal. This is pervasive for much of the study area, which covers a remarkably diverse set of environments. One must ask that if each region that has been studied by archeologists is considered marginal and uninhabitable during certain times of the year (primarily the winter), where did these people go? If, for example, the San Juan Basin could not have been occupied during the winter, as many researchers suggest, it seems unlikely that groups would have migrated to the more mountainous regions surrounding the Basin, since these, too, would have been uninhabitable during the winter months. Many groups may have seasonally dispersed southward to warmer climates. Indeed, there is evidence of contact with Chiricahua Archaic groups, if one relies on projectile point comparisons (see previous discussion), but would such long distance movements have been possible or desirable on an annual basis?

Researchers must be careful not to fall into the trap of assuming environmental constraints that might not have existed. Clearly, many areas of the prehistoric Southwest were, and are, marginal, and successful adaptation to these required specialized adaptive strategies. We question, however, the utility of defining marginality in such a restrictive sense as to preclude year-round (or permanent) occupation. This is supported by neither ethnographic nor archeological data. If one fully accepts the definition of marginality as stated in Moore and Winter (1980), an environment as desolate as the Western Australian desert would not be marginal, since Aborigines have been living there permanently for thousands of years. Likewise, areas such as the Negev Desert of Palestine, certainly marginal by most standards, witnessed intense and permanent occupation for thousands of years (e.g., Marks and Friedel 1977; Marks and Simmons 1977; Simmons 1981b). In summary, one must object to the a priori assumption that Archaic groups could not permanently have occupied many portions of the study area.

Economy

Aspects of Archaic economy already have been alluded to in the preceding discussions on site type and settlement models. Central to all consideration of Archaic economy is the assumption that it was oriented towards the efficient

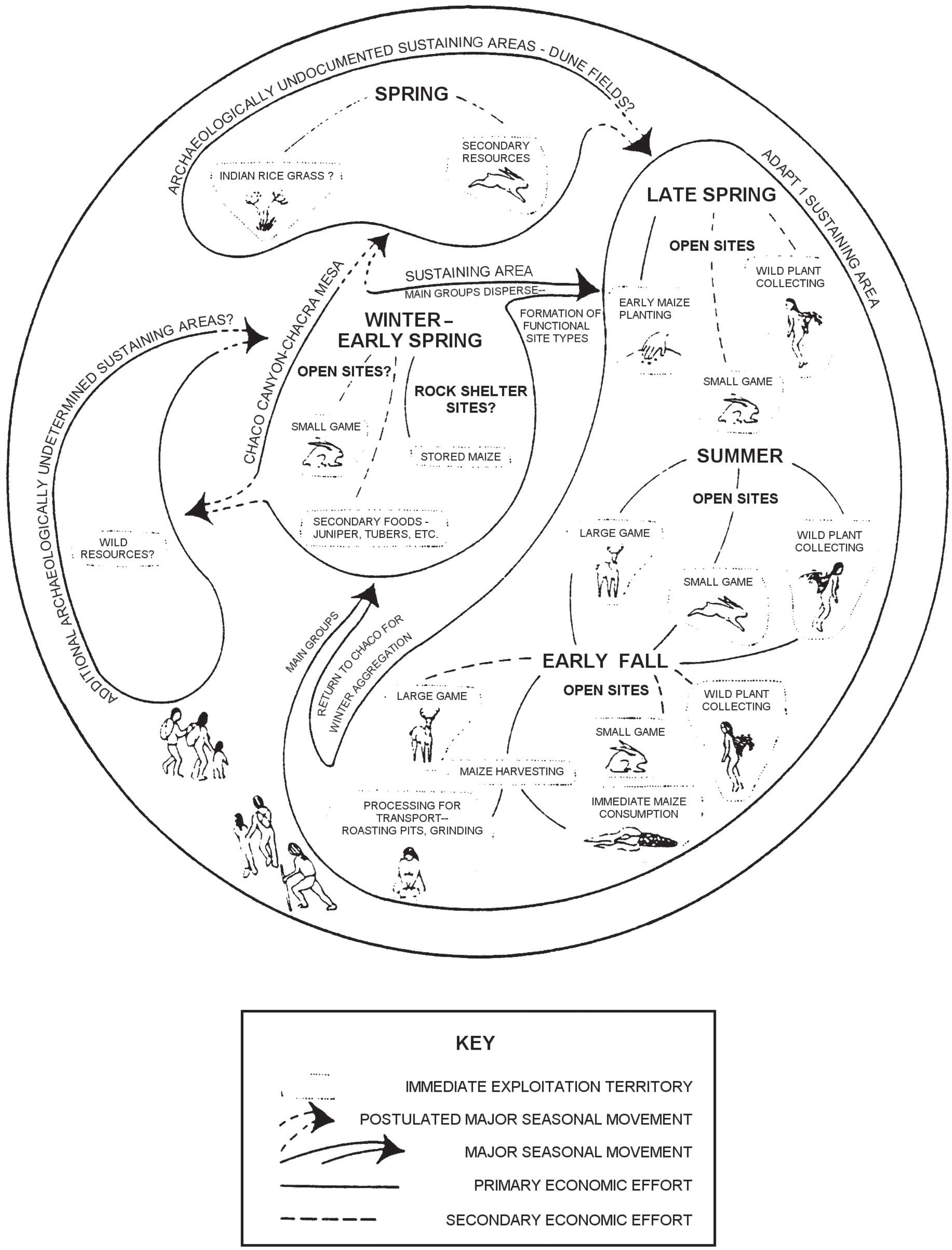


Figure 9. Proposed model of the Archaic occupation of the greater Chaco Canyon region (from Simmons 1982d:917)

collection of seasonally available wild plants and the hunting of wild fauna. While most researchers would accept this assumption, there is little consensus beyond it. For example, in the same volume one author believes that Archaic subsistence was characterized by vegetative abundance (Eschman 1983:3380), while another set concludes that a narrow resource base is a more accurate reflection (Toll and Cully 1983). Such disagreement is healthy and in many cases reflects semantic differences. But, it is clear that if we are to be able to precisely examine Archaic adaptations, it is essential to have more information than the fact that these groups were simply hunters and gatherers.

Steps recently have been taken to flesh out this generalization. Earlier studies frequently did not devote much effort towards retrieving actual economic data in the (incorrect) belief that such information was not present or preserved, especially in open air sites (as opposed to rockshelters). Economic reconstructions were based largely on inferences drawn from site location and from artifacts. These are, of course, important variables to consider in reconstructing Archaic economies. But, as recent studies have clearly shown, economic data frequently are preserved in the archeological record if appropriate recovery techniques are employed.

Actual economic data, primarily in the form of plant remains, but also consisting of hunted fauna, have been recovered in Archaic contexts. This traditionally has come from caves or rockshelters, where preservation is good. These sites include Bat Cave (Dick 1965a; Wills et al. 1982; Wills 1985), Tularosa Cave (Heller 1976; Martin et al. 1952), Cordova Cave (Martin et al. 1952), Sheep Camp Shelter and Ashislepah Cave (Simmons 1984), Boca Negra Cave (Galinant et al. 1970), Fresnal Shelter (Carmichael 1982; Wimberly 1972), En Medio and Armijo Shelters (Irwin–Williams 1973; Irwin–Williams and Thompkins 1968), and Tornillo and Roller Skate Shelters (Upham et al. 1987). More surprisingly, however, has been the documentation of macrobotanical remains from open air Archaic sites (e.g., Donaldson 1982; Toll 1982; Toll and Cully 1983). In addition, economic pollen from open air sites has also contributed significantly to defining Archaic subsistence practices (e.g., Fish 1982; Fish et al. 1986).

While the amount of economic data recovered from these sites is usually not impressive, it does offer firm evidence of Archaic subsistence. Not surprisingly, the plants that appear to have been favored by Archaic groups are those seasonally available in the immediate region; they usually are associated with dune areas. *Chenopodium sp.* appears to have been a favored resource (e.g., Donaldson 1982:171; Struever and Knight 1979) in the NIIP and Chaco areas respectively. In the NMAP project area, Indian ricegrass and dropseed have been documented in Archaic contexts (Toll and Cully 1983). Other techniques, such as site catchment analysis, also have helped define Archaic subsistence (e.g., Simmons 1982f).

The Introduction of Cultigens into the Southwest

One aspect of late Archaic economy requires additional discussion. This involves the introduction of cultigens into the subsistence base. This was an extremely significant event, for it set the stage for subsequent cultural developments. It also is a very controversial issue, with two opposing schools of thought. One believes that the introduction occurred early (ca 2000 B.C.), while the other believes this was a relatively recent event (e.g., ca 500 B.C. or later). The issue is summarized by several authors (e.g., Cordell 1984:169–180; Simmons 1982e: 910–915, 1986), and it is far from resolved.

The origin and development of agriculturally based economies in the Southwest has been of major interest to archeologists for several years. Ever since Dick's (1965a) excavations at Bat Cave in central New Mexico, many researchers have believed that the presence of maize in the Southwest dates to several centuries, if not millennia, before the birth of Christ. And yet, economic systems based on food production do not appear to have occurred until Basketmaker times, and even then the exploitation of wild food resources continued to be important.

When and where maize and other cultigens were introduced into the Southwest remains an unresolved issue. That this introduction was originally from Meso-America is unquestioned, but that is about where consensus of opinion stops. Although many researchers believe that maize was present in the Southwest by 1500–2000 B.C., if not earlier (Irwin–Williams 1973:9; Woodbury and Zubrow 1979:43), supporting archeological data are rare. The ca 3600 B.C. dates from Bat Cave are now known not to be directly associated with maize. The original claims for early cultigens ignored problems with the site's complex stratigraphy and rodent disturbance (Berry 1982; Wills et al. 1982; Wills 1985). Another presumably early site, Fresnal Shelter (Carmichael 1982; Wimberly 1972) in southeastern New Mexico, has produced evidence of maize that date to ca 1500 B.C., but pending publication of the results of the excavations, the significance of these findings is difficult to substantiate (cf. Berry 1982).

Irwin–Williams (1973:9) believes that maize was initially introduced during the Armijo phase. Supporting data of a specific nature are not yet available, however. In the southern Southwest, Haury (1957) also has indicated that maize was in use by ca 2000 B.C. at Cienega Creek, a site belonging to the Cochise culture. Recent reevaluation of chronological information, however, suggests that the reported dates from several of these sites may in fact be far too early (Berry 1982). There has been a recent well argued, if conservative, trend to view the advent of maize in the Southwest as a relatively recent occurrence (e.g., Berry 1982; Ford 1981; Minnis 1985).

Both Berry's and Minnis' works are important critiques of the evidence for early maize in the Southwest. Berry (1982, 1985) argues persuasively against the majority of the cases for early cultigens. Using tree-ring, radiocarbon, and stratigraphic evidence, he convincingly shows that the majority of early sites that have been claimed to contain maize do not stand up well to critical scrutiny. He then proposes that population movement in the northern Southwest was more considerable than previously thought, and that major events in Anasazi prehistory, including the adoption of agriculture, were characterized by abrupt and episodic transitions (Berry 1982:33). Berry has, however, been strongly criticized by several authors (e.g., Dean 1985; Irwin–Williams 1985; Simmons 1986).

Minnis (1985) also discusses the early role of agriculture. He, too, offers convincing arguments against the uncritical acceptance of many claims for the antiquity of maize, concluding that the earliest well documented case is Jemez Cave in New Mexico, where maize is dated to ca 700 B.C. The thrust of Minnis' work, however, is on the role that agriculture may have played in early Southwestern society. He stresses that there are a number of forms of plant domestication, and that the use of domestic plants by indigenous peoples will vary with their needs, the availability of other resources, environmental constraints, and population density.

Despite Minnis' and Berry's reservations, several recently investigated sites suggest that this use was, in fact, quite early, although economic dependence on food production may have occurred relatively late. Two projects in the San Juan Basin and one in south-central New Mexico provide supporting evidence for an early use of cultigens.

In the San Juan Basin, the presence of maize and squash, two of the three classic Southwestern cultigens (the third is beans), has been documented (Simmons 1982a, 1984, 1986) at early dates. Pollen evidence of maize was recovered from Archaic hearths at two sites dating to ca 1700–2000 B.C. (Fish 1982; Simmons 1986). Pollen data, however, are considered by some as inadequate to support a clear use of maize. However, on the same projects, macrobotanical specimens clearly point to an early usage. The earliest macrobotanical samples of maize were dated to 770 B.C. at one site, while at another squash was dated to 950 B.C. (Simmons 1986:79). Even discarding the pollen evidence, these are among the earliest documented cultigens in the Southwest.

Another recent project has also documented the macrobotanical presence of maize at ca 1200 B.C. in south-central New Mexico (Upham et al. 1987). Archeological details of this investigation are still sketchy, but it once again appears to support Irwin–Williams' (1973) original contention that cultigens were introduced early rather than late.

Two other recent studies in southeastern Arizona have yielded relatively early maize remains at ca 500 B.C. (Fish et al. 1986) and at ca 40 B.C. (Huckell 1984:197). While these dates are not extremely early, they are contributing to a growing data base that should help document the initial use and impact of cultigens on Southwestern economies.

With the advent of the tandem accelerator mass spectrometry (TAMS) method of radiocarbon dating, it has been possible to date very small samples. This allows the dating of single specimens of cultigens and promises to help resolve the controversy.

What is important to realize in considering this issue is not when cultigens were introduced, but rather their effect on indigenous economies. Simmons (1982e, 1984, 1986) has addressed this in detail, noting that in the Chaco area none of the sites with early cultigens contain the accouterments normally associated with agriculture. The suggestion that maize initially represented a secondary resource has already been discussed. In this sense, limited horticulture rather than intensive agriculture may be a more accurate characterization. Certainly, this is a complex issue and will continue to occupy the attention of researchers for some time. It seems apparent that the necessary prerequisites for agriculture were in place long before there was a full implementation of this economic strategy. The reasons for this lag are not yet known, but it represents one of the most intriguing problems in Southwestern prehistory.

Social Structure and Population Dynamics

As with the preceding Paleo-Indian period, there is little direct information intact in Archaic sites that can precisely address questions of social structure and organization or population dynamics. Even with the recent surge of interest in Archaic studies, few researchers have been tempted to tackle this issue. The study of social structure and population dynamics is perhaps one of the most difficult to document archeologically, especially when dealing with groups who left few traces.

Human burials, which can provide excellent information about social structures, are notoriously rare in the Archaic. Irwin–Williams (1967) notes that burials under rock cairns are a general practice (for the Picosa as a whole), but provides little supporting data. She also notes that Archaic cremations have been excavated. Perhaps the largest population of Archaic burials is from the Cienega Creek site in southern Arizona, where Haury (1957) identified 43 cremations in a large pit. This large number could indicate continued reoccupation of the same locality by the same social group (Minnis and Nelson 1980:90). Clearly, the very fact that cremation was a burial practice has social implications. By and large, though, there is little information available on Archaic burials, and thus few social implications can be derived.

A similar situation exists regarding Archaic structures. Residential units can provide excellent social structure information. Unfortunately, as noted earlier, few Archaic structures have been documented, so once again this is an information source of limited value.

Inevitably, most reconstructions of Archaic social structure or social organization rely on ethnographic comparison of hunters and gatherers. Aspects of Archaic social structure already have been addressed in earlier discussions on site types and settlement models and need not be repeated here. As Elyea and Hogan (1983:400) suggest, the social organization of hunters and gatherers often is characterized by three nested social groups. The minimal unit is the domestic group, which consists of a nuclear or extended family. The minimum band (cf. Steward 1938) consists of several households and usually contains around 25 individuals. The largest social unit is the maximum band (cf. Steward 1938), which is primarily based on intermarriage, visiting, and other forms of social interaction. The size of a maximum band frequently averages between 300 to 500 individuals. A maximum band also is "the largest social unit in which regular exchange relations are maintained. It is also the level at which the implications of the extended exchange network are most appropriately assessed" (Elyea and Hogan 1983:400). It is from this general perspective, and at this level, that most researchers have dealt with the Archaic.

One aspect of social interaction that is at least partially detectable in the archeological record involves trade and exchange networks. There is evidence, in the form of nonlocal artifacts and raw materials, that Archaic groups were not so isolated as to be ignorant of other groups in other areas. Both Winter (1980a) and Elyea and Hogan (1983) deal with this in some detail, suggesting interregional trade patterns.

Examining population dynamics, there is slightly better evidence to suggest at least general trends. Yet the situation is far from clear, and one must rely on several studies outside of the project area for examples. Estimating the population of hunters and gatherers is a difficult and frustrating task that is not facilitated by an incomplete archeological record. Although archeologists have been able to estimate the size of some prehistoric populations from the size and number of structures (e.g., Cook and Heizer 1965, 1968; Naroll 1962), this is not possible with hunter–gatherers since their remains typically lack structures that are preserved in the archeological record.

In most of the study area, a semi-arid environment is characteristic, and overall Archaic population density probably always was relatively low. In such environments, the scarcity and sparse distribution of resources, plus a low yield and seasonal unpredictability, are best managed by small groups with frequent seasonal movements (Hassan 1981:180). The definition of small is difficult to quantify, but ethnographic and archeological estimates suggest a range of 15–50 individuals, with a mean of 25 (i.e., Stewart's minimum band). This number seems to be a constant, regardless of population density, environment, or time period, if one follows Stewart's (1938) classic study of Great Basin groups. Other researchers, however, derive other figures. For example, Binford (1980:7) believes that the smallest foraging groups would be made up of as few as five to ten individuals, while Calhoun (1970:122) estimates that 12 adults form a minimal stable unit. What must be considered here is the fluid composition of many hunter and gatherer groups. During certain times of the year, group size may increase, whereas at other times it may decrease (Simmons 1982e:903).

In an admittedly speculative treatment, Simmons (1982e: 903–906) has suggested population figures for the San Juan Basin during the Archaic, relying strongly on Hassan's (1981) model. He concludes that at any one time during the San Juan Basin Archaic, one can calculate a population of between 630 to 3,060 individuals, or, using an average band size of 25 individuals, 25.2 to 122.4 bands. While this is a very tenuous conclusion based on a weak data base, it does suggest that the San Juan Basin could never have supported a hunting and gathering population exceeding about 3,000 people. Leaving such speculation behind for the moment, most researchers think that there was population growth throughout the Archaic's long tenure, culminating in relatively high densities during the late Archaic (e.g., Irwin–Williams 1973; Reher 1977c). This is in no small part attributed to the incorporation of agricultural strategies into the economy, which allowed for sedentism (or at least semisedentism). It is likely that this general scenario is essentially correct, but supporting data are far from convincing. For example, if one examines Archaic phase information available for much of the San Juan Basin, the highest number of sites appears to occur during the San Jose phase, or middle Archaic (Elyea and Hogan 1983:396; Simmons 1981a:15–16). Interestingly, though, what little information is available for the central San Juan Basin (i.e., the Chaco Canyon area) suggests a reversal to this trend, with more sites occurring during the late Archaic (i.e., Armijo and En Medio phases), a pattern also suggested for the Arroyo Cuervo area to the south (Irwin–Williams 1973). This is interesting because if agriculture was initially experimented with in the Chaco area during the late Archaic, one might expect an increase in the number of sites (Simmons 1981a:16). On the other hand, it is dangerous to equate number of sites with population density. More sites do not necessarily mean a higher population. In fact, a reduction in the number of sites could reflect a shift to sedentism and agriculture, where sites might be expected to be larger, but fewer in number, than previously (Elyea and Hogan 1983:398).

In any event, caution must be exercised in proposing such scenarios. Archaic chronology is far from refined, and much of it is based on survey data where presumably diagnostic artifacts allow for a phase placement. This is less than satisfactory. Even when examining the numerous radiocarbon dates presently available, which also suggest a late emphasis, one must be aware of possible distorting factors. For example, the abundance of late dates might simply reflect the increased archeological visibility and preservation at later sites.

Over the 6,000 year time span encompassed by the Archaic, it is virtually certain that population density fluctuated, although a general increase through time is likely. Once cultigens were introduced, this increase may have expanded considerably, although this is not apparent until post-Archaic times. As Elyea and Hogan (1983:398) aptly state "[A]dditional information from both late Archaic and early sedentary sites is clearly necessary to assess the trend further."

Problem Areas in Archaic Archeology

At the beginning of this chapter, we indicated that the Archaic, until quite recently, has been ignored by most researchers. Over the past decade, this situation has changed dramatically, as the bulk of this chapter has attempted to illustrate. A considerable Archaic literature now exits for the Southwest. This, however, does not necessary mean that we know a lot more about the Archaic than previously. In point of fact, we do, but this increase in knowledge has not been proportional to the increase in Archaic studies. There still are major gaps in our understanding of the Archaic. Some of these are so fundamental that they must be filled prior to more precise treatment of the Archaic, while others relate to more sophisticated questions of Archaic adaptation. These deficiencies have been specially addressed by Judge (1982) and Simmons (1981a). These two studies address concerns relevant to both management and research concerns.

Judge (1982:6–7) recognized that, at a minimum, there are three categories of aceramic base line data that desperately require attention. These are: chronological placement of sites, site distribution, and site types.

Despite an abundance of recently obtained radiocarbon dates, Judge is correct in assessing that our knowledge of Archaic archeology is limited. He notes that absolute chronological control is desirable, but that relative placement is essential to proper management. Additionally, the establishment of even a rough contemporaneity of sites is important (Judge 1982:6).

In assessing the deficiency of site distribution base line data, Judge feels that the region (the San Juan Basin in this case) should be generalized into ecological zones that are relevant to past subsistence strategies. Within such zones, known archeological sites should be accurately located. If less than 100 percent inventory has been completed (which generally is the case), the nature and representativeness of the sample within the ecozone and region should be identified (Judge 1982:6).

The determination of basic site type is essential to both proper management and research issues. Minimally, the distinction between habitation and nonhabitation sites should be made, and the criteria used for such a classification should be clearly identified (Judge 1982:7).

How has the current spate of studies focusing on the Archaic contributed to establishing these base line data? Progress is rapidly being made, as has been indicated in the preceding discussion. We currently have several radiocarbon dates for the Archaic, and efforts are being made to more precisely provide relative placements. Site distribution studies are common, although consensus of opinion is not. Most researchers working with Archaic materials have been able to generate site types more sophisticated than habitation and nonhabitation. In short, it would appear that the deficiencies noted by Judge are being rectified.

In another study examining the Archaic, Simmons (1981a) has identified several problems facing researchers and managers. He cites six issues that are relevant from both theoretical and methodological perspectives.

Site Identification

One basic problem facing those dealing with Archaic materials is the seemingly simple task of identifying a site as Archaic. Many aceramic sites (i.e., those lacking ceramics) cannot a priori be assumed to represent Archaic occurrences. They could be Paleo-Indian sites lacking diagnostics. Furthermore, a site without ceramics is not necessarily preceramic in cultural terms: such sites could represent specialized, nonceramic facies of later groups (cf. Cordell 1979a:23–24; Wilson 1979:115–116).

Until recently, the investigation of small aceramic open-air artifact scatters was not considered interesting and was largely ignored. Even many of the early Archaic studies focused on sites with clear diagnostics and/or with stratigraphy (i.e., rockshelters). When forced to deal with the smaller aceramic sites, frequently lacking diagnostics, researchers often assumed them to be Archaic. While this may be the case in many instances, it is a tenuous assumption to make without supporting evidence. Analytical methods of dealing with this issue should be given priority for those working with aceramic materials.

The most readily available analytic treatment for determining whether or not a site is Archaic is in lithic analysis. Prior studies all too frequently emphasized tools to the exclusion of waste material, or debitage and debris. Recent investigations, however, have emphasized analysis of complete assemblages, and these will assist greatly in the basic task of discriminating Archaic materials from those of other cultural periods.

In a related vein, the concept of site recently has been questioned, especially as it relates to the low visibility remains of Archaic hunters and gatherers. Researchers have always been at a loss on how to deal with isolated artifacts. These constitute an integral part of past cultural systems, but should they be regarded as sites. An adequate way to deal with isolated artifacts also should be a priority. Coupled with the site issue is actual site definition. Some researchers have advocated non-site approaches (e.g., Dunnell and Dancey 1983; Foley 1981; Thomas 1975). Irwin–Williams and her colleagues have suggested the use of a density dependent method, instead of the traditional site method, as a way of dealing with low visibility archeological materials, such as those that frequently characterize the Archaic (Irwin–Williams et al. n.d.). These approaches promise to add to the sophistication in dealing with the Archaic.

Chronology

This issue has already been discussed above. It is sufficient here to indicate that additional absolute and relative chronologies are essential. Not only is it necessary to be able to date a site as Archaic, but it is desirable, realizing that the Archaic spans some 6000 years, to have firmer chronological control and make phase placements.

Site Function

Site function is related to Judge's (1982) discussion on site types. Although progress is being made in defining site types and function, it is a complicated task and little agreement exists among researchers. One problem related to site function needs to be singled out. In some cases, site functions have been defined on the basis of survey data alone. This can be very distorting. Once excavation is undertaken, the nature of many sites changes dramatically from what survey data suggested. This clearly has implications for deriving precise functional interpretations from survey data alone.

The Resolution of Survey and Excavation Data

The problem of site function leads directly to another issue inhibiting a better understanding of the Archaic: resolving survey and excavation data. As just indicated, survey information is not always an accurate mirror of excavation results. It is becoming clear that using survey information alone in assessing Archaic adaptations can blind researchers with a distorting survey mask. Sometimes the discrepancies between survey and excavation data are so severe that to use only the former in reconstructing Archaic adaptive strategies is to ensure spurious results.

Collection and No-Collection Strategies

This is an issue plaguing all archeological surveys. Should artifacts be collected or left in place during survey? Collection vs. no collection strategies are often dependent on contract stipulations, research orientation, management considerations, and whether or not an area will be returned to with excavation as a goal.

Related to this problem is the concept of in-field analysis if collection is not to be undertaken. While such analyses can be useful if they are carefully structured, one must exercise extreme caution in their implementation. Variables affecting in-field analysis include recording comparability between personnel; pressure to record sites (and artifacts) quickly; field conditions, such as heat or wind that could affect an individual's judgment; dirty artifacts where critical attributes cannot be identified without cleaning; low or misleading surface visibility; and inexperienced personnel doing the recording. If we are to develop methods for critically dealing with aceramic sites, lithic analyses need to be conducted by trained personnel under controlled laboratory conditions.

We are not necessarily advocating a systematic collection policy here. Indeed, in most cases, it seems desirable not to collect artifacts on surveys. Collection policies can be detrimental to research interests as well as to the resource itself. All too often if artifacts are collected and a site is returned to later for excavation, it is difficult to reconcile the collection and excavation data. Again, there is no easy answer to this issue, but collection and no-collection strategies need to be carefully thought out.

Data Recovery and Analysis Methodology

A final issue relevant to understanding the Archaic is data recovery itself. While difficulties exist with survey data, they can be compounded once excavation is undertaken. Excavation strategies and resultant data must be critically examined. We do not advocate requiring all sites to be excavated the same way. This clearly would be counterproductive. On the other hand, the disparity in excavation and analysis techniques apparent from reading the literature is remarkable. It is critical that some degree of comparability be established so that the results from one project can realistically be compared with those from another.

What has seriously impaired regional comparisons is this lack of data comparability between projects. This relates both to survey and excavation methodology and to the analytical approaches used in examining data. Until some consensus can be reached, the state of baseline data in the study area will remain weak, especially when viewed from a regional perspective (Simmons 1981a:13–15).

To these lists could be added another related issue that has recently become a topic of considerable discussion. This simply is "What is Archaic?" As indicated above, some researchers are proposing that an essentially Archaic adaptive strategy continued, in many parts of the Southwest, up to Protohistoric and contact times. Is it appropriate to consider these groups as Archaic? Or, were they associated and related to the more sedentary groups known to exist during this latter period, representing specialized hunting or gathering aspects? This is an issue that is receiving more and more attention and promises to be a major focus of future research.

Summary

Considering the problems in dealing with Archaic archeology, it is a surprise that any progress is being made at all. Certainly one can get a pessimistic view of the potential for resolving many of these issues. As Judge has succinctly noted:

> The status of archeological base-line information ...can be summarized quite easily: so many gaps exist in even the most basic data available that it is doubtful that appropriate recommendations can be made at this time to permit the proper, long term conservation of sites of the early time periods. Similarly, management's priorities are easy to establish: work immediately toward the acquisition of information to fill the gaps in base-line data (Judge 1982:43).

We believe that Judge's gloomy prognosis is perhaps overstated. There is considerable reason to be more optimistic. Many researchers currently working with Archaic materials have made great methodological and theoretical strides in understanding this elusive archeology. The gaps in baseline data are being filled in. While vast questions remain, the Archaic is currently a hot topic of study, and new insights are rapidly emerging. We are confident that this once neglected archeology is finally receiving the attention it so richly deserves.

REGIONAL DISCUSSION

Colorado (Douglas D. Dykeman)

Mountains

Archaic remains have been documented in the Mountain subregion of Colorado in the vicinity of the Arkansas River Valley by Buckles (1973), Martin (1974), and Guthrie (1981). Other areas with evidence of Archaic occupation are the Rio Grande National Forest (Burns 1981) and the Cottonwood Pass area (Black 1986). These sites and many others from the Rocky Mountain region of New Mexico, Colorado, Wyoming, and Idaho are indicative of unique adaptation to high altitudes that has recently been described as the Mountain tradition by Black (1986). The Mountain tradition is a synthetic construct that is virtually synonymous with the Archaic, and treats the major lithic complexes found in the Rocky Mountains as stylistic variants. In this manner, Black (1986) notes that the temporal and spatial diversity of the Mountain tradition is described by a number of previously defined complexes, including the Rio Grande complex (Renaud 1942a, 1944; Honea 1969), the Mount Albion complex (Benedict and Olson 1978), the Uncompahgre complex (Wormington and Lister 1956; Buckles 1971), and the Magic Mountain and Apex complexes (Irwin–Williams and Irwin 1966).

The Mountain tradition dates to ca 7000 B.C.–A.D. 300. Black (1986) believes that it has its roots in the Paleo-Indian period of the Great Basin, rather than from the Plains as implied by Honea (1969). Black posits an extensive migration from the Great Basin to the mountains as a result of rapid environmental change at the end of the Holocene. The change from mesic conditions to xeric ones in the lowlands prompted a shift in settlement patterns to mountain environments. This is considered to be a conservative move as the population attempted to maintain its original adaptation in a wetter, cooler mountain environment. This strategy was not completely successful, however, because the shift to the mountains required a unique set of adaptations that resulted in the Mountain tradition.

Initially, the Mountain tradition is represented by forest-adapted populations that bear only surficial resemblance to the lowland developments of the Desert Culture and other Archaic groups (Black 1986). Settlement characteristics of the Mountain tradition are the establishment of winter camps at lower valley elevations in the cooler months and the use of high altitude camps during warmer seasons. Band level society is postulated for these groups (Guthrie et al. 1984). Contact with other Archaic groups probably occurred during the warm seasons when lowland groups penetrated the mountains in direct competition for faunal and floral resources (Black 1986). It was this contact and overlapping use of the same environment that produced the diversity of projectile point styles apparent in the region.

The Mountain tradition artifact assemblages vary according to patterns known for other Archaic groups (Black 1986). Large stemmed and side-notched projectile point forms predominated during the Early Mountain tradition Archaic; this was followed by stemmed indented base and basal notched forms during the Middle Archaic; corner-notched, contracting stemmed, and serrated styles, occurred during the Late Archaic.

Technologically, there is little difference in the nonprojectile point stone assemblages of the Mountain tradition. Black (1986) notes the appearance of a microblade technology ca 5500 B.C. This may indicate the loss of the last vestiges of the lanceolate point styles.

The Archaic of the Mountain area is characterized by high diversity reflected in artifact assemblages. Most authors (cf. Buckles 1973; Martin 1974; Honea 1969) attempted to solve this problem by reference to cultural–historical constructs devised by archeologists for areas adjoining the Mountain study region. Black (1986) has presented a unifying concept of the Mountain tradition that explains local variability as an in situ development. The concept requires further refinement that only the accumulation of additional data can provide.

San Luis Valley

The Archaic in the San Luis Valley is known as the Upper Rio Grande culture, a term first coined by E. B. Renaud (1942a). The artifacts of the Upper Rio Grande culture were reexamined by Honea (1969), who used the term *Rio Grande complex* to describe the material culture. Following from the previous discussion on the Mountain subregion, all these materials could be subsumed under the Mountain tradition. To be consistent with a majority of the literature, however, we will retain the term *Rio Grande complex* in the following discussion.

The Rio Grande complex represents the Early and Middle Archaic in the San Luis Valley. Renaud (1942a, 1944) first reported the presence of ceramic cultural horizons in strata beneath Formative Stage sites. In general, the Rio Grande complex sites are open-air campsites, though workshop, lookout, and rockshelter sites also are own.

The artifact assemblage of the Rio Grande complex consists of a rather distinct array of projectile point types, side scrapers, and choppers that were usually manufactured from basalt. One-handed manos are consistently present at these sites, indicating vegetal food processing. This assemblage can be identified by a series of diagnostic projectile points known as Rio Grande points. Two subtypes are defined from a collection of 160 specimens collected by Renaud (1942b). Subtype 1 is similar in morphology to Jay points identified by Irwin–Williams (1973) as part of the Oshara tradition. Subtype 2 resembles Bajada phase points, and the Rio Grand point type itself is similar in morphology to Pinto and San Jose points. Rio Grande points show affinity to types from the Buttermilk and Monitor Mesa phases of the Uncompahgre complex (see Buckles 1971).

There is little evidence for a Late Archaic occupation in the San Luis Valley. This consists of surface finds within the Blanca Wildlife Refuge that bear some resemblance to items from the upper levels of the Magic Mountain sites (Guthrie et al. 1984).

Front Range

The Archaic in the Front Range study area is known from scattered surface finds and Archaic levels in rockshelters. In this respect, the data base for the Archaic is only slightly larger than that from the Paleo-Indian Period.

Evidence for an Early Archaic (ca 5500–3000 B.C. occupation consists of surface finds of projectile points that are morphologically similar to those of the Magic Mountain complex (Irwin–Williams and Irwin 1966). Such finds have been made along the foothills and on the Park Plateau. Artifact assemblages commonly associated with Early Archaic sites include manos, metates, and choppers, which suggest the shift in subsistence strategy to small game and vegetal foods. Early Archaic sites occur almost exclusively at lower elevations below the Ponderosa pine–Douglas Fir zone. The principal ecozones used by Early Archaic populations seem to have been grassland and canyon environments in the Front Range region.

Alexander et al. (1982) found four Early Archaic sites in the grassland zone of the Fort Carson Military Reservation. An additional 13 sites contained manos defined as Early Archaic of the Magic Mountain complex.

Also, in grassland environments, six Early Archaic sites were recorded by Gooding (1977). These sites, located near Colorado Springs, had diagnostic projectile points morphologically similar to the Magic Mountain/Apex complex. Two other Early Archaic sites were documented by Gooding and Hand (1977) in the canyon environment of the Arkansas River west of Canon City.

The Middle Archaic (ca 3000–1000 B.C.) in the Front Range region is characterized by the presence of the McKean complex. This region is considered to be the southernmost expansion of McKean materials that are most easily identified by projectile point styles such as McKean, Duncan, and Hanna. At Draper Cave, radiocarbon dates of 1530 B.C. and 1570 B.C. were obtained from levels bearing McKean complex materials (Hagar 1976). McKean complex materials also have been noted in surface context at Fort Carson (Alexander et al. 1982). A Middle Archaic radiocarbon date of 1190 B.C. was extracted from 5LA1055 in eastern Las Animas County. This rockshelter contained cores, bifaces, scrapers, and groundstone implements that could not be directly related to the McKean complex.

The Late Archaic (ca 1000 B.C.–A.D. 1) is recognized by artifact assemblages containing diagnostic projectile points such as Ellis and Marcos styles. The sites occur in open settings ranging from activity areas to large camps; however, most information has been collected from rockshelter excavations.

Campbell's (1969) excavations at Medina Rockshelter produced Ellis points in association with a variety of small animal remains. No groundstone was found, indicating that vegetal food processing was not a function of the site. One radiocarbon sample from the site dated to 20 B.C. (Breternitz 1969). Ellis points have been found at Trinchera Cave, located in central Las Animas County (Wood 1974). These were in association with the remains of both large and small game, though the smaller animals, such as cottontail rabbits, were most common. Vegetal food processing is suggested by the recovery of groundstone implements and edible plant remains. Ornaments, bone tools, yucca fiber, cordage, and remains of a basket were recovered, and attest to the excellent preservation afforded by the rockshelter environment.

On the Chaquaqua Plateau, Campbell (1969) reported several Late Archaic sites that were characterized by an abundance of groundstone. Faunal assemblages indicated a preference for small game. In addition, the presence of olivella shell and alibates flint indicate long distance trade or procurement.

New Mexico

Northeast

As with southern Colorado, Archaic occupation in northeastern New Mexico appears to have started early and persisted late. A considerable overlap with both earlier and later cultural periods is suggested. Most researchers place the Archaic in northeastern New Mexico from ca 6000 B.C. to A.D.1000. Despite information from a number of projects, very few details are known about the Archaic sequence of northeastern New Mexico (Stuart and Gauthier 1984:300).

Early Archaic sites are very poorly documented in the area. Steen's (1955, 1976) excavation at Pigeon Cliffs near Clayton exposed an Early Archaic occupation as well as Paleo-Indian material. The Archaic deposit was radiocarbon dated to ca 6000 B.C. and represents one of the earliest known dated Archaic sites in the area. Other possible Early Archaic sites are reported from Ute Dam (Hammack 1965a) and at Los Esteros (Mobley 1978; Levine and Mobley 1976). A site (LA 8120) near Folsom was excavated and radiocarbon dated to ca 700 B.C. (Anderson 1975).

The later Archaic is better known. Both surveys and excavations have documented numerous sites (e.g., Lang 1978; Wiseman 1978; Mobley 1978; Campbell 1976). Other Late Archaic sites have been located by Hall (1938) near the Canadian River, by Renaud (1930) from the Dry Cimarron drainage, by Hammack (1965a) at Ute Reservoir, by Mobley (1978, 1979) at Los Esternos near Tucumcari, by Wiseman (1978) near Logan, by Glassow (1980) in the Cimarron area, and by Anderson (1975) near Folsom.

As elsewhere in the project area, a major problem has been in determining whether or not aceramic sites are Archaic. Hammack (1965a), for example, believes that many of the lithic scatters he located probably postdate A.D. 1000 and are the remains of Protohistoric Apache groups. The suggestion of late surviving Archaic groups needs to be considered.

In parts of northeastern New Mexico, maize, pottery, and the bow and arrow appeared around A.D. 200. This marks the beginning of the so-called Plains Woodland, Neo-Indian, Basketmaker, or Late Archaic period, depending on the investigator (e.g., Campbell 1976; Thoms 1976; Lang 1978; Glassow 1980). This period is an adaptation similar to the earlier "true" Archaic strategy (i.e., hunting and gathering), but with the addition of limited agriculture and some technological innovations. Agriculture was not, however, adopted throughout the region (Stuart and Gauthier 1984:302)

During this later period, two subsistence trends are apparent. In the northern region (Cimarron area) increased sedentism and a stronger reliance on agriculture is proposed (Glassow 1980). To the south (Los Estero area), hunting and gathering remained the predominant subsistence mode up to and including the Puebloan period. Elsewhere in northeastern New Mexico during this later period, the appearance of cord-marked pottery indicates the beginning of the Plains Woodland period, which is not well known in the area. Plains Woodland groups are believed to have been semi-sedentary agriculturalists (Stuart and Gauthier 1984:303).

Upper Rio Grande Valley

The Archaic in the Upper Rio Grande area is better documented than it is in northeastern New Mexico. It has been largely defined by the Oshara tradition (see below), although there is little evidence for its direct applicability (Stuart and Gauthier 1984:44). In the southern portion of the Upper Rio Grande valley, Cordell (1979a:23–34) succinctly summarizes the Archaic sequence. Several studies have investigated the Archaic in this region, with perhaps the most intensively examined areas being the Abiquiu Reservoir District, and the White Rock Canyon–Cochiti Lake region (Biella 1979; Biella and Chapman 1975, 1977a, 1979b; Lord and Cella 1986; Schaafsma 1975, 1976, 1977; Warren 1975). Other significant projects include Baker and Winter's (1981) study of high altitude adaptations at Redondo Creek; studies near Albuquerque (Agogino and Hester 1953; Campbell and Ellis 1952; Lent and Scholk 1977; Reinhart 1967a, b, 1968; Schaafsma 1968); the Cimarron region (Steen 1955; Thoms 1976); the Galisteo Basin (Lang 1977a, b; Honea 1969); and the Parajito Plateau (Hill 1978). Research in the northern reaches of the Upper Rio Grande have been rarer, although materials recorded by Renaud (1942a, 1946; Ansalone 1971; Hume 1974a, b) may be Archaic (Cordell 1979a:23).

It is of interest to note that the Upper Rio Grande Valley represents an area where some of the earliest work with the Archaic was conducted. Despite the numerous projects conducted in the area, the relative scarcity of Archaic sites, especially when compared to the San Juan Basin, is striking. When Stuart and Gauthier summarized data from the area, they tabulated only 78 sites (out of 1168) as Archaic, excluding the Cochiti Reservoir area (Stuart and Gauthier 1984:47).

Stuart and Gauthier (1984:46–47) note that Archaic remains in the Upper Rio Grande are distinct from those in the adjacent San Juan Basin in at least two ways. First, in the Upper Rio Grande, there is a higher distribution of Late Archaic sites. This is in contrast with the San Juan Basin, where, by and large, sites dating to the Middle Archaic (San Jose phase) appear dominant. Secondly, it was in the Upper Rio Grande Valley, at Cochiti Reservoir, where the concept of vegetative diversity for Archaic site distribution was initially questioned (Chapman 1979b:75–102). The Cochiti area, Chapman observes, is one of the most vegetatively diverse areas in North America. He continues to note that "we must consider whether variation in relative diversity within such a highly diverse setting is significant as a control of Archaic settlement within the reservoir or are better used as comparative data for evaluating other patterns of settlement in other less diverse environmental settings" (Chapman 1979b:102).

Another major work from the Rio Grande Valley with significance for Archaic studies is Baker and Winter's (1981) Redondo Creek study. They explicitly were examining high altitude adaptations of Archaic (and other) groups. In addition to an innovative treatment examining adaptation to higher elevations, they also documented a lack of Oshara Archaic materials. Rather, projectile points resembling the southern Archaic tradition (Chiricahua Cochise) were present. This is an important observation, since the Redondo Creek area is well north of the presumed boundaries of the Cochise Culture.

San Juan Basin

Moving further west into the San Juan Basin, understanding of the Archaic improves significantly. As has been obvious from the earlier discussion, the basin has been the focus of recent research into the Archaic. Over the past several years, numerous large scale projects have been conducted in the basin, and nearly all of these have had a substantial Archaic component. Significantly, while these projects have primarily been surveys, they also have included major testing and excavation. Consequently, it should be no surprise that the majority of innovative research into the Archaic has as its geographic base the San Juan Basin.

The greatest distribution of Archaic sites in the San Juan Basin is concentrated in its northern and northeastern reaches. As Judge (1982:35) notes, the large number of Archaic sites in these portions of the basin pose three related questions. Does this distribution reflect (1) actual Archaic settlement preferences; (2) increased site visibility due to exposure through more erosion than in the south; or (3) inadequate sampling? This cannot be satisfactorily answered, but Camilli and Seaman (1978:19) suggest that there has been a systematic bias against recording Archaic sites in the southern basin. Coupled with the fact that there has been substantially more development activity in the northern portions of the basin, and consequently more archeological investigation, the disproportionate number of Archaic sites in the north may at least partially be due to survey bias. All phases of the Archaic occur in the San Juan Basin, although not all are well represented. Generally, the earlier Jay and Bajada phases are poorly documented, while San Jose, Armijo, and En Medio sites are more abundant. In the northern basin, sites belonging to the Middle Archaic (San Jose phase) are the dominant class, while to the south, near Chaco Canyon and Bisti–Star Lake, the Late Archaic (Armijo and En Medio) appears better represented (Simmons 1981a:16). As discussed earlier, however, dating sites to specific Archaic phases is extremely difficult, especially when relying primarily on survey data.

Figure 10 shows the location of some of the major projects recently undertaken in the San Juan Basin that have had a major Archaic focus. These, and numerous smaller projects, have recorded over 10,000 aceramic sites in the basin. Perhaps the most intensively studied area of the basin, at least in a geographic sense, has been the Navajo Indian Irrigation Project (NIIP), located south of Farmington. Numerous large scale studies (surveys *and* excavations) have been conducted there, documenting a very intensive Archaic occupation (e.g., Del Bene and Ford 1982; Gilpin et al. 1984; Kirkpatrick 1980a; Reynolds 1980; Reynolds et al. 1984; Simmons 1980; Vogler et al. 1982, 1983).

Another portion of the basin that has received considerable attention is the CGP/UII/NMAP project areas, south of Fruitland in the Chaco Wash area (Hogan and Winter 1983; Moore and Winter 1980; Reher 1977a). Other large scale investigations with significant Archaic components include Huse et al. (1978), Sessions (1979), Simmons (1982a, 1984), Wait (1976a), Wait and Nelson (1983), and Wilson (1977). This is by no means a comprehensive list, and added to the large scale projects must be literally hundreds of smaller investigations. Several of the larger projects are summarized by Elyea and Hogan (1983), Judge (1982), Moore (1980b), Simmons (1981a), and Vierra (1980a), but an up to date and comprehensive summary integrating all projects does not exist.

Although the San Juan Basin has been intensively studied, there still are major gaps in geographic coverage, as noted above. There has been relatively little study of the central or

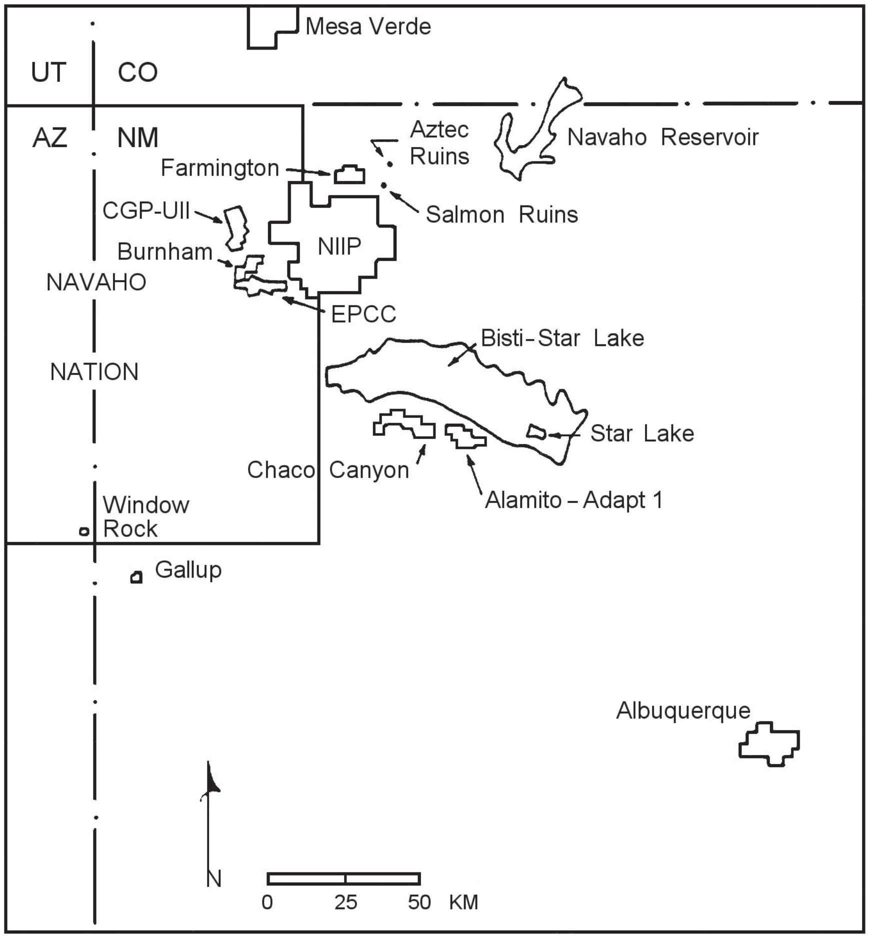


Figure 10. Location of major archeological projects in the San Juan Basin

southern portions of the basin. This is a particularly acute deficiency, since the core area of the Oshara tradition (i.e., the Arroyo Cuervo) skirts the San Juan Basin, but is more appropriately considered under "West-Central New Mexico." If in fact the Oshara tradition is a manifestation of the large, pan-northern Southwest Archaic complex, the nature of Archaic remains in the southern San Juan Basin would be of great interest.

West-Central

A considerable Archaic occupation is known from west-central New Mexico, and it was from this area that the Oshara tradition, widely used throughout the Southwest, was first defined. In the northeastern portion of this region, Irwin–Williams and her colleagues' extensive research in the Arroyo Cuervo and Rio Puerco areas has documented this Archaic sequence. It is also within this region that Bat, Tularosa, and Cordova caves are located, all sites relevant to the supposed early presence of cultigens in the Southwest.

In the Mount Taylor subdivision of west-central New Mexico, Stuart and Gauthier (1984:128–129) note the apparent late survival of Archaic groups, or at least an Archaic economy. They see a process of increasing agricultural intensity from ca A.D. 200 to 500 in some parts of the area, while in others, a hunting and gathering economy apparently was in operation much later. Whether or not this could be considered Archaic is debatable, but it represents an interesting problem.

In their overview of cultural resources of the Mount Taylor region, Tainter and Gillio (1980) provide several subdivisions. Relevant to the Archaic is the eastern subdivision, which is comprised of the Oshara materials. Within this eastern subdivision, however, they also discuss the Archaic of West Mesa (or Llano de Albuquerque). This forms the eastern boundary of their Mount Taylor overview area. Research on the Archaic of the West Mesa includes projects by Reinhart (1967a, b, 1968) and Campbell and Ellis (1952). Reinhardt (1968) proposed three phases for the West Mesa: Atrisco (pre-1000 B.C.), Rio Rancho (1000–1 B.C.), and Alameda (1 B.C.–A.D. 550). These appear to be local equivalents of the Armijo, En Medio, and Trujillo phases of the Oshara tradition, respectively. Although Reinhart (1967a:114, 220) believed that the Atrisco phase could be related to the southern San Pedro Cochise, his work was conducted prior to Irwin–Williams' proposal of the Oshara tradition, and the Cochise affiliation is now considered questionable (Tainter and Gillio 1980:46).

Other Archaic sites also are known from various portions of the Mount Taylor region. On Cebolleta Mesa, Dittert (1959), Beal (1976), and Ruppe (1953) have documented an Archaic presence. In the San Mateo Valley, some of the early research into the Archaic was conducted (e.g., Bryan and Toulouse 1943; Bryan and McCann 1943). Agogino and Hester (1958) documented San Jose Archaic sites in the Grants area. Of interest is that survey in the lower elevations of the San Mateo Valley have not documented an extensive Archaic occupation (Allan et al. 1976), while the upper elevations do contain abundant Archaic materials (Schaafsma 1978; Powell 1978; Mager and Anschuetz 1979).

Elsewhere in the Mount Taylor region, Weaver (1978) has documented Pinto Basin type projectile points at Black Creek near Manuelito Canyon. In the Zuni area, extremely little is known about the Archaic; isolated projectile points have been found (Tainter and Gillio 1980:89), but few sites are documented. Additional information on the Archaic of the Mount Taylor region may be found in Tainter and Gillio's (1980) overview.

The Archaic of the Socorro subdivision of west-central New Mexico is not as well documented as in the Mount Taylor region. Berman's (1979) overview is relevant for this area, as are portions of the synthesis prepared by LeBlanc and Whalen (1980), especially the chapter by Minnis and Nelson (1980).

Central

We have very little information on the Archaic in Central New Mexico. No federal overviews have yet been conducted for this region, and archeological surveys have been rare in the region. Of interest, though, is Lyons (1969) survey of the Estancia Valley. He identified in the literature or located by survey 48 sites, 39 of which he identified as either Paleo-Indian or Archaic.

The two well known sites in this area that have been excavated that contain Paleo-Indian materials also contain Archaic remains. These are the Lucy Site (Roosa 1956a, b) and Manzano Cave (Hibbin 1941). At Lucy, Pinto Basin-like projectile points and numerous manos and metates are present. Manzano Cave contains projectile points similar to Gypsum Cave as well as grooved stone balls (Stuart and Gauthier 1984:319).

Although research on the Archaic in Central New Mexico has been extremely limited, one project is of considerable interest. Tainter's (1979) investigations of lithic scatters in the Mountainair area documented Archaic sites and, more importantly, discussed these in the framework of significance. Although aspects of his study have been criticized (cf. Brett and Shelley 1985), the work is important in that it was an early attempt to investigate lithic scatters in terms of *significance*, an essential construct for providing legal protection to cultural resources.

Southwest

Southwest New Mexico is the geographic focus of the classic Mimbres and Jornada–Mogollon areas of later prehistory, but a substantial Archaic occupation also has been documented. This differs from the Oshara tradition in that it shows stronger southern (Cochise) influences. Stuart and Gauthier's (1984) overview only discusses the Archaic in this area in relation to later occurrences and the emergence of pithouse villages and agriculture.

Minnis and Nelson (1980:65) note that, with the possible exception of the areas west of the San Andres mountains, all Archaic remains in southwest New Mexico belong to the Cochise tradition. Early research in this area was conducted by Gila Pueblo, which located numerous preceramic components at multicomponent sites. The basic definition of the Cochise Culture was derived from this area and southeastern Arizona (Sayles and Antevs 1941; Sayles 1945, 1964, 1983). For Southwestern New Mexico, then, the Cochise sequence is generally accepted, with the exception of the Cazador phase, which has met with criticism. This sequence consists of the following phases: Sulphur Springs (local Paleo-Indian)—10,500–9000 B.C.; Cazador—9000–6000 B.C.; Chiricahua—6000–1500 B.C.; and San Pedro—1500 B.C.–A.D.1. For south-central New Mexico, an Archaic sequence cross-dated to the Cochise has generally been used. It consists of the following phases: Early Archaic—ca 6000–3500 B.C.; Middle Archaic—ca 3500–1500 B.C. and Hueco—1500 B.C. up to possibly A.D. 900 (MacNeish and Beckett 1987:4).

Projects that have dealt with Archaic sites include studies by Greiser (1973); N. Whalen (1971, 1973), and Blake and Narod (1977). Rose (1970) and Blake and Narod (1977) investigated Archaic sites located in sand dunes near Deming. By and large, though, the Archaic has not received a substantial amount of recent attention in the area, with the exceptions noted below.

Recent attention has been directed towards several rockshelters located in this region, (or in southeastern New Mexico, depending on where one draws the boundary). Technically, these are located in south-central New Mexico, but this is not used as a geographic subdivision in this work. Fresnal Shelter (Wimberly et al. 1972) and Bob Cat Cave (Minnis and Nelson 1980:69) are important sites in the area, Fresnal especially since it may contain evidence for early cultigens.

MacNeish and Beckett (1987) report on several rockshelters, such as Roller Skate and Tornillo, as well as Fresnal. Of particular importance has been the claim for very early cultigens at Tornillo and Roller Skate shelters (Upham et al. 1987). MacNeish and Beckett have proposed a new tradition for the Archaic of this region, the Chihuahua tradition. While the validity of this following remains to be documented, it is useful to provide a brief summary here (the section was prepared by Patricia A. Hicks).

The Chihuahua tradition has four temporal subdivisions: the Gardner Springs complex (ca 6000 ± 500 to 4000 ± 300 B.C.); the Keystone phase (ca 4000 ± 300 to 2500 ± 200 B.C.); the Fresnal phase (ca 2500 ± 200 to 900 ± 200 B.C.); and the Hueco phase (ca 900 ± 200 B.C. to A.D. 250 ± 200). Table 6 lists the projectile point types that are considered to be diagnostic of each phase.

The Gardner Springs complex is not well defined. Sites have been found on the floors of the bolsons (basins), near playas, along the Rio Grande, on lower bajada slopes, and in the mountains. The presence of ground stone in the assemblages suggests that gathering of floral foodstuffs was an important activity, but quantities of antelope and deer bone suggest that hunting was also important. Settlement pattern data indicate some degree of scheduling of subsistence activities (MacNeish and Beckett 1987:10, 25).

Table 6.
Projectile Point Types Associated with the Archaic Chihuahua Tradition

Phase Name	Projectile Point Types
Gardner Springs Complex	Jay, Bat Cave, Abasolo, Bajada
Keystone	Pelona, Armagosa, *Todsen, Almagre Possibly: Langtry, Shumla, Trinity, Bat Cave
Fresnal	Chiricahua, Nogales, Augustin, *Todsen, *La Cueva, San Jose-like, *Fresnal, Maljamar Possibly: Pedernales
Hueco	Large and Small San Pedro, *Hatch, *Hueco, *Fresnal, Armijo

Note: *Denotes a new projectile point type. See MacNeish and Beckett (1987:16–19) for descriptions.

During the Keystone phase, occupation continued in all environments, but intensified on the bajada slopes. Hunting of large game was still a part of the subsistence regime, but gathering of floral foodstuffs increased. Scheduling of subsistence activities is indicated by settlement pattern data. A trend towards decreased territory size, or decreased group mobility, is suggested by the presence of at least one pithouse that apparently dates to the period. Cultigens may have been utilized during this period, given the occurrence of several squash seeds in a context purportedly dating to 3434 B.C. (MacNeish and Beckett 1987:12). The practice of incipient horticulture during this period is still open to question, however, because it is not currently possible to evaluate this date as complete contextual data have not been published.

During the following Fresnal phase the number of sites increased and a greater number of environmental zones were exploited. The population may have been sedentary to some degree, as indicated by the presence of aggregations of pithouses along the Rio Grande. Cultigens such as corn and squash were used, and as a result, a well structured subsistence schedule was probably in place, or certainly in the process of being developed (MacNeish and Beckett 1987:12, 30).

The description of the Hueco phase originally given by Lehmer (1948:71–75) has not been altered in any significant manner by MacNeish and Beckett's recent work. Site frequency increased, and the larger sites contain numerous pithouses, suggesting that the population was at least semi-sedentary for a portion of the year. It is not yet clear if the inhabitants of the region were full-time horticulturalists, but reliance on cultigens definitely increased. Several species of maize, squash, beans, and what is probably a domesticated species of amaranth, have been recovered from sites in the area. Few bones of large mammals have been found, suggesting that hunting was deemphasized. On the whole, the subsistence data indicate a well developed seasonal round (MacNeish and Beckett 1987:16, 30).

Southeast

Southeast New Mexico presents an interesting dilemma in terms of the Archaic. As elsewhere, the Archaic is not well known, and the just described Chihuahua tradition (MacNeish and Beckett 1987) is relevant here. The identification of Archaic remains in southeastern New Mexico is largely based on survey data using presumably diagnostic projectile point forms. Over half of the sites recorded in the region are aceramic but few of these contain diagnostic lithic materials. A few could date from the Paleo-Indian period, and the majority probably date from anywhere from ca 5000 B.C. to at least A.D. 1000 (the Yeso Creek site). If one includes Yeso Creek, only four documented Archaic, as opposed to aceramic, sites have been radiocarbon dated in southeastern New Mexico, as of the time of Stuart and Gauthier's writing. These are: Yeso Creek, Blackwater Draw, Locality No. 1, the Howell Site, and GS-3 (Stuart and Gauthier 1984:266).

One intriguing aspect of the Archaic in this region is that no remains suggesting an early agricultural subsistence base have been recovered. This is in contrast to several other Archaic sites further to the west. Another interesting point is that of the few excavated Archaic sites in the area, there is little suggestion of an economic focus on large mammal procurement. This is unlike western New Mexico, for example, where some Archaic assemblages have yielded the remains of deer, antelope, and bison. Most sites in the southeast have yielded smaller mammals, such as turtle, rabbit, and rodents. Stuart and Gauthier conclude "that the general technological and subsistence patterns were similar in many ways, but that agricultural strategies were either little known or unproductive in southeastern New Mexico. Big game hunting also appears to have been a limited subsistence strategy" (Stuart and Gauthier 1984:267).

Stuart and Gauthier doubt that there were high densities of Archaic populations in southeastern New Mexico prior to A.D. 700–800. They believe that if additional unknown aceramic sites could be dated, many might overlap temporally with later ceramic period occupation. In other words, they proposed that relatively sedentary ceramic-bearing groups lived in the same general area with people who continued to follow a more mobile and less technologically complex adaptive strategy. They also believe, based on the limited faunal assemblages recovered from Archaic sites in the southeast, that Archaic life was difficult. They state that "it would appear that the temptation to adopt an agricultural strategy would have eventually been strong when it became possible to pursue such a strategy.... we suspect that while the need was there...the conditions were not right to pursue agriculture until roughly A.D. 900" (Stuart and Gauthier 1984:268). These are interesting conclusions and certainly point to directions that future research in this area could take. The question of Archaic-like economies persisting to, in some instances, the Protohistoric period, is an intriguing one and presents a complex classification problem, as noted earlier. Simply stated, is the Archaic based on a temporal span, or, if it is based on an economic strategy, is it possible to have Archaic groups in existence up to European contact?

Trans–Pecos (Patricia A. Hicks)

Beginning around 9000 B.C. and continuing into the Historic period in the Trans–Pecos region, there was a gradual trend toward warmer and drier conditions, punctuated by occasional wetter periods. Associated with this climatic shift was a gradual upward displacement of forest and woodland plant communities, and the concomitant spread of Chihuahuan Desert species (Mallouf 1985:17). There is currently some question as to whether or not the Altithermal period (Antevs 1962) affected the Trans–Pecos region. There does appear to have been a hiatus in deposition from roughly 5400 to 2500 B.C.), but disagreement exists as to the causal factors involved, and how significantly the human populations of the region were affected (Marmaduke 1978:17). With regard to the environmental character of the Trans–Pecos region during the pre-Contact period, Mallouf notes:

> Unlike the modern creosote-dominated desert environment...the lowland Holocene landscape appears to have been more savannalike, having widespread grasslands containing both xerophilous [arid adapted] woodland and desert species. Such mixtures of woodland and desert shrub species with grasslands presented a biotic assemblage of maximum potential for hunting–gathering economies (Mallouf 1985:17).

The hunting and gathering adaptation characteristic of the Trans–Pecos region and adjacent areas of northern Mexico has been described as culturally conservative (Shafer 1977:13; Taylor 1964:200). In some areas of the Trans–Pecos, this way of life may have existed for as long as 10,000 years with little change. Since the 1930s a number of chronological schemes have been proposed for the Trans–Pecos region. The general chronological framework for the Archaic stage throughout Trans–Pecos employed here follows Mallouf (1985:100–128). The Early Archaic begins around 6500 B.C. (and perhaps earlier in some parts of the region) and lasts until 3000 B.C.; the Middle Archaic spans the period from 3000 to 500 B.C.; and the Late Archaic commences around 500 B.C. and lasts until A.D. 1000. Projectile point types commonly associated with each of these periods (as well as with the Paleo-Indian period) are listed in Table 7, and some examples are illustrated in Figure 6. The temporal affiliations of these point types are generally inferred by reference to sequences of projectile point types from the Central Texas and Lower Pecos regions (Mallouf 1985:101).

Table 7.

Temporal Affiliation of Some Trans–Pecos Projectile Point Types (See also Mallouf 1985 and Marmaduke 1978)

Temporal Period	Projectile Point Types	
Late Prehistoric A.D. 1000–1600	Fresno, Harrell, Livermore, Perdiz, Scallorn, Toyah, Starr, Cliffton	
Late Archaic 500 B.C.–A.D. 1000	Ensor, Palmillas, Paisano, Frio, Edgewood, Ellis, Darl, Figeroa	
Middle Archaic 3000–500 B.C.	1750–500 B.C.	Shumla, Marcos, Almagre, Williams, Conejo, Lange, Tortugas, Montell, Castroville
	3000–1750 B.C.	Langtry, Val Verde
Early Archaic 6500–3000 B.C.	4500–3000 B.C.	Pandale, Bulverde, Travis, Nolan
	6500–4500 B.C.	Lerma?, Baker/ Uvalde, Martindale, Early Barbed
Paleo-Indian 10,000?–6500 B.C.	Clovis, Folsom, Plainview, Golondrina, Meserve, Angostura, Lerma?	

Puebloan

Although research concerning the Archaic in Trans–Pecos has been conducted for a number of years, an understanding of the culture–historic framework for this period in the Puebloan subregion is only just developing. During the 1930s several dry caves were excavated in the Hueco Mountains. Unfortunately, their stratigraphy was poor, preventing the development of a relative chronology (Cosgrove 1947). Reconnaissance in south-central New Mexico, west Texas, and northern Chihuahua in the 1940s resulted in the definition of the Jornada Mogollon, and a set of phases that are still used today by some researchers in the area. The Hueco phase is the earliest in the Jornada sequence and represents the basal hunting and gathering culture out of which the later Jornada Mogollon developed (Lehmer 1948:71–75). Projectile points are used most frequently to assign sites to a temporal period following typological and chronological frameworks that have been developed in adjacent regions (e.g., Dick 1965a; Sayles and Antevs 1941; Suhm and Jelks 1962). This tactic has met with varying degrees of success, as not all of the projectile point styles found on local sites resemble types recovered from dated contexts in other areas.

Over the years various researchers have speculated on the derivation and nature of the local hunting and gathering population that preceded the later Jornada Mogollon residents. Based on his work in the Upper Gila and Hueco Mountains, Cosgrove (1947:167) concluded that the early inhabitants of the region were related, albeit remotely, to the San Juan Basketmaker. Lehmer (1948:73) considered the earliest stages of the Jornada Mogollon to be a "crystallization of...a basic 'Cochise' pattern; a complex of traits found in different forms in southern Arizona, southern New Mexico, and West Texas, "that differed from other Southwestern cultures in being oriented more toward gathering rather than hunting. Irwin–Williams (1979:33) would place developments in this area within the poorly understood southeastern Archaic tradition.

More recently, a local chronology has been developed for the Archaic period in south-central New Mexico. This culture–historical framework is termed the Chihuahua tradition (see previous discussion with New Mexico–Southwest), and is based on radiocarbon and obsidian hydration dates from excavated shelters, and on information from regional survey in the Sacramento and Organ Mountains, the Tularosa Bolson, and the Mesilla Valley near Las Cruces, New Mexico, and El Paso, Texas (MacNeish and Beckett 1987). The authors of this essay believe that the Chihuahua tradition encompasses not only the area of south-central New Mexico, but portions of west Texas, and northern Chihuahua, Mexico, as well (MacNeish and Beckett

1987:3, Figure 1). The portion of west Texas that is a part of the Chihuahua tradition includes all of the Puebloan subregion, and that part of the Interior subregion west of the Guadalupe, Van Horn, and Chinati Mountains. It is difficult to say at this time if this chronology is applicable beyond its area of definition because several crucial individual site reports are not yet available for independent evaluation and comparison.

In summary, the Archaic Stage in the Pueblo subregion of the Trans–Pecos differs from contemporary developments to the east. The importance of gathering in the economy increased through time, but may have been accompanied by a greater emphasis on hunting large mammal species than is seen in other areas. Horticulture may have been introduced to the region early. Pithouse architecture may have made its first appearance during the Keystone phase. The Chihuahua tradition is currently the only culture–historic framework for the Archaic Stage in south-central New Mexico and west Texas that has been developed from local information. The applicability of this framework to other areas in west Texas, northern Mexico, and southern New Mexico should be tested in future research endeavors.

Interior

Diagnostic projectile points in the Interior subregion are similar to those found in the Plains subregion, except in the northern portion of the area where styles more common to the north and west are occasionally found. Paleoenvironmental data indicate that forest and woodland communities were being displaced to higher elevations as Chihuahuan desert species spread in response to a trend towards warmer and drier conditions (Mallouf 1985:17).

A lack of securely dated stratified cultural deposits has severely limited archeological interpretation of the Early Archaic period. In the northern portion of the Interior, intensive surveys in the Guadalupe Mountains have produced minimal evidence for an Early Archaic occupation. Projectile points diagnostic of the period have been recovered from lithic scatters and sites with burned rock middens located in saddles at high elevations, along ridges, and on arroyo terraces (Katz 1978). In contrast, no evidence for Early Archaic occupations of lower elevations has been recovered from nearby areas such as the Salt Basin (Katz and Lukowski 1981), or farther south in the Van Horn region (Hedrick 1975).

In the Davis Mountains in the central portion of the Interior, open sites dating to the Early Archaic period have been recorded along canyons in areas that today are forested with pine, juniper, and oak (Mallouf 1985:104). South of Alpine, Texas, two deeply buried sites were excavated by the Peabody–Sul Ross expedition (Kelley et al. 1940:93–117). While some of these materials have since been attributed to a Late Archaic occupation of the region, the materials assigned to the Maravillas complex are unquestionably older, but just how much older is not clear. The Maravillas complex itself remains poorly defined (Mallouf 1985:41).

There appears to be a clustering of Early Archaic sites in the Big Bend area. Sites dating to the period are found most frequently in the basin and foothill zones along arroyos or near springs (Mallouf 1985:102, 1986:71). Early Archaic materials have been found associated with hearthfields, middens, and lithic scatters at low elevations in these environmental zones. There is also some indication that rockshelters were being inhabited at least sporadically (Mallouf 1985:42, 102; Marmaduke 1978). It has been suggested that a broad based hunting and gathering adaptation oriented towards the utilization of desert species was developed first in the eastern portion of the Big Bend (Mallouf 1981). A clustering of Early Archaic sites in this area is suggestive, but not conclusive. Additional stratigraphic and chronometric data from this and adjacent regions will be necessary to prove or disprove this.

Available data suggest that the Interior subregion was probably sparsely inhabited by highly mobile groups (Mallouf 1985:102) that may have been territorially oriented (Shafer 1977; Taylor 1966). Projectile point types diagnostic of the period are indicative of some level of interaction between the Lower Pecos and Central Texas, and to a lesser extent the northern Mexico and southern New Mexico regions. Settlement pattern data indicate that there was some north–south variation in subsistence patterns. In the southern portion of the Interior, Early Archaic camps are most frequently located in basin and foothill environments, while in the north they are commonly associated with canyons at high elevations in the mountains (Mallouf 1985:107). It is not clear if this patterning is actually a result of different subsistence and settlement decisions, geomorphological and environmental factors affecting erosion and deposition, or sampling error related to the limited amount of professional work that has been performed in the area.

The Middle Archaic period in the Interior subregion is known from open air sites and rockshelters in the southern portion of the section (Bousman and Rohrt 1974:23). The diagnostic projectile points and other items of material culture listed in the following section on the Plains subregion, have also been recorded at sites in the Interior. Paleoenvironmental data for the period indicate a trend toward warmer and drier conditions in the first half of the period, followed by an episode of increased moisture (Mallouf 1981:128–131, Figure 3).

In the north and central portions of the area, Middle Archaic site density does not appear to have increased substantially over that seen in the Early Archaic. In the Guadalupe Mountains, projectile points diagnostic of the period have been found associated with burned rock middens and lithic scatters. Preferred locations for settlement include high stream terraces, saddles, ridge crests, and benches (Katz 1978). In the Salt Basin and Van Horn areas to the west and south, no sites dating to the period have been recorded (Katz and Lukowski 1981). In the Davis Mountains, Middle Archaic materials have been found associated with hearthfields, lithic scatters, and buried deposits exposed by erosion along arroyos. Preferred site locations appear to be terraces near canyon bottoms, ridges within canyons, and in saddles at high elevations (Mallouf 1985:113).

The Big Bend portion of the region contains by far the highest density of Middle Archaic sites in the Interior subregion. At this time it is not clear if this is simply a result of the different levels of research activity in different areas, or an actual reflection of differences in prehistoric intraregional population densities. Middle Archaic diagnostics have been found associated with hearthfields, burned rock middens, lithic scatters, rockshelters, and quarries. These sites are found in all major environmental zones, with the highest densities located in the basins and foothills. In the foothills, the favored areas for settlement appear to be on pediments and benches in the vicinity of springs (Mallouf 1985:112). In the basin zone, Middle Archaic sites are sometimes exposed by modern arroyo cutting deeply buried in the basin fill (e.g., Kelley et al. 1940: 93–117).

Examination of projectile point sequences in use in the Trans–Pecos and central portion of Texas suggests that during the early portion of the Middle Archaic interaction between the two areas was severely curtailed. Later in the period Central Texas styles again come into use in the Trans–Pecos. Data from the Bear Creek area in the southern portion of the Interior have led Marmaduke (1978:177–179) to hypothesize that periods of increased moisture are strongly correlated with expansion of grassland environments, and the movement of bison, into the Trans–Pecos. Such a situation, in his view, would enhance the opportunity for interaction between hunting bands from different regions. On the other hand, during times of decreased moisture availability, bison would withdraw from the Trans–Pecos, and collection of floral resources (particularly lechugilla) would intensify. Increased reliance on lechugilla and other succulent species would limit occupation in areas where such plants were not present. The association of Middle Archaic diagnostics with burned rock middens, hearthfields, and other sorts of burned rock accumulations suggests that processing of succulent and semisucculent species was an important subsistence activity (Mallouf 1985:112). Marmaduke's hypothesis is plausible, but needs to be more rigorously tested against paleoenvironmental, ethnobotanical, and faunal data, as well as other classes of material culture beyond projectile points. Unfortunately, most existing data sets are not adequate since they lack good temporal controls.

Middle Archaic site size and frequency appear to have increased slightly over the preceding periods, with sites being found in a broader range of environments. Mallouf (1985:115) notes that a strong dependence on plant foods, and a fairly consistent patterning of sites, may be indicative of tighter band organization and a stronger territorial orientation. Rockshelters were inhabited with greater frequency and exhibit material culture assemblages containing artifacts related to subsistence activities, as well as ones suspected of serving ceremonial functions.

The Late Archaic period in the Interior subregion is defined by reference to projectile point typologies developed in the Lower Pecos and Central regions of Texas, and areas in northern Mexico. Perishable and non-perishable artifacts associated with the period are noted in the discussion of the Plains subregion Late Archaic. While the data base for this period is greater than that for previous periods, stratigraphic and radiocarbon data are still limited.

In the northern portion of the Interior a number of rockshelters were excavated in the Guadalupe Mountains in the 1930s (e.g., Mera 1938a). These shelters produced a variety of artifacts, including ceramics and cultigens (Bradford 1980: 9), but were generally poorly stratified, limiting their research potential. More recently, cultural materials belonging to the Late Archaic and Historic periods have been recovered during well controlled excavations at Pratt Cave (Schroeder 1983). Unfortunately, cultural materials were relatively sparse, and radiocarbon dates on basketry, wood, and bone indicate that the deposit was mixed. In the southern portion of the Guadalupes, survey has revealed a number of sites dating to the Late Archaic period. Ring middens and burned rock middens are the most common kinds of sites recorded, with the preferred location for occupation being at the heads of canyons (Katz 1978).

Farther to the west, Late Archaic sites have been reported from the Salt Basin. In this area Late Archaic diagnostics have been found in hearthfields, lithic scatters near arroyos, and at quarries (Mallouf 1985:124–125). Hedrick (1975) has recorded a number of sites in the Wild Horse Valley northeast of Van Horn, Texas. Many of these sites are located in sand dunes and other areas with sandy soils (Hedrick 1975:54–57, Table 1).

In the Davis Mountains, Late Archaic lithic scatters have been recorded on terraces within canyons and on ridges and saddles between canyons, while buried components have been noted in the valley fills. The Late Archaic adaptation in this area may have differed somewhat from that seen in other parts of the Interior. Late Archaic sites in the Davis Mountains do not contain burned rock middens, suggesting a decreased emphasis on the processing of desert succulents. The larger sites of the period are situated on the uppermost terraces within the canyons, a location that would have afforded the inhabitants ready access to the pinyon and oak groves of the area (Mallouf 1985:123). If the local population was in fact harvesting acorns and pinyon nuts, seasonality of occupation and some degree of scheduling in the subsistence system is implied.

In the southern portion of the Interior, Late Archaic sites have been recorded in all major environmental zones. In the rock faces and on high terraces along the Rio Grande and its tributary canyons are found dry shelters, quarries, and open air sites containing bedrock mortars, burned rock accumulations, and ring middens. Pictographs and petroglyphs have been found along the river that are stylistically distinct from those found in the Lower Pecos region. In the basins, dry shelters are common, as are quarries, lithic scatters, hearthfields, and other sites containing burned rock accumulations. In the basins, sites are most commonly located along arroyo systems. Late Archaic sites are most dense in the foothills, where deep refuse middens suggestive of prolonged or repeated occupations are located near springs. Sites with burned rock accumulations also are common. Bedrock mortars and slab metates frequently are found on the sites, as are large numbers of projectile points. This is suggestive of a mixed hunting and gathering economy, but with perhaps greater emphasis on the former than is found in other environments. Occupations at high elevations in the mountains occur along ridges, in saddles, and on mountain peaks. Sites at high elevations may have served ceremonial functions, but the presence of accumulations of burned rock, hearths, and refuse middens attest to repeated and potentially prolonged habitation (Mallouf 1985:120–121).

Evidence for early horticulture in the Interior subregion is limited and generally of poor quality. Mallouf (1985:127) notes that some form of incipient horticulture was probably being practiced in the area by A.D. 200 to 500, but that there is very little supportive data. At the Bee Canyon Cave Site (Coffin 1932) remains of maize and squash were recovered, but because of poor excavation techniques it is impossible to determine if this material was associated with the Late Archaic or a later occupation. Kelley et al. (1940:27) list maize as one of the traits of the Chisos Focus, the earlier portion of which overlaps the final 200 years of the Late Archaic period as defined here. Cultigens (i.e., cotton fiber and chili seeds) recovered from mixed contexts at Pratt Cave in the Guadalupe Mountains have been attributed to a Mescalero occupation (Schroeder 1983:25).

In general, Late Archaic site density is higher in all areas of the Interior than during previous periods. Sites are now found in all environmental niches, and there are indications that some represent repeated and/or prolonged use. The use of ring middens suggests a continued emphasis on the exploitation of desert succulents such as sotol, lechugilla, and prickly pear. There is intriguing evidence from the Davis Mountains that seasonality and scheduling in resource exploitation may have been developing or was becoming more structured. In some portions of the area incipient horticulture may have become a part of the subsistence regime.

In summary, in the Interior subregion, Early and Middle Archaic sites appear to be restricted to higher elevations in the Guadalupe and Davis Mountains, and at lower elevations in the Big Bend. During the Late Archaic, sites are found in virtually all environments, in all areas of the Interior. The region was probably occupied by small bands that may have inhabited restricted territories. These territories probably became smaller through time as the population grew and improvements in food processing technology allowed for a more complete utilization of local resources. There is some indication that seasonality and scheduling of resource usage may have been been developed, or was in the process of changing during the Late Archaic period. There is also reason to believe that inhabitants of the Trans–Pecos were affected by developments in adjacent regions, and that the degree and the character of this interaction changed through time. While information for the Archaic stage is better than that for the preceding Paleo-Indian stage, much of our understanding of the lifeways of the people still remains in the realm of speculation. Well controlled excavation data are sorely needed to answer questions related to chronology, subsistence, interregional interaction, and paleoenvironment. More regional survey data would help to answer questions concerning settlement technology, population growth and movement, and subsistence.

Plains

Very little stratigraphic and radiocarbon data are available for the Early Archaic period in the Plains subregion. Mallouf (1985:104) notes that two recent professional studies in Pecos County have recovered evidence of an Early Archaic occupation in the area from open sites containing burned rock middens, hearthfields, lithic scatters, and some small rockshelters. In the Toyah Basin, sites of all types dating to the Archaic frequently are associated with arroyos. Overall, there appears to be some clustering of Early and Middle Archaic materials in the Stockton Plateau and Toyah Basin portions of the Plains subregion (Mallouf 1986:72).

Information from dry shelters in the Lower Pecos region immediately to the south of the Plains subregion provides some insight into the lifestyle of the peoples who lived to the north. These shelters have produced a wide variety of artifacts including numerous perishables. For example, at Hinds Cave (Shafer and Bryant 1977) many stone tools were recovered from strata dating to 7000 to 4000 B.C.), as were painted pebbles, sandals, matting, grass-lined pits, and burned rock middens used in plant food processing (Mallouf 1985:106). Perhaps the most important material recovered from this site are the numerous human coprolites. Analysis of these indicates that desert succulents such as prickly pear, lechugilla, and to a lesser degree sotol, were important plant foods in the diet (Williams–Dean 1978:246, Table 14). Although hunting was still practiced, the gathering of floral foodstuffs was the major focus of the subsistence system. As noted by Mallouf (1985:106), this is a significant interregional subsistence trend that continues throughout the Archaic period, well into Late Prehistoric times.

Based on data from Hinds Cave and other shelters, and a regional study of rock art in the Lower Pecos, Shafer (1977, 1981:129) has postulated that groups inhabiting the region during the Early Archaic and later periods were semi-sedentary and tied to specific territories. Taylor (1966) has proposed a similar adaptive strategy to explain the patterning of materials that he encountered in northern Mexico. With an increase in research in the Plains subregion, and other parts of the Trans–Pecos, it may be possible to independently test these ideas.

Stratigraphic and radiocarbon data pertaining to the Middle Archaic in the Plains subregion are limited, and generally of poor quality. As with Early Archaic remains, Middle Archaic materials have been found throughout the area, although there is some tendency for sites to cluster in the Stockton Plateau and Toyah Basin areas (Mallouf 1985:112, 1986:72). The material remains from dry caves are quite varied and include: basketry, sandals, cordage, matting, netting, pointed sticks, fending sticks, dart foreshafts, stone and shell beads, antler flaking tools, bone awls, grinding slabs, manos, abraders, scraping implements, hammerstones, utilized flakes, and cores (Mallouf 1985:109, 1986:72).

Paleoenvironmental data indicate that the climate continued to become more arid from 3000 to 2000 B.C.), Between 2000 and 500 B.C.), however, moisture appears to have increased (Mallouf 1986:73). Archeological evidence suggests that during the Middle Archaic, population increased, possibly as a response to moister conditions (Mallouf 1985:109). There is also some indication that interaction between the Trans–Pecos and Central Texas areas increased, which Mallouf (1986: 73) hypothesizes may have been due to incursions into the Trans–Pecos by bison hunters from the east. Because the Plains subregion borders the Central Texas region, this area of the Trans–Pecos is the logical one in which to attempt to define and quantify the degree of interaction between the two regions.

The distribution of Middle Archaic sites is not consistent from area to area, nor for that matter, within a specific area. Along the Pecos River in Pecos County, Middle Archaic materials have been found in association with ring-middens, hearthfields, and rock shelters. Favored site locations include arroyo margins and bluffs at the heads of canyons. On the Stockton Plateau there is some tendency for Middle Archaic sites to be located in and above canyon and arroyo systems. But, whereas one canyon may evidence a relatively dense Middle Archaic occupation, a nearby canyon system that possesses virtually identical physical characteristics will exhibit no evidence of use (Mallouf 1985:113). Such a situation seems to indicate that very subtle environmental factors were influencing settlement decisions. As paleoenvironmental data for the region become more refined, it should be possible to determine what these factors were by employing techniques used in autecology [a branch of ecology that studies the inter-relationship between the individual organisms or groups of organisms and their environment].

During the Late Archaic period, the numbers of sites increases dramatically. This is probably reflective of an increase in population (Mallouf 1985:125, 1986:74), but may also be related to increased archeological visibility. Although there are numerous Late Archaic sites in the Plains subregion, the stratigraphic and radiocarbon data are limited in scope. As a result, Late Archaic occupations still are defined with reference to projectile point typologies that have been developed for the Lower Pecos and Central Texas areas, and occasionally northern Mexico (Mallouf 1985:116).

Excavations in dry shelters in the Plains subregion and adjacent areas (e.g., Cosgrove 1947; Holden 1941; Howard 1932; Smith 1932) have revealed a rich and varied material culture associated with the Late Archaic and Late Prehistoric periods. Artifacts that have been recovered include: end and side scrapers, perforators, an assortment of mano and slab metate forms, hammerstones, abraders, bone awls, pointed sticks, wooden shaft straighteners, split-yucca fireboards, fire drills, atlatls, throwing sticks, wooden scoops and tongs, pouches and blankets of rabbit fur and sewed skins, basketry, sandals, vessels made from gourds, and assorted items fashioned from fiber (Mallouf 1985:117).

The period of increased effective moisture that characterized the latter portion of the Middle Archaic ended between 500 and 200 B.C., and species adapted to arid conditions rapidly reasserted themselves. The Middle Archaic subsistence system dependent upon the collection and processing of desert succulents, with a secondary emphasis on hunting, persisted throughout the Late Archaic period. However, during the Late Archaic a wider variety of environmental niches were exploited, and some improvements were made in food processing. These improvements include an intensified use of pit ovens, and the possible introduction of ring middens (Mallouf 1985:117). There are some indications from the Ram's Head site in Pecos County that the use of ring middens may have begun in the Middle rather than Late Archaic (Mallouf 1985:50; Young 1982). Greer (1965) contains a detailed description of these features, and an excellent review of the ethnographic and ethnobotanical literature pertaining to their use. Exploitation of previously unused niches and the development of new food processing technology may be two responses to increased population density and a concomitant decrease in territorial size.

In general, the settlement pattern data indicate intensive and repeated use of a wide range of environments. In the Toyah Basin portion of the Plains subregion, information from private collections supports the presence of a dense Late Archaic occupation. The favored locations for settlement appear to have been arroyo margins, and areas adjacent to the Pecos River. Common site types include hearthfields, isolated hearths, burned rock middens, ring middens, rockshelters, and quarries (Mallouf 1985:123). In the Stockton Plateau area similar kinds of sites are found concentrated on terraces along drainages (Mallouf 1985:121). A number of rock art sites have been recorded in the section, particularly along the Rio Grande and Pecos River (e.g., Mallouf and Tunnell 1977; McNatt 1981: 128). The pictographs and petroglyphs of the area exhibit a rock art style dissimilar to that found in the Lower Pecos region (Mallouf 1985:125, 127). Whether this reflects a lack of interaction between the two areas, the existence of well defined territories (Shafer 1977), or differences in ceremonial/religious practices (e.g., Whitley 1987), is unclear.

In summary, much remains to be understood concerning the Archaic occupation of the Plains subregion. Because so little professional work has been accomplished in the area in recent years, stratigraphic and radiocarbon data are limited and often of poor quality. Projectile point sequences borrowed from adjacent regions need to be fine tuned against local chronological data. Ethnobotanical data for the area are limited, but suggestive of a highly conservative way of life oriented towards the exploitation of succulent and semisucculent desert species. However, the possibility of seasonal, temporal, and intraregional differences in the proportions and kinds of species exploited still needs to be considered. Population growth has been cited as an explanation for increased numbers of sites, and their location in a wider range of environments during the Late Archaic period. This explanation needs to be rigorously tested and alternate explanations (i.e., sampling error, enhanced site visibility, etc.) need to be explored. Other hypotheses concerning changing interregional contacts, and the development and maintenance of group territories and boundaries, are in need of testing against local data.

THE FORMATIVE PERIOD—NEOLITHIC ARCHEOLOGY IN THE SOUTHWEST

Alan H. Simmons (with Douglas D. Dykeman and Patricia A. Hicks)

SYNTHESIS

The Formative period, frequently known as the Puebloan or Anasazi period (see discussion under Introductory Commentary), covers the classic cultures of Southwestern archeology. It has been the focus of archeological research for over a century and an enormous literature exists. When most people, professional and lay, think about Southwestern archeology, the image that comes to mind is of large pueblos and cliff dwellings. And indeed, the archeology of the Formative period represents some of the most spectacular cultural remains known in North America.

It would be a mistake, though, to think that the spectacular ruins dotting the Southwestern countryside are the only remnants of this complex period. It is becoming increasingly clear that the Formative represents several different cultural trajectories, some of which culminated in the large pueblos, others of which left a more modest archeological signature.

In a traditional sense, the Formative period is a time when the full impact of the early experiments with agriculture that began during the late Archaic were realized. Once man had control over his subsistence base with the advent of agricultural economies, the foundation for further cultural refinement was laid. With the relative economic stability offered by agriculture, the establishment of permanently occupied villages was possible.

The early phases of the Formative are represented by numerous such villages, whose occupants drew their subsistence base from both agriculture and a continuation of hunting and collecting. These first villages were modest affairs, in most cases consisting of semisubterranean structures, or pithouses. As population grew, above-ground dwellings became a more efficient structure, and village plans became more sophisticated. Such villages often rapidly grew into more substantial settlements.

During the later phases of the Formative, the classic Southwestern florescence was realized. In many regions this was represented by large settlements displaying an amazing degree of sophistication. Artistic achievement and ritual behavior were at all time highs. Several sophisticated achievements occurred, including intricate water control systems, massive architectural projects, elaborate trade networks both within and outside of the study area, and the establishment of ceremonial complexes. All of these point to a level of cultural complexity previously unrealized in North America. These achievements are even more impressive when one realizes the generally marginal nature of most of the Southwestern environment.

Perhaps the most well documented evidence of these accomplishments within the study area is the Chaco Canyon region of northwestern New Mexico (Figure 11). The Chaco Phenomenon represents one of the most sophisticated prehistoric developments known for North America, and it is easy to overemphasize these to the exclusion of other areas. And yet, other regions displayed equally complex, but perhaps less massive, developments. In the Mimbres area of west-central New Mexico, for example, the degree of artistic achievement realized is unequaled in the Southwest. In the Rio Grande Valley, some of the largest pueblos known in the Southwest were constructed. A tremendous amount of diversity characterizes the Formative and it is difficult to generalize about the period. All of the developments that occurred point to an enormously complex social system, and deciphering this has been a primary research task for years.

Although the spectacular remains have received, understandably, a disproportionate amount of attention, other Formative developments also are notable. In the outlying regions of the study area, such as eastern New Mexico, south-central Colorado, and Trans–Pecos, a continuation of economic patterns witnessed during the Archaic is common. The reasons for this are intriguing, and the relationship of at least partially nomadic groups to the major population centers is one topic of considerable research interest. Indeed, some recent research has suggested that population mobility during the Formative was much more common than has traditionally been believed. It is becoming apparent that hunting and gathering always were important aspects of Southwestern life. That such activities tend to be less visible archeologically than are those related to agricultural pursuits has led to an over-emphasis on the latter.

In some parts of the study area, the classic Formative achievements were terminated rather abruptly. The reasons for this decline are not known, but they may have included climatic deterioration, overpopulation, and poor land management practices. It is easy, however, to view this decline as a general abandonment of much of the region when, in fact, it represents population movement and the restructuring of settlement patterns. And, while some areas, such as Chaco Canyon, did undergo a massive reorganization, other regions, such as the Rio Grande Valley, continued to prosper. Indeed, when the Spaniards arrived in the region in the sixteenth century, they found not only abandoned ruins but also very actively occupied pueblos.

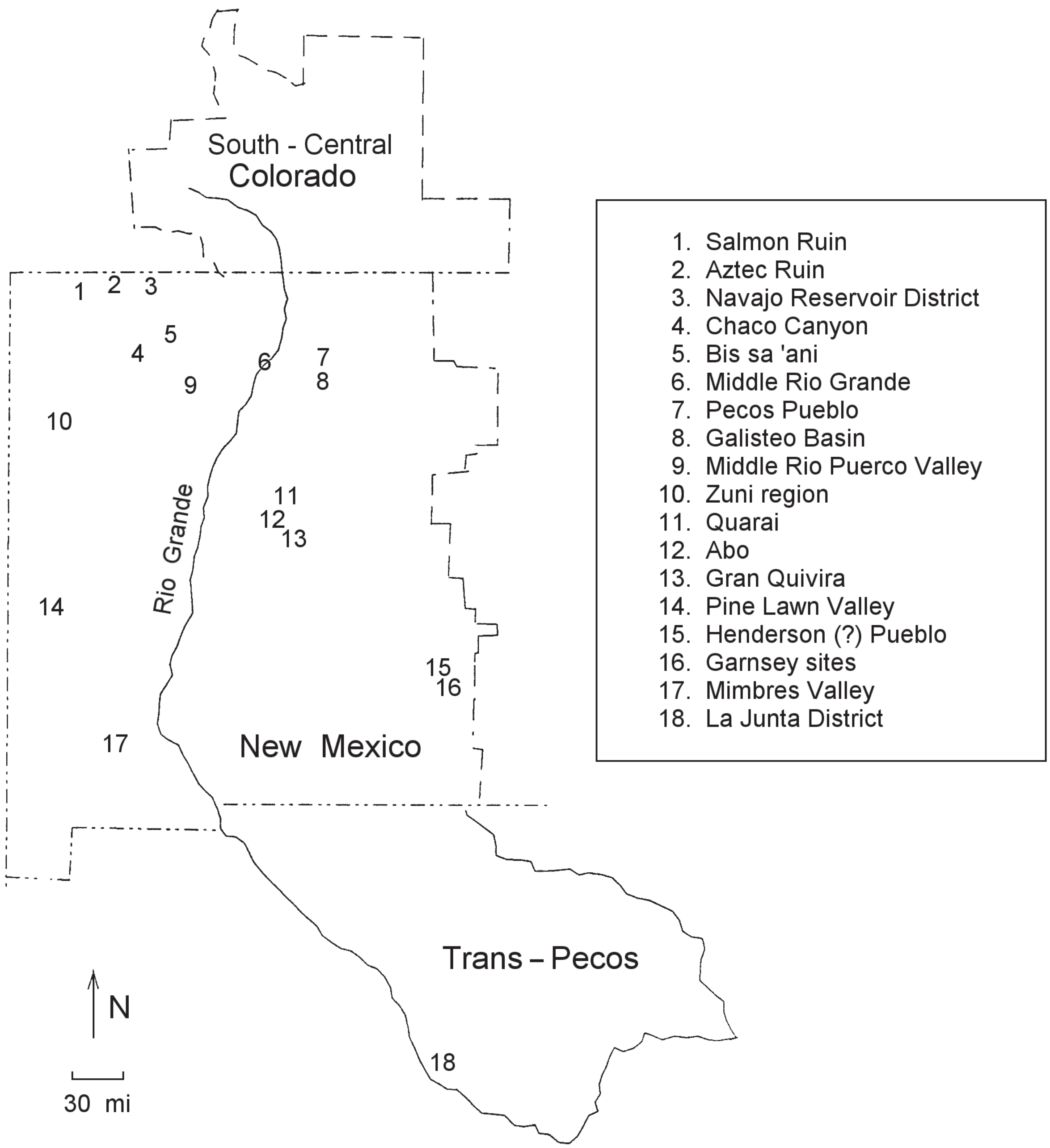


Figure 11. Location of principal Formative and Protohistoric sites and regions

PERIOD DISCUSSION

The Formative is a general term applied to the appearance, and in many cases the continuation of, village life (cf. Flannery 1968; Martin and Rinaldo 1951; Willey and Phillips 1958). In the Southwest, the Formative is usually referred to as the Anasazi or Puebloan period. At the outset, let us state that this is a very unsatisfactory term. After considerable thought, we have decided to retain it simply because a better, commonly agreed upon term does not exist. This does not mean that we are happy with the usage of Formative, for it has many meanings depending upon geographic context. Accordingly, it must be understood that our usage of Formative is a general one referring to post-Archaic and prehistoric developments in the project area. An alternative term would simply have been village–town period, since much of this period is characterized by the presence of such sites. This, however, is also a misleading term, masking the remarkable diversity characteristic of this period. While villages and towns certainly are a hallmark attribute, they are by no means the sole type of site, or adaptation, represented. Recent research has indicated a complex interplay of agriculturally based sedentism on one hand and the continuation of hunting and gathering adaptations on the other hand. In dealing with a geographic area as large as the present one, it would be misleading to characterize the entire period as one of towns and villages when in fact large portions did not undergo such developments. The usage of any one term is a semantic preference, and there is little point in engaging in semantic arguments that cannot be won. There simply is no one satisfactory term that can be used for this period; Formative represents an uneasy compromise. With this concern expressed, let us examine a few other issues relevant to this chapter. As just noted, Formative archeology has been the focus of archeological research for several years. Consequently, an enormous amount of information is available. The task of assimilating these data and abstracting relevant research issues and data gaps is a daunting one.

Unlike earlier cultural periods, where information is limited, many major issues in Formative archeology are largely resolved, at least those involving the general framework of events and chronology. Nonetheless, the very wealth of information that exists on the Formative has ensured that a plethora of key archeological issues remain unanswered. These often are quite specific topics and frequently are the subject of considerable academic controversy. It should perhaps be taken as a healthy sign to the discipline that all the questions never will be answered, no matter how abundant the available information.

In an overview such as this, there is absolutely no way to satisfactorily deal with all Formative developments within the entire study area. The regional diversification first seen in the Archaic is amplified during the Formative to an incredible degree. We are sure to omit a certain scholar's key research concern, or to gloss over another's. Since there has been an explosion in archeological literature in recent years, we may even inadequately present some issues. This chapter addresses some of the current principal themes that archeologists working with Formative materials are presently investigating. These include basic topics of terminology and chronology as well as concerns that are only tangentially resolvable by archeological inquiry. We make no attempt at resolution or at providing detailed discussion on any of these issues. Our intent is to illustrate the wide range and the diversity of both archeological materials and opinions that encompass the Formative period. We should note that many of our examples are drawn from the Chaco Canyon region. This is not done due to a Chaco-centric bias. The fact remains, however, that the Chaco region is well published and that many of the major research issues in Southwestern archeology have been addressed in this region. Equally notable achievements occurred in other areas of the Southwest. However, the basic framework of many such developments, while mirrored in other regions, can be well illustrated from the Chaco area. Thus our illustrations frequently cite Chaco data; in many cases these observations are present in other regions as well.

There may be some curiosity as to our usage of Neolithic in this chapter's title. Neolithic is far more often used to describe Near Eastern and European cultures, and has not seen common use in the Americas. Yet it is an appropriate term here, since it characterizes much of the period under discussion in the sense that the primary settlement/subsistence mode was one of villages with an economy partially based on domesticated plants.

Given the abundance of previous research on the Formative in the Southwest, it might be expected that several synthetic works are available. This is, in fact, not quite the case. There are classic Southwestern summaries, including the works of Kidder (1927), McGregor (1965), Wormington (1947), and Willey (1966:178–245), but these are surprisingly rare. This perhaps is best attributed to the fact that writing a general prehistory of the Southwest is an enormous task that few archeologists have wanted to tackle. It is a task certain to be criticized, given the disparate number of opinions strongly held by many Southwestern archeologists. In most instances pan-Southwestern summaries are dated, having been written when archeology was still in a largely descriptive stage. This perhaps facilitated the task, but with the advent of improved data recovery methods and more profound thinking on archeological interpretation, the job of synthesizing the Southwest became monumental. This accounts for the rarity of modern syntheses. Certainly excellent regional summaries exist, but the number of general Southwestern summaries can be counted on one hand. An ambitious attempt was Martin and Plog's (1973) study of the archeology of Arizona, but this was handicapped by following a modern political boundary and by a strong bias in data presentation and interpretation. In New Mexico, Stuart and Gauthier's (1984) work comes closest to a statewide synthesis. It, too, has biases as well as a management-specific perspective. The most recent attempt at summarizing Southwestern prehistory in a meaningful, contemporary fashion certainly is Cordell's (1984) study. While aspects of her work have been criticized (e.g., Berman 1987; Wilcox 1987), she is to be applauded for attempting to do what few researchers have been bold enough to. To the reader of this overview who is seeking more detail, Cordell (1984) would be one of the first places to turn to, as would Stuart and Gauthier (1984).

Terminology

Terminology for the Southwestern Formative is a confusing issue, both to the lay person and to the professional archeologist. A plethora of regional and chronological terms exist. These often are based on minute differences in artifacts types, most frequently ceramics, or presumed temporal distinctions. In the most general sense, two terms are used to refer to cultural developments in the project area during the Formative. These are Anasazi and Mogollon. The former generally refers to groups in the northern portion of the region, while the latter is confined to the west-central and southern portions of the study area. On this level of integration, a third term, Hohokam, refers to the elaborate cultural developments primarily restricted to southern Arizona, while Patayan covers developments in northwest and north-central Arizona. Thus, these terms serve a basic classificatory function; they are broken down into numerous regionally distinct phases and traditions. The degree of precision of these often is a reflection of the amount of research attention that a certain area has received. Cordell (1984:98–118) provides a concise and useful discussion on the main cultural phases and traditions included within the Formative.

In the space of this overview, we would be foolish to attempt a detailed discussion of terminology. Literally scores of phase names have been documented. Appropriate detail is provided later in this chapter under the subregion discussions. Local phases are chronologically based, but the precise temporal placement varies considerably by region.

It is of historic interest to note that the first systematic classification of Southwestern materials, the Pecos Classification (Kidder 1927), still is widely in use. Although it has been refined, Kidder's basic classification of Basketmaker through Pueblo stages is considered a valid and useful framework. The nomenclature and diagnostic traits for each cultural stage of the Pecos Classification, abstracted from Cordell (1984:55–58; Willey 1966:199–220), are summarized below:

- Basketmaker I, or Early Basketmaker (no dates available since this was a postulated stage): This was a hypothetical period used to represent preagricultural developments; it is no longer used; rather, the developments envisioned now relate to the Late Archaic.

- Basketmaker II, or Basketmaker (ca 100 B.C.–A.D. 400): Pottery is not present; however, agriculture is known, the atlatl (spear thrower is used); and small villages occur.

- Basketmaker III, or Post-Basketmaker (ca A.D. 400–700): Dwellings are pithouses or slab houses; pottery is made with the cooking ware being plain, without plastic (scoring, incising, and applique) decoration; the people of this and the preceding Basketmaker stages did not practice cranial deformation.

- Pueblo I, or Proto-Pueblo (ca A.D. 700–900): This period is represented by villages of aboveground, contiguous rectangular rooms constructed of true masonry; this is the first period during which cranial deformation is practiced; culinary vessels have unobliterated coils or bands at the neck.

- Pueblo II (ca AD. 900–1100): Small villages occur over a larger geographic area than previously; corrugations extend over the exterior surfaces of cooking vessels.

- Pueblo III, or Great Pueblo (ca A.D. 1100–1300): This period is characterized by the appearance of very large communities and artistic elaboration and specialization in crafts.

- Pueblo IV, or Protohistoric (ca A.D. 1300–1600): Much of the Pueblo area is abandoned, particularly the San Juan region; artistic elaboration declines and corrugated wares gradually disappear, giving way to plainware.

- Pueblo V, or Historic (ca A.D. 1600–present): This is the final period, representing the historic pueblos.

Cordell (1984:55–58) makes several relevant points regarding the Pecos Classification. She observes that the scheme is developmental and not strictly chronological. Cultural developments were not synchronous and all stages were not represented throughout the Southwest. Furthermore, the Pecos Classification emphasized changes in skeletal characteristics (primarily cranial deformation), architecture, and ceramics. Skeletal traits were considered important because it was not known if Basketmaker groups were related to later Puebloan peoples. The genetic continuity of those populations is now generally accepted. Architecture and ceramics were employed as diagnostic traits since they permitted regional comparisons.

While a plethora of terms exists to characterize Formative developments, it is useful to ask exactly what all those phase names really mean. Are they reflections of actual cultural groups? Probably not. These are heuristic archeological devices. In the early days of research, nearly every new project defined a new culture, largely based on ceramic traits. This resulted in the confusion of terms extant today, starting with the usage of "Formative." The implications of much of the early research was almost biological, with hierarchically defined roots, branches, stems, and phases (cf. Gladwin and Gladwin 1934; Colton 1939). The intent was to classify, and not give individual phases a life of their own. Unfortunately, in reading much of the early literature, one gets a distinct impression of ceramic lifeforms. While considerably more sophistication is evident in modern discussions of terminology, it is useful to know that many of the terms still in use today were initially defined from a biological perspective.

Site Types

The Formative is characterized by an amazing variety of site types. Since various site types will be discussed under separate subheadings of this chapter, it is only necessary to summarize some of the more prevalent types here:

- pithouses (semisubterranean structures) – individual and in small villages

- single story pueblos – individual and in small villages; single or multiple rooms

- multistory pueblos – these range from small units to massive structures
- water control features – these include irrigation systems, check dams, agricultural fields, run-off systems, cisterns, wells, dams, ditches, headgates, terraces, linear borders, "waffle gardens," rock piles, and reservoirs
- "roads" – these are linear features associated with the Chaco Phenomenon
- signal features – these also usually are associated with the Chaco Phenomenon
- lithic and ceramic scatters
- lithic scatters
- ceramic scatters
- rockshelters
- shrines
- stone circles
- petroglyphs and pictographs
- stone cairns
- stairways
- granaries

Chronology

Unlike the earlier Paleo-Indian and Archaic periods, the Formative has benefited fully from modern advances in archeological chronology. The Formative period covers perhaps 1500 years. This is considerably shorter than the preceding periods, yet it is the Formative that has the most detailed chronology. This is due to several variables, including more sites excavated, better preservation, and the recovery of a wide range of datable materials.

Both absolute and relative dates have allowed for quite specific temporal placement of many Formative phases. Consequently, chronology is not an overriding issue in Formative archeology. However, refinements are constantly being made and many researchers are able to argue for chronological placement of materials to within a few years, as opposed to a few hundred years. The following, abstracted from Cordell (1984: 87–95) is a brief summary of methods currently in use for dating Formative cultures.

Ceramic Cross-Dating

Ceramic cross-dating has been, and continues to be, a key cultural and temporal marker. Prior to the development of absolute dating methods, cross-dating represented the major technique for dating many of the Formative cultures. After the development of methods such as dendrochronology, ceramic types were assigned to absolute chronologies. Cross-dating is still widely used as a general indicator of both cultural and temporal affiliation. It is an especially useful method of estimating such affiliations on survey projects, where it may be impossible to obtain absolute dates. As Cordell notes, cross-dating "provides a quick method for roughly ordering sites in time, but it has been much abused" (1984:91).

Dendrochronology

Dendrochronology, or tree-ring dating, was developed by astronomer A. Douglass and the method is fully discussed by Fritts (1976). Dendrochronology is both a precise paleoenvironmental and temporal indicator. The best materials for tree-ring dating are drought-resistant species such as pinyon, Douglas fir, and yellow pine, and the method has been widely used throughout the Southwest. Since such species frequently were used in the construction of Formative period dwellings, dendrochronology represents the most precise dating method available to archeologists in the Southwest. Dendrochronology has allowed for some very specific reconstructions of use patterns and dates of construction and remodeling for prehistoric pueblos, as exemplified in Dean's (1969, 1970) research in northern Arizona. The technique, however, is not foolproof (see Cordell 1984:89–90), but it represents a very powerful analytic tool.

Radiocarbon Dating

Radiocarbon (C–14) dating is widely used to date Paleo-Indian and Archaic materials. The method is also used to date Formative phases, but there are some inherent difficulties with this usage. Although radiocarbon dating is an absolute method, it is not a very precise one, especially when dealing with events of relatively short duration. In the Paleo-Indian and Archaic periods, when individual phases may be represented by several hundred years, radiocarbon dates provide an adequate temporal framework. However, the Formative period is not an excessively long one, and many of its phases are encompassed by only a few hundred years, if that. Since many radiocarbon determinations have an error (plus or minus) factor of up to a few hundred years, the utility of the method is reduced. In addition, there are other problems with radiocarbon dating, as summarized by Cordell (1984:83). Of particular interest is Schiffer's (1982) old wood argument. This argument notes that several hard woods are long lived (up to several hundred years) and that archeologists must be aware of the possibility that radiocarbon dates on such species may be considerably older than the cultural contexts in which they occur.

Archeomagnetic Dating

Archeomagnetic dating is widely used in the Southwest, both as a supplement to dendrochronology and in situations where tree-ring dating is not possible (Weaver 1967; Windes 1980). The technique depends on two natural phenomena. First, the earth's magnetic field constantly shifts in intensity and direction. Second, when clay is heated beyond 200°C (as in a hearth), the magnetic fields of iron particles within the clay take on the magnetic orientation of the earth's magnetic field at that time and place. In order to date a sample, it is necessary to have an accurate map of the past positions of the earth's magnetic field. Although such maps exist in many parts of the Southwest, there is no agreed-on archeomagnetic map for the period before A.D. 600. Despite this, the method is extremely useful in dating many Formative sites, if appropriate samples are available and if the time is spent to extract them (Cordell 1984:93–94).

Obsidian Hydration

Obsidian hydration dating was developed by geologists. Its basic principle is that obsidian will slowly absorb atmospheric or ground moisture. When a fresh surface is exposed, as in artifact flaking, this surface also begins to absorb moisture. Hydration rims form and can be measured, allowing for a chronological placement. The rate at which these rims form, however, is not constant, and it is necessary to have calibrations for specific obsidian sources (Cordell 1984:94–95). Obsidian hydration dating has been used with varying degrees of success on Archaic materials (e.g., Baker and Winter 1981). At Formative sites, obsidian hydration can be used in conjunction with dendrochronology, radiocarbon dating, and ceramic cross-dating as a supplemental source of chronological information. While it is a potentially useful chronological technique, obsidian hydration has been criticized, and its use should be applied judiciously.

Origins

There now seems little doubt that the Formative had its roots in the preceding Archaic period. Before much information was available on the Archaic, the origins of the Anasazi (and other Formative groups) was something of a mystery. Mexico often was cited as a probable population source. With the documentation of in situ Archaic development, however, few would question that the Formative Southwestern cultures had their ultimate origins in the Archaic. Studies such as Irwin–Williams' (1973) Anasazi Origins Project have documented this continuity, and the development of limited maize horticulture during the Late Archaic is additional supporting evidence.

The initial stages of the Formative are characterized by small villages consisting of, usually, semisubterranean pithouses. The earliest Formative stages (i.e., Basketmaker I and II) are not well documented. Indeed, as hinted at in the last chapter, there has been little explanation for the apparent long-term knowledge of agriculture (first seen in the Late Archaic) but the retarded development of sedentary village life, which did not appear for another approximately 2000 or more years. This remains a critical gap in our knowledge of the archeology of the study area. Discussion of the initial development of Neolithic economies is an immensely complex issue, and cannot be adequately dealt with here. Suffice it to say that we do not know the specifics of how and why Formative cultures developed as they did.

In any event, our knowledge of the early Formative is limited. Indeed, Berry's (1982) critical analysis of Southwestern Formative development argued that only seven structures are known for the period between 185 B.C. and A.D. 1. Between ca A.D. 200 to 900, however, numerous villages were established throughout the Southwest. While these sites are clearly distinct from preceding Archaic occurrences, they do share many material culture items with the Archaic. These include grinding stones and a variety of chipped stone artifacts. The traditional distinguishing criterion between late Archaic and earliest Formative (i.e., early Basketmaker) often is cited as the presence of ceramics. Shortly thereafter, trade items and the bow and arrow appeared at early Formative sites (Cordell 1984:214).

In contemporary archeological thought, the addition of a single item of material culture (in this case, ceramics) should not be considered such a significant event that it resulted in profound cultural change. Rather, many researchers are interested in examining cultural processes from an adaptive framework, where an entire suite of technological advances or improvements allowed for culture change. The documentation of the first or the earliest of anything is of little practical value if one adheres to such an approach (cf. Flannery 1973).

The significance of an increased cultural inventory has been argued by many researchers. Was additional cultural baggage a cause or a reaction to the increased sedentism and reliance on domestication seen during the early Formative? A few researchers have dealt explicitly with this issue. For example, Glassow's (1972, 1980) studies in the Cimarron area of New Mexico have addressed the development of early agricultural communities. He has suggested that the change from dart points and spears to bows and arrows may be related to increased reliance on agriculture and the need for a more efficient hunting technology (Glassow 1972). Additional studies such as Glassow's examination of technological change would be a welcome addition to the study of early Formative cultures in the Southwest.

Current mainstream archeological opinion regards the transition from the Archaic to the early Formative as a gradual development based on increased intensification of maize agriculture and increased sedentism. This view has been challenged by Berry (1982), who argues for a series of abrupt changes between the documented phases, rather than a gradual, evolutionary model. Berry has been criticized by several Southwestern archeologists (e.g., Irwin–Williams 1985; Dean 1985), but he does pose some intriguing questions. Regardless of whether or not Formative development represents gradual evolution or punctuated change, as suggested by Berry (1982), few researchers argue that its origins lie in the late Archaic.

Artifact Variation

Formative material culture is extremely rich. Indeed, this richness is one key element that has made many Formative sites so attractive to vandals and pothunters. Many Formative artifacts are considered fine art, especially ceramic vessels. The following discussion very briefly highlights major Formative artifact classes.

Ceramics

Ceramics are a hallmark artifact class of the Formative period. Ceramic vessels made their first appearance early in the Formative, and from relatively simple forms rapidly developed into a wide array of sophisticated styles and types. The differences in ceramic technology and decoration treatment are basic to cultural–historic reconstructions used by Southwestern archeologists, and ceramics are extremely useful information sources for the identification, discussion, and resolution of a wide variety of archeological issues (Cordell 1984:216).

Virtually scores, if not hundreds, of ceramic types have been defined in the Southwest. These are not discussed here, although some of the more important wares are dealt with later in this chapter under the regional discussion. Southwestern archeologists have always spent an inordinate amount of time describing ceramic assemblages, and a vast literature has been generated. Early treatments were largely descriptive and chronologically oriented (e.g., Colton 1939, 1953, 1956) or concerned with ceramic technology (e.g., Shepard 1939, 1942, 1954; Kidder and Shepard 1936). In recent years, archeologists have used ceramics as one key component in attempting to reconstruct social organization, in devising sophisticated analyses attempting to gain insight into cultural processes and change, in identifying presumed trade networks and population movements, or in refining chronology (e.g., Franklin 1983; Hill 1970; Irwin–Williams 1980a; Longacre 1970; F. Plog 1974; S. Plog 1980; Toll 1984; Toll et al. 1980; Windes 1977, to name but a few). While many ceramic studies, both past and present, appear rather esoteric, the fact remains that ceramics form an essential component of Formative culture. They have considerable interpretative power, and proper analysis can lead to detailed insights into Formative life.

Lithics

Formative lithic studies have generally been overshadowed by ceramic studies. Although well made projectile points, presumably arrows, were manufactured during the Formative, there is a general decline in chipped stone technology in many areas. Whether this is more apparent than real is not yet well determined, since Formative chipped stone analyses often have been subjected to only the most cursory analytical treatment (Olszewski and Simmons 1982). However, such assemblages have been the focus of detailed technological studies in recent years (e.g., Cameron 1984; Schutt 1980b; Simmons 1982b, 1982g, 1982h; Vierra 1980a), and our understanding of Formative lithic assemblages has increased substantially. These studies have shown that Formative lithic assemblages are much more complex than previously thought, contain substantial information potential, and comprise a significant proportion of many Formative artifact assemblages.

Groundstone artifacts, consisting primarily of manos and metates, have received slightly better analytical treatment than has chipped stone. These artifacts are closely tied to subsistence reconstruction; thus they have frequently received more attention, although most of this has been primarily descriptive.

Perishable Artifacts

In many areas, Formative sites are well enough preserved to have yielded artifacts that normally are not recovered in the archeological record. Often, such sites are caves or rockshelters (Guernsey and Kidder 1921; Martin et al. 1952; Morris and Burgh 1954; Morris 1980), although perishable artifacts have been recovered from habitation and ceremonial sites as well (e.g., woven mats from a structure near Chaco Canyon [McAnany 1982] or the numerous wooden ceremonial objects known from several localities).

A wide variety of perishable materials is known from Formative sites. These include various types of baskets, cordage, blankets wrapped with fur and feathers, cradle boards, sandals, a variety of fibers, cotton cloth, braided sashes, string aprons, knotted netting, a variety of bone implements, and human hair artifacts (Cordell 1984:216; Morris 1980:80–143). Many of these occur relatively early (i.e., Basketmaker) in the sequence, although perishable remains also are known from late Formative sites.

Exotic and Ritual Artifacts

Another category of Formative artifacts can be classified as ritual, exotic, or ceremonial. Such objects frequently are perishable, although in many instances they consist of ceramic or lithic objects. Of course, interpreting an artifact as ceremonial is a risky proposition; all too often archeologists tend to classify something in this category when such an object does not fit well within a preexisting category. Frequently, the interpretation of an artifact as ritual is dependent upon its context within a site, thus necessitating careful excavation procedures.

Presumed ritual artifacts have been recovered from a wide assortment of contexts in the project area. Regions with sophisticated developments, such as Chaco Canyon and portions of the Mimbres area, have been particularly rich. In Chaco Canyon, for example, such objects include prayer sticks, plume holders, miscellaneous carved artifacts, painted wooden objects, and a variety of carved zoomorphic forms, including some manufactured from semiprecious stones such as turquoise (Vivian et al. 1978). In the area surrounding Chaco Canyon, stone phallus-like artifacts have been recovered from a cache at the Bis sa 'ani outlier, a unique find for the Southwest. The cache also included other cult objects, such as sandstone tablets and discs (Breternitz and Marshall 1982:440–443).

Vivian et al. (1978:19–33) summarize similar artifacts from Southwestern contexts outside the Chaco area. Other possible ritual items found at Formative sites throughout the region include human effigy vessels, copper bells, shell trumpets, pottery incense burners, painted tablets and wood effigies, macaw skeletons, killed ceramic vessels (where a hole has intentionally been punched through a vessel), and inlays of selenite, mica, or turquoise on shell, wood, or basketry (Cordell 1984:217).

Trade Goods

An assortment of artifacts presumed to have been imported into the project area occur at many Formative sites, if only rarely. Often, these are classified as exotic luxury goods or ritual artifacts. The determination of a trade object can be a difficult task, unless that object is manufactured on a material not available in the project area. Items such as copper bells, some shell artifacts, and macaws, for example, had to have been imported into the project area.

Summary

The preceding discussion has been a very brief and cursory treatment of some of the artifacts present at Formative sites. Our intention has been to illustrate the remarkably wide range of objects known from such sites. These include artifacts associated with everyday life as well as ritual and luxury goods. Some of the most well executed and spectacular examples of prehistoric art known in North America come from within the project area.

Architecture

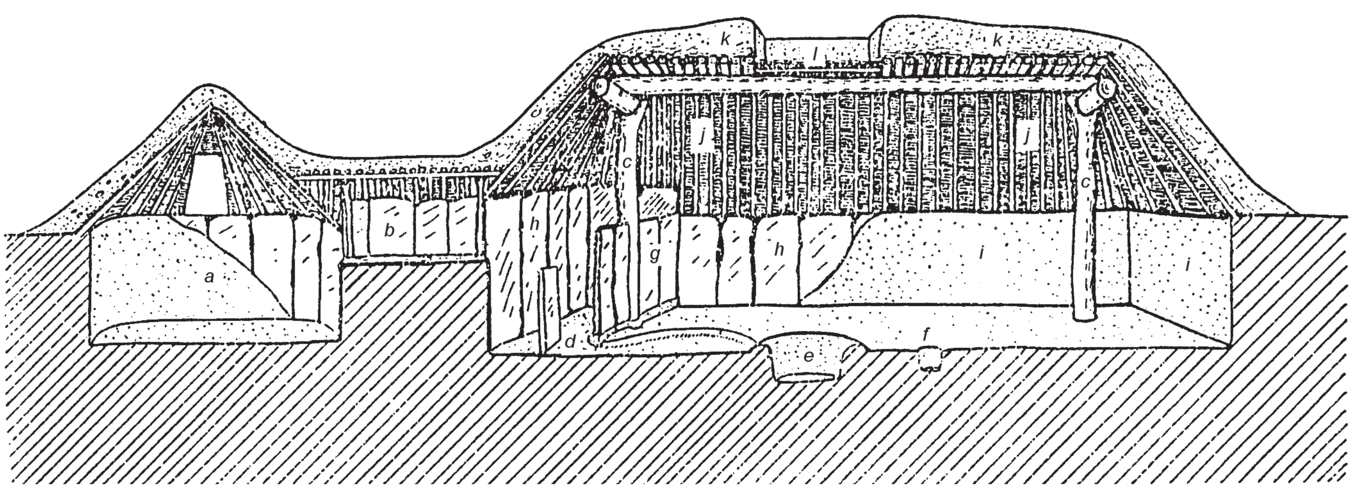
Architecture is one of the most common archeological remains, yet archeologists have probably done less to interpret and explain architectural variation than with any other data set (Gilman 1987:538). The most visible element of Formative culture is its architectural remains. An incredibly complex and wide range of variation characterizes its architecture. This includes not only the spectacular multistory pueblos and cliff dwellings so often illustrated, but also more modest structures represented by both pit-structures and smaller pueblos. Description of Formative architecture has been more than adequate; or, as some might argue, even compulsive. However, the development of an explanatory framework examining the significance of architectural variation has not been as prevalent as might be expected.

Formative architecture comes in many forms. Habitations and ritual structures have received most attention, but if viewed from a wider perspective, other architectural elements also occur at Formative sties. These include storage structures, temporary or ephemeral structures, walls, and agricultural features. The study of architecture is of significance for addressing issues beyond construction method alone. Topics that have been examined using architectural data include subsistence, social organization, and ceremonial behavior. In the following discussion, we summarize some of the key elements of Southwestern Formative architecture.

Early Structures — the Pithouses

The first Formative Southwestern structures consisted of pithouse villages. Pit-structures are defined by Gilman as “any noncontiguous building whose floor is excavated below the ground surface” (Gilman 1987:539). This definition includes several variation of structures, but primarily involves the pithouses so common to the early Formative, or Basketmaker, period (Figure 12).

In general, early pithouses are round to oval in shape, about 4.5–5 m. in diameter, and ca 0.5 m. deep. Remains of superstructures and roofs frequently are poorly preserved, but often consisted of cribbed logs laid horizontally in abundant amounts of mud mortar. Pithouse walls that extend above the ground’s surface often consisted of vertical poles interlaced with twigs and covered with mud. Entry to pithouses was either through the roof or through side entryways in the walls. Internal features of pithouses often included upright slabs and hearths



Postulated method of house construction. a, Antechamber. b, Passage. c, Support posts. d, Deflector. e, Fire pit. f, Sipapu. g, Compartment wall. h, Slabs lining periphery of pit. i, Plastered walls. j, Pole and brush framework. k, Earth and plaster covering on superstructure. l, Smoke hole.

Figure 12. Postulated reconstruction of a Basketmaker pithouse (from Roberts 1929:12)

(Cordell 1984:218–219). Pithouses often consist of two rooms: a main room and an attached antechamber.

Through time, pithouse forms underwent changes and in most areas became standardized. Regularly occurring styles and shapes varied by region. In the Mogollon area of Southwest New Mexico, for example, pithouse shape ranged from generally oval to rectangular. After their initial appearance, pithouses also generally decreased in size. Firepits, often slab or cobble lined, became standard floor features and were set into floors in front of the entryway (Cordell 1984:219).

In the Anasazi area in northeastern New Mexico and Colorado, pithouses were constructed with adobe wing walls separating the house into two main areas. Processing artifacts found in the smaller, vestibular area suggest that this part of the house served as a kitchen and food preparation area. In both Mogollon and Anasazi areas, *sipapus* (small holes) are sometimes located to the rear of the house. Other features common in Anasazi pithouses include ventilator openings, slab or adobe deflectors, and benches or raised platforms around most or all of the room's perimeter. The deflectors, located between the central hearth and ventilator shaft, presumably served to direct incoming air away from the open fires. As Anasazi pithouses became more standardized, they frequently were equipped with hatch entrances through the roof, and the impressions of ladder posts often are found beneath these (Cordell 1984:219).

The Transition from Pithouses to Pueblos

In much, but not all, of the project area, a transition from subterranean to above-ground structures occurred around A.D. 700 to 1000. The above-ground structures were comprised of multiroom pueblos with adobe or masonry walls. In some areas, the transition was gradual, with people still living in pithouses and using above-ground structures for storage. Later, the surface rooms served as habitation and storage structures, while, in some cases, the subterranean structures were converted to ceremonial rooms. In other areas, such as in the Mogollon region, the transition was abrupt and without transitional forms (Cordell 1984:230).

Attempts to explain the transition are usually linked to economy in one sense or another. Generally, the view is that increasing agricultural intensification, increasing sedentism, and increasing social complexity were key elements in the move to pueblos. We should note that the transition from semi-subterranean circular structures to contiguous above-surface roomblocks is not restricted to the Southwest: it occurs through the world. For example, Flannery (1972) dealt with the issue in some detail in the Near East, offering explanations based on a complex interplay of economic intensification and social complexity.

In the Southwest, several models other than economically based ones have been proposed to account for the transition. These include ecological (Whalen 1981b), labor intensity (Lipe and Breternitz 1980; McGuire and Schiffer 1983), culture change (Plog 1974), and economic/climatic/seasonality (Gilman 1983, 1987) explanations.

Gilman (1983, 1987) has examined the transition in some detail, and her argument bears summary. She considers the relationships between seasonality and both pithouses and pueblos, observing that both the size of population and intensity of the subsistence system dictates whether pithouses or pueblos are selected as appropriate habitations. Through an elaborate argument using both ethnographic and archeological data, she surmises that pithouses were used seasonally, during the winter, by groups with a relatively low reliance on agriculture. This interpretation of winter use is bolstered by Farwell's (1981) study of thermal efficiency in pithouses. It is important to note that Gilman does not necessarily imply that early pithouse sites were seasonally used, but rather only that the pithouses themselves were. She continues to argue that while pueblos also were not occupied for the entire year, they were used for longer periods of time and probably had a greater chance for reuse each year. She summarizes her arguments as follows:

> The difference in degree in the conditions surrounding the use of ethnographic pit structures and pueblos suggests a theoretical framework for the transition between the two kinds of structures in the Southwest. Growing population and the concomitant subsistence intensification prompt changes in food information networks and the amount of time and space needed to store, process, and cook food, in turn causing changes in architectural forms. These latter changes have two parts—from below to above-ground and from outside to inside structures (Gilman 1987:560).

In another study of the transition, Plog (1974) was concerned with broader factors of cultural change as opposed to specific architectural variations. He viewed the transition as a technological change derived from population growth.

While the details of both studies can be criticized from a variety of perspectives, such investigations represent a positive trend in attempting to explain the transition. These studies have gone beyond description and are thought-provoking explanatory models. They might not be correct, but at least they have stimulated other researchers to consider the causes of the transition. Both rightfully portray the transition as a highly complex series of events involving the restructuring of activities and new methods of integrating communities. While continuity between Basketmaker and Puebloan phases exists, differences emphasizing organizational complexity were beginning to emerge and are recognizable archeologically (Cordell 1984: 237).

We should note that the transition to pueblos was not a pan-Southwestern event. In many areas, the transition did not occur at all, and pithouses continued to be built and used until the Late Prehistoric and Protohistoric periods. This is especially true in the eastern portions of the study area. It also has relevance for some of the higher elevations in the region, where pithouses may have been more energy efficient than above-ground structures (Farwell 1981; Stuart and Farwell 1983). In some instances, pueblos and pit structures were used concurrently, and in other cases not.

Puebloan

During and immediately after the pithouse to puebloan transition, much of the Southwest witnessed the general expansion of small village settlements. Among the earliest types of Puebloan villages is the unit pueblo initially described by Prudden (1903, 1914, 1918). These "Prudden units" consist of masonry surface structures arranged in a line, arc, or L, a circular ceremonial room (or kiva, reminiscent of the earlier pithouses), and a refuse midden (Figure 13). These are generally oriented along a north–south axis (Cordell 1984:237–240).

After ca A.D. 1000, many parts of the Southwest witnessed a cultural fluorescence. This was the classic Puebloan period, and one outstanding feature is the presence of nearly monumental architecture in parts of the study area. Chaco Canyon, in the central San Juan Basin is one example best exemplifying the architectural sophistication of this period (Figure 14), although complex structures also are known from elsewhere, such as the Rio Grande Valley. In general, though, modest, medium sized pueblos were more common site types. It is important to understand that a huge amount of architectural variability characterized this period.

Architecture in Chaco Canyon has been extensively studied and can be used here to provide several examples of this variability. Architecture includes both well planned towns and unplanned villages. So great are the differences between the village sites and the towns that early researchers believed them to be manifestations of two different, noncontemporary, groups, representing, respectively, the Hosta Butte and Bonito phases. There is now a consensus of opinion, however, that both existed side-by-side, thus the term *phase* is inappropriate, and Cordell (1984:246) prefers to use *style*.

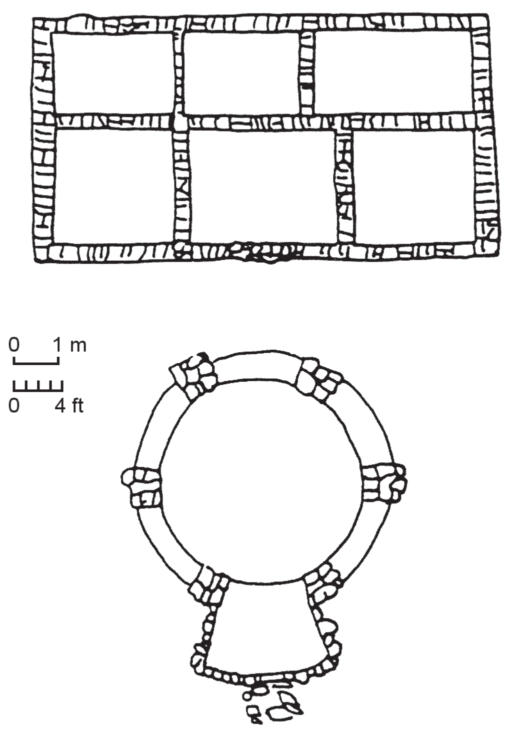


Figure 13. A "Prudden Unit" pueblo (Cordell 1984:239) Illustration by Charles M. Carrillo adapted from Prudden (1918)

The Hosta Butte style villages in Chaco Canyon are similar to earlier Puebloan sites in the area. They average 16 rooms, are single story, are generally oriented southeast, and appear to have grown rather haphazardly. Their walls are of somewhat irregular, simple compound masonry. Rooms are usually small with low ceilings. Plazas are open instead of enclosed by walls or room blocks. Circular kivas are small with vertical posts or pilaster roof supports. Burials frequently occur in associated refuse or in subfloor contexts (Cordell 1984:246–248).

Although most research attention in Chaco Canyon has focused on the large pueblo towns, a considerable amount of interest is developing in the small site architecture of the region, as best summarized by McKenna and Truell (1986). Indeed, as more systematic research is conducted in the region and elsewhere, it is becoming obvious that even during the classic puebloan period, small sites characterized by modest villages, were quite common (e.g., Breternitz et al. 1982; Simmons 1982a; Ward 1978).

It is the massive Chaco pueblos, however, that have captured the imagination of both professional archeologists and the lay public. These towns were well planned, with major architectural units being constructed at one time by a well organized labor force. The Bonito style sites are large, with an average of 216 rooms. The best known site, Pueblo Bonito, has over 800 rooms. These sites are multistoried, with up to at least four floors. Rooms are large and high ceilinged. The sites were constructed of cored, veneered, and decorative masonry resulting in a very distinct style. The decorative veneer often was covered with adobe plaster or matting. Bonito style sites are oriented to the south with plaza areas almost always enclosed by a roomblock or a high wall. Small kivas within the towns occur at a ratio of one to every 29 rooms. The kivas had cribbed roofs supported by horizontal logs generally placed at regular intervals along low benches (Cordell 1984:248–253).

Within Chaco Canyon itself, several large Bonito style towns have been documented. Each has at least one great kiva incorporated into the plaza area. Isolated great kivas also are known, as are great kivas associated with Hosta Butte style villages and Chacoan outliers. The Chacoan great kivas are unusual because of their size and distinctive floor features. The great kiva at Casa Rinconada, for example, is ca 20 m in diameter. Antechambers are commonly associated, and floor features, oriented north–south, include square raised fireboxes, paired masonry vaults, and roof supports. Large shaped sandstone disks were used as seatings for the roof support timbers. Wall niches or crypts were common (Cordell 1984:253–254).

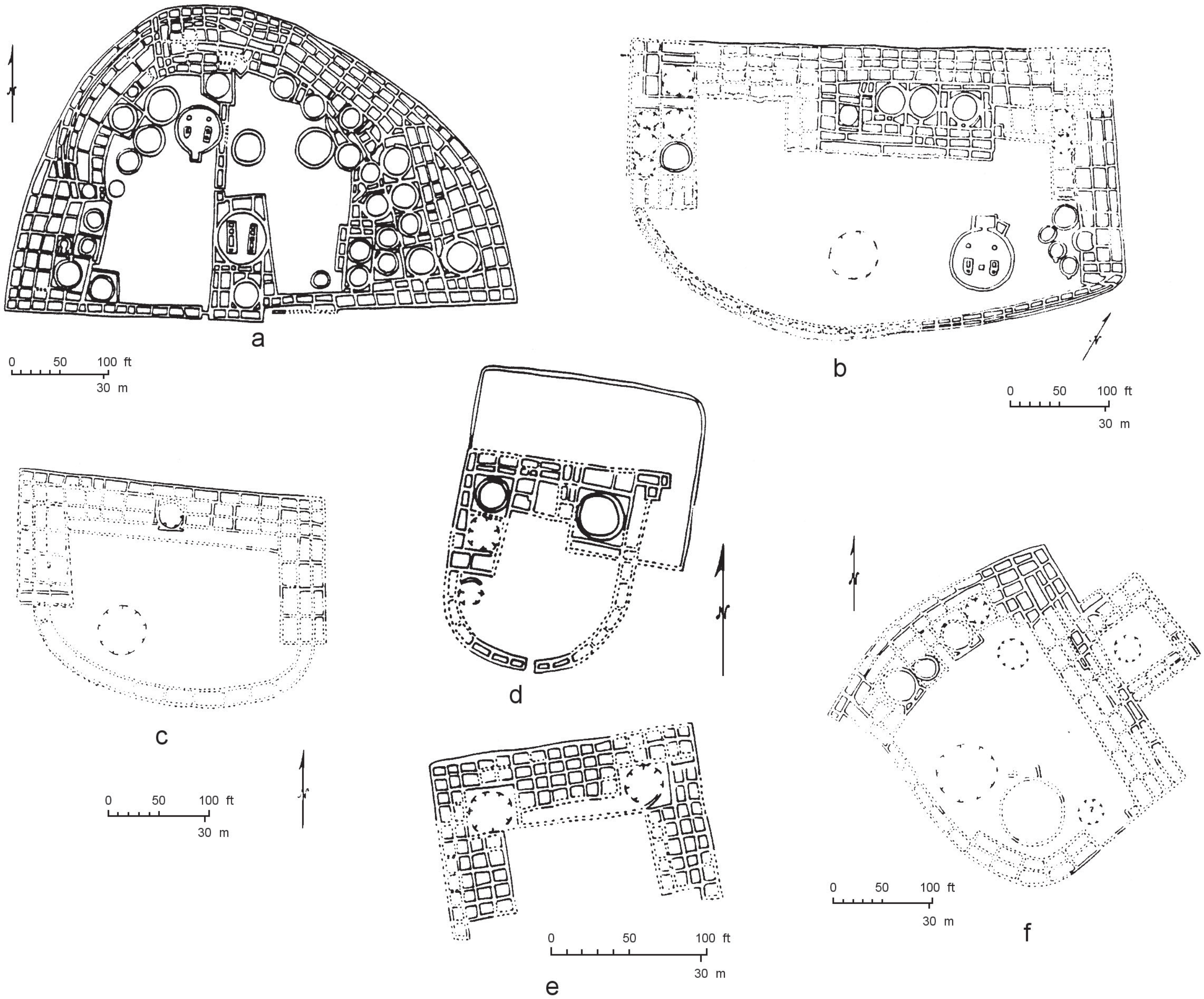


Figure 14. Some examples of the complexity of Chacoan architecture
a. Pueblo Bonito; b. Cherro Ketl; c. Hungo Pavi; d. Tsin Kletzin; e. Wijiji; f. Una Vida (Cordell 1984:251)

Tower kivas also are well documented in the Chaco region. These are circular kivas of two or more stories. Some are free standing, but most are incorporated within roomblocks and enclosed by rectangular walls with rubble fillings (Cordell 1984:254–255).

A tremendous literature, both dated and current, exists on the architecture of Chaco Canyon. This includes studies by Holsinger (1901), Judd (1922), and Vivian and Mathews (1965), and the more recent research by the Chaco Center (Lekson 1983, 1986).

In addition to the large towns within Chaco Canyon proper, the presence of Chacoan outliers is well documented. They share the following characteristics: they are outside of Chaco Canyon proper, they exhibit Chacoan core veneer masonry, Chacoan ceramic assemblages, and either great kivas, tower kivas, or both, and they are connected to Chaco Canyon by means of a roadway or a visual communication system of signaling stations. Over 70 outliers have been documented, some located up to 80 km from Chaco Canyon (Cordell 1984: 261).

Chacoan outliers consists of a variety of site types falling within the general description provided above. They include large settlements, such as Salmon (Irwin–Williams 1980a, b) and Aztec (Morris 1915) ruins near Bloomfield, New Mexico, smaller but still large pueblos with associated smaller villages (e.g., the Bis sa 'ani community [Breternitz et al. 19821), and isolated sites. Detailed descriptions of many of the outliers, as well as discussion of their significance, may be found in two excellent recent works: Powers et al. (1983) and Marshall et al. (1979). The Chacoan outliers are reflective of a cultural continuity, as seen in architecture and ceramics, and illustrate the sophistication and widespread nature of the Chacoan influence.

The Formative period, of course, covers a far wider area than the San Juan Basin, and sophisticated settlements occurred throughout the study area. To the north, but outside of the present study area, were very substantial and quite spectacular developments in Colorado, including the elaborate cliff-dwelling pueblos found in the Mesa Verde region, as well as free standing communities.

In the Mogollon area, in west-central New Mexico, numerous villages are well documented. As elsewhere in the Southwest, Mogollon area architecture represents a transition. Round pithouses are initially documented; these were later modified to rectangular ones and finally to above-ground pueblos. During the Mimbres Classic phase, architecture is not particularly impressive nor well constructed. Common Mimbres buildings were a series of contiguous, single story rectangular rooms with walls of unshaped river cobbles set in mud or adobe mortar. Roofs were supported by the walls from one to three or four roof support posts. In some cases, such as at the Galaz site, the community appears to have evolved from a small number of core surface rooms into a number of larger separate room clusters. Mimbres Classic pueblos often grew quite large, up to ca 150 rooms. Ceremonial or communal architecture is documented. Anyon and LeBlanc (1980) and LeBlanc (1983) suggest that during the Mimbres Classic period there were two classes of ceremonial structures: those used by segments of the village and those used by the village populations as a whole. Early in the Classic period, communal structures were very large, rectangular, semisubterranean kivas. Later ceremonial rooms in Classic Mimbres pueblos were small, semisubterranean kivas that were remodeled pithouses (Cordell 1984:293–297).

Another region with substantially documented architecture during the Formative is the Rio Grande Valley. Many excavated habitations in the area are pithouses and associated surface mud-brick or jacal structures. The pithouse architecture is generally relatively simple with round or rectangular forms. Pueblo villages also are known for the area, of course, as summarized by Cordell (1979a:34–105). In terms of sheer size, some of the later Formative Rio Grande settlements are larger than any in the entire Southwest, dwarfing even the large Chacoan pueblos. Additional detail is provided later in this chapter, under the Regional Discussion heading.

This discussion has emphasized domestic architecture, ranging from modest single dwellings to massive multistoried complexes. Some attention also has been given to ceremonial structures. In addition to such structures, a wide range of other architectural features is known from Formative sites. These include ephemeral adobe, jacal, or mudbrick structures, storage facilities, temporary habitations, and a wide variety of agricultural features, ranging from check dams to elaborate irrigation systems. The Formative period represents the zenith of Southwestern cultural development, and one very visible component of this is the remarkably varied architectural remains.

Trade and Exchange Networks

There is no doubt that peoples living in much of the study area were in communication with other regions. Trade and exchange were undoubtedly common components of this interchange. Many scholars, in fact, have used trade models to account for much of the development of Southwestern Formative cultures. While the documentation of trade or exchange items may be relatively easy, the verification of trade or exchange systems is difficult to demonstrate archeologically.

Chaco Canyon has been, again, the focus of much research on Southwestern trade and exchange systems. Basically, two categories of trade interaction have been discussed: trade and exchange indigenous to the Southwest, or trade and exchange involving contact with groups outside the Southwest.

The external, outside contact model usually attributes Chacoan development to the influence of long distance trade with Meso-American groups (Ferdon 1955; DiPeso 1974; Hayes 1981a; Kelley and Kelley 1975; Lister and Lister 1981). This school of thought is usually referred to as the Pochteca model, in reference to the ethnohistorically documented class of long distance Aztec traders and middlemen. While the Meso-American Aztecs postdated Formative Southwestern development (Aztec Ruin near Bloomfield is a distinct misnomer), the concept of long distance pre-Aztec Meso-American trade is used as a key argument for the Pochteca model. Support of this model relies on clear evidence of Meso-American traits in the Southwest, on Meso-American trade items in Southwestern contexts, and on an abrupt change in technology or settlement configurations as a result of Meso-American influences. The external trade model has been used to account for everything from Chacoan core veneer masonry to column fronted galleries, towers, T-shaped doorways, effigy vessels, ceremonial wooden canes, platform mounds, roadways, signaling stations, rock-cut stairways, and irrigation devices (Cordell 1984:273–274).

While these elements cannot be linked firmly to Meso-American connections, there is no doubt that there was some trade between the two regions, especially in luxury goods. Macaws, copper bells, and, possibly, shell inlay, are considered firm indicators of Southwestern trade with areas to the south. Jett and Moyle (1986) also have proposed that the depictions of various species of fish on Mimbres ceramics indicates trade and probably direct contact with the Gulf of California area of Sonora. Despite this, however, supporting data for substantial Meso-American interplay are few. While the issue is far from resolved, many researchers feel that a major Meso-American influence is unlikely, arguing instead that such influence was probably in the form of direct and periodic trade through long established connections rather than due to the actual formation of a Pochteca system (eg., Mathien 1981, 1986; McGuire 1980). This is especially true for Formative developments in the present study area. If one turns to Hohokam developments in southern Arizona, the case for Meso-American influence is far stronger, although still not conclusive.

The issue of internal indigenous trade and exchange is, in a sense, more difficult to deal with. There clearly was major interaction between local groups throughout much of the Southwest's long prehistory. The Chacoan development undoubtedly relied heavily upon trade, and some researchers have indicated that exchange activity was a major Chaco focus. For example, Judge (1979) suggested that Chaco development may reflect the establishment of reciprocal exchange networks involving regionally based redistribution systems. He argued that such a redistribution network served to distribute necessary subsistence goods and desirable craft items. Chaco's centralized position in the San Juan Basin made it a key locale for the storage of goods en route to other areas. The great kivas provided centers of redistribution and collection while the towns acted as warehouses for the storage of goods. Along these lines, Lightfoot (1979) also has argued for kivas functioning as redistribution hubs. Judge (1979) also suggested that turquoise exchange may have represented a sort of protocurrency system. What is important to realize is that research such as Judge's indicates that it was possible for sophisticated trade and exchange networks to have evolved internally and that it is not necessary to invoke outside forces.

Mathien's (1981, 1986) detailed study of exchange in the San Juan Basin represents a major contribution to the question of Meso-American influence in the Southwest. While her conclusions are not definitive, she correctly acknowledges that development of sophisticated cultures such as the Chacoan Phenomenon can be indigenous and do not require reliance upon external influences.

Much research attention on trade in the Southwest has focused on luxury or exotic goods. More mundane objects also were exchanged. Ceramic trade is documented, as is evidence for lithic raw material exchange (e.g., H. Toll 1981, 1984; Toll et al. 1980; Cameron and Sappington 1984; Cameron 1984). Also relevant is the documentation of long distance importation of trees for building materials into Chaco Canyon (Betancourt et al. 1986). While this may or may not have involved actual trade, it attests to the ability of local groups to engage in long distance endeavors. In sum, there is little doubt that trade and exchange were common elements in the Southwest (Hudson 1978). The significance of such systems, however, remains to be documented.

Social Organization

Attempts to identify social organization during the Paleo-Indian and Archaic periods are feeble when compared with the much better data base available for the Formative. The social organization of Formative cultures has long occupied a special niche in Southwestern archeology. Given the presence of modern and ethnohistorically documented groups in the region, several attempts have been made to draw parallels between the modern and prehistoric analogs. This is not an unjustified approach, since there clearly are many similarities and, in some cases, direct links between modern Puebloan groups and the archeological record. However, an uncritical application of direct analogy is not appropriate.

Notwithstanding the ethnographic evidence, there is substantial archeological information relating to social organization. It is, however, often ambiguous. Social organization is not a directly tangible aspect of the archeological record. When dealing with groups who left no written records, it is difficult to be confident about social and religious interpretations and reconstructions.

Early Village Social Organization

For the early phases of the Formative (i.e., the Basketmaker pithouse villages and the transition to pueblos), Cordell (1984:225–230, 237–242) provides a concise discussion of some of the major approaches taken to reconstruct social organization. It is informative to summarize her treatment of this issue.

Cordell (1984) begins by discussing Steward's (1955) study of the origin of the matrilineal Western Pueblo multiclan villages. This represents one early systematic attempt to examine Pueblo social organization using what archeological data were available at the time of his writing. He did not see great organizational differences between the Basketmaker and early Puebloan villages, arguing for nonlocalized clans making their appearance during the later Pueblo II period. Steward suggested that Western Pueblo matriliny was a result of the long horticultural history in the Southwest, when tending crops was initially done by women as an outgrowth of gathering. Unfortunately, Steward did not have at hand a representative sample of archeological data, and his conclusions suffered from this (Cordell 1984:240–241).

Steward's study used archeology, but only to a degree. Cordell (1984:225) notes that investigations of social organization from an explicitly archeological perspective is a relatively recent phenomenon, although Martin's (1950) research with Mogollon remains in Pine Lawn Valley, western New Mexico, was one of the first pioneering attempts at interpreting social organization with archeological data. Martin synthesized general trends observed in the archeological data and he made social interpretations based on Murdock's (1949) classic ethnographic study of social structure. Essentially, Martin postulated that the archeological record indicated a change from extended families to nuclear family households. This was reflected in changes in house size and associated materials. Through time, houses became smaller and the number of houses in each village increased, as did the number of villages; the number of metates and other tools per house decreased; and there was a decrease in the proportion of basin metates and mortars to slab and trough metates. Martin continued to suggest that the observable archeological changes reflected an increasing population and a consequent increasing reliance on agriculture. He inferred, using Murdock as a guideline, that the period was characterized by matrilocal residences, matrilineal descent, matrilineal inheritance, politically independent villages, and probable monogamy.

A later study of the same area by Bluhm (1960) changed some aspects of Martin's interpretations. Bluhm observed that larger villages had one or more ceremonial structures, while these were lacking in the smaller pithouse villages. She concluded that rather than a system of independent, autonomous villages being in operation, the ceremonial structures could have served both larger and smaller villages.

Lightfoot and Feinman (1982) have examined social organization in the Mogollon area from a different perspective. They presented complex arguments using the concept of village leaders as critical. They dealt with aspects of early villages such as increased sedentism, increased population growth, agricultural intensification, and increased long distance trade, arguing that these developments required leadership decision-making positions (i.e., suprahousehold decision makers).

F. Plog (1983) also has addressed social organization in early Formative villages. He was concerned with the differential spatial and temporal distribution of patterns in architecture and ceramics. Plog also argued that prior to the advent of intensive cultural resource management investigations, the archeological record was biased towards the larger, diagnostic sites, and that this affected interpretations relating to social organization. He proposes that sites sharing strong normative patterns reflect alliances characterized by evidence of specialized production, trade and exchange, and, sometimes, social ranking or stratification. Plog notes that none of the Southwestern societies (including later Formative groups) reached the economic and political complexity seen in the Old World, in Central, or South America.

Cordell (1984:230) concludes by observing that current archeological interpretations of social organization in the early pithouse villages have diverged considerably from Martin's (1950) original treatment. The likelihood that these early villages were not all politically, socially, and economically independent is now recognized. The observations of Bluhm (1960) were critical in this recognition. Additional research has shown marked differences in the forms, sizes, and assemblage inventories of villages. These recently have been interpreted as indicating distinctions in social organization. Even if these interpretations are substantiated by subsequent research, they remain important contributions. Culture–historical explanations of the past are inadequate "to represent the variation in and the similarities among regions that the newer frameworks address" (Cordell 1984:230).

Formative Town and Village Social Organization

When attempting to examine social organization among the later Formative groups, the situation is markedly more complex. Some of the models discussed above, such as Plog's (1983) are still appropriate, but with the advent of the sophisticated cultural occurrences that characterize much of the later Formative, interpreting social organization becomes a more difficult task.

Not surprisingly, a considerable amount of research attention has been directed to reconstructing social organization at both Chaco Canyon itself and at numerous Chacoan outliers. Many of the models for Chacoan development that consider social organization also rely on the concept of exchange networks (see previous discussion), and the two need to be considered jointly.

In Chaco Canyon, numerous models that relate to social organization have been proposed. These are well summarized by Pippin (1987:Chapter 7), and a few may be recapped here. Vivian (1970a, b; Vivian and Mathews 1965) postulated that control of water resources at Chaco led to two different principles of social organization: dual organization in towns and localized corporate lineages or clans in the smaller villages. Along the same lines, Grebinger (1973) suggested that control of water resources allowed for the development of a pristine ranked society. The presence of relatively sophisticated water control systems and irrigation in Chaco is well documented (Lagasse et al. 1984; Hayes 1981a; Vivian 1974) and undoubtedly was related to social organization. However, some researchers (e.g., Ford 1977; Farrington 1980) have questioned the proposition that irrigation necessarily required centralized authority. This clearly is a complex issue, and will continue to occupy a considerable amount of research attention.

Altschul's (1978) discussion of the Chaco Interaction Sphere argues for a regional perspective. Social organization plays a major role in his discussion, and he examined three related postulates. The first is that throughout the San Juan Basin, the development of water control technologies resulted in the formation of towns with weaker corporate kinship groups, stronger institutionalized pancommunity sodalities, and clearer authoritarian leadership than at settlements that continued to rely on dry or floodwater farming. The second postulate examined by Altschul is that increasing population densities initiated the development of a hierarchical society based on a redistribution system centered at great kivas and resulting in the establishment of satellite communities. The third postulate is that the development of the Chaco Phenomenon was a response to demographic, environmental, or social stresses in the San Juan Basin that required increased communication between corporate units.

Another intriguing study involving social organization resulted from recent research at the Chaco outlier of Bis sa 'ani. The concept of the Chaco Halo was advanced to characterize the relationship between settlements in Chaco Canyon and those in the outlying vicinity (Marshall et al. 1982:1236–1240; Doyel et al. 1984). They propose that the numerous village settlements adjacent to Chaco Canyon were agricultural production centers and were perhaps seasonally occupied. These researchers expanded their discussion to observe that the pattern of centralized community organization seen in sites in Chaco Canyon is a common feature of the eastern Anasazi area as a whole, but is lacking in the western Anasazi areas. They argue that this pattern is relatively widespread and cannot be considered Chaco-specific. They suggest that "Chaco Canyon may be envisioned as a central node developed by the outlying communities to create an intercommunity regional organization. From this perspective, it is possible that the great pueblos of Chaco Canyon are regional affiliates representative of certain community aggregates in the outlying provinces" (Marshall and Doyel 1981:72).

Social organization also has been discussed in the context of Chacoan outliers alone. For example, at the Salmon Ruin outlier, Irwin–Williams (1980a) examined the evidence for social organization. She concluded that while there was no clear evidence for economic ranking, the presence of Chaco imports and Chacoan architectural features indicated that ideology was important in organization. Irwin–Williams, in describing what she terms the Chacoan Phenomenon notes that the large outlier sites involved "an integrated cultural phenomenon reflecting a high degree of technical knowledge and specialization and a centralized authority structure, tight social control, and membership in a complex network economically and physically linked to the Chaco" (Irwin–Williams 1980a:163).

Researchers conducting recent excavations at Bis sa 'ani (Doyel et al. 1984:38–39; Marshall et al. 1982:1231–1233; Marshall and Doyel 1981) also have advanced arguments relating to outlier social organization. They proposed that two types of communities are evident: ancestral, showing accretional growth through time, and scion, or descendant, communities showing relatively little time depth. Outliers like Bis sa 'ani, Pierre's Site, Grey Hill Spring, and Whirlwind Lake are posited to have been scion communities, appearing in marginal land late in the Chacoan sequence. They continue to argue that such communities developed as a result of increased population in order to increase regional carrying capacity, as a response to factional splits in ancestral communities, as a result of an organized effort to develop logistical nodes along Chacoan roadways, and as satellite communities for the exploitation of regional resources (Cordell 1984:266). The Bis sa 'ani researchers continued to advance the concept of the Chaco Halo (see above) to characterize the relationship between settlements in Chaco Canyon and outlying areas. While provocative, these arguments have met with some criticism (e.g., Cordell 1984:269; Pippin 1987).

Whether involved with Chaco Canyon specifically or with the regional perspective offered by outlier studies, most reconstructions of Chaco social organization suggest that it was hierarchically organized (Pippin 1987). Saile (1977), for example, suggested that the distinctly ordered geometries of town architecture indicated special residences of elite classes. Several researchers have felt that many outliers also represent elite groups of Chacoans (cf. Cordell 1984:264). Eddy (1974b:65, 1977:49–50) postulated that the inhabitants of Chimney Rock (an outlier in southwestern Colorado) were an emigrant colony of priestly males who imported religious customs and lore. Judge's (1979:903) consideration of redistribution networks suggested an elaborate social hierarchy with an elite element. Irwin–Williams (1980a) suggested centralization of authority in Chaco towns, while Grebinger (1973) argued that this authority formed a ranked society. Schelberg (1984:17) compared the organization complexity to that of a chiefdom. Lekson (1986:272) notes that the organization of labor required to build the Chacoan town suggests "a level of socio–political complexity considerably beyond that of the ethnographic Pueblo world."

Social organization studies also have addressed the notion of differential status. Mathien's (1984) study of jewelry suggests the presence of a ranked society during the Bonito phase. Chaco burials suggest high ranking lineages within a stratified population (Akins 1986:131–133, 140–141) (although see Palkovich 1984b).

While the San Juan Basin represents a rich data base for examining social organization, other parts of the Southwest also contain relevant information. Although outside of the present study area, the elaborate developments at Mesa Verde in southwestern Colorado have contributed substantially to our knowledge of Formative social organization (and exchange: Mesa Verde influence is common at many Chaco sites). Both Chaco Canyon and Mesa Verde are representations of the San Juan Anasazi tradition and share several features (Cordell 1984:283–293). Rohn's (1977) study of Mesa Verde villages and communities is particularly relevant in a consideration of social organization as reflected in the archeological record. In the Mimbres/Mogollon region, there also is considerable evidence for elaborate social organization, although it is not as strong as that from the San Juan Basin. Examination of ceremonial structures at Classic period Mimbres sites has led some researchers to conclude that either kin-based or nonkin-based sodalities, representing segments of villages, used smaller structures. Larger ceremonial structures were used by the entire village populations (Anyon and LeBlanc 1980; LeBlanc 1983). Another aspect of Mimbres culture that may have social implications is in the finely crafted pictorial and geometric ceramics. The esoterica of many vessels suggests a rich ceremonial life, and Mimbres bowls often are recovered in burial contexts, placed over the heads of individuals. Such behavior may well be related to social stratification of some sort (Cordell 1984:293). In general though, several lines of evidence, such as the lack of planned structures, the apparent absence of a widespread trade organization, and the lack of a defined hierarchical treatment of burials, suggest a relatively egalitarian social organization during the Classic Mimbres. Despite the excellence of Mimbres ceramics, there is no evidence suggesting specialized production or regional integration of a broad scope. Although organization of ceremonial activities must have been important at the village and perhaps the local level, this is not enough evidence to indicate a nucleated system (Cordell 1984: 298).

Conclusions

It is clear that a considerable amount of recent research attention has focused on social organization. During the late 1960s and early 1970s, there was an enthusiastic interest in examining Puebloan social organization (especially kinship and residential rules) with the presumed benefits of the new archeology (e.g., Hill 1970; Longacre 1968, 1970, 1975). Several more recent studies of social organization and political complexity have tended to focus on later Puebloan groups in central and northern Arizona. These primarily have examined: household decision-making and autonomy; household labor intensification and craft production; and the organization of commodity exchange (e.g., Graves 1983; Ciolek–Torello 1978; Longacre et al. 1982; Reid 1984, 1986; Reid and Whittlesey 1982; Plog 1986; Upham 1982, 1983, 1984; Upham et al. 1981; and Upham and Plog 1986). As Cordell (1984:241–242) notes, the early studies were provocative, but also were considerably criticized (e.g., Aberle 1970; Plog 1980; Stanislawski 1969). Recent investigations continue to provoke controversy (e.g., Graves 1987).

Until new analytical methods are developed, this level of investigation will not proceed beyond informed speculation. As of yet, there is little agreement on what organizational principles were associated with the remarkable events that characterized the Formative period. Some general concurrence, however, is apparent. For example, the integration of ceremonial systems undoubtedly was important, but it is unclear how trade was organized, labor groups recruited, or craft specialists supported. It is unlikely that each of these systems was organized in the same way, and it will be important for future research to fully characterize and explain the differences among them (Cordell 1984:301).

Ritual Behavior

Ritual and ceremonial behaviors are notoriously difficult concepts to document archeologically. In the past, if an artifact's function could not be determined, it frequently was classified as ceremonial. This clearly is a less than desirable approach and is more of a reflection of our inability to deal with cultural materials not fitting comfortably within preestablished categories. With this said, there is a substantial amount of information available related to ritual behavior during the Formative. This falls into three general categories: artifacts, architecture, and archeoastronomy.

The presence of ceremonial or ritual artifacts in many Formative contexts is well documented. Again, the Chaco area offers some of the best evidence for ritual artifacts (e.g., Vivian et al. 1978; Breternitz and Marshall 1982:440–443), but ceremonial objects also are known from many other parts of the study area. For example, some of the elaborate Mimbres ceramics may have functioned in a ritual context, such as *killed bowls* whose bottoms had holes punched through them (Carr 1979). Burial data often are another source of ritual or ceremonial information (e.g., Akins 1986; Akins and Schelberg 1984; Whittlesey 1978, 1984). What is important to remember in discussing ritual behavior is not only the artifact itself, but the context in which it is located.

Most interpretations of Formative ritual behavior that involve architecture rely on the ethnographically documented concept of the kiva, although shrines and other possibly ceremonial structures also are documented (e.g., Windes 1978). Kivas are generally believed to represent ceremonial chambers—a type of prehistoric church. The ceremonial function of kivas is well documented ethnohistorically, and the analogy to prehistoric ritual activity seems warranted.

Kivas are believed to have developed from Basketmaker pithouses. At larger early villages, there is usually some evidence for a nonresidential, presumably special function, structure. These often are distinguished from residential structures by virtue of being larger, lacking domestic features, and having unusual architectural features (Cordell 1984:222). During the later, Formative phases, the concept of ceremonial rooms is retained and well developed, with kivas being common elements in nearly every village and town site. Most kivas are circular, semisubterranean structures, although square kivas also are documented. Great kivas and tower kivas also occur throughout much of the study area, although a concentration may be seen in the San Juan Basin. Great kivas are particularly impressive, often containing several elaborate features. The functions of these large kivas may be related to both ceremonial and exchange or trade activities (cf. Judge 1979; Lightfoot 1979). Kivas generally occur within town or village sites, but they also can be isolated occurrences. This is especially true with great kivas, but small isolated kiva sites also are known (e.g., McAnany 1982).

While the interpretation of kivas as ritual or ceremonial structures has been widely accepted, Lekson (1984:60) recently has questioned the validity of this assumption. He prefers the purely descriptive term of *round or circular rooms* to *kiva*, believing that in many cases, these functioned in a domestic capacity. Lekson reserves the term *kiva* in the ethnographic sense for the great kivas found in the plazas of Chacoan towns. Lekson's concept is an intriguing one, and while not universally applicable, it warrants further attention.

Another category of ritual behavior that must be considered involves archeoastronomy. A considerable literature on archeoastronomy in the Southwest has been generated (e.g., Carlson and Judge 1986; Ellis 1975; Newman et al. 1982; Reyman 1976; Williamsen et al. 1975, 1977), much of it controversial. Frazier (1986:188–202) provides a highly readable discussion of archeoastronomy as it relates to Chaco Canyon.

Much of the discussion on archeoastronomy revolves around Native knowledge of celestial events. Seasonal cycles have spiritual and symbolic meaning to many ethnographic Puebloan groups, and are also relevant in terms of agricultural practices. Several investigators have assumed that such cycles also were important in prehistoric times. While this is not an unreasonable conclusion, its archeological documentation is a much more difficult task. Much of the archeological study of this subject has involved experimentation with various architectural features and their relationships to winter and summer solstices or other supposed astronomical orientations. A particularly controversial debate has evolved surrounding the significance of the so-called sun dagger at Fajada Butte in Chaco Canyon (Sofar and Sinclair 1986; Sofar et al. 1979).

A fair amount of polemic has been generated regarding the significance of certain purported celestial alignments and it is easy to carry the argument too far. Frazier aptly summarizes the situation from a rational perspective:

> No doubt most kinds of sun-watching sites had no dramatic features that reveal themselves to us today. Charting the sun can be easily done from any location with a view of the horizon and some natural features that can serve as markers. And...man-made structures can easily incorporate a variety of ways to note the sun's seasonal path. There's no reason to believe that most of these arrangements meant anything more special and permanent to the Chacoans and their brethren than the calendars we hang on our walls mean to us (Frazier 1986:199).

It is important to realize that ceremonial and ritual behavior concepts cannot be separated from other, interrelated activities. This is particularly true for exchange and trade networks, which may well have had ritual aspects involved with them. In many cases, it is unlikely that secular and nonsecular activities were as separate in prehistoric times as they are in modern society.

Regional Interaction and Integration

It should be clear from the preceding discussions that a considerable amount of regional interaction occurred during the Formative. Problems of dealing with this in terms of specific archeological correlates have already been discussed, especially in the Social Organization section. Dealing with regional interaction and integration on a synthetic level is a difficult conceptual task.

Cordell (1984:245–301) has grappled with this issue in an admirable fashion. She discusses it on a pan-Southwestern basis, and considers several systems of major regional interaction as well as what she terms *areas in between*. Not surprisingly, much of Cordell's discussion focuses on the Chaco Phenomenon, a system of regional interaction that dominated much of the northern Southwest. There can be little doubt of the complexity and sophistication of the Chaco Phenomenon (Irwin–Williams 1972). Not only were developments within Chaco Canyon reflective of a level of sophistication rarely witnessed in North America, but Chacoan influence spread from beyond the confines of the Canyon. The Chaco outlier system was, of course, an integral component to the system, and the widespread distribution of these related sites attests to the far reaching influence of Chaco Canyon (Marshall et al. 1979; Pippin 1987; Powers 1984; Powers et al. 1983). About 70 outliers have been identified, and these vary in distance from Chaco Canyon from ca 5 to 80 km (Cordell 1984:261).

Coupled with the outliers is the elaborate system of Chaco roads (Kincaid 1983; Lyons and Hitchcock 1977; Obenauf 1980; Robertson 1983). The precise function of this remarkable system is not known, but the roads connect several major Chacoan outliers, and about 650 km have been identified, many by remote sensing techniques. These roads are remarkably straight, and when they approach a major topographic obstacle, such as a cliff, they are associated with stairways or ramps. There is some variability in the form of the roads. They sometimes were cut into bedrock, but others were created by simply the removal of vegetation and loose soil. Some of the roads are curbed with boulders, and their width is very consistent: major roads are ca 9 m wide and secondary ones are ca 4.5 m wide (Cordell 1984:257–258). It is likely that they served to facilitate communications or to transport resources to and from Chaco (Cordell 1984:260; Betancourt et al. 1986).

Another communication device involves signal towers and signal fires. Several features located at high elevations apparently served as signal towers, and 23 have been identified around the San Juan Basin. Drager (1976) feels that these were part of a communications network; each is visible to at least one of the other sites, and many are visible to half a dozen or more. Hayes and Windes (1975) have also noted that there may be a relationship between these signaling sites and some of the Chacoan road network.

In summarizing the Chacoan regional interaction system, Cordell (1984:273) observes that it was a highly organized, centralized, hierarchial, and regional sociopolitical system. Some researchers view this system as originating within the Chaco Canyon core area and expanding outward, but others suggest that it is one element of a larger Anasazi development. Many view "the Chaco Phenomenon as a short lived indigenously Anasazi response to the basically economic constraints of population–resource imbalances within the agriculturally risky San Juan Basin" (Cordell 1984:273).

Cordell also considers other major Southwestern systems of regional integration, but these all fall outside of the present project area. They include the Casa Grandes area of Chihuahua (DiPeso et al. 1974) and the Hohokam of southern Arizona (Haury 1976; Doyel 1980).

While the major systems of regional integration have received a disproportionate amount of research attention, most areas of the Southwest were not incorporated into these in a direct fashion. Instead, the prevailing pattern was one of continued local development. Cordell (1984283) terms these as "areas in between," noting that two patterns of integration are apparent in much of the Southwest. These are aggregated and dispersed systems, as originally defined by Irwin–Williams (1982) for demographic patterns in the Puerco River Valley.

Cordell examines two examples of each system. Mesa Verde (outside of the present study area) and the Mimbres represent aggregated systems and the Rio Grande Valley and the Jornada Mogollon represent dispersed systems. Several other subregions also can be viewed as areas in between, such as developments in the eastern part of New Mexico, in Trans–Pecos, and in southeastern Colorado. Many of the groups inhabiting these areas, while Formative in time and some cultural traits, maintained a hunting/gathering focus that was similar to that observed during the Archaic. These developments certainly represent areas in between in more ways than one: culturally they do reflect marginal developments peripheral to activities seen in areas like Chaco Canyon; archeologically, these areas have also been marginal to most research interests and attention.

Cordell has presented a useful concept by framing the Formative in terms of regional integration systems on one hand, and aggregated and dispersed subsystems on the other. By way of summary, she observes that between ca A.D. 900 and 1150, village life had spread throughout much of the Southwest. Archeologists have emphasized the differences in each of the major culture areas by reference to distinct cultural or ethnic traditions. More recently, interpretation has focused on organizational variability within culture areas. Systems such as the Chaco Anasazi, show evidence of standardization in architectural construction, some public architecture, craft specialization, and substantial trade networks. There is, however, little agreement about the organization of these systems or how they developed. The integration of ceremonial systems probably was important, but it is not clear how trade was organized, labor groups recruited, or craft specialists supported (Cordell 1984:300).

Although the major regional systems incorporated large areas, most of the population living in the Southwest at the time of these probably participated in more simply organized systems. Cordell presented two patterns of systems lacking hierarchical development. An aggregated system was illustrated by cases such as the Mesa Verde and Mimbres. A dispersed pattern was exemplified by the Rio Grande and Jornada regions. Aggregated systems contain very large sites, but these were predominantly residential and were aggregates of formerly dispersed local communities. There were undoubtedly social mechanisms that integrated these villages, but relatively egalitarian relationships among household residential groups are suggested by the architecture of these settlements. This indicated that the aggregated communities were organized in ways more similar to the modern Pueblos than were the nucleated systems (Cordell 1984:300).

In both the Rio Grande and Jornada areas as well as much of the remainder of the study area, groups appear to have remained more mobile throughout the Formative. It is likely that villages were small and perhaps temporary and may have housed only a few related families. Subsistence probably was as much by gathering and hunting as by agriculture (Cordell 1984:300–301).

Settlement Pattern

Formative settlement patterns have been directly and indirectly alluded to in the preceding discussions. Certainly most relevant is Cordell's (1984) concept of regional integration on the one hand and areas in between, consisting of aggregated and dispersed settlements patterns, on the other hand. There clearly is no one system that accurately characterizes the entire period. Rather, a remarkable variety is evident. We can briefly summarize some of the more apparent settlement patterns in existence during the Formative.

During the early Formative, pithouse villages formed a major component of the settlement pattern. These ranged in size from only a few structures to quite large villages. Smaller villages exhibit little architectural variation, while larger villages often contain special use structures. Most villages suggest a low population density, and it is likely that many were only seasonally occupied. Given the high risk involved with agriculture in much of the Southwest (e.g., general aridity, unpredictable rainfall, short growing season), many early villages probably were not long term occupations. This is especially true for Mogollon and Anasazi villages. Early Mogollon villages appear to have been located in defensive situations on high bluffs or ridges, while early Anasazi villages were located in more diverse settings, although a preference for high areas is still apparent. After ca A.D. 500, pithouses villages in both areas tend to be located away from higher areas, instead being situated on alluvial terraces or the first benches above rivers (Cordell 1984:223–225). Glassow (1972) has suggested that this reflects a greater reliance on agriculture, while Cordell believes that the shift also could have involved "the development of social mechanisms that served to integrate villages in effective opposition to remaining hunter–gatherer populations and to each other for effective sharing to even out local food shortages" (1984:225).

As the Formative developed from pithouse villages to pueblo villages, regional variation also increased. In some areas, such as the upper Little Colorado region, the pithouse villages had become quite large, and after A.D. 500, populations dispersed into smaller pueblo villages (cf. Plog 1974). Thus, increased populations and larger villages may not always have been an inevitable consequence. In general, though, one does see the formation of larger villages through time in many areas of the Southwest.

Once pueblo villages became common, a complex settlement pattern can be observed, one that varies considerably by region and within regions. For example, the Chacoan regional integrated system included a variety of settlement types. These ranged from towns and villages within Chaco Canyon to the elaborate system of outliers. Many of these settlements were linked by roads, and special site types, such as great kivas, were a component of the settlement system. It is important to realize that even within the Chacoan system of regional integration, there was not one set settlement pattern.

Although most studies of the Chacoan outliers have focused on the large pueblos themselves, many outliers apparently consist of a community of smaller villages that surrounded a larger pueblo (Marshall et al. 1979; Powers et al. 1983; Powers 1984). This pattern has been known since even early investigations at outliers, such as Village of the Great Kivas (Roberts 1932). However, systematic study of an entire Chacoan outlier community, including excavation of both the outlier and a sample of the surrounding villages, has occurred only once, at Bis sa 'ani (Breternitz et al. 1982; Doyel et al. 1984).

Outside of Chaco, the diversity of settlement patterns is no less complex. Both aggregated and dispersed systems lacked hierarchial development, but were successful adaptations to localized environments. In fact, after the collapse of the regionally integrated systems, both the aggregated and dispersed systems continued.

While most research attention has focused on puebloan villages, in many areas pithouse villages continued to be the principal settlement type. This is especially true in the eastern portion of the study area, where hunting and gathering was perhaps as important, or more important, than agriculture. In this area, the settlement pattern reflects this economic focus. Even in areas where agriculture was common, there is evidence pointing to the existence of mobile populations that were separate and distinct from the more sedentary groups archeologists commonly have used to define Southwestern cultural sequences. Such mobile populations, resulting in ephemeral archeological remains, may in fact reflect a much larger settlement system for the Formative than has commonly been believed (cf. Upham 1984).

A final point to briefly address here is the concept of sedentism. The assumption often is made that Formative villages represented sedentary populations, and this undoubtedly is accurate. However, sedentary is not well defined in the archeological literature. A village may represent a sedentary habitation, but not necessary a year-round occupation. Even at Chaco Canyon, reflecting the most permanent of Anasazi building traditions, the suggestion has been made that occupation was essentially seasonal, with Chaco representing a San Juan Basin-wide ceremonial center (cf. Judge 1983). Lekson notes that some of the Chaco buildings, by the very virtue of their permanence, may have been designed to "stand for long periods of the year without maintenance.... If the large structures were primarily designed to survive long periods of neglect, this might support the idea of Chaco as a periodic population center" (Lekson 1986:270). The point to be made is that a simple sedentary/mobile settlement dichotomy is probably an inaccurate reflection of actual Formative settlement patterns.

Abandonment

When the first European explorers entered the Southwest in the 1500s, they found many of the larger pueblos abandoned. Most of the central San Juan Basin appears to have been abandoned by the late 1200s. By 1300, much of the San Juan and Mesa Verde areas also were abandoned, and by 1450 the same is true for the Upper Little Colorado and White Mountain areas. The southern Rio Grande Valley appears to have been abandoned by the 1680s (Cordell 1984:313). These large scale abandonments have been the topic of debate for many years. The collapse of sophisticated systems such as Chaco Canyon and Mesa Verde often has been interpreted as a mystery, an event that took place within an extremely short time span. While there is no doubt that large areas of the Southwest did witness regional abandonment, the mysterious nature of this has been exaggerated.

A tremendous literature on abandonment fills the pages of Southwestern studies; much of it is quite speculative. Cordell (1984:303–325) devotes an entire chapter of her Southwestern summary to abandonment, and this is an excellent summary of the various hypotheses advanced as well as current thought on the subject. Upham (1984) also summarizes much of the literature on abandonment and offers a provocative but well reasoned alternate perspective. The following discussion is abstracted from both works.

Traditionally, two types of explanations have been advanced to account for the widespread abandonment: cultural and environmental. Cultural explanations run the gauntlet from reasoned theories to pure speculation. Perhaps the most common hypothesis cites warfare as the cause of abandonment. Warfare is usually posited between the pueblos and non-Southwestern interlopers (i.e., the Athabaskans, or ancestors of the modern Navajos and Apaches) (Gladwin 1957; Kidder 1924). Some researchers, however, have proposed warfare between Puebloan groups (Davis 1965) or even internal factions within Puebloan groups (Titiev 1944; Bradfield 1971). Another cultural explanation was the disease hypothesis advanced by Colton (1936). He believed that as Puebloan communities grew, poor sanitation became a major problem, resulting in widespread epidemic diseases. One other cultural model for abandonment involves mass migration and population diffusion (e.g., Jett 1964). Finally, some of those who advocate the Meso-American Pochteca exchange model consider abandonment a result of the disruption of trade contacts.

While some of these models are appealing, they are not supported by available archeological data. For example, abandonment occurred prior to the influx of Athabaskans in the region. There also is limited evidence for widescale warfare in the Southwest, or for mass epidemics. Likewise, migration is notoriously difficult to document archeologically, and, although there is no doubt that population movement did occur in the Southwest (e.g., the Mesa Verde occupation of many Chacoan sites), there is little supporting evidence of mass migrations accounting for abandonment. The cultural models simply do not adequately explain the pattern of abandonment that can be observed in the archeological record.

The other set of hypotheses commonly invoked to explain abandonment is environmentally oriented. The most common is the great drought model, where it was hypothesized that a pan-Southwestern drought was the cause of abandonment. Aspects of this climatic model, which is partially supported by dendrochronology and documented episodes of arroyo-cutting, are perhaps the most widely cited explanations for abandonment (Brew 1946; Bryan 1941; Hack 1942; Hewett et al. 1913; Reed 1940; Schoenwetter and Dittert 1968).

More sophisticated environmental models include associated cultural factors. An example is a model involving clearing land for agricultural features and cutting firewood as having major effects on arroyo cutting (Betancourt and Van Devender 1981; Lister 1966). Another is the correlation of population movements and regional climatic changes on the

Colorado Plateaus (Euler et al. 1979), while yet another model examines changes in elevation and the seasonal distribution of rainfall (Stuart and Gauthier 1984). Related studies using tree-ring data (Jorde 1977; Slatter 1973) also have addressed the drought issue.

Cordell summarizes both explanatory models succinctly:

> In sum, none of the entirely cultural or environmental models available provides a sufficient explanation for the abandonment phenomenon. Most writers would probably agree that the causes were complex, entailing both environmental and cultural aspects... abandonment itself is a rather more complex process than is sometimes imagined. If explanatory models are to be developed and evaluated, they must apply to accurate descriptions of the events to be explained (Cordell 1984:312).

After examining traditional explanations for abandonment, Cordell (1984:312–325) reevaluates the entire concept. She proposes three levels of abandonment: site-specific, local, and regional, noting that Southwestern sites rarely are occupied for long periods of time and that local abandonment seems to have been a recurrent theme throughout most of the area. Explanations for local abandonments usually involve changes in subsistence patterns and movement to regions where alternate economic strategies were used. In addition, changes in rainfall patterns, movements to well watered areas, and the abandonment of marginal or wooded buffer areas contributed to the processes of population aggregation (Cordell 1984:317).

While site-specific and local abandonments may have been common features in the Southwest, regional abandonments were not. When they occurred, Cordell (1984:317–318) notes that they usually are associated with a change in the observable archeological pattern. These changes historically were interpreted as migrations and population displacements. However, the traditional interpretations may be incorrect; large scale regional abandonments were more complex and reflective of the scale of the social systems preceding them. The highly organized systems may not have been able to maintain themselves structurally and initially, there is the appearance of population decline (Cordell 1984:235). More realistically, though "the situation may have been one of decentralization, reduced coordination of labor, and changes in village layout. Some trade networks, albeit fragmented, were maintained" (Cordell 1984:235).

In concluding this discussion on abandonment, Upham's (1984) model of adaptive diversity can be examined. He considers most models of abandonment as inadequate and notes that a large amount of information on the Southwest is frequently ignored. This is the presence of mobile adaptive strategies in addition to the more highly visible sedentary strategies. By incorporating this large body of data into the archeological record, Upham concludes that the apparent abandonment of regions is best "explained by viewing the abandonments in relation to the resilience and diversity of Southwestern adaptive strategies" (Upham 1984:235). Specifically, Upham suggests that "the oscillation between sedentism and mobility may be a valid model for large portions of the Southwest, and the return to a mobile settlement strategy may represent what archeologists have traditionally characterized as abandonment" (Upham 1984:249).

Upham notes that the Southwest has always been marginal to agriculture (cf. Ford 1972) and that when conditions affecting agricultural productivity changed, the populations responded by adapting to a more efficient mode of living (Upham 1984:251). Upham has presented an intriguing model that may account for some of the presumed abandonment that occurred throughout much of the Southwest. On the other hand, to assume that all, or even most, sedentary Puebloan groups reverted to hunting and gathering as a primary subsistence base is not supported by available data, as discussed in the next chapter.

In sum, there really is no mystery associated with the abandonment of certain parts of the Southwest during the 1200 and 1300s. A variety of factors contributed to regional abandonment in some areas. As Cordell and Plog observe, the "notion of abandonment is a conceptual problem; it probably obscures a great diversity of behaviors that occurred...including migration, increased movement, and the death of some local groups" (Cordell and Plog 1979:418). What has been interpreted as abandonment is probably more accurately reflective of a reshifting of populations and of adaptive strategies, rather than actual abandonment. In some cases, the reshift resulted in fewer, but larger, pueblos being occupied up to historic contact. In other instances, the shift may have resulted in a reemphasis on hunting and gathering, an adaptive mechanism that proved to be more efficient than attempting to maintain agriculture in a marginal environment.

Economy

Economy represents one of the most fundamental elements of archeological interpretation. Economic patterns and strategies can set the stage for sophisticated cultural developments, and it is not surprising that subsistence studies have always been important components of archeological inquiry. Formative economy used to be viewed, and frequently still is, in relatively simplistic terms. The scenario usually is as follows: after a broad based hunting and gathering economy endemic during the Archaic, limited maize horticulture was introduced towards the end of that period. The earliest Formative villages (i.e., Basketmaker—or pithouse villages) came into being because of a combination of agricultural intensification and population growth; their inhabitants practiced a mixed economy of agriculture and hunting/gathering. By the classic Formative, pueblo villages and towns existed almost exclusively on the Southwestern economic triumvirate of maize, beans, and squash. Hunting provided meat, and some gathering was practiced, but agriculture was the principal subsistence base, and without it developments such as Chaco Canyon, Mesa Verde, or Classic Mimbres would not have been possible.

That is the traditional view of Formative economy. Recent reevaluation of some fundamental concepts, however, points to a far more complex picture, and one, almost heretically, emerging conclusion seems to be that agriculture may not have been as intensive as previously believed.

The evidence for this reappraisal is multifaceted. It comes from actual archeological paleoeconomic data, from an evaluation of settlement patterns, from ethnographic analogy, from burial data, and from some provocative theoretical arguments. Many recent studies examining Southwestern economy and adaptations are strongly framed within an ecological perspective stressing man/land relationships (e.g., Gummerman 1971; Dean et al. 1985; Zubrow 1971; Glassow 1972, 1980; Woosley 1980; Simmons 1986; Hunter–Anderson 1986; Whalen 1986). The issue is quite complex and worthy of entire volumes (e.g., Fish and Fish 1984; Ford 1985). Here we will only summarize some of the relevant arguments.

Formative economic reconstructions revolve around two basic themes: how much of the diet was derived from wild resources as opposed to cultigens, and what is the specific makeup of individual species composing this diet? These two interrelated questions have implications for settlement patterns, seasonality, and a host of other issues.

During the early Formative, economic reconstruction is more straightforward and less controversial than it is during the later phases. During the pithouse village phases, there is no question that maize, beans, and squash were in the Southwestern economic repetoire, being cultivated throughout the region. Despite this, however, Cordell makes two relevant observations: “First, nowhere in the Southwest were villages sustained entirely on agricultural produce. Second, the wild resources that continued to be significant varied from region to region” (Cordell 1984:215).

A general trend during the pithouse village phases towards an increasing reliance on agriculture can be observed in most cases. This period of prehistory, however, has not received a substantial amount of research attention in recent years, thus actual archeological data from excavated sites using modern recovery techniques have not been abundant. While some recent studies have examined this time period from the perspective of economic adaptation, in many cases conclusions are based on data that are only peripherally or inferentially related to economy (i.e., they do not use actual floral and faunal remains). For example, Glassow (1972) argues that changes in artifact assemblages (primarily from dart and spear points to the bow and arrow) reflect the increasing significance of agriculture. He proposes that as more time was invested in agricultural activities, hunting was still necessary to provide protein, and that the bow and arrow represented an efficient hunting technology.

Another model relating to pithouse village economy that uses a nonsubsistence aspect of material culture is Gilman’s (1987) examination of Formative architecture. Using a variety of Southwestern archeological data and worldwide ethnographic information she concluded that pithouses (or “pitstructures” as she terms them) were winter habitations associated with a relatively low dependence on agriculture (Gilman 1987:560).

It is when we turn to the later Formative phases that economic interpretations become, in a sense, more interesting, but also more controversial. The traditional view of primary economic reliance on agriculture recently has been questioned (e.g., Upham 1984). A variety of evidence suggests that even during the zenith of Formative development, hunting and gathering remained important economic components. Much of the evidence for this conclusion comes in the form of pollen analysis or actual floral and faunal remains from Formative sites.

The idea that hunting and gathering remained an important component of the economic system at smaller Formative sites is somehow easier to accept than it is at the larger town sites. Several recent projects at small settlements have documented that the addition of cultigens to the Formative subsistence base only served to broaden economic choices. In no case was hunting and gathering replaced by agriculture; rather, both represented complementary resource bases (e.g., Cully and Clary 1983; Donaldson 1982; Fish 1982; M. Toll 1983).

There seems to be more reluctance to accept this subsistence duality at larger sites. But even at these, there is convincing evidence of the importance of hunting and gathering. For example, at Salmon Ruin, a large Chacoan outlier, analysis of plant remains revealed that wild resources, especially cheno–ams and grass seeds, were of great importance in the economy, especially during the site’s later (Mesa Verde) occupation (Doebley 1981). At Bis sa ’ani, another Chacoan outlier, wild resources also were a significant economic component (Donaldson and Toll 1982; Cully 1982), as they were at Guadalupe Ruin (Pippin 1987).

Even at Chaco Canyon itself, wild resources were used during the Formative (M. Toll 1981, 1985; Cully 1985). M. Toll’s (1984) study of taxonomic diversity between smaller villages and larger, planned towns indicated that the range of exploited plant species was greater at the town sites. This was interpreted as reflecting greater access to resources outside of the canyon, such as pinyon and pricky pear cactus. Analysis of coprolites from both Chaco Canyon (Clary 1984) and Bis sa ’ani (Cully 1982) also revealed that wild resources, both floral and faunal, were consumed. Studies of faunal remains from Anasazi sites also indicate the continued importance of hunting (e.g., Bertram and Draper 1982; Akins 1984, 1985).

The intent of this discussion is not to suggest that agriculture was unimportant during the later Formative. This clearly was not the case. Even at sites such as Bis sa ’ani (and its associated smaller community villages), located in an environment that is only marginal in terms of arable land, agriculture was a major economic focus (Cully et al. 1982). The point is that even at the major, most sophisticated Formative settlements, hunting and gathering also remained important, albeit secondary, practices. This has long been recognized, and is well documented among ethnographic Puebloan groups. Yet all too frequently, the archeological literature only pays limited attention to this and has tended to overemphasize the significance of agriculture.

It is apparent that many Puebloan groups were more heavily reliant on wild resources than previously believed. Even in peripheral Puebloan zones, such as the Hueco Bolson area of Trans–Pecos, a reliance on plant cultivation is apparent during the Puebloan phases, but hunting and gathering also continued to play a major subsistence role (Whalen 1986:80). Upham's (1984) discussion in this context is particularly provocative in that he believes that mobile hunter and gatherer groups always were abundant in the Southwest, even during the Formative, but have been understudied by researchers who were more interested in the impressive remains of sedentary or semi-sedentary groups. Consideration must also be given to contemporary non-Puebloan groups, as well as nonagricultural specialized adaptations, such as documented in southeastern New Mexico (e.g., Speth 1983).

It is becoming increasingly obvious that, in the agriculturally marginal environmental setting of the Southwest, hunting and gathering were major supplementary economic practices. In concluding their article on experimental corn plots in Chaco Canyon, Toll et al. (1985) cite a quotation from a Hopi farmer that perhaps best characterizes the difficulty of agriculture in the region: "At harvest I was disappointed with my corn crop, realized that I was a poor farmer, and wondered whether I would ever be able to support a family" (Simmons 1942:255).

Although it has not yet been demonstrated, and may never be, it may be incorrect to characterize the economic framework of much of the Formative period as being based primarily on agricultural intensification. Rather, a more accurate view is that the economic base was diversified, with complimentary reliance on both agriculture and the selective exploitation of wild resources.

Before concluding this discussion, one other aspect needs to be briefly addressed. Human remains are most abundant in the Southwest during the Formative periods. Stodder (this volume, chapters 9–11) deals with the issue of bioarcheology in the project area in great detail, and we do not intend to reiterate her examination here. The variety of topics that may be addressed from burials is wide and includes data on mortuary practices, ceremonialism, human demography, social stratification (or lack of it) and elements related, directly or indirectly, to economy (e.g., Brown 1971; Frisbie 1978; Hinkes 1983; Longacre 1975, 1976; Plog 1985; Upham and Plog 1986; Whittlesey 1978, 1984). The latter includes information on pathologies, disease, nutrition, and possibly related economic concomitants. Also relevant are recent chemical analyses of human remains that can provide specific nutritional information, including examining the proportions of wild vs. domesticated resources consumed by a population (e.g., Bumstead 1984, 1985; Bumstead et al. 1986; Larsen 1984; Rose et al. 1984). This approach has not been widely applied in the Southwest; it represents a significant advance in precisely documenting economy, and could have major implications for our interpretations of Southwestern prehistory. However, the sensitive issue of human remains (see Chapter 13) must be addressed, and until this is satisfactorily resolved, it is unlikely that human remains will be widely available for sophisticated, but often destructive, analyses.

In conclusion, the ability to determine on a quite specific level the economic parameters of a given group is coming within the grasp of archeologists. In recent years, there have been significant and exciting new advances in paleoeconomy, both in more sophisticated analytic techniques and in innovative theoretical approaches (e.g., Earle and Christenson 1980; Gilbert and Mielke 1985; Jochim 1976; Klein and Cruz–Uribe 1984; Speth 1983; Wing and Brown 1979; Winterhalder and Smith 1981). These promise to add substantially to our knowledge concerning a very basic and crucial aspect of prehistoric adaptations.

Summary

The Formative period in the Southwest, while covering less than 2000 years, encompasses some of the most substantial cultural developments known for North America. We have divided the Formative into two general stages—the early, pithouse village stages and the later, pueblo stages. In the northern portions of the Southwest, these traditionally have been referred to as the Basketmaker and Anasazi, or Puebloan, periods respectively. While "Basketmaker" and "Anasazi" may only be appropriate for part of the study area, the sequence of pithouse villages to above-ground pueblo villages, and, in some cases, towns, generally can be applied to the entire region. However, some areas continued to witness pithouse villages without the development of pueblos, and in other regions mobile hunters and gatherers did not live in villages at all. It is difficult to generalize about the Formative because there is so much cultural diversity and complexity apparent during this time. Dean et al. (1985), in examining adaptations in the northern part of the Southwest, are acutely aware of this complexity and correctly observe that explanatory models based only on one variable are doomed to failure. Although they were specifically addressing environmental factors, their conclusions can be extended to a wider range of variables:

> No longer can a single measure of environmental variability, such as rainfall, be invoked to explain behavioral change. It is essential that both high and low frequency processes be documented and that their interaction with one another be understood. In addition, the behavioral implications of temporal and spatial environmental variability must be accounted for in understanding adaptive processes. Finally, because so many environmental, behavioral, and demographic variables interact in different ways to produce different adaptive systems, each period under investigation is likely to be unique. Generalization, therefore, is difficult (Dean et al. 1985:550).

The diversity apparent during the Formative has led to a plethora of regional terms and sequences. The Formative has witnessed more archeological attention than any other time period in the Southwest and, consequently, the regional sequences of most areas are relatively well known. On the other hand, attention has been disproportionate. Formative cultures resulted in quite spectacular archeological remains, and not surprisingly these have captured the attention of a majority of archeological research. With some notable exceptions, it is only in recent years that research emphasis has turned to the smaller sites that perhaps better characterize the Formative in many parts of the study area.

Research into the Formative cultures of the Southwest has made major contributions to the archeological discipline. Significant aspects include, but are not limited to, the following: the development of early villages and intensification of agriculture, or, in more worldwide terms, the development of Neolithic economies; sophisticated architectural techniques; trade and exchange networks; ceramic technology; mortuary practices; political and social complexity; and settlement interaction. All of these topics have received a considerable amount of attention, and while by no means resulting in consensus opinion, research in the Southwest have served to stimulate how both archeological method and theory are approached within a contemporary framework. There are, of course, still significant gaps in our understanding of the Formative. Many issues remain controversial, and, indeed, the entire conceptual framework upon which Southwestern archeology has been based has been criticized (e.g., Berry 1982; Cordell and Plog 1979; Cordell et al. 1987). Aspects of these criticisms are valid, and continued research will refine our perceptions and explanations of Formative cultures.

As a more balanced approach is taken to Formative archeology, it is becoming apparent that many of our traditional notions will have to be modified. A few examples can serve to illustrate this. The “Chaco Phenomenon” has long been held to reflect the closest thing to civilization (however one may wish to define that elusive concept) that North America has ever witnessed. At the risk of committing heresy, perhaps this has been overstated. There is no doubt that the Chaco Phenomenon was a complex and sophisticated system. On the other hand, what are some of the aspects that make up a civilization? Frequently cited are the following: monumental architecture; exchange and trade; communication systems; rigid social stratification; organized religion and a priesthood; writing systems; metallurgy; and the development of city-states. How many of these can be documented in the Chaco Phenomenon? Monumental architecture, trade and exchange, and communication systems. These alone do not make a civilization. But, there is no reason to need to consider Chaco as a civilization, or even a proto-civilization. The point of this argument is that the Chaco Phenomenon is in and of itself a fascinating example of cultural adaptation. It is not necessary to invoke civilization to explain it.

To be certain, the Chaco Phenomenon represents one of the most sophisticated cultural achievements in North America. But it is not the only one. Developments in coastal Florida, along the Mississippi River, and in the Pacific Northwest, to name but three examples, may have rivaled Chaco’s complexity. The remains from these areas are not as spectacular as those from Chaco, but this may be more due to the Southwest’s excellent preservation rather than an intrinsic superiority of Chaco. What all this boils down to is that it is important to keep a balanced and proper perspective when interpreting the significance of achievements such as the Chaco Phenomenon.

Two other examples of how current rethinking is shaping our concept of Formative prehistory can be briefly cited. Upham’s (1984) arguments for a more profound impact of hunting and gathering economies throughout the Formative deserves serious consideration. We doubt that all Formative villagers and town dwellers reverted to a hunting and gathering economy when farming was no longer viable, as Upham implies, but he has provided a thought-provoking discussion.

Another related example involves the belief that while agriculture was essential to many Formative developments, it was not the sole, or necessarily even the primary, subsistence base in many instances. Hunting and gathering always was important in the Southwest’s prehistory.

In conclusion, some of the most productive and provocative archeological research in North America has been conducted on the Southwestern Formative. Much is known about the general sequence of events throughout a majority of the region, but severe data gaps still exist. These generally are not of the magnitude of data gaps for, say, the Archaic; rather, they revolve around the more precise research questions that the wealth of data from Formative sites can address. It is likely that continued research on Formative cultures will fill these gaps. Studies of cultural processes and change will continue to dominate explanations of the complex prehistory of this area, as will more standard and traditional investigations. Both are necessary.

REGIONAL DISCUSSION

To thoroughly document the extent of investigation on Formative sites in the project area would require a volume many times the size of this work. Literally hundreds, if not thousands, of documents have dealt with Formative archeology in the region. These range from sparsely distributed CRM (and other) reports, including studies of only a few pages to many thousands of pages, to numerous unpublished and published M.A. and Ph.D. theses and dissertations, to thousands of site reports, site-specific, theoretical, and synthetic articles, to major books and multivolumed studies. Clearly we cannot summarize all of these for each subdivision of the project area, and we make no attempt to do so. The final portion of this chapter deals with regional manifestations of the Formative on a very general level. The following discussion only outlines major Formative events in the project area; if additional detail is required, Stuart and Gauthier (1984) provide the best starting point in finding both primary and secondary sources. In addition, the regional overviews cited in Chapter 1 are indispensable. All of these overviews not only summarize pertinent cultural events, but also point out major research questions and deficiencies.

Colorado (Douglas D. Dykeman)

Formative occurrences in the Colorado portion of the study area are more related to the Great Plains than they are to the very substantial Anasazi developments evident from Southwestern Colorado, such as at Mesa Verde. Nonetheless, some distinctive blends of both Plains and Southwestern traditions can be observed in the archeological record. Furthermore, each of the three subregions defined for Colorado has quite distinctive Formative sequences. In general, though, the persistence of an Archaic-like adaptation characterizes much of the region, a situation paralleled in much of eastern New Mexico and Trans–Pecos.

Mountains

The key to the identification of the Formative in the Mountain subregion is the establishment of sedentary village life based, at least partially, on an agricultural subsistence strategy. Formative cultures are known in the regions surrounding the Mountain study region; however, there is little evidence of utilization of mountain resources. This is probably due to the paucity of arable land and the extremely short growing season characteristic of the region. The Formative occurs from ca A.D. 300 to about A.D. 1300 or later in some regions. Formative cultures in neighboring regions include the Anasazi to the southwest, the Fremont culture to the west, and the Woodland culture along the front range/plains transition area.

Evidence for human occupation during the Formative period in the Mountain subregion comes from only three sources. Martin (1974) and Buckles (1973) document sites of this age in the upper Arkansas Valley, and Dykeman (1982) tested a site in the foothills of the La Garita Mountains. Despite Formative dates, all three authors attribute these archeological phenomena to a continuation of a hunting and gathering subsistence strategy that does not qualify for consideration as proper Formative. In effect, the patterns evident in the Archaic may persist in the Mountain study region until the Protohistoric and Historic periods.

San Luis Valley

Discoveries of ceramics on some sites in the San Luis Valley indicate transitory use of area by Anasazi and Plains Woodland peoples. There is evidence for temporary camp sites, but no documentation of long term habitation sites. Pearsall (1939) documented Anasazi incursions into the San Luis Valley through the identification of ceramic types. He described ten sites that contained ceramics ranging in age from A.D. 700 to 1540. The strongest evidence is for late Puebloan use after A.D. 1325.

Renaud (1946) reported ceramics resembling Pueblo I through Pueblo IV wares along the Rio Grande River in the lower San Luis Valley. Late period Northern Rio Grande wares occurred at twelve sites investigated by Renaud. In addition, he reported the discovery of Puebloan ceramics along the eastern margin of the valley at Dry Lake and Great Sand Dunes National Monument.

Swancara (1955) observed ceramics characteristic of Pueblo I through Pueblo IV near Great Sand Dunes National Monument. There is some indication of Basketmaker remains; however, this has not been substantiated (Swancara 1955).

Recently, the San Luis Valley Project has documented Anasazi ceramics at six sites in the area (Haas 1980, 1982). The ceramic associations appear to be related to the Anasazi of southwestern Colorado and northwestern New Mexico. Haas found no evidence of Rio Grande wares. An important observation as a result of the San Luis Valley Project is the identification of Woodland (i.e., Great Plains) ceramics that are widely scattered in the valley. In addition, Farmer (1978) and Kyle (1981) have noted Woodland projectile points in the area. Unfortunately, the evidence for a Woodland occupation of the San Luis Valley is not very substantial.

Though there is evidence for Formative cultures in the San Luis Valley, it is probable that year-round inhabitants continued to practice a hunting and gathering economy. The period from A.D. 500 to Spanish contact is characterized by frequent incursions by peoples from a variety of backgrounds. During this period, there was probably intermittent occupation by prehistoric Utes, possibly associated with the Uncompahgre complex (Buckles 1971). Hurst (1939) excavated the Ute rockshelter site in Saguache County that yielded a number of corner-notched projectile points. The corner-notched style is fairly consistent in assemblages dating after A.D. 1, and these artifacts resemble those described by Buckles (1971), but have similarities to Great Basin styles as well (Dykeman 1982). Remains of corn stalks are noted by the site (Hurst 1939). These may be indicative of Anasazi, Woodland, or a late Ute occupation.

Front Range

As with other areas in the Colorado portion of the project area, sedentism and well established communities do not characterize the Front Range subregion. Instead, the adaptive strategy is one of hunting and gathering supplemented by horticulture. Following Eighmy (1984), the Formative in the Front Range subregion is termed the Ceramic period and is divided into early and late periods.

The Early Ceramic period dates to ca A.D. 1–1000. It is characterized by the maintenance of the Archaic adaptation of hunting and gathering. Certain Archaic point styles continue to be manufactured during this period (Eighmy 1984). Significant changes, however, are the introduction of the bow and arrow, domesticated plants, and structures (Campbell 1963). Two phases are recognized during the Early Ceramic period: the Woodland and the Graneros.

Evidence for the Woodland phase, which reflects a Great Plains origin, is known throughout the Early Ceramic period. The phase is characterized by cord-marked conoidal ceramics. Single, and occasionally multiple, room structures constructed of dry-laid masonry foundations occur along the major river valleys and on the Park and Chaquaqua Plateaus. Artifact assemblages include a variety of small corner-notched projectile point styles and an abundance of groundstone implements.

Though no direct evidence of domesticated plants has been found at sites dated prior to A.D. 500, Campbell (1976) believes that maize agriculture was introduced early and maintained throughout the Early Ceramic period.

Woodland sites are known from the Park and Chaquaqua Plateaus (Campbell 1976). Gooding and Hand (1977) documented Woodland sites in the Arkansas Valley west of Canon City. Farther north along the front range, Gooding (1977) found evidence of Woodland in the grassland environment near Colorado Springs. Watts (1975) postulated Woodland affiliation at the Avery Ranch site. Nelson (1966, 1967) plotted the distribution of ceramic types along the front range. His data indicate the occurrence of Woodland and Pueblo pottery in the Purgatoire and Apishapa River valleys.

The Graneros phase (A.D. 500–1000) is quite similar to the Woodland in most respects. In fact, the two phases are considered contemporaneous after A.D. 500 because the archeological sequences used by various researchers are not mutually exclusive. The Graneros phase is characterized by well documented use of domesticated plants. Two varieties of maize, *Harnosa de Ocho* and *Pima Papago*, have been found in dated site contexts. Other cultigens are not well documented. Small game procurement was still a major source of food, and the gathering of wild foods supplemented the subsistence economy. There is little difference in the ceramic assemblages, as cord-marked pottery is a characteristic of both the Woodland and Graneros phases. Settlements tend to be larger, incorporating multiple house units constructed in circular or oval plans. Defensive barrier walls or wind breaks are constructed of dry-laid stone masonry (Eighmy 1984). In addition, certain styles of rock art have been attributed to the Graneros phase (Campbell 1969). The investigations by the University of Denver in Graneros Canyon resulted in the preliminary identification of the Graneros phase. In particular, one site (Colo. 2:1:1) contained both cord-marked ceramics and a lithic assemblage that did not appear to be related to Archaic technology (Withers 1954). Since then, the Graneros phase has been identified at Torres Cave (Hoyt 1979). At that site, the procurement of small game is evident from the faunal remains (Guthrie 1979). Campbell's (1969) research in the vicinity of the Park and Chaquaqua Plateaus resulted in the widespread documentation of Graneros phase sites in the southern Colorado front range.

The Late Ceramic period is dated to ca A.D.1000–1500. It marks the introduction of arguably Formative cultures in the Front Range subregion. Prehistoric settlement patterns indicate more intensive use of the Arkansas River Valley and the Park and Chaquaqua Plateaus. The occupation of the Arkansas Valley during this period is usually assigned to the Apishapa phase that was originally defined under the Panhandle aspect of Oklahoma and Texas (see discussion under New Mexico–Northeast). The plateau cultures were originally considered under the rubric Upper Purgatoire complex, which included two phases: St. Thomas (A.D. 1000–1150) and Sopris (A.D. 1150–1250). The terms Upper Purgatoire complex and St. Thomas have received little support in the literature and the Sopris phase has been expanded to include all prehistoric manifestations in the area from A.D. 1000 to 1300 (Ireland 1971). In addition to these cultures, Gooding (1977) and Gooding and Hand (1977) have suggested the presence of Upper Republican materials along the front range as far south as the Arkansas River.

The Apishapa phase is characterized by a horticultural subsistence strategy involving at least five varieties of maize with the addition of beans. Floral remains of native species have been recovered at many sites indicating the continuation of wild food supplements. Hunting small game was maintained as well, based on the faunal assemblages and associated diagnostic projectile point types, such as Reed and Washita (Eighmy 1984). Eighmy (1984) notes that site density was markedly increased, though the architectural elements remained similar to the stone masonry houses of the latter part of the Early Ceramic period.

Apishapa phase levels are noted at several sites excavated by Campbell (1969). Radiocarbon dates of A.D. 1140 ± 85 at Medina Rockshelter, A.D. 1135 ± 125 at Pyeatt Rockshelter, and A.D. 1175 ± 85 at Steamboat Island Fort, indicate an Apishapa presence in the eastern portions of the Chaquaqua Plateau. There also is evidence of the Apishapa phase at Trinchera Cave, based on the presence of Stamped-type cord-worked sherds (Eighmy 1984). Other Apishapa sites of importance include Umbart Cave, Tecla Moglewicz Cave, and Staring Cow Cave (Campbell 1969).

The Sopris phase is known from the Park Plateau almost exclusively; however, Wood (1971) argues for its presence as far north as El Paso County. Eighmy (1984) summarizes the salient features of the Sopris phase. It involves a sedentary horticultural population occupying the area between A.D. 1000 and 1300. There is evidence for maize horticulture, but beans and squash are not on the list of cultigens. Upper Rio Grande ceramics, such as Taos B/W and Taos Incised, are present in low frequencies. Villages contain a variety of architectural styles, including jacal construction, masonry construction, and possibly pithouses. Pithouses and jacal structures were the earliest house forms; these were later supplanted by masonry construction. The two best examples of Sopris phase sites are the Sopris site and Leone Bluff site (Baker 1964; Ireland 1971; Wood and Bair 1980). Both contain pithouses, jacal structures, and masonry structures. Ceramic assemblages include local varieties, such as Sopris Plain, cord marked, and micaceous tempered, along with intrusive wares such as Red Mesa B/W, Gallup B/W, Taos Incised, Taos Gray, and Taos B/W. Faunal and floral materials suggest a diverse subsistence strategy involving horticulture, gathering, and the procurement of small game.

New Mexico

Northeast

Archeological research in northeastern New Mexico has tended to be severely underemphasized. Wendorf (1960:55) aptly characterized the situation: "Northeastern New Mexico has received very little attention from archeologists in recent years, although rich and varied remains are known to exist there." Little has changed since the time Wendorf was writing, although there has been an increase in projects. Regardless, the former lack of interest in the region has resulted in both inadequate chronologies and cultural identifications. Few absolute dates are available, and most cultural events have been cross-dated by ceramics and projectile points. Cultural identify is confused, and many names have been assigned to the same cultural phenomena. One reason for this is that the region has been studied by investigators oriented both to the great Plains and to the Southwest, and this has resulted in a confusing terminology (Stuart and Gauthier 1984:291).

The confusion of terms is well illustrated by Stuart and Gauthier, and Figure 15 outlines the archeological sequence for the area. As is obvious from examination of this figure, Formative developments are not adequately defined. One reason for this is that they are not as impressive as the Formative sites further to the west. Perhaps the most detailed study of the Formative in the area has been Glassow's (1980) examination of the Cimarron area, where he defined several phases:

- Vermejo (A.D. 400–700)
- Pedregoso (A.D. 700–900)
- Escritores (A.D. 900–1290)
- Ponil (A.D. 1100–1290)
- Cimarron (A.D. 1200–1300)

If one does not look at the Cimarron area, Anasazi occupation of northeastern New Mexico is generally believed to have begun around A.D. 1000. A number of pueblo sites have been excavated, but these generally are poorly published. Four major areas of pueblo sites are known: the Pintada Canyon area, the Ribera–Tecolate area, the Watrous Valley area, and the Cimarron area (Stuart and Gauthier 1984:303).

The Cimarron area represents our best knowledge of Formative northeastern New Mexico, and the sequence may be briefly summarized here. The earliest phase, the Vermejo (A.D. 400–700) is similar to Basketmaker II occupations elsewhere in the Southwest, but dates slightly later. Vermejo sites contain no ceramics, and structures are simple, above-ground circular houses. The succeeding phase, the Pedregoso (A.D. 700–900) is characterized as being similar to the Sambrito phase in the

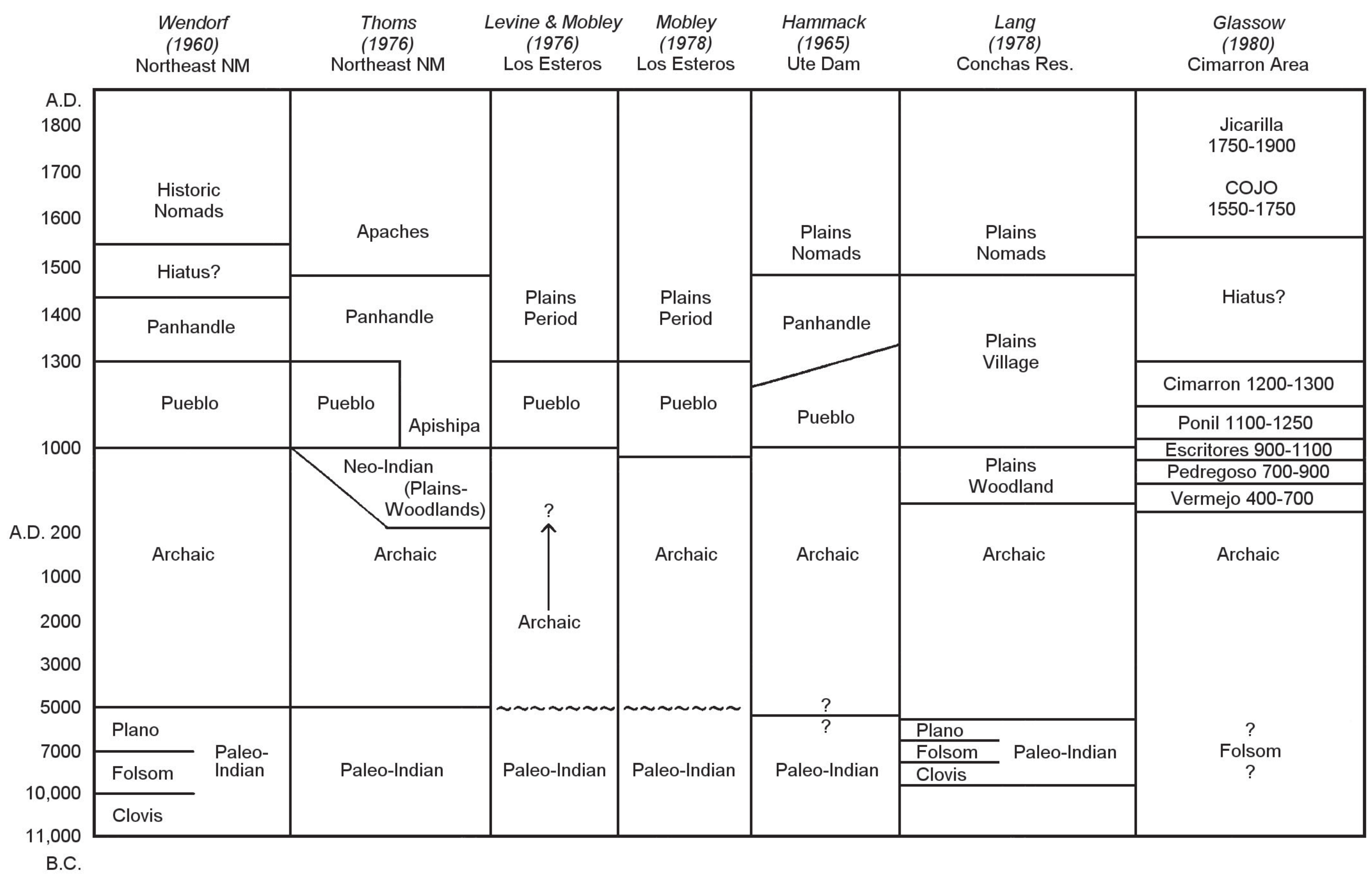


Figure 15. Comparative archeological sequences for northeast New Mexico (from Stuart and Gauthier 1984:292)

Navajo Reservoir district. Ceramics appear for the first time in the form of crude, thick, and oxidized sherds. The next phase is the Escritores phase (A.D. 900–1100). It contains pithouse architecture, and Red Mesa B/W and Kana'a Neck-banded pottery are typical. The Ponil phase (A.D. 1100–1250) is the most extensive phase in the Cimarron area. Architecture consists of above-ground structures usually of more than one room. Numerous rockshelters also were occupied. Ceramics include Taos Gray, Taos B/W, or Kwahe'e B/W. The final Formative phase is the Cimarron phase (A.D. 1200–1300). It consists of large multiroom pueblos. Ceramics include Santa Fe B/W. Glassow (1980) recognizes a shift in settlement from the upper canyon area at higher elevations to lower canyons and plains margins during the later periods. He also suggests a very low population density during the Pedregoso phase.

Post-Anasazi developments are relatively well documented in northeastern New Mexico. These are generally referred to as the Antelope Creek focus of the Panhandle aspect. This terminology reflects the Great Plains orientation of this period. The Antelope Creek focus can be summarized as follows. Many Antelope Creek focus sites are characterized by contiguous room pueblos, defined by rows of upright slabs. Subsistence is believed to have included both agriculture and bison hunting, and occupation occurred primarily between A.D. 1300 to 1450. This period is best known in the Texas and Oklahoma Panhandle areas, where it was first defined (Campbell 1976). The origins of the Antelope Creek focus may be in a general Plains Woodland tradition, which is similar to Basketmaker II or early Basketmaker III in the Southwest (Lang 1978). By A.D. 1000, the Plains Woodland period was replaced by the Apishapa focus. Apishapa sites are characterized by upright slabs, usually defining a single circular or oval room. Several Apishapa sites are known in northeast New Mexico; one has been excavated (Sitio Creston, Wiseman 1975). Ceramic types during the Apishapa period consist of cord-marked ware, and there is an increasing number of rooms per site (Stuart and Gauthier 1984:309–310).

Following the Apishapa is the Antelope Creek focus. Antelope Creek sites are generally larger than Apishapa sites containing from 6 to 80 rooms. Rooms are primarily rectangular. Pottery consists of cord-marked ware and Pueblo tradewares from the Rio Grande Valley. Sometime after A.D. 1300, there was a shift to lower elevations and to areas along permanent water courses. The upland areas of Colorado and New Mexico are thought to have been virtually unoccupied. Abandonment of the area by Panhandle groups is generally believed to have taken place around A.D. 1450, although some groups along the Canadian River in New Mexico may have continued occupation into the 1500s (Stuart and Gauthier 1984:311–313).

Our knowledge of the archeology of northeastern (and central) New Mexico, including the earlier periods as well as the Formative, is succinctly summarized by Stuart and Gauthier:

> Virtually all cultural periods in northeast New Mexico and central New Mexico need to be reappraised. Absolute dates need to be gathered wherever possible, and artifact types need to be redefined into tighter chronologies. A movement back to the basics is sorely needed. This would include refined chronologies, site distributions, site densities, etc. Then we can proceed with research questions (Stuart and Gauthier 1984:344).

Upper Rio Grande Valley

As opposed to the northeastern portion of the state, Formative developments in the Upper and Middle Rio Grande Valleys were quite impressive, have a distinct character, and are represented by a considerable degree of regional variability. Unlike other regions in the project area, however, there is little evidence for a long term in situ development in the northern portion of the Rio Grande Valley. The cultural sequence in the Upper Rio Grande Valley is summarized in Table 8. These periods are briefly summarized below, following Stuart and Gauthier (1984:44–60). This discussion will focus on the Cochiti–Pajarito area, but is generally applicable to the entire Upper and Middle Rio Grande Valley.

Very little is known of the local Basketmaker III/Pueblo I occupation of the upper Rio Grande Valley. During the Early Developmental period, there is an increase in architectural features at sites, and most have a few pithouse depressions. Sites range from one to three pithouses and generally are located near permanent sources of water in lower elevations. Overall, sites from this period generally are ephemeral. Unlike other areas where extensive pithouse occupations have been documented, there are few comparative data from the Rio Grande area.

The Late Developmental period also is poorly studied. Almost all sites are multicomponent, being associated either with Basketmaker III/Pueblo I or later Pueblo III occupations. Sites appear to be related to elevational/rainfall differences (see Stuart and Gauthier 1984:48–49), with sites containing earlier components generally occurring in low elevations and those occurring in higher elevations containing later components.

Unlike the earlier periods, occupation during the Coalition period is abundantly documented. Coalition sites range in size from one or two rooms to over 200 rooms. The most common site size is 13–30 rooms. The majority of these are small linear or L-shaped room blocks, and often occur early in the Coalition period. During the Coalition, the Pajarito Plateau experienced major occupation, with literally hundreds of sites known. In wetter highlands of the Plateau, masonry construction was common, while in the drier areas around Tesuque and Santa Fe, thin walled adobe was common. Many researchers working with these materials have focused on the rapid influx of population just prior to A.D. 1200, suggesting the sources as either the Mesa Verde or Chaco regions.

The Rio Grande Classic, or Pueblo IV, occupation of the Rio Grande Valley is characterized by aggregation into larger sites. Many of these exceeded 100 rooms, and some are even larger, containing 300–500 or more rooms. However, the

Table 8.
Formative Chronology for the Upper Rio Grande Valley (from Stuart and Gauthier 1984:45 and Wendorf and Reed 1955)

Local Designation	Pecos	Chronology	Typical Ceramics
Lithic/Archaic	BM II/BM III	?–A.D. 600?	none
Early Developmental	BM III/P I	A.D. 600– 900	primarily plainwares; some brownwares
Late Developmental	P II	A.D. 900–1200	Kwahee B/W; often Chaco II B/W, some Wingate B/R (late)
Coalition	P III	A.D. 1200–1325	Santa Fe B/W; frequent Mesa Verde B/W; St. Johns Polychrome
Rio Grande Classic	P IV	A.D. 1325–1600	Glaze E (early); Rio Grande Glazes; Los Padillas Glaze; Tewa Polychromes

distribution of site size is strongly bimodal. One to four rooms are common, as are sites having over 50 rooms. Both Biella and Chapman (1977b) and Hunter–Anderson (1979a, b) have provided thoughtful discussions on the significance of these developments. Terminal Pueblo IV and Pueblo V developments in the Rio Grande Valley are considered Protohistoric and Historic and are discussed in the next chapters.

In the context of these developments, it is important to note that while research attention has focused on the larger Formative sites in the Rio Grande Valley, a substantial number of very small sites also are documented. These often have been classified as undated Anasazi sites, and Stuart and Gauthier (1984:56–58) note a correlation of loss of phase identity with increasing elevation. They argue that many of these sites can be dated, and that many are either Pueblo I/Pueblo II transitional or Pueblo III/Pueblo IV transitional. They conclude that "some sites cannot be identified because they represent the transformation between clearly recognized phases—they are literally out of phase in the normative sense. Others suffer the same fate because they are literally out of place in the same sense" (Stuart and Gauthier 1984:58). What Stuart and Gauthier are suggesting, of course, is that more research into these small, ephemeral sites would greatly assist in clarifying several issues of Formative adaptation, a point echoed by Upham (1984).

Within the general developments just summarized, several regional variants have been identified (Cordell 1979a:34–64). These include the following districts: Taos and Cimarron; Albuquerque; Gallina; Chama; Santa Fe; and the Pajarito Plateau. Within each district, numerous phases have been defined, and a considerable literature exists. Additional detail may be found in Cordell's (1979a) discussion.

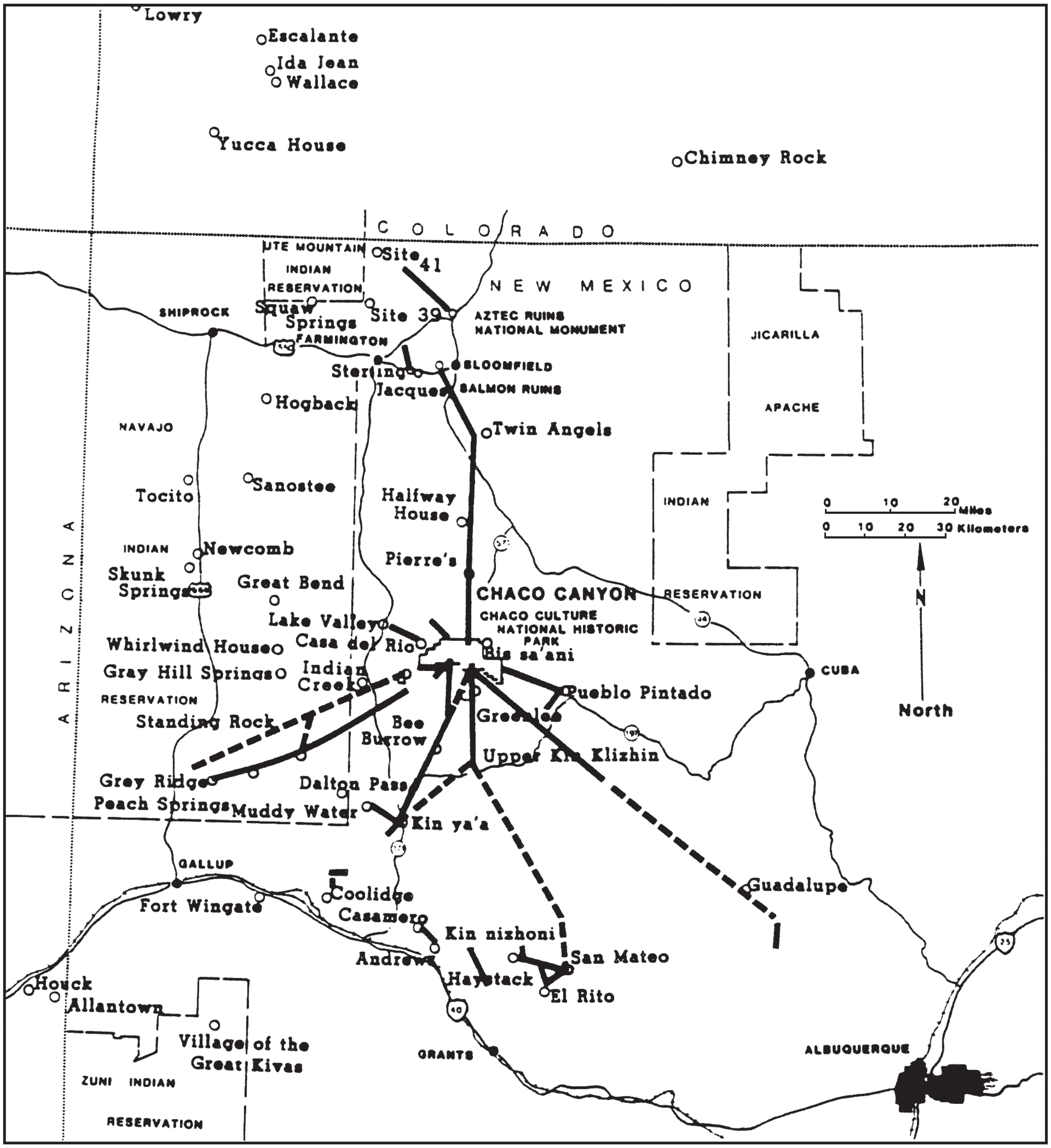
One aspect of major significance regarding the Rio Grande Valley Formative relates to the widespread abandonment of other areas of the northern Southwest after Pueblo III times. It seems fairly clear that abandonment is an inappropriate concept (see previous discussion), and that major population shifts occurred rather than actual abandonments. One recipient area for these shifts was the Rio Grande Valley. The massive expansion of population in the Rio Grande Valley beginning during the Coalition and culminating during the Classic period is traditionally seen as reflecting a migration of peoples, especially from the San Juan Basin (Reed 1950; Wendorf and Reed 1955; Ellis 1964a). The Rio Grande Classic often is viewed as a period of cultural florescence (Wendorf and Reed 1955), when the population reached its maximum prehistoric extent, large aggregated communities were built and there was an elaboration of material culture, manifested by mural paintings, decorated pipes, elaborate axes, carved bone tools, stone effigies, and a wide variety of vessel forms (Cordell 1979a:45). While not dispensing with this general framework, Cordell (1979a: 64–105) offers a more balanced view of these developments in the Rio Grande Valley, emphasizing human ecology, demography, economy, social organization, and settlement system. In addition, the paleoenvironmental arguments advanced by Holbrook for the Gallina area are appropriate (Holbrook 1975; Holbrook and Mackey 1979).

San Juan Basin

Of the entire project area, the San Juan Basin is the best known in terms of Formative archeology. This is due to the immense amount of attention that has been focused on the Chaco Phenomenon (Figure 16) (see Lister and Lister 1981 and Frazier 1986 for excellent summaries of the history of research in Chaco Canyon). This phenomenon, however, has tended to overshadow other developments in the San Juan Basin and adjacent regions. While not as impressive as what occurred in Chaco Canyon, these also represent major aspects of the archeological record.

In general terms, the Pecos Classification can be adequately applied to the San Juan Basin. The Basketmaker and Puebloan sequences cover most developments in the Basin. Cordell (1982:65–71) provides a capsule summary of Pueblo I through Pueblo IV occurrences in the region, and the following is abstracted from her discussion.

Two developmental criteria are usually used to assign sites to specific periods within the Pecos classification. These are architectural forms and ceramic assemblages. Cordell (1982: 65) notes, however, that the widely recognized chronology



Chacoan road system and outliers. Chacoan outliers are named and indicated by open circles. The road segments shown as solid lines have been documented by ground surveys. The dashed line segments are known only from aerial photographs.

Figure 16. Schematic illustration of the Chaco Phenomenon (Cordell 1984:259) Illustrated by Charles M. Carrillo

may in fact be quite inaccurate. Realizing this, the diagnostic traits for Pueblo I include the appearance of above-ground rooms and Kana'a Neck-banded ceramics. Dates generally fall between A.D. 700–900. Most Pueblo I villages are room arcs, usually of jacal with masonry footings. Pithouses are retained as kivas. Most villages are small. In the Chaco area, Pueblo I site density and size is relatively small. The portions of the San Juan Basin that contain relatively dense Pueblo I occupations are in the northeast and near perennial streams (Cordell 1982:66–67).

The Pueblo II phase dates to ca 900 to 1050 or 1100. This is the maximal geographic dispersal of Anasazi sites. Masonry becomes the dominant form of building material, and small unit-pueblos become characteristic site types. There is a variety of ceramic styles, and local phase schemes often use one or more types as temporal markers. In Chaco Canyon, Hayes (1981a) uses Tohatchi Banded as the diagnostic type, with Red Mesa Black on White (B/W) as the typical decorated ware. Within Chaco Canyon, early and late Pueblo II occupations have been delineated. During the late Pueblo II occupation, more masonry is apparent and kiva depressions are more obvious, since they are now masonry lined. Red Mesa B/W is rarer, and Tohatchi Banded is replaced by Coolidge Corrugated. Gallup B/W and Wingate Black on Red (B/R) are new ceramic types at Chaco. An apparent settlement shift occurs during late Pueblo II, with the plains north and south of Chaco Canyon being uninhabited (according to Hayes 1981a:29), while the canyon bottom population is nearly evenly located along the length of the canyon. Settlement density throughout the San Juan Basin apparently was increased during Pueblo II times. Sites are concentrated in northwestern and southeastern parts of the Basin, as well as in Chaco Canyon. There was an apparent decline in these in the northeastern quarter of the Basin. Pueblo II is often considered the beginning of the Anasazi Florescence (Cordell 1982:67–69). The Pueblo III period is generally dated to ca A.D. 1050 to 1300. It is characterized by population aggregation in a few locations and the eventual abandonment of the entire Four Corners area. Within this context, the Chaco Phenomenon must be described as unique, and it is likely that events related to Chaco dominated much of the San Juan Basin. For Chaco, Hayes again divides the Pueblo III into early and late phases. Early Pueblo III is characterized by construction of the large Chacoan towns and modification of the villages. Escavada B/W and Gallup B/W are principal decorated ceramic types. Chaco B/W is never abundant. During about the middle of the Early Pueblo III period, Chaco Corrugated replaced Coolidge Corrugated. Trade wares include Wingate B/R, Puerco B/R, McElmo B/W, and trachyte-tempered, carbon-painted black on white types from the Chuska Valley. Diagnostic ceramics of the late Pueblo III in Chaco are McElmo and Mesa Verde B/W and Chaco–San Juan. Late Pueblo III is characterized by a decrease in population in Chaco, although there is new construction and some new sites. Important new architectural changes also occur. Many of these architectural changes as well as the ceramic assemblage suggest that Mesa Verde migrants may have been responsible, although there is no actual evidence of massive incursions of such migrants. Pueblo III sites are known throughout the San Juan Basin, with concentrations in Chaco Canyon, on Lobo Mesa, and in the Chuska and Tohatchi flats areas. The northeastern portion of the Basin shows a low Pueblo III density (Cordell 1982:69–70).

The preceding was a very general overview. Examination in more detail of the Chaco area is appropriate here. Over a hundred years of investigation in Chaco Canyon has resulted in several revisions to the cultural sequence in this area (see, for example, Hayes 1981a:18, Figure 10). Stuart and Gauthier (1984:42) summarize the Chaco sequence as follows, using Bannister (1964:200), Hayes (1975), and Vivian and Mathews (1965:108–115) as principal sources. Note that the fine level of dating is primarily due to dendrochronology.

The earliest Formative sites are pithouse villages belonging to the Basketmaker phases. These date from A.D. 644–777, and include the famous Basketmaker III village of Shabik'eschee (Roberts 1929). Several other Basketmaker sites also are known (see parts of McKenna and Truell 1986). The Classic Chaco sites date from A.D. 828–1178, with the best clustering occurring between A.D. 900–1124. All major building activity ceased by A.D. 1124. During this classic period, three phases have been identified.

- Bonito phase (A.D. 1030–1130): Large pueblo towns, public architecture, cored veneer masonry; (clusters between 900–1124); long term, in-place development.
- Hosta Butte phase (A.D. 1040s +): Small villages, irregular plans; long term, in-place development.
- McElmo phase (A.D. 1050–1124 +): Large, compact pueblos; McElmo B/W ceramics; no in-place development.

Note that these phases are contemporaneous, something that has added to the confusion surrounding Chacoan terminology (cf. McKenna and Truell 1986:13–15). The traditional view, one that is still seen in the literature, is that during the classic period, Chaco was comprised of both towns and villages. Although rarely stated explicitly, there has frequently been an assumption that the town dwellers represented a more complex elite, while the villagers were the peasant stock of Chaco (see, for example, Vivian 1970a, b). This period is followed by a Mesa Verde reoccupation dating to A.D. 1250–1275. Characteristic ceramics are Mesa Verde B/W. From A.D. 1275–1300, small scattered occupations occurred on mesa tops south of the canyon and on Chacra Mesa to the east. Ceramics from this period included Mesa Verde B/W, Heshotauthla Polychrome, St. Johns Polychrome, and Klagetoh Polychrome. From A.D. 1300–1350, small occupations within Chaco Canyon occurred, with characteristic ceramics including Mesa Verde B/W, Pinnawa G/W, Klagetoh B/W and B/O, and Heshotauthla Polychrome (Stuart and Gauthier 1984:42). While major building activity ceased during the twelfth century, the canyon still was occupied into the mid-1300s, but the nature of this occupation is not clearly understood. It probably represented a greatly diminished form of what had previously occurred in the Canyon.

The sequence identified above is widely used, but the recent endeavors of the Chaco Center have resulted in some major modifications. Revisions include dropping the Hosta Butte and McElmo phase terms and extending building activity to A.D. 1140 or later at some sites (Judge 1979; Schelberg 1980; Toll et al. 1980). Current thinking (e.g., Toll et al. 1980) on the McElmo phase suggests that occupation in Chaco Canyon during the late twelfth and early thirteenth centuries was much more extensive than previously believed. There was occupational continuity between the Bonito and McElmo styles. One current interpretation of the McElmo phase throughout the San Juan Basin "is that it represents a change in economic affiliation toward the Mesa Verde area that was the major remaining population center after the disruption of the Chaco Phenomenon" (Cordell 1984:271).

Lekson (1983, 1984, 1986), examining the architecture at Chaco Canyon, has classed the Chacoan sequence according to building activity. His chronology is summarized below:

- A.D. 900–940: Initial construction of towns — Penasco Blanco, Pueblo Bonito, and Una Vida; large, multistoried, arc-shaped; possible 80-year building hiatus.
- A.D. 1020–1050: Next major construction at Pueblo Alto, Chetro Ketl, and Pueblo Bonito.
- A.D. 1050–1075: Construction primarily limited to additions to existing buildings; one new structure, Pueblo del Arroyo, started; elevated circular rooms.
- A.D. 1075–1115: Formal changes and accelerated construction; six major and massive construction programs.
- A.D. 1115–1140(?): Construction programs return to pre-1075 level; new buildings include so-called McElmo sites (i.e., Mesa Verde occupation); numerous specialized structures.

Lekson concludes his study by noting that:

> At some point, the centrality of the larger Chacoan sites expanded beyond the limits of the canyon and its immediate surroundings... Presumably, Chaco had become central to a region, and the functions of the larger buildings at Chaco had shifted from central places within the canyon to buildings in a cohesive larger settlement, itself central to both a core area around Chaco and a much larger area approximating the San Juan Basin... This view is supported by the late proliferation of building types, and their high density in the central canyon during and after the A.D. 1115–1140 construction period. In a 3-km length of the canyon...the built environment was nearly continuous and included stratified housing, public ceremonial architecture, community storage facilities, extensive boundary walls, roads, and road features.
>
> For this later period, the town–village terminology is misleading. Several towns are literally a stone's throw apart, and the villages are cheek-by-jowel. Rank-order analyses and hierarchies of settlement size that consider Pueblo Bonito, Chetro Ketl, and Pueblo del Arroyo separately are misguided; these buildings—together with the numerous other structures in the central canyon—should be considered a coherent analytical settlement unit. It becomes necessary to shift our concern from towns and villages to the canyon itself—especially the central area around South Gap —as a larger settlement of signifcant complexity. It would not be unreasonable to see this complexity, when coupled with Chaco's regional centrality and relatively high population density, as nearly urban. By the middle 1100s, Chaco was much closer to being a city than simply a canyon full of independent agricultural towns and villages (Lekson 1984:69–71).

The Chacoan outliers, as part of the Chaco Phenomenon, generally fall within the sequences described above (Powers et al. 1983; Marshall et al. 1979). Marshall et al. (1979) have classified the outliers into two chronological frames: Early Chaco Communities (A.D. 550–950) and Late Chaco Communities (A.D. 950–1200). These generally correspond to Basketmaker III/Pueblo I and Pueblo II/Pueblo III respectively. Predominant ceramics of the Early Chaco Communities include White Mound B/W, Kiatuthlanna B/W, and Red Mesa B/W types of the Cibola White ware series. Lino B/W and LaPlata B/W also occur. Late Chaco Community ceramics include Cibola White wares and Cibola Gray wares. These include Red Mesa B/W, Escavada B/W, Gallup B/W, and Chaco B/W types of Cibola White wares. Intrusive Chuskan, Mesa Verdean, Tusayan, and Socorro materials also occur.

Despite the years of research at Chaco, the nature of the Chaco Phenomenon is still argued. As indicated above, Lekson (1985a; Eddy 1972, 1974a) considers Chaco Canyon at its zenith as an actual city. Stuart and Gauthier (1984:40) regard the Chaco Phenomenon as the highest tier of adaptation ever developed in the San Juan Basin (and, by implication, the remainder of New Mexico): the low level state system. They conceive of Chaco and its outlier system as a vast hub network, with Chaco Canyon the hub, the road system the spokes, and the outliers as the rim. We have indicated earlier in this chapter that perhaps too much attention has focused on Chaco's complexity. Even characterizing it as a low level state may be an overstatement. In any case, however, the Chaco Phenomenon does represent one of the most complex cultural developments ever to occur in the Southwest.

After the collapse of the Chaco system, a comparative vacuum remained in the San Juan Basin, although Anasazi groups continued to occupy Chaco Canyon and the surrounding areas. The intensity of this occupation may have been greater than previously believed, but by comparison to what had preceded it, it was distinctly unimpressive. Stuart and Gauthier (1984:42) suggest that from the late 1100s to the 1300s, nomadic and seminomadic groups were drawn into the central San

Juan Basin. However, there was life after Chaco, and substantial Anasazi developments shifted east, towards the Rio Grande Valley.

The Chaco Phenomenon has tended to overshadow other Formative developments in the San Juan Basin. The Formative is known from other areas in the vicinity, and in many cases was only marginally affected by the Chaco Phenomenon. One area on the margins of the San Juan Basin that has received a considerable amount of attention is the Navajo Reservoir District, where a distinct sequence has been identified (Table 9) (Eddy 1966, 1972, 1974a; Dittert et al. 1961). The Navajo Reservoir District is especially significant for the information it has contributed to the early Formative and the development of villages.

While a good deal obviously is known of Formative development in the San Juan Basin, there is still more to be learned. For example, Cordell (1982:73–85) identifies several research questions specific to the Pueblo period in the San Juan Basin. As surprising as it may seem, the complete chronology of Puebloan settlement in the Basin is poorly controlled and requires refinement. Another issue involves the problem of distinguishing the archeological remains of highly mobile hunters and gatherers from limited activity Puebloan sites. Coupled with this is the need for a better understanding of the ways that complex societies interacted with less complex groups. Finally, the collapse of the Chaco System still is not satisfactorily resolved and requires additional systematic investigation.

West-Central

The Formative in west-central New Mexico is extremely diverse and complex. Both the Mount Taylor and the Socorro subareas of west-central New Mexico have substantial Formative developments that can only be summarized in the most superficial terms here. One reason for the remarkable cultural diversity exhibited is that both Anasazi and Mogollon traditions blend in this region. Another reason is the area's environmental diversity: in west-central New Mexico, the Colorado Plateau province meets the Basin and Range province. This has resulted in a remarkably variable topography with elevations from 1380 m to over 3000 m (Stuart and Gauthier 1984:119). Not surprisingly, this environmental and cultural diversity has given rise to a plethora of archeological phases.

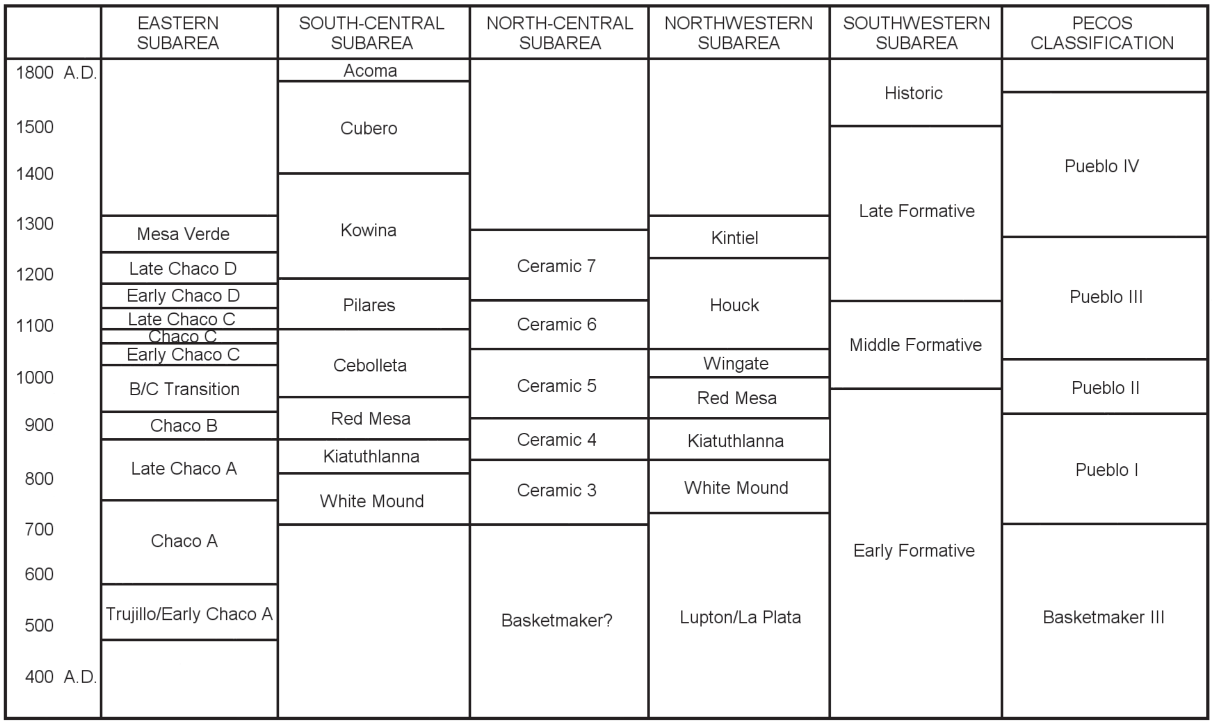
In the Mount Taylor (northern) portion of west-central New Mexico, Tainter and Gillio (1980) have provided an excellent and comprehensive overview of the Formative. Rather than even attempt to reconstruct or reorganize the numerous archeological phases that they have identified in the area, we have simply reproduced their elaborate sequence as Figure 17. Examination of this figure reveals the cultural complexity of the area, and if one needed to be convinced even further, additional study of Tainter and Gillio would dispel any doubts as to the labyrinth of terms (e.g., Tainter and Gillio 1980:Tables 5, 6, 7, 8, 9, and 11).

Since the publication of their overview, additional research in the area has added to our knowledge of Formative events. Pippin's (1987) revised treatment of Guadalupe Ruin, a Chacoan outlier located in the Rio Puerco Valley, provides an excellent and detailed examination of research at this important site and summarizes regional developments, especially as they relate to the extension of the Chaco Phenomenon in the area. Another regional study, although largely unpublished, has examined the Rio Puerco drainage in detail and found very distinctive Formative developments, including the documentation of the community surrounding the Guadalupe outlier (C. Irwin–Williams, personal communication; S. R. Durand, personal communication). Stuart and Gauthier (1984:121–131) provide a concise evaluation of the Mount Taylor region. The following summary is abstracted from their discussion.

Increasing agricultural intensification can be seen in the area from A.D. 200 to 500/600. The period of the terminal Archaic/Early Basketmaker may have been one of increasing agricultural dependence by a few groups, while also one of increasing numbers of hunters and gatherers. With the exception of the Rio Puerco Valley, there is a general absence of early Basketmaker remains in the Mount Taylor area. This may be explained by early agriculturalists withdrawing to smaller areas

Table 9.
The Sequence from the Navajo Reservoir District (from Stuart and Gauthier 1984:41, 113)

Phase Name	Pecos Equivalent	Dates	Comments
Los Pinos	Basketmaker II	A.D. 1–400	Cobble ringed shallow houses with associated jacal surface structures; possible kivas; Brownware ceramics at ca A.D. 300
Sambrito	Basketmaker III	A.D. 400–700	True pithouses appear; increase in brownwares and appearance of gray wares from Mesa Verde
Rosa	early Pueblo I	A.D. 700–850	Larger villages; use of deep pithouses; population increase; gray ceramics; neck-banded, Mesa Verde Redwares, decorated ceramics
Piedra	late Pueblo I	A.D. 850–950	Semisurficial pithouses; more village occupation; pithouses become smaller and shallower and are increasingly rectangular; each village has an unusually large depression (kiva?); upstream settlement shift; large number and variety of exotic goods
Arboles	early Pueblo II	A.D. 950–1050	Surface masonry pueblos; after population highs during Rosa and Piedra phases, population decreases; continued shift upstream; most occupation has moved away from the Navajo Reservoir District



* Weaver's (1979) sequence is presented here, rather than Gladwin's (1945), because it contains more recent data, and because Gladwin's has generated so much controversy.
** Dates after Marshall and others (1979:257).

Figure 17. Formative cultural sequence for the Mount Taylor area of west-central New Mexico (from Tainter and Gillio 1980:96)

outside of west-central New Mexico, leaving other regions, such as the Zuni highlands, as uncontested hunter–gatherer territory. Stuart and Gauthier (1984:131) feel that this period from ca A.D. 200–500 was one of major ethnic differentiation coupled with increasingly complex and separate trading patterns, and that until ca AD. 700, the situation became even more complex. Essentially, they are arguing for a relatively late hunter/gatherer presence in the Mount Taylor area as other regions may have been exploited by early farmers: "as early agriculturalists met with modest success, they opened up additional space to hunter–gatherer population expansion" (Stuart and Gauthier 1984:130). Their interpretation of the archeological record supports this conclusion and merits serious consideration.

From this complex scenario, increasingly widespread trade, the disappearance of hunters and gatherers altogether from west-central New Mexico, and the possible deemphasis of ethnic differentiation, occurred from ca A.D. 700 to 1150. The collapse of the 200-year-old Chaco Phenomenon around A.D. 1150 had repercussions in west-central New Mexico. During Pueblo III times, restructured settlement and trading patterns, emphasizing an upland economic network, are postulated. These were interrupted by episodes of abandonment in the late Pueblo III period, and sites became defensively located. Some sites were abandoned with nearly intact assemblages, while others were burned in a short period of disintegration at the beginning of the Pueblo IV period. Following this period, several distinct subsistence adaptations appear to have occurred leading into the Historic period. The late twelfth and thirteenth centuries are viewed as "a calamitous period which both opened and closed with substantial population movements. The first occurred when the Chacoan network disintegrated, the second with abandonments in the higher mesa and woodlands" (Stuart and Gauthier 1984:131).

The southern, Socorro, subregion of west-central New Mexico is much more distinctly Mogollon in character than is the Mount Taylor area. Organizational complexity is apparent in dealing with the Formative here, and many of the developments in the classic Mogollon region (see discussion on southwest New Mexico) are reflected in the Socorro area.

We may summarize Formative developments in the Socorro area as follows. The term Formative is used here to refer to developments occurring from the Pine Lawn through Three Circle phases of the Mogollon–Mimbres sequence. The earliest phase (Pine Lawn) is relatively well known, and is one reflection of a regional wide phenomenon constituting the early evidence for small sedentary village life. There is substantial variability in these early Pine Lawn pithouse settlements, however. Village size varies from only several to fifteen or twenty pithouses, with dates from around the mid A.D. 200 to ca 600. The first brownware ceramics appear early during this period. Early pithouses are known from terminal Archaic sites, but their transition into early Pine Lawn villages has not been well studied.

The succeeding Georgetown phase (A.D. 550–650) is enigmatic. After the attainment of substantial village size, there is a near hiatus in occupation, leading Martin and Plog (1973) to suggest a generalized population decline during this period. In traditional terms, the late Georgetown phase overlaps with Pueblo I. From about A.D. 700 through roughly A.D. 1000 (San Francisco and Three Circle phases), the character of the Mogollon area changed to one like that of the Anasazi (Martin and Plog 1973). This is reflected by above-ground architecture, great kivas, and the Chaco-like B/W pottery that occurs in the region. By A.D. 900 or 950, "the nature of trade, ceramic development, architectural development and settlement pattern becomes enormously complex in an extremely short period of time" (Stuart and Gauthier 1984:138).

The Reserve–Tularosa periods are the local reflections of Pueblo I/Pueblo II to Pueblo III/Puebloan IV horizons, with rough dates from A.D. 910 to 1325. These periods are broadly bracketed by a decline of Mimbres Boldface B/W wares and the appearance of new styles of utility wares associated with a locally made black-on-white (Reserve B/W). The end of this period is marked by abandonment in the western and highland portions of the area by A.D. 1325. The Reserve and Tularosa phases are characterized by "major shifts in settlement pattern and cultural identity in the western Socorro district. Trade increases, social complexity increases, the size of largest sites increases, but fewer and fewer sites occupy the forested highland until all are abandoned" (Stuart and Gauthier 1984:139). The abandonment of this area itself has been cause for much speculation, and it is often argued that the subsequent Pueblo IV, or Salado occupation in the lower Rio Salado drainage of Arizona, is related to the late Pueblo III occupations in the Gila Forest area of the Socorro region. Both actual migrations and economic interchange have been proposed (Stuart and Gauthier 1984:139).

Before concluding this brief summary of the Socorro area, it is important to note that most research has focused on the western Socorro region. The eastern, Rio Grande, subarea of the Socorro district has not been as well studied; in fact, this area represents one of the most undersurveyed regions in the entire Southwest. This deficiency may mask some very interesting cultural developments there. Stuart and Gauthier (1984:139–141) consider the available evidence and are able to conclude that the western and eastern portions of the Socorro area are remarkably different. Based on a survey of the lower Puerco and Salado (not the Arizona Salado) rivers near their junction with the Rio Grande (Wimberly and Eidenbach 1980), a major difference is the absence of Pueblo III sites, which is completely at odds with the substantial developments in the western Socorro area. On the other hand, Marshall and Walt's (1984) survey of the Rio Abajo area, which is in the same general vicinity, did locate several Pueblo III sites (their Late Elmendorf phase). These contradicting data sets only point to the intrinsic interest of this region, and, in point of fact, research into this area is beginning to accelerate (e.g., Marshall and Walt 1984; Earls 1982; Levine and Tainter 1982), enough so that a tentative phase sequence has been established:

- Paleo-Indian, ca 20,000–5000 B.C.
- Archaic, ca 5000–200 B.C.
- San Marcial (Basketmaker II), ca 200 B.C.–A.D. 400
- Tajo (Pueblo I), ca A.D. 800?–1000
- Early Elmendorf (Pueblo II), ca A.D. 950?–1100
- Late Elmendorf (Pueblo III), ca A.D. 1100–1300
- Ancestral Piro (Pueblo IV), ca A.D. 1300–1540
- Colonial Piro (Pueblo V), A.D. 1540–1680
- Revolt and Abandonment, A.D. 1680–1800
- Post Revolt: Reoccupation, A.D. 1800–1821
- Mexican, A.D. 1821–1846
- American, A.D. 1846–present

The 20,000 B.C. date seems far too early for an easily defensible Paleo-Indian date.

Central

The relatively small area comprising the central New Mexico subregion is generally referred to as the Salinas District. While a considerable amount of archeological research has been undertaken in the area, most of it has been site specific, focusing on late pueblos and on Spanish missions. Very little systematic survey has been conducted, and consequently we know very little about the actual archeological composition of the area.

It is not surprising that most of our information on the Central New Mexico subregion comes from the late Pueblo period. The impressive pueblos and Spanish missions are well known and have attracted a considerable amount of archeological attention. Two state monuments and one national monument have been established to preserve these late sites. The missions at Quarai and Abo State Monuments have been excavated, but the associated Native pueblos are virtually untouched (Ely 1935; Toulouse 1949). At Gran Quivera National Monument, both mission and Native areas have been excavated (Vivian 1964; Hayes et al. 1981b; Hayes 1981b).

Table 10 provides a general Formative phase and chronological sequence for Central New Mexico. Note that this includes the early Historic period as well as earlier developments. Stuart and Gauthier (1984:321–325) outline Formative developments in the region, as does Caperton (1980:3–11). These are summarized below.

The earliest known Formative occupation in central New Mexico consists of a pithouse village located near Gran Quivera. At least nine pithouses make up this village, although only two have been excavated (Green 1955; Fenenga 1956). Most of the pottery recovered was Jornada Brown, but Lino Gray or Kana'a Gray was present in low frequencies and San Marcial B/W was reported from one of the pithouses. An occupation from A.D. 600 or 700 to 900 was proposed. Other pithouse sites also have been identified in the southern portion

Table 10.
Formative Sequence for the Central New Mexico subregion, based on Gran Quivera (from Stuart and Gauthier 1984:322)

Phase	Pecos Equivalent	Dates	Ceramics
Claunch Focus*	Pueblo III	A.D. 1200–1300	Chupadero B/W; Indented Corrugated Utility
Arroyo Seco	Pueblo III	A.D. 1200–1300	Corrugated Utility (contemporary with Claunch)
Gran Quivera	early Pueblo IV	A.D. 1300–1425	Cieneguilla Glaze on Yellow;Jornada Brown; Indented Blind Corrugated
Pueblo Colorado	mid Pueblo IV	A.D. 1400–1500	Large G-P; Little Colorado Polychrome; Jornada Brown; Indented Blind Corrugated
Pueblo Pardo	late Pueblo IV	A.D. 1500–1650?	Kotyiti G-P; San Lazaro; early P V G-P; Jornada Brown
Salinas	Pueblo V	A.D. 1600–1675	Salinas Redware; Mexican Majolica; Plain Smooth Utility Ware

*Note: Toulouse and Stephenson (1960), who originally defined this sequence, used the term focus rather than phase

of Chupadero Mesa and on Jumanes Mesa (Caperton 1980:3–4). Little is known of the period from approximately A.D. 900 to 1300 due to gaps in the literature and site records. Both Vivian (1964) and Mera (1940) believe that Pueblo development in central New Mexico was similar to what occurred in the Rio Grande Valley, but that strong influences from the Jornada Mogollon also were present. Following the abandonment of Jornada area at around A.D. 1400, these groups may have moved into central New Mexico.

The supposed influx of Jornada Mogollon groups at around A.D. 1400 appears to fit the overall rise in the number of sites during the Pueblo IV period. However, Stuart and Gauthier (1984:324–325) caution that there have been no systematic surveys that can help address this issue. They note several data gaps, observing that most archeological attention has been focused on the area around Gran Quivira and Chupadero Mesa.

Southwest

The southwestern New Mexico subregion of the study area encompasses the Mimbres and Jornada Mogollon regions. This area, especially the Mimbres region, has been the focus of archeological research for over 100 years. Various aspects of Mogollon culture extended over a large area of New Mexico and Arizona, with ill-defined boundaries also occurring in northern Chihuahua and southwest Texas (Stuart and Gauthier 1984:175). We will first address the core Mogollon area—the Mimbres Valley— and then turn to the Jornada Mogollon.

The Mimbres area has endured archeological investigations since the 1880s. Early survey work was conducted by Nels Nelson and by Gila Pueblo in the 1920s and 1930s. Excavations also were conducted during this time, with major work being undertaken at the Mattlock site, Cameron Creek, Swartz Ruin, and the Galaz site (Blake et al. 1986:442). Several excellent works summarize Mogollon cultural developments and the current status of Mogollon research in the region, with LeBlanc and Whalen's (1980) synthesis being by far the most comprehensive. Other major sources include Anyon and Le Blanc (1980, 1984), Anyon et al. (1981), Beckett and Silverbird (1982), Blake et al. (1986), Brody (1977), Bullard (1962), Graybill (1975), LeBlanc (1983), Lekson (1978, 1985a), Minnis (1985), Stuart and Gauthier (1984:178–210), Upham et al. (1984), and Wheat (1955). Haury's 1936 work remains a classic.

As might be expected, numerous phase sequences have been produced for the Mimbres area. We have reproduced the summary constructed by Stuart and Gauthier (1984:178) (Figure 18) as representative of the Mogollon sequence. These phases are briefly summarized below, drawing largely from Blake et al. (1986:442) and Stuart and Gauthier (1984:178–210).

The first Mogollon phase is variously termed the Early Pithouse (LeBlanc and Whalen 1980), the Al Cabo (also LeBlanc and Whalen 1980), Mogollon I (Wheat 1955), Pine Lawn (Willey 1966), Pine Lawn–Georgetown (Bullard 1962), or the Hilltop phase. The nature and appearance of this earliest Mogollon manifestation is not clearly understood and has given rise to conflicting opinions. As Stuart and Gauthier note:

> *In fact*, the diagnosis of transition from the San Pedro Cochise (final Archaic period) rests on the first appearance of Alma Plainware pottery. The conflicts arise, in some cases, over the validity of stratigraphy in cave deposits (Martin et al. 1952 and Bullard 1962 re: Tularosa and Cordova Caves) and, in others, from a lack of datable material. The earlier appearance of ceramics seems to have occurred to the west and south (Stuart and Gauthier 1984).

Regardless of terminology, the Early Pithouse period dates to ca A.D. 200–550. It represents the first substantial sedentary agricultural occupation in the area and is reflected in the archeological record by undecorated ceramics and pithouses that were round, deep, and well constructed. Most sites were located on isolated knolls or ridges above floodplains (Blake et al. 1986:442).

This important period, representing the shift to sedentism and agriculture, is actually poorly documented and suffers from "limited excavation and intensive survey data. Furthermore, survey data are biased by over-representation of the major river valleys. Our knowledge of this period is inadequate with regards to settlement size, number of settlements,

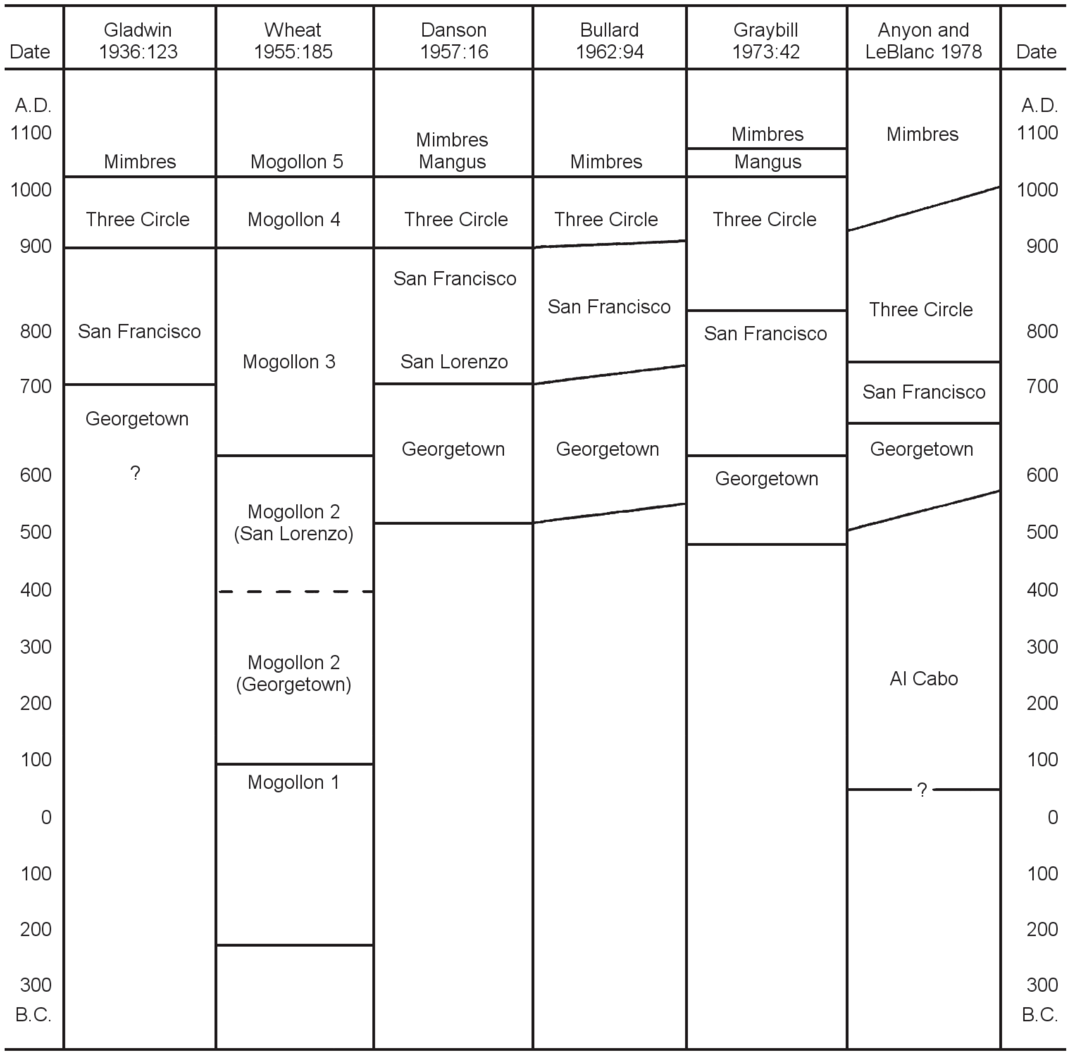


Figure 18. Mogollon chronologies (from Stuart and Gauthier 1984)

and resource exploitation" (Stuart and Gauthier 1984:184–185).

The Late Pithouse period dates from A.D. 550 to 1000. It is composed of three phases: Georgetown, San Francisco, and Three Circle. In the Mimbres Valley, this period is marked by site locations on the first terrace above the rivers, rectangular pithouses, the development of communal structures or great kivas, and increased interregional exchange (Blake et al. 1986:442).

The Georgetown phase (A.D. 550–650?) is difficult to interpret because there is relatively little evidence available. The phase appears to be characterized by a few small to medium sized villages, population loss or dispersal, and increased dependence on foraging. However, it must be realized that the data base may be weakened due to a century of focusing on river basin surveys and the painted ware sites (Stuart and Gauthier 1984:188). The development of Classic Mimbres bowl painting began in this period with the manufacture of a highly polished and red slipped ware known as San Francisco Red. The first painted ware in the region, Mogollon R/Br developed out of the San Francisco Redwares. Designs are principally geometric with few curvilinear elements. The first ritual killing of bowls and internment with burials occurs during this period (LeBlanc 1983:72–73).

During the San Francisco phase (A.D. 650–850?), there are substantial changes in agriculture, and site size and population increases, though not dramatically. Although wild resources continue to be important, there is an increasing dependence of maize, beans, and squash. The *Harinoso de Ocho* type of corn makes its appearance. There is little evidence for increasing social stratification from burial goods, but the size of pithouse units does increase (Stuart and Gauthier 1984:193). During this phase the first curvilinear elements appear on ceramics, the prevailing type being Three Circle R/W.

Painted jars are now being produced and decorated with scrolls and spirals. Around A.D. 750, firing techniques change so that the previously red paint now fires black (LeBlanc 1983:73).

During the subsequent Three Circle phase (A.D. 850–975/1000?) there is a remarkable expansion of village size, at least at the larger sites. The number of pithouses increases and most are superimposed over earlier pithouse settlements. The Three Circle phase is one of substantial population increase, of continued in situ village growth, and of increasing dependence on agriculture. Actual pithouse size decreases, communal structures increase in size, and pithouses become straight sided and half walled. Burial goods become more common and variation between grave offerings are observable. During this and the preceding San Francisco phase, there is a rapid transition from Three Circle R/W to Three Circle B/W to Boldface (Mangus) B/W to Transitional B/W, leading to the supposition of increased and widespread trade (Stuart and Gauthier 1984:197).

The Classic Mimbres period (ca A.D. 1000–1150) is best known for its intricately decorated pottery. During this period, cobble-walled above-surface pueblos were built, and some sites had as many as six room blocks with up to 50 rooms each. Great kivas ceased to be made, but small kivas, both surface and semisubterranean, were associated with the room blocks (Blake et al. 1986:442).

While substantial achievements occurred during this period, the Classic Mimbres appears to have been classic only in the Mimbres Valley and adjacent areas. The scale of development becomes much more modest away from this center. Population at the beginning of this period increased substantially, but leveled off rapidly. The major architectural change is to above-ground pueblos, none of which exceeded a single story in height (LeBlanc 1983:28); some smaller sites are thought to have been occupied only seasonally. Trade in certain exotic items, such as shells and macaws, appears to have been widespread, primarily to the south and west. Social organization appears to have shifted towards smaller family units and the changes in kivas suggest modifications to basic integrative mechanisms. There is burial evidence for increasing social or economic stratification. The location of the major Mimbres villages along watercourses near the most optimal zones for food production suggest a dependence on agriculture (LeBlanc 1983:25). However, reliance on agriculture may have declined late in this period; Upham's (1984) arguments regarding increased hunting and gathering patterns are particularly relevant here. At the end of the Classic Mimbres period, there is a sharp break to a presumably non-Mogollon tradition (Stuart and Gauthier 1984:204).

The three major periods discussed above represent a long, continuous tradition. Change appears to have been gradual, and there is no evidence for sharp cultural breaks and large scale population movements into or out of the area until the end of the Classic period (Blake et al. 1986:442).

Following the Classic Mimbres period, there are two additional phases. The Black Mountain (or Animas) phase dates to A.D. 1150 to 1300, although Stuart and Gauthier (1984:206) propose a terminal date of ca 1375. The Cliff phase dates from sometime in the 1300s to A.D. 1425–1450. There may be a gap between these two phases, but not enough data are available to clarify this. Pueblos during both phases were built of adobe and some contain a hundred rooms or more. The Black Mountain phase appears to represent a cultural break with the preceding Mogollon–Mimbres sequence and may be culturally linked with the Casa Grandes culture in northern Chihuahua. After the possible hiatus, the Mimbres Valley was only sparsely occupied during the Cliff phase. Structures continued to be built of adobe, but diagnostic differences occur in ceramics, burial practices, and site layouts. These sites are likely related in some fashion to the Salado culture of southeast Arizona (Blake et al. 1986:442). Note should be made that the nature of the Salado culture and its influence in the Mogollon area is a subject of considerable controversy (LeBlanc and Nelson 1976; Nelson and LeBlanc 1986).

In summarizing the Mimbres developments, Blake et al. (1986), in evaluating the 1200-year Mimbres Valley cultural sequence, believe that population increased substantially from the Early Pithouse period to the Classic Mimbres period. Then it rapidly declined. Two subsequent post-Classic occupations occurred, but neither reached the same levels of population size attained during the Classic Mimbres period.

The eastern part of the southwest New Mexico subregion is based on the Jornada Unit. The Jornada branch of the Mogollon defined by Lehmer (1948) is focused here, although it has manifestations elsewhere in New Mexico, western Texas, and Chihuahua. Archeological research on the Jornada Mogollon has a long history, as it does with the Mimbres region. The former, however, has been more balanced in the sense that emphasis has not been as site-specific as it has with the Mimbres Mogollon. Despite this, however, excavation data are limited when compared to those for survey (Stuart and Gauthier 1984:210–211). There are several classic works on the Jornada Mogollon (e.g., Lehmer 1948; Mera 1938a), and recent research in the region has been summarized by the proceedings of the first and second Jornada Mogollon Conferences (Beck 1985; Beckett and Wiseman 1979).

Although the Jornada Mogollon has traditionally been viewed as a cultural backwater to the rest of the Southwest, recent research in the area has altered this perspective (Beckett and Wiseman 1979). A variety of studies have illustrated the Jornada Mogollon's research potential for contributing to issues as diverse as rock art (Schaafsma and Schaafsma 1974) to archeoastronomy (Eidenbach 1981). Additional discussion on the Jornada Mogollon is provided in the Southeastern New Mexico section of this chapter.

Southeast

During the Formative, the southeastern subregion encompasses the eastern extension of the Jornada Mogollon. Stuart and Gauthier succinctly point out a major problem with the archeology of the region: “Compared to most other regions of New Mexico, little archeological attention has been focused on the southeast plains. Perhaps this is so because the region is vast, the visible archeological remains are not so remarkable as in the Anasazi and Mogollon heartlands’ and the archeological record is poorly substantiated from independent chronology” (Stuart and Gauthier 1984:259).

This situation, however, is rapidly changing. In recent years, numerous projects have been conducted in the southeastern portion of New Mexico and, as with central New Mexico, the entire southern portion of the state is witnessing a massive amount of attention (Powers 1987:862). This does not mean, however, that our understanding of cultural events there have increased proportionately.

The Archaic, or at least a similar adaptation, continued until at least A.D. 1000 in southeastern New Mexico, if not later. Stuart and Gauthier (1984:268) refer to the Formative in the region simply as the Ceramic period occupation, spanning ca A.D. 400 to 1450 or 1500. Ceramic period represents something of a generic term, but it is appropriate because little traditional Puebloan development is evident in the area. Table 11 summarizes some of the standard chronological phases for the area.

Table 11.

Major Cultural Sequences for Southeastern New Mexico; see text for dates (abstracted from Stuart and Gauthier 1984:220, 269)

Northern-Middle Pecos Valley	Central-Sierra Blanca	Southern-Eastern Variety of Jornada Mogollon
Early 18 Mile	Glencoe–P II/Early P III	Ochoa
Late 18 Mile	Corona–early P III	Maljamar
Early Mesita	Negra Lincoln, mid P III/ early P IV	Querecho
Late Mesita Negra		
Early McKenzie		
Late McKenzie		
Post-McKenzie		
Historic		

Stuart and Gauthier (1984:268) note that about two-thirds of Ceramic period sites are lithic and ceramic scatters and that structural sites are not common. Even one of the largest Ceramic period sites, Bloom Mound (Kelley 1966), is only 10–12 rooms in size, and pales by comparison of size to Puebloan sites further west. Most structural sites in southeastern New Mexico contain from two to three up to perhaps 20 or 30 structures. The majority of these, however, are shallow pithouse depressions (Stuart and Gauthier 1984:268–270).

There are two basic phase sequences for the southeastern subregion: a northern one (Jelinek 1967) and a southern one (Corley 1965; Leslie 1979). Although dated, Jelinek’s (1967) study of the Middle Pecos Valley is enduring and represents some of the most comprehensive research conducted in the region. Since it is a major work still frequently referred to, it is summarized below.

The Early 18 Mile phase (A.D. 800–900) shows evidence for the first sites that may be permanent settlements. These occur in areas with agricultural potential. Associated ceramics include Lino Gray and brownwares. Later in the phase (Late 18 Mile phase—ca A.D. 900–1000), a number of fairly small sedentary communities occur. These contain shallow pithouses and occasionally small contiguous surface rooms. Red Mesa B/W appears at this time in association with Jornada Brown ceramics. The 18 Mile phase has been divided into early and late components, the early aspect representing an early lowland development that occurs nearly statewide with Pueblo I sites and is contemporaneous with late Basketmaker III developments in the highlands. During the Late 18 Mile phase, the first well established communities are documented. Stuart and Gauthier conclude that it is equivalent temporally and adaptively to the later downhill shift that they proposed for the Mimbres area. Jelinek notes that trade during this phase is with the eastern Anasazi rather than with the nearby highland areas.

Following the Late 18 Mile phase is the Early Mesita Negra phase, dated to ca A.D. 1000–1100 and the Late Mesita Negra phase, dated to ca 1100–1200. During these phases, the most intense occupation occurs, and sites are larger than previously. An extensive trade network in ceramics developed, and ceramics include Reserve B/W, Cebolleta B/W, Mimbres B/W, Socorro B/W, and the continued presence of some Red Mesa B/W. At the very end of the Late Mesita Negra phase, Chupadero B/W makes its first appearance and graywares again increase as brownwares decline.

The Early (ca A.D. 1200–1250?) and Late (ca A.D. 1250–1350) McKenzie phases are represented only by several large structural sites and a few surrounding ceramic and lithic scatters. The Early McKenzie phase is characterized by a decline in intrusive ceramics. During this time, there is a general shift in settlement patterns throughout New Mexico to the highlands. The McKenzie phases, though aggregated in site size, are numerically modest since they fall in the earlier and later parts of the Pueblo II period of highland development, according to Stuart and Gauthier (1984:274).

The post-McKenzie occupation (A.D. 1350–?) is the local equivalent of Pueblo IV. These sites are primarily temporary camps and a major change in subsistence is suggested. Maize use apparently decreases dramatically while bison exploitation appears to have increased substantially. Jelinek concluded that at roughly this time, there was a return to bison hunting and that formerly sedentary populations abandoned agriculture in favor of a more nomadic life.

Stuart and Gauthier (1984:274) note that following the post-McKenzie phase, there is little evidence for substantial bison remains in sites until A.D. 1450–1550. They conclude that bison hunting involved two major episodes—the first around A.D. 1250–1300 and the second A.D. 1450 to Historic times. The second episode coincided with the so-called Little Ice Age, a widely known and well documented climatological event, which lasted from roughly A.D. 1500 to 1880 (Stuart and Gauthier 1984:274).

In the southern portion of the southeastern subregion, Stuart and Gauthier (1984:274–277) conclude that the Querecho (A.D. 950–1100/1150) and Maljamar (A.D. 1100/1150–1300) phases are the local equivalents of Pueblo II and early Pueblo III, although an agricultural strategy is not well documented. Following the Maljamar phase, a 50–60 year hiatus may exist prior to the Ochoa phase (A.D. 1350–1450). Two episodes are believed to characterize the Ochoa phase—the early Ochoa involved some bison hunting, while the later Ochoa was a semi-sedentary period made possible by a later optimum in buffalo population that began perhaps as early as A.D. 1450 and continued into the early Historic period, up to ca 1550 (Stuart and Gauthier 1984:274–275). In this context, Speth's (1983) important work at the Garsney site is significant, but will be considered in more detail in the next chapter, since that site dates to the Protohistoric/early Historic periods.

Before concluding this section, mention also needs to be made of Kelley's (1966) important research in the Sierra Blanca region. Although Stuart and Gauthier (1984) consider this research under southwestern New Mexico, it more appropriately fits in southeastern New Mexico, being located in the west-central portion of this subregion. The earliest phase, the Glencoe, is divided into early and late components. Early Glencoe dates to ca A.D. 900–1100, while Late Glencoe covers A.D. 1100–1200. These are equivalent, respectively, to Pueblo II and early Pueblo III. The Glencoe phase consisted of a sedentary population that developed late and was thinly spread. Village sites tended to be located in the narrow limits of the pinyon–juniper belt of the Upper Sonoran zone, at elevations from ca 1650 m (5400 ft) to ca 1900 m (ca 6200 ft). Villages consisted of from five to 10 pithouses. During the succeeding Corona phase (also dated to ca A.D. 1100–1200 and equivalent to early Pueblo III), several traits that are out-of-date elsewhere in the Southwest persisted. By the Lincoln phase (A.D. 1200–1300+), equivalent to mid Pueblo III and early Pueblo IV, villages up to 120 rooms are known and population is believed to have been at its highest (Stuart and Gauthier 1984:220–221).

The southeastern subregion of the project area represents a complex archeological configuration. While initially it is not as sophisticated as in other portions of the Southwest, some very interesting adaptations occurred there. Although the situation is rapidly changing, southeastern New Mexico has been underrepresented by archeological research and cultural development in the area clearly requires considerable further investigation.

Cultural development in southeastern New Mexico loosely parallels trends in both the Anasazi and Mogollon regions, though on a more modest scale. Evidence for agricultural dependence in this area is limited, especially moving to the south and east. Beginning somewhere around A.D. 1200, there is more evidence for large game hunting than previously. The first period of dependence on agriculture or on relatively stable collectible wild resources ended by ca A.D. 1150; this was followed by a return to agricultural dependence after A.D. 1300 in some areas and to bison hunting in others (Stuart and Gauthier 1984:275–277).

It seems apparent that Archaic-like hunting and gathering strategies lasted until quite late in southeastern New Mexico, and undoubtedly were always a feature in parts of southeastern New Mexico. It is likely that agricultural and hunting and gathering strategies coexisted in relative proximity in much of southeastern New Mexico (Stuart and Gauthier 1984:289).

Trans–Pecos (Patricia A. Hicks)

True Formative developments as defined for areas further west do not occur in Trans–Pecos. The term Late Prehistoric (ca A.D. 1000–1500 or later) is generally used instead, and includes developments otherwise included as Protohistoric. Accordingly, the following discussion also relates to the Protohistoric period, which will not be specifically addressed in the next chapter.

Several significant technological advances mark this period in the Trans–Pecos. These include the appearance of the bow and arrow throughout the region, and in some areas, ceramics and agriculture (Mallouf 1985:128).

Puebloan

The Late Prehistoric is the best represented period in the Pueblo subregion. Following A.D. 200 the northern portion of the area was occupied by populations that are identifiably Jornada Mogollon. In the southern portion of the section, however, Puebloan traits do not make their appearance until approximately A.D. 1200, or perhaps slightly earlier (Kelley 1952a:361; Mallouf 1986:74). The culture–historic framework that is used in the northern portion of the area was developed as a result of work performed in south-central New Mexico (Lehmer 1948). Subsequent research in the El Paso area has demonstrated its applicability to that portion of the Trans–Pecos. The culture–historic framework in use in the southern portion of the Pueblo Section is based on work that was undertaken along the Rio Grande in the La Junta region near Presidio, Texas (Kelley et al. 1940:31–38).

The southern Jornada sequence is composed of four phases. These are the Hueco phase that was discussed earlier in the context of the Archaic, and the Mesilla, Dona Ana, and El Paso phases (Lehmer 1948:71–84). The Mesilla phase has traditionally been defined on the basis of the presence of pithouse architecture and El Paso Brown ceramics, and, in its original formulation, was thought to have begun around A.D. 900. In recent years these ideas have undergone some modification. It is now recognized that pithouse architecture had its beginnings during the Archaic (e.g., MacNeish and Beckett 1987). El Paso Brown ceramics have been recovered from contexts that postdate the accepted end of the Mesilla phase, bringing into question the utility of this type as a sensitive temporal indicator. On the other hand, the beginning of the Mesilla phase has been pushed back 700 years based on the occurrence of El Paso Brown ceramics in contexts dating to A.D. 200 (Carmichael 1985a:14). Because of these and other problems, some researchers in the area prefer to refer simply to a pithouse phase that includes the Mesilla and Dona Ana phases, and a later Pueblo phase that is the equivalent of the El Paso phase of the original Jornada Mogollon sequence (e.g., Whalen 1981a, b, 1986).

Another characteristic that purportedly defines the Mesilla phase is the aggregation of the population into pithouse villages (Lehmer 1948:78; Whalen 1978:8). Analysis of regional survey data for the south-central New Mexico and west Texas regions, however, indicates that the majority of the sites assigned to the phase are better considered short term camps associated with the gathering of floral resources (e.g., Upham 1984). Sites dating to the Mesilla phase have been found in a wide range of environments. Carmichael has summarized the settlement pattern data:

> A high degree of mobility and a generalized subsistence pattern seem to be indicated, and both conditions contribute to a high degree of seasonal functional variability (Hard 1983). In fact, general similarities to the Archaic with regard to site size, contents, and distributions suggest that much of the Mesilla phase represents essentially an Archaic adaptation with the addition of ceramics (Carmichael 1985a:14).
>
> Sites in the area have been interpreted as reflecting hunting in the mountains (Way 1977; O'Laughlin 1977), processing of agave and other succulents in the foothills and along the Rio Grande margins (Whalen 1978; O'Laughlin 1979, 1980) and the gathering of mesquite, grasses, cacti, and various annuals in the basins (Brethauer 1978; Carmichael 1981; Eidenbach and Wimberly 1980). O'Laughlin also suggests the presence of a riverine component within the Mesilla phase settlement system, on the basis of work at the Sandy Bone site (1977). The use of domesticated plants increases throughout the phase and by A.D. 1100 becomes an important aspect of reorganization of land use patterns in the area (Carmichael 1985a:15).

Village sites become more common late in the phase and tend to be located along the Rio Grande, adjacent to ephemeral drainages in the mountains and foothills, and occasionally on alluvial fans. In the Hueco Bolson, villages exhibit a statistically significant tendency to occur near playas on the basin floor (Whalen 1986:72).

The Dona Ana phase (ca A.D. 1100 to 1200) was originally defined on the basis of surface collections alone and was considered a short lived, transitional phase. The typical architectural forms consist of adobe-walled surface structures adjacent to pithouses. Ceramic assemblages at these sites include quantities of El Paso Brown, El Paso Polychrome, and El Paso Red-on-brown. Intrusive wares include Mimbres Black-on-white, Chupadero Black-on-white, Three Rivers Red-on-terracotta, Playas Red, and St. Johns Polychrome (Lehmer 1948:78–80). Sites have been found along the Rio Grande and in the Tularosa Bolson, but because of a lack of excavation, the phase remains poorly understood. Carmichael (1985a:15) notes that sites representing the phase provide the first evidence for substantial long term habitation outside of the riverine environment. Villages are found most commonly on the lower slopes of alluvial fans, and at canyon mouths where the potential for runoff horticulture is highest.

The El Paso phase (ca A.D. 1200 to 1400) represents the terminal period of prehistoric occupation in the northern portion of the Pueblo Section. Diagnostic characteristics of the phase include a predominance of El Paso Polychrome ceramics with everted, thickened, or thickened everted rims. The variety of intrusive ceramics occurring on the sites increases, with the most common types being Chupadero B/W, Lincoln B/R, Three Rivers Red-on-terracotta, and "smudged corrugated ware" (Lehmer 1948:81). These intrusive wares are indicative of a wider range of contacts than seen in previous periods, as is the presence of marine shell from the Pacific and Gulf coasts and copper bells from Mexico (Lehmer 1948:81; Whalen 1978:44). Carmichael (1985a:17) notes that these data may indicate a shift in regional patterns of exchange that could be related to a decrease in the importance of Casas Grandes after A.D. 1300 (LeBlanc 1980:802). In this context it is also appropriate to note that El Paso phase populations appear to have influenced developments in the La Junta region in the southern portion of the Pueblo subregion (Lehmer 1948:84).

Surface structures composed of contiguous rooms fashioned from adobe are the architectural form characteristic of the El Paso phase. Large villages tend to cluster in locations that would have been conducive to horticulture, such as the toe slopes of alluvial fans and areas near playas (Carmichael 1985a:16). In the Hueco Bolson, 95 percent of the villages dating to this period are found at, or just below the intermontane basin edges (Whalen 1981b:83), an ideal position for the pursuit of runoff horticulture. The traditional view of these villages is that they housed a sedentary population that practiced horticulture on a full time basis.

During the El Paso phase, horticulture appears to have supplanted gathering as the mainstay of the economy, as evidenced by the recovery of a variety of cultigens, including maize, squash, bottle gourd, and two species of beans (Ford 1977:200; Whalen 1981b:85). However, gathering of wild plant foods continued to be an important activity. Variable quantities of wild plants, including mesquite, agave, yucca, acorns, assorted grasses, cheno–ams, and cacti, have been recovered from El Paso phase sites (Ford 1977:203, Table E2; LeBlanc and Whalen 1980:428), and large burned rock features indicative of the processing of desert succulents have been dated to the period (Carmichael 1985a:351). Although there are more and larger villages than during previous periods, the vast majority of the sites that have been dated to the El Paso phase are small camps occupied for short periods. Some researchers interpret this as indicating a higher degree of mobility than previously assumed (e.g., Carmichael 1985a; Upham 1984).

Based on research in the Hueco Bolson, Whalen (1977, 1978, 1981b) has suggested that shifting from gathering to horticulture as the major focus of the subsistence system would have introduced new priorities in the scheduling of subsistence-related activities. In response to these new priorities, the degree of specialization of individual sites increased from the Mesilla through the El Paso phases. In other words, El Paso phase villages and camps are located in fewer environmental situations than sites of earlier phases, and a narrower range of activities appears to have taken place at each site. In fact, there are indications that some activities (e.g., processing of agave) that took place within villages in earlier periods were being performed in small camps away from the main settlements during the El Paso phase (Whalen 1986:85). An analysis of small sites dating to different periods indicates that small El Paso phase camps are slightly larger than those dating to previous periods and tend to be located closer to playas (Whalen 1986:74). It has been suggested that the playa sites may represent special use sites associated with the procurement of wild grass seed (Whalen 1986:75). It is not clear if the larger size of these camps is indicative of a larger task group size, or of repeated occupation of a favored locality.

Whalen (1981b) has developed a model using data from the Hueco Bolson that attempts to explain the Pithouse-to-Pueblo transition. In this model, population growth during the latter portion of the Hueco phase and the early portion of the Mesilla phase resulted in an increase in the density of villages on the floor of the bolson. As population density increased, horticulture became an attractive means to increase the productivity of the bolson floor. This tactic was frustrated by the marginal horticultural potential of the central portion of the bolson and ultimately resulted in the movement of the population to the edges of the basin where more optimal conditions existed. Increased reliance on cultigens resulted in a restructuring of subsistence related activities. Because horticulture is more labor intensive than broad spectrum gathering, larger residential groups would begin to develop. With demands increasing on the limited amount of arable land in the region, the population would begin to aggregate into larger communities in an effort to assert and maintain rights to this limited resource. As the population became more aggregated there would be an increased need for social controls, one result of which was the development of an elaborate ceremonial cycle. Aggregation of the population into yet larger villages resulted in an even heavier reliance on cultigens as a means for maintaining a large, dense population on a long term basis (Whalen 1981b:88–89).

There is little accepted evidence for an occupation of the northern portion of the Pueblo subregion following A.D. 1400. Usual reasons (see earlier discussion under Abandonment) cited for abandonment of the region invoke some sort of environmental change and the inability of the local cultural system to adapt to the differing conditions, be it increased aridity, alteration in the periodicity of rainfall, down cutting of arroyos, or increased salinity of the soil. As has been pointed out by Tainter (1985:146), these factors do not really explain why a region was abandoned. The more logical cultural response to such occurrences would be to reduce the population in the region under stress. In such a situation, lack of occupation may be more apparent than real, with the population reverting back wholly or partially to a broader based subsistence economy centered around hunting and gathering (Tainter 1985:146; Upham 1984:236). Alternatively, the population may disperse to more favorable regions with the abandoned area visited periodically by old or new populations on hunting and gathering forays.

Beginning around A.D. 1000 to 1100, Puebloan traits had begun to spread down the Rio Grande Valley, and by A.D. 1200 permanent villages had been established in the La Junta region at the confluence of the Rio Grande and Rio Conchos. This is known as the Bravo Valley aspect (Kelley 1952b:277; Kelley et al. 1940:31–38). At the peak of its development, it extended down the Rio Grande Valley to a point about 15 kilometers south of its junction with the Rio Conchos, and 65 kilometers up the Rio Conchos and several of the larger eastern tributary canyons. The Bravo Valley aspect has been subdivided into three foci, of which only the La Junta focus (ca A.D. 1200 to 1400) and the Concepcion focus (ca A.D. 1400 to 1700) will be discussed here. The vast majority of the research that has been undertaken in the La Junta area was performed under the direction of J. Charles Kelley in the 1930s and 1940s (Kelley 1952a, b, 1955, 1986; Kelley et al. 1940; Shackelford 1955). Since that time, the area has seen very little professional work.

The La Junta focus is contemporaneous with the El Paso phase as indicated by the presence of quantities of El Paso Polychrome in the artifact assemblages. It has been proposed that there was an actual movement of El Paso populations into the La Junta area (Shackelford 1955:258). At least one site in the Presidio area contains a small adobe walled pueblo that has been interpreted as a possible colony of El Paso migrants (Lehmer 1958:128; Shackelford 1955:258).

Although there are many similarities between the occupations in the two areas, La Junta focus materials differ in some ways from El Paso materials. For example, La Junta focus architecture is distinct. Houses dating to the La Junta focus are generally composed of a single room, rather than a series of contiguous rooms as is true for El Paso phase pueblos (Lehmer 1958:128). Some are rectangular structures that have been built in pits. These are not subterranean pithouses like those found in earlier phases in the north, but structures with walls built up from the floor of the pit, so that the pit wall acted as a support, but did not form a part of the wall (Kelley et al. 1940:33; Lehmer 1958:130). Other La Junta structures were circular pithouses with pole superstructures that may have been covered with thatch (Lehmer 1958:130).

Shackelford (1955:261) notes that all of the ceramics found on La Junta focus sites are from nonlocal sources. Many are Southwestern types such as El Paso Polychrome, Chupadero B/W, Tusayan Polychrome, and Playas Red, while others such as Ramos Polychrome and Babicora Polychrome have Mexican origins (Kelley et al. 1940:34). The lack of locally manufactured ceramics is one of the intriguing problems that still remains unanswered about this period.

Another question of considerable research interest concerns the possibility that the La Junta focus represents not one but two distinct groups of people who resided in the same villages for a portion of the year (Lehmer 1958:130). Kelley (1952a, b, 1955, 1986) has reviewed the various accounts concerning the Spanish entradas into the region, and these indicate that the Patarabueye peoples along the Rio Grande were sedentary farmers. These accounts also mention mobile groups known as the Jumano who periodically lived in the Patarabueye villages, but also spent time hunting and gathering in areas as far distant as eastern Texas (e.g., Kelley 1955). These groups probably functioned as traders and were certainly responsible for the dissemination of information and ideas. It is not clear when the semisymbiotic relationship between the Jumano and the Patarabueye developed, but the differences in house forms in the La Junta focus villages is certainly suggestive that such a relationship may have existed as early as A.D. 1200.

The period that follows the La Junta is the Concepcion focus. Although this intrudes into the Historic period, it is discussed here for continuity. During this period architecture was characterized by large rectangular houses built in pits, occurring individually or in groups numbering up to seven (Kelley et al. 1940:35). Lehmer (1958:130) has hypothesized that these structures were built to house extended family groups rather than nuclear families, as was the case with the house forms encountered in the previous La Junta focus.

The ceramic assemblage on Concepcion focus sites is radically different from that recorded for La Junta focus sites. Intrusive wares from New Mexico and Chihuahua are totally absent from the collections. Ceramics are all locally manufactured and consist of Chinati Plain, and unnamed red-on-gray, and red-on-brown wares (Kelley et al. 1940:35; Shackelford 1955:261). The Concepcion focus also contains the first evidence of traits borrowed from Spanish frontier settlements (Lehmer 1958:130), and could therefore provide significant data pertinent to the investigation of the processes of enculturation.

The southern portion of the Pueblo subregion is one of the more fascinating areas for archeological research in the Trans–Pecos, and yet it remains one of the least studied. Kelley's early research still stands as the most comprehensive undertaken in the region and addresses problems pertaining to interregional interaction that are only now beginning to be approached in other areas. In light of this timely contribution, the Museum of Anthropology at the University of Michigan has recently published his 1947 dissertation (Kelley 1986). The ethnohistorical and ethnoarcheological potential of the La Junta region has by no means been exhausted, and additional research in this intriguing area should be encouraged.

Interior

The bow and arrow and ceramic vessels may have entered the Trans–Pecos region from the north and west as early as A.D. 300 and were certainly present in quantity in parts of the region by A.D. 900. The bow and arrow appears to have been readily accepted, but ceramic technology, and horticultural practices do not seem to have been intensively employed (Mallouf 1985:129).

Puebloan influence is strongest in the northern portion of the Interior subregion. In this area, the bow and arrow may have come into general use earlier than in the south (Bradford 1980:9). Bradford (1980:12) notes that the most intensive utilization of the Guadalupe Mountains appears to have occurred during the Late Prehistoric stage, between A.D. 1150 and 1300. At low elevations in the mountains, sites containing Jornada Mogollon ceramics are found on alluvial fans and flats. Although evidence for architecture and cultigens at these sites is lacking, their location in topographic situations that would have been conducive to horticultural practices is suggestive (Mallouf 1985:129). Sites at higher elevations in the mountains often are located in positions similar to Late Archaic sites. Ring middens often are found on these sites suggesting that there was a continued emphasis on the processing of floral foodstuffs (Katz 1978). In the Salt Basin, sites dating to the Late Prehistoric period are most frequently found on the flats adjacent to the margins of dry lakes and ponds, and on alluvial fans. Sites in the former location appear to be special activity sites related to the extraction and processing of salt, while those on the alluvial fans are probably representative of base camps (Katz and Lukowski 1981:24). It is doubtful that horticulture was ever pursued in this area, given the shallowness and limey character of the soils (Katz and Lukowski 1981:9).

In the central portion of the Interior, numerous Late Prehistoric sites have been recorded in the basins and in the mountains. Among the most famous of these is a site containing a cache of over 1200 complete and fragmentary projectile points recovered in 1895 on the summit of Mt. Livermore in the Davis Mountains (Janes 1930). Excavations at Carved Rock Shelter near Alpine, Texas, produced a wide range of perishables, including cobs of maize. Storage cysts and grass lined pits were also recorded at this site and, together with the site's location, suggest the practice of some form of horticulture (Mallouf 1985:134; Smith 1938).

Occupation of the Big Bend region in the southern portion of the Interior during the Late Prehistoric period represents a continuation of the hunting and gathering economy developed in earlier periods. Rockshelter sites are common, as are open-air sites located in a wide range of environments. Evidence for horticulture is scanty, and ceramics are rarely found away from the village centers along the Rio Grande (Mallouf 1985: 136, 139). In the foothills of some of the mountain ranges in the region, groups of circular to oval, stacked stone enclosures occur. These have been termed the Cielo complex (Mallouf 1985:140, 1986:75) and have been interpreted as temporary structures built by hunting and gathering groups engaged in the seasonal exploitation of foothill and basin resources.

Overall, Late Prehistoric settlement patterns are similar to those of the Late Archaic. Ring middens, accumulations of burned rock, and hearths are the most frequently encountered features at sites in all environments. Although ethnobotanical data for the region are poor, the use of ring middens suggests a continued reliance on desert succulents (Greer 1965). Mallouf (1985:143) indicates that as yet unpublished data from a study in the foothill environment of the Big Bend supports the existence of a well structured seasonal round. Stylized rock art, use of mountain tops and unusual geographic features, prepared burials, and objects such as prayer sticks and beaded rattles suggest that the inhabitants of the region possessed a rich ceremonial life (Mallouf 1985:146).

In some areas incipient horticulture may have been employed as a supplement to the basic hunting and gathering economy. Alternatively, the cultigens found in Interior sites may have been obtained from village sites along the Rio Grande. One of the more fascinating questions in Trans–Pecos archeology concerns the character of the relationship between the sedentary horticultural groups along the Rio Grande and the mobile hunting and gathering groups of the Interior. This question, and the problem of interregional interaction and cross cultural relationships in the Trans–Pecos in general has been approached by Kelley (1952a, b, 1955). Kelley's work has contributed significantly to an understanding of the archeology of the area, but some of his interpretations are in need of reevaluation in light of new data. For example, Kelley et al. (1940:30–31) define the Livermore focus as an intrusion of nomadic bands from the High Plains into the Trans–Pecos between A.D. 900 and 1250 (1940:161). As noted by Mallouf (1985:16), although this explanation has been largely ignored by other researchers, it may in fact prove valid. This concept needs to be evaluated against paleoenvironmental, chronological, faunal, and artifact data derived from recent well controlled excavations in the Interior and adjacent areas.

In summary, the Late Prehistoric period exhibits a continuation of patterns that had their origin in the previous Archaic period. Procurement of desert succulents continued to be the mainstay of the economy in most areas, but the subsistence system was probably more structured. In some areas a well structured seasonal round appears to have been in place. Although horticultural products never figured significantly in the economy, small plots of maize may have been planted near springs and cienegas in the foothills and mountains. Interaction between the hunting and gathering groups in the Interior and horticulturalists in the Jornada area and along the Rio Grande is indicated by the presence of ceramics and cultigens, but the degree and character of this interaction remains poorly understood. We know from early historic accounts that in the late seventeenth century, hunting and gathering groups from the Interior were living in horticultural villages (e.g., Kelley 1955), but it is not yet understood when this symbiotic relationship began, or how it was maintained. Further archeological work in the area, and perhaps additional historical work in the various Spanish archives will shed new light on the subject.

Plains

In the Plains subregion the hunting and gathering adaptation characteristic of the Archaic stage appears to have persisted into the Historic period. Based upon the limited amount of work that has been performed in the area, there seems to be some north–south variation in this adaptation.

The Late Prehistoric period in the northern portion of the subregion is best known from rockshelter excavations. In these shelters an assortment of Puebloan ceramics have been recovered in association with a variety of perishables (Mallouf 1985:130). Late Prehistoric sites are well represented along the Pecos River between Pecos and Upton, Texas. These contain arrowpoints, bifacial knives, stone and shell beads, and large accumulations of burned rock. Although ceramic densities at these sites are relatively low, the diversity in the types present is notable (Mallouf 1985:134). Jornada types, Middle Pecos decorated wares, Caddoan wares, and plainware types associated with the Southern Plains have all been found in the area (e.g., Holden 1941; Rogers 1972).

Bison bone has been recognized on a number of the sites (Mallouf 1985:134). Several contemporaneous sites excavated in southeastern New Mexico also have produced the remains of bison (e.g., Jelenik 1967; Parry and Speth 1984; Speth and Parry 1978, 1980; Wiseman 1985), suggesting an emphasis on a hunting-based economy (Stuart and Gauthier 1984:274, 289). However, owing to the small number of excavated sites, it is not yet clear how important bison exploitation was in the economy of the inhabitants of either southeastern New Mexico or the Trans–Pecos region. A related point concerns changes that were made in other segments of the subsistence system to accommodate an increased emphasis on hunting.

Late Prehistoric sites are common on the Stockton Plateau. The settlement system appears similar to that documented for the Late Archaic (Mallouf 1985:140), but the kinds of features associated with the sites appear to have changed. In the Sanderson Canyon area, most rockshelters exhibit a Late Archaic occupation, but the most intensive use of the shelters occurred during the Late Prehistoric period. In this same area, hearth fields consistently date to the Late Prehistoric, and may have supplanted the use of pit-roasting features that resulted in the accumulation of burned rock middens. In general, Late Prehistoric sites are smaller in size than are those of the Late Archaic. Bandy (1980:213–216) theorizes that decreased population density resulted in an alteration in subsistence activities. The idea that population decreased is not, however, consistent with what is known from adjacent regions. Bandy's hypothesis is deserving of testing by future researchers to determine if this is just an isolated case or a more widespread phenomenon.

In summary, although the Late Prehistoric is by far the best represented period in the Plains subregion (at least in terms of abundance of sites), little is known about it. This is largely due to the minimal amount of professional work that has been undertaken in the area. Baseline data related to chronology, settlement, and subsistence are limited in scope. Bison hunting may have become economically important in some portions of the area, or alternatively, interaction with bison-hunting populations of the southern Great Plains may have increased. Interaction between inhabitants of the Plains subregion and populations in the Puebloan subregion of Trans–Pecos, the Great Plains, and central and eastern Texas areas is indicated, but the character and intensity of this interaction has not been explored.

THE PROTOHISTORIC PERIOD: 1300–1539

Alan H. Simmons (with Douglas D. Dykeman)

SYNTHESIS

From about A.D. 1300, after the disintegration of many of the regional systems until initial contact with the Europeans in the midsixteenth century, much of the Southwest underwent a series of geographic population shifts. In some cases, this resulted in the formation of large population aggregates, while in others an adaptation similar to that characteristic of the Archaic persisted or reoccurred. Although in a technical sense, these developments may be categorized as Late Formative, a variety of terms have been used to describe them. These include Late Prehistoric, and, more commonly, Protohistoric. These frequently are used interchangeably. We have a somewhat negative reaction to the term Protohistoric, since it implies some sort of anticipatory development. However, it is a commonly used term, and due to this precedence we will maintain its usage here.

In some parts of the study area during this time, most notably the Rio Grande Valley, Formative developments continued, culminating in the occupation of huge pueblos. These represent some of the largest ruins known in the Southwest. In many instances, some of the large pueblos were occupied when Europeans first entered the region and the Historic period began.

During this time, both the Rio Grande Valley and the immediately adjacent portions of eastern New Mexico experienced a rather dramatic influx of population from the San Juan Basin. While these areas had been inhabited prior to A.D. 1300, occupation was not very dense until the Protohistoric period. Other portions of the study region also witnessed similar population shifts. Complicating the matter further is the initial appearance of nomadic groups not native to the Southwest (i.e., the Athabaskans).

Although this period witnessed the construction and occupation of some of the largest structures known in the Southwest, there was a considerable population that lived by hunting and gathering, and who may have had limited or no contact with agriculturists. Some researchers have argued that these groups represent a shift of former agriculturalists to a more mobile settlement and subsistence pattern. Others suggest that the groups never were related, and that, in fact, many of these hunters and gatherers, often living on the fringes of major Southwestern developments, were following an economic pattern first realized during the Archaic.

Another economic pattern that occurred during the Protohistoric period was a very specialized focus on the hunting of bison. This is best illustrated in the eastern portions of the study area. Sites have been excavated here that illustrate a very efficient and highly organized system of bison procurement.

In general, archeological research into the Late Prehistoric or Protohistoric period has focused on two areas. Considerable attention has been directed towards the large, late pueblos, especially those where subsequent early European occupation, usually in the form of missions, can be documented. Much of this research was undertaken in the early 1900s by investigators using the direct historic approach. In using this method, these researchers hoped to develop a relative chronology from historic time into the prehistoric period.

The other focus has been on determining the origins of modern Navajos and Apaches. These people, presently occupying large portions of New Mexico and Arizona, are not indigenous to the Southwest. They are related to the Athabaskan-speaking groups, whose homeland is in interior Alaska and Canada.

In recent years, there has been an increasing awareness of the Protohistoric period (e.g., Wilcox and Masse 1981). At the 1987 meeting of the Pecos Conference, for example, a number of papers on this period were presented and many represented by far the most interesting and innovative contributions to that conference. This new interest has involved not only archeologists but also historians, and detailed discussion rapidly outdistances the scope of the present volume. The recent interest has involved research at both the large pueblos and at smaller sites that reflect specialized economic activities that frequently were not associated with agriculture. Some of the highlights of the Protohistoric period will be addressed in this chapter. Many aspects of the archeology of the Protohistoric period already have been discussed, primarily in Chapter 6. These need not be repeated here. Three specific aspects of the period will be examined: the Late Prehistoric aggregation of Puebloan villages; the archeological evidence for the initial entry of the Athabaskans into the Southwest; and the specialized adaptations that occurred in the eastern portion of the study area.

PERIOD DISCUSSION

The Aggregated Puebloan Village

After the collapse of regional systems such as the Chaco Phenomenon, the formation of large population aggregates, and the development of distinctive regional art styles in the forms of ceramic decoration and kiva wall murals occurred in a few areas (Cordell 1984:327–328). Cordell (1984:327–356) devotes nearly an entire chapter of her Southwestern summary to this topic, and the following discussion borrows freely from her study.

Many of the large sites occupied between A.D. 1300 and the Historic period were investigated in part because by using the direct historical approach, researchers felt that these sites could provide a close parallel to prehistoric developments, and a relative chronology from historic times to earlier periods. Some of the sites studied using the direct historical approach included San Cristobal, Pueblo Largo, Pueblo Blanco, and San Lazaro in the Galisteo Basin (Nelson 1914), Pecos Pueblo (Kidder 1924, 1958), Tyounyi on the Parajito Plateau (Hewett 1909a), and ancestral Zuni (Hawiku) (Smith et al. 1966) and Jemez (Unshagi and Giusewa) (Reiter 1938) sites. Many allied studies also occurred at late sites across the New Mexico border in Arizona.

In recent years, there has been a renewed interest in this period, and many large aggregated sites have been studied with fresh perspectives. These include examination of social integration (Clark 1969; Longacre et al. 1982; Upham 1982), political complexity (Graves 1987; Upham 1982; Upham and Plog 1986), social ranking and status as derived from burial data (Plog 1986; Whittlesey 1978, 1984), and elitism and household activity (Cordell and Plog 1979; Upham 1982; Upham et al. 1981). In addition, later sites have been investigated to evaluate the chronicles of the Spanish explorers and to determine the effects of the initial contact on native peoples (Reff 1987; Upham 1982, 1986, 1987; Wilcox and Masse 1981). The majority of these studies, however, were not in the project area. Rather, they concentrated on many of the large late Puebloan sites in Arizona, such as Nuvakwewtaqa at Chavez Pass and Grasshopper Pueblo.

This period is characterized by a dramatic population increase and shift of settlements into the Rio Grande Valley and adjacent portions of eastern New Mexico, including the margins of the Estancia Basin and the Llano Estacado. Although these areas had been inhabited prior to A.D. 1300, occupation was not dense until the Protohistoric period. Numerous sites are known; some are extremely large, consisting of several hundred, if not thousands, of rooms. At the same time portions of western New Mexico witnessed the construction of large pueblos, many of which were occupied at the time of historic contact (e.g., Zuni Pueblo). While the economic base was agricultural, hunting and gathering remained significant subsistence supplements (cf. Upham 1984).

Some of the better known very large sites occupied in the Chama River Valley, the Pajarito Plateau, and the Taos area during this period include Te'ewi (Wendorf 1953a), Tsiping, Howiri, Tsama, Sapawe, Tsankawi, Tshirege, Puye, Otowi, Tyounyi, Pot Creek Pueblo, Old Picuris, and "Cornfield Taos" (the ancestral Taos village) (Cordell 1979a; Dick 1965b; Ellis and Brody 1964; Hewett 1906; Steen 1977; Wetherington 1964). Further south, near Santa Fe, Protohistoric pueblos include Arroyo Hondo (Schwartz and Lang 1972), Cieneguilla Pueblo, Pindi Pueblo (Stubbs and Stallings 1953), and the Galisteo Basin pueblos—Pueblo Largo, San Cristobal, San Marcos, Las Madres, and Pueblo Lumbre (Lang 1977a). There also is a series of large Late Prehistoric sites along the upper Pecos, including Pecos Pueblo, Rowe Ruin, Arrowhead, and Dick's Ruin (Cordell 1979a; Holden 1955; Kidder 1958). Near Albuquerque, large Late Prehistoric pueblos include Kuaua, Alameda, Paako, Tijeras, and San Antonio (Cordell 1979a, 1984:331; Lambert 1954; Tichy 1938). South of Albuquerque, sites include Pottery Mound (Hibben 1967, 1975) and the Piro Pueblos (Cordell and Earls 1982; Marshall and Walt 1984).

Many of the large Late Prehistoric sites exhibit a large degree of variation in building techniques and materials. Kivas were still common structures (both small and great kivas), but these lack the elaborate floor features, such as benches, niches, or paired vaults of Chacoan kivas (Cordell 1984:331–333).

The origin of these large Late Prehistoric sites is a major topic of interest. Most researchers have assumed that mass population migrations occurred (cf. Rouse 1958) from the San Juan Basin and the Mesa Verde regions, both known to have been abandoned. A problem, however, is that there is a time gap of at least 50–100 years between the abandonment of many of those areas and the construction of the Late Prehistoric pueblos. In addition, no sites "are so closely similar to those of the population source areas that they can be considered evidence of a migrant community" (Cordell 1984:333). While research has emphasized the large Late Prehistoric sites, it is important to realize that smaller sites also continued to be occupied. In all probability, most people maintained residences in or affiliated with the large pueblos; however, throughout the inhabited areas there are numerous very small sites, fieldhouses, and limited-activity loci. During this time, in many of these areas, we see the first evidence of soil- and water-control features. Agricultural field systems frequently are associated with small sites that may have been occupied on a seasonal basis (Cordell 1984:337).

In this context, it also is important to remember Upham's (1986) argument that much of the apparent abandonment of the Southwest was in fact a restructuring of the economy and population resettlement where groups previously living in villages returned to a more mobile settlement and subsistence pattern, one that relied strongly on hunting and gathering. Given the presence of the large aggregated villages, it is obvious that Upham's argument is not appropriate for much of the project area. On the other hand, he presents an intriguing model that undoubtedly does reflect Late Prehistoric settlement and subsistence in many parts of the region.

While population shifts are characteristic of the Protohistoric period, much of the material culture demonstrates continuity. A relatively new development during the late thirteenth and fourteenth centuries, however, is that some ceramic types were produced and traded over large distances. In addition, a few decorative styles were widely copied on locally produced types. This resulted in a great homogeneity among some classes of ceramics across much of the project area (Cordell 1984:337).

Three important and well documented Late Prehistoric ceramic wares contributed to this pattern. These are the White Mountain redwares, the Salado polychromes, and the Rio Grande glazes. The White Mountain redwares (Carlson 1970) consist of related types produced in east-central Arizona and western New Mexico. The Salado polychromes were originally defined from the Galdwins' research in the middle Gila area of Arizona (Gladwin and Gladwin 1930) and are largely restricted to Arizona, although they are known in the Mimbres Valley of New Mexico. The entire issue of Salado cultural identity is one of controversy (Cordell 1984:341–343; Doyel and Haury 1976), and is only marginally pertinent to the study area (see Nelson and LeBlanc 1986). The Rio Grande glazes were produced between ca A.D. 1300 and 1700. The earliest Rio Grande glazes apparently were manufactured at a number of different centers in the Albuquerque vicinity and were widely traded (Warren 1977). By the 1600s, glaze pottery was produced at only a few locations, primarily the Salinas area, the Galisteo Basin, and at Pecos and Zia Pueblos (Snow 1982).

One striking aspect of the period is the presence of elaborate kiva paintings or murals. These suggest a strong tradition of religious art and indicate widely shared religious beliefs. Only four sites, dating to the fourteenth to the sixteenth centuries, are known to contain such murals (although "painted kivas" are known from other sites, including ones much earlier, e.g., Brew 1946; Silver 1982; McAnany 1982; Smith 1952). Two of the four sites, Kawaika-a and Awatovi (Montgomery et al. 1949; Smith 1952) are in northern Arizona, while two are in New Mexico. These are Kuaua, north of Albuquerque (Dutton 1963) and Pottery Mound, near Los Lunas, south of Albuquerque (Hibben 1975).

At these sites, multiple layers of murals were preserved on the interior walls of rectangular kivas. Although the details of the paintings differ, there are many similarities. For example, figures commonly are shown "wearing flaring kilts with sashes and holding similar ritual objects such as staffs, gourd water containers, and quivers. In each case the ritual nature of the paintings is reflected not only in their subject matter but also by the practice of deliberately plastering over the painting, presumably once its purpose had been fulfilled" (Cordell 1984: 343). The origins and significance of these murals are subjects of considerable controversy, as discussed by Cordell (1984: 343–345).

In summary, the Protohistoric period in much of the project area is characterized by large aggregated pueblos, although smaller sites also were occupied. Trade and exchange were important variables during this period, and several issues relating to social and political complexity have characterized recent studies. Despite this, there is disagreement why the large aggregated pueblos initially developed and how they functioned. The recent resurgence of interest in this period represents one of the most promising areas of inquiry in contemporary study.

The Entry of the Athabaskans into the Southwest

The Navajo, who presently occupy large portions of Arizona and New Mexico, are the largest group of Native Americans in North America. They, and the Apaches, are not, however, indigenous to the Southwest. They are related to the Athabaskan-speaking groups. The entry of Athabaskan speakers into the Southwest is a complex and controversial issue to which researchers have devoted significant attention (Brugge 1980, 1981a, 1983; J. Gunnerson 1979; Schaafsma 1981; Wilcox 1981). In its simplest terms, there are two basic questions:

1. When did Athabaskan groups enter the Southwest?; was it prior to the Spanish entry into the region? and
2. When can the two basic modern ethnic groups of Navajo and Apache first be clearly distinguished?

Ancillary topics include, but are not restricted to, the following: what impact did these nomadic groups have on indigenous Puebloan (and other) groups? To what degree was exchange and trade practiced, with both the Puebloans and the Spanish? What acculturation processes were involved? On what was early Athabaskan economy based? And when, and how did a distinctly Navajo economy develop?

A considerable amount is known about the early Navajos and Apaches. Both archeology and historic Spanish records provide ample documentation. In the next chapter, we will address this in more detail. However, the earliest manifestation of the Athabaskans is poorly understood. There are no historic documents, and the archeological record is ambiguous.

Despite the fact that the entry of Athabaskan-speaking Native Americans into the Southwest must reflect a rare case of actual population migration, the time when this occurred is not well documented. In spite of some claims, we do not know when these peoples first entered the Southwest, nor do we know their route. They may have entered the Southwest prior to the time of European contact, but empirical evidence is limited.

There are several possible routes by which the early Athabaskans could have entered the Southwest. Some researchers believe that a route east of the Rocky Mountains was followed (Hester 1962), while others feel that this entry was actually through the Rocky Mountains (Huscher and Huscher 1942). As Cordell observes:

> If an eastern route were demonstrable, it is possible that the southern Athabaskan speakers learned agriculture and ceramic manufacture from Plains groups, an idea that some scholars (e.g., Gunnerson and Gunnerson 1971; Hester 1962) support. On the other hand, Opler (1983) discusses linguistic data that may favor the more western route. Without very convincing archeological evidence either view is difficult to support (Cordell 1984:358).

Various researchers have proposed a Dinetah phase to represent the initial Athabaskan entrance to the Southwest (Hester 1962). This phase is largely based on negative evidence, subtracting traits known to be of Puebloan origin (Dittert 1958; Dittert et al. 1961:245–246). In this sense, the Dinetah phase shares similarities with the much earlier, and equally hypothetical, Basketmaker I phase. In any case, common Dinetah phase dwellings are believed to have been forked-stick hogans, and pottery consisted of locally manufactured Dinetah utility wares and traded Jemez B/W. The initial Athabaskans are believed to have been nomadic hunters and gatherers, but Dinetah economy is posited to have been semi-sedentary and agriculturally based, having been influenced by Puebloan groups.

Despite its persistence in the literature, Eddy (1966:505–508) does not use the term *Dinetah*. He notes that Dittert et al.'s (1961) usage was a hypothetical, heuristic construct, and that documentation of Navajo remains clearly relating to this phase is scant, although some of what Eddy (1966:513–515) terms intermediate Navajo may belong to an early (i.e., pre-1700) period. The fact remains that no solid archeological evidence exists for Athabaskan occupancy of New Mexico prior to A.D. 1700 (Wilcox 1981:227). Until data to the contrary are available, it may be wise to adopt Eddy's view and consider the Dinetah phase as a hypothetical construct that researchers can use in a fashion similar to the Basketmaker I phase. Schaafsma (1981:303–313), in fact, presents a convincing argument against its use at all.

We should note, however, that at least two claims, one by Schaafsma himself, have been made for early Athabaskan, and possibly actual Navajo, occupation in the northern Southwest. Schaafsma (1978:61, 1979) presents evidence for an early supposed Navajo occupation in the Abiquiu Reservoir area that he terms the Piedra Lumbre phase. He believes these sites are reasonably interpreted as the habitations described in many Spanish documents (Schaafsma 1981:313). Much of his chronological evidence is from dendrochronology, radiocarbon and alpha recoil dating, as well as from artifactual materials, and thus appears rather firm (however, see Lord and Cella [19861 for another view).

In spite of this, a problem exists with the nature of the Abiquiu sites. Ceramics from these are largely nonlocal trade wares (Tewa Black, Red, or Gray); Tewa Polychrome; micaceous Pueblo utility wares; or Hopi yellow wares) (Schaafsma 1978:54), and not the well documented early Navajo wares (Brugge 1981b). The sites are small, with masonry structures, but these do not appear to be especially indicative of early Navajo sites described elsewhere. Finally, although Schaafsma notes similarities in chipped stone (especially projectile points), systematic comparative analysis on such materials from early Navajo sites is virtually nonexistent. The Abiquiu Reservoir data are intriguing, but they are not definitive. Of course, if Athabaskan entry into the Southwest was from the eastern plains, as seems likely (Wilcox 1981:219–234), it is logical that sites from northcentral New Mexico would date earlier than those from northwest New Mexico. This, indeed, is the point that Schaafsma ultimately is making, noting that there is at least some actual archeological support for the Piedra Lumbre phase, while this is lacking for the Dinetah phase (Schaafsma 1981:313).

Finally, sites near Trinidad Lake in southern Colorado may contain early Athabaskan materials, based on evidence from dental morphology (Turner 1977). This, however, remains unsubstantiated.

In summary, there is little archeological data to support the presence of an ethnically defined, Navajo presence in the Southwest prior to A.D. 1700. This is especially true for the San Juan Basin. Slightly better archeological evidence for an early Navajo occupation exists to the east at Abiquiu, but even this remains equivocal (cf. Lord and Cella 1986).

Specialized Economic Adaptations

The last issue to be considered in this chapter deals with the specialized economic adaptations that were apparent in the eastern portion of the project area during Protohistoric times. This has been selected for discussion both because it represents an economic orientation not previously seen in the area and also because recent research on the topic has demonstrated some innovative uses of archeological data.

Outside the research that has been conducted at early Athabaskan sites and at the large aggregated pueblos, very little is known about population trends during this Late Prehistoric period in many parts of the project area. This is particularly true of the southeastern region. Jelinek's (1960, 1967) research in the Middle Pecos Valley remains a standard reference. He suggested that a decline in agriculture and an increase in bison hunting during the Late Prehistoric occupation of the area reflected a transformation of farmers into nomads. He further proposed that this was not due to less favorable farming conditions, but rather to a new and presumably lower risk resource base, that is, bison hunting. This conclusion, however, has been questioned (e.g., Bryson et al. 1970; Reher 1977b; Speth and Scott 1985).

While provocative, Jelinek's conclusions were based on surface samples and limited excavation of basically unstratified sites. More recent research in the region has resulted in some revisions to his conclusions (e.g., Gallagher and Bearden 1980; Henderson 1976; Mobley 1978).

Many of the Protohistoric sites investigated in the southeastern portion of the study area are burned rock middens believed to have been used for roasting agave (mescal), sotol, and yucca. Since the Mescelero Apaches used the area historically, several archeologists have used the Mescelero settlement–subsistence system as a model for much of the late prehistory of the area. Historically, the Mescelero wintered in protected valleys in the mountains and subsisted on stored mescal and other plant foods. During the other seasons of the year, they moved into the lowlands to gather wild plant food and to hunt bison, deer, and antelope (Basehart 1973).

While aspects of the Mescelero model seem appropriate, many of the Late Prehistoric sites in the area were small pithouse villages and thus are inconsistent with the model. Bohrer (1981:46), in fact, has suggested that the Mescelero economic pattern may not have emerged until the Historic period, with the introduction of the horse and with intensive raiding of Spanish settlements and livestock. This suggests that the model may be inappropriate in characterizing the late prehistory of the project area. Clarification of this situation is a major research issue that needs to be addressed in future investigations.

In any case, certainly not all of the Late Prehistoric sites in the southeastern portion of the project area were small villages. Specialized activity sites have been documented, and one of the most innovative studies in the area has been Speth's (1983; Speth and Parry 1978, 1980) research at the Garnsey Bison Kill near Roswell. A brief summary of this research is appropriate here.

The Garnsey Bison Kill dates to the middle of the fifteenth century. It is a bison kill site in which the preferred targets were bulls. Skeletal evidence suggests that the hunt occurred in the spring. This is in contrast to the well known Northern Plains pattern in which cows were the principal targets and most hunting occurred in the fall and winter (e.g., Frison 1978). Not only were bulls the major target at the site, but the few cows that were taken were discriminated against in butchering and processing. As a result, most of the bones left behind at the site were from cows, not bulls. Several observations of the faunal assemblage led to the conclusion that the level of body fat of the animals was a critical consideration in processing decisions at Garnsey (Speth 1983; Speth and Spielmann 1983).

Speth's complex interpretation of this pattern has implications for understanding both the highly selective behavior at Garnsey and food exchange with horticulturalists. His arguments are based largely on nutritional requirements, and his conclusions are worth quoting at length:

> If these observations stand up to further scrutiny, they have important implications for understanding not only the highly selective behavior witnessed at Garnsey, but also several other seemingly enigmatic aspects of hunter–gatherer subsistence behavior. Hunters and gatherers regularly face periods of restricted energy intake in late winter and spring. At such times they often subsist on stored carbohydrate foods and supplement their diet with hunted foods. It is precisely at such times that the level of fat in the diet becomes critical. To make effective use of the protein provided by hunting, hunters must maintain their calorie intake from fat as high as possible or else find alternative sources of carbohydrate. Briefly, some of the more obvious options open to hunters and gatherers to cope with the noninterchangeability of fat and carbohydrate at low total energy intakes include: (1) being highly selective in the animals they kill and the parts they consume (as at Garnsey); (2) switching to species that maintain high body fat levels throughout the winter and spring (e.g., beavers or geese); (3) emphasizing plant gathering rather than hunting in the fall, in order to build up large carbohydrate reserves; (4) undertaking limited cultivation; or (5) trading for carbohydrates with horticulturalists (Speth 1983:xvi).

While the Garnsey Bison Kill has received the most attention, Speth and his colleagues also have investigated other Late Prehistoric sites in the area. These include the Henderson site (Rocek and Speth 1986), the Angus site (Speth and Scott 1983), and the Garnsey Spring Campsite (Parry and Speth 1984). These studies have contributed significantly to a reassessment of the economic changes apparent in the area during this period.

Essentially, Speth's research suggests a pattern diametrically opposite that suggested by Jelinek (1967). The recent investigations indicate that the increasing emphasis on bison during the Protohistoric period may reflect a greater commitment on the part of the inhabitants to a village-related agricultural economy, and not a transitional stage of people well on their way to becoming nomadic bison hunters. In short, Speth is arguing for a socioeconomic explanation for the increasing reliance on large species (i.e., bison). This is a very complicated issue that cannot be adequately addressed here, and is far from resolved. It represents one of the most intriguing research issues to emerge in this region in years.

Summary

Protohistoric archeology in the project area generally has focused on three issues: the Late Prehistoric aggregated pueblos, including those that were occupied at the time of European contact; the entry, identification, and effect of the Athabaskans into the Southwest; and the bison hunting adaptation that occurred in the eastern portion of the region.

Defining the chronological limits of Protohistoric occurrences is not an easy task. Most of the better documented archeological aspects actually occur during postcontact times and thus are more properly considered as historic. In some regions, such as Trans–Pecos and much of the Colorado portion of the study area, Protohistoric developments often are not notably distinct from what preceded them by hundreds, if not thousands, of years. In these cases, the distinction between prehistoric and Protohistoric, or even historic might be artificial. For purposes of convenience, we have discussed the Late Prehistoric and Protohistoric developments in the project area in this chapter rather than in the historic archeology chapter. The reader, however, should keep in mind that much of the preceding refers to postcontact situations.

Although a considerable amount of research effort has been directed towards the Protohistoric period, this does not match the attention that other periods have received. There has, however, been a recent resurgence of interest in these later time periods. In particular, many of the less tangible aspects of archeological inquiry, such as social and political complexity, have been examined by turning to the large late pueblos. While many such studies have produced inconclusive results, they represent one area of continued research interest.

REGIONAL DISCUSSION

Southem Colorado (Douglas D. Dykeman)

Mountains

The Protohistoric and Historic periods for the Mountain subregion represent the distribution of aboriginal populations near, during, and after the time of European contact and the ultimate occupation and domination of American culture. For the purposes of this chapter, there is relatively little to add to the Protohistoric period that differs substantially from discussion in the previous chapter. In general terms, there is a continuation of the basic Archaic-like pattern of hunting and gathering observed during the Formative period. The aboriginal groups occupying the Mountain subregion during the Proto-historic period are generally believed to have been of Ute affiliation. In fact, until the Utes were moved out by Anglo-Americans, the mountains were considered a Ute stronghold rarely breached by other Native groups (Martin 1974).

San Luis Valley

The Protohistoric period in the San Luis Valley is characterized by a variety of cultural adaptations. Prior to the Anglo-American occupation of the valley, the aboriginal adaptations included horse nomads and herder/horticulturalists.

The herder/horticulturalist adaptation is represented by the early Navajo occupation in the San Luis Valley. The Huschers (Huscher and Huscher 1942, 1943) investigated several hogan sites along the western edge of the valley and postulated an intermontane, southward migration of these groups before their ultimate disposition in the Four Corners area. These sites consisted of from one to 40 circular or polygonal structures that were usually constructed of stone masonry. Associated with the structures were very small corner-notched, flat-based projectile points, as well as a variety of ceramic types. These types included gray utility wares, sand-tempered wares, and cord-marked pottery that may be of Navajo manufacture (Huscher and Huscher 1943). In addition, micaceous tempered pottery that could have been manufactured by either Navajos or Utes occurred on some sites. A rather early date of A.D. 1000 was given for the initial construction of hogans in the San Luis Valley (whether or not this is accurate, or represents actual Navajos, however, is open to question; see previous discussion on entry of the Athabaskans into the Southwest). Hogans evidently were occupied until European contact in the 1700s.

Boyd (1940) describes a number of game drive lines constructed of sticks and rocks. These have been identified by Ute informants as antelope traps. The construction of these is attributed to pre-Ute inhabitants (Boyd 1940); however, this seems unlikely because the wooden components of the traps would have long since decomposed. It is probable that these structures were constructed during the Historic period by Ute bands in the region.

Front Range

The Protohistoric period in the Front Range subregion is characterized by hunter–gatherer adaptations supplemented by part time horticulture. Groups practicing this strategy are thought to be ancestral Apache populations that later adopted horse nomadism as a life style. These early Apache populations are known as the Carlana focus and the Dismal River aspect.

As has been previously noted, the entry of the Athabaskans into the Southwest is an issue of considerable controversy. One site in this subregion has added fuel to the debate. This site is in the Trinidad Lake area of southern Colorado, and the data are quite tenuous. Essentially, the evidence is from a site dating quite early—ca A.D.1075–1190—and consists of dental morphology from skeletal remains. The first molars on the mandibles of over 20% of the individuals had three roots, rather than the usual two. This genetic trait is common in Athabaskan populations, thus leading to the claim for early Athabaskans in, at least, southern Colorado (Cassells 1983:180; Turner 1977). Otherwise, however, the assemblage is not indicative of an Athabaskan origin; the accompanying ceramics are Rio Grande types (Cordell 1979a:106). Thus, the Trinidad Lake burials provide some intriguing suggestions for an early entry of Athabaskans, but are not conclusive.

The Dismal River aspect and Carlana focus, much later occurrences, are well documented. They are virtually identical except for settlement pattern. The Dismal River peoples occupied the plains environments, though they made forays into other ecozones. The Carlana focus may be considered a Dismal River adaptation that is specific to the Park Plateau area.

The Dismal River aspects (A.D. 1675–1725) was distributed widely in the western plains states. It is recognized archeologically by the presence of fine sand-tempered pottery, very small triangular un-notched and side-notched projectile points, and a varied assemblage of bone tools (Gunnerson 1968). Dismal River houses are pentagon shaped in plan view with a covered entryway to the east. These structures are constructed of poles and can be up to ca 4.5 m in diameter.

The Carlana focus is similar in most respects to the Dismal River aspect except for the use of micaceous temper in the pottery, and the addition of circular house types. The Carlana focus is known from the Park Plateau (see Lutz and Hunt 1979; Eighmy 1984).

New Mexico

Northeast

As with the Front Range of Colorado much of the archeology relating to the Protohistoric period in the northeastern subregion of New Mexico involves early Athabaskan studies. Also relevant are portions of the Panhandle aspect, since the terminal date of this is ca 1450 (see discussion in Chapter 6 for additional detail). The focus of attention, however, is on Athabaskan archeology. Most of our information comes from the substantial research of the Gunnersons (e.g., Gunnerson 1969, 1979). The issue of early Athabaskan entry into the Southwest has already been addressed earlier in this chapter and need not be repeated here. We should note, however, that most of the Gunnersons' research has involved Apache archeology rather than Navajo archeology, although, as indicated previously, the early distinction between the two groups is tenuous at best.

Numerous site types are documented for this period. These include multiroom pueblos, pithouses, and stone circles (commonly inferred to represent tipi rings). While pueblos generally are considered to have been occupied by Anasazi-related groups, at the Glasscock site there is evidence for an Apache pueblo. In northeastern New Mexico, these Athabaskan groups are generally viewed as nomadic hunters who adopted agriculture and began building small pueblos shortly after their initial contact with native Puebloan groups (Stuart and Gauthier 1984:313).

Stuart and Gauthier (1984:313) note the general similarity in settlement distribution between early Apache sites and those dating to the Paleo-Indian period. This leads them to suggest a similar adaptive strategy of big game hunting, with the Apaches focusing on bison. As such, the research of Speth to the south of this area is relevant. While such a strategy may have been a primary economic focus, trade with (and raiding of) more sedentary Pueblo groups also was important.

In northeastern New Mexico, nearly all Apache sites have been dated by the presence of Ocata Micaceous pottery, believed to have been made from A.D. 1550 to 1750 (Gunnerson 1979). This is very similar to pottery produced at Taos and Picuris pueblos and adds to the strength of arguments positing trade between the pueblos and the more nomadic Athabaskan groups.

Upper Rio Grande Valley

The Rio Grande Valley witnessed substantial population aggregation during Late Formative and Protohistoric times. This occurred during the late Pueblo IV and Pueblo V periods, or the Rio Grande Classic phase (cf. Wendorf and Reed 1955). Stuart and Gauthier (1984:54) note that there are 60 Pueblo V components in their sample for this region. There are many major sites in the greater Rio Grande region. Some of the better known sites in the Chama River Valley, the Pajarito Plateau, the Taos area, the Santa Fe area, the Galisteo Basin, the upper Pecos region, and in the Albuquerque area, have been addressed in the previous section.

Early Athabaskan remains also are relatively well documented in the Rio Grande region, especially from the Piedra Lumbre Valley near Abiquiu Reservoir (Schaafsma 1976, 1978, 1979; however, see Lord and Cella [1986] for a different view). Cordell (1979a:106–110) provides a brief overview of the evidence for early Athabaskans in this region, emphasizing settlement configuration, ceramics, and projectile points. Although many of these observations also relate to the Historic period, one also is relevant here:

> It is clear that distinguishing Athabascan sites from Pueblo sites and camps will often be difficult, while eastern Apache and Navajo sites probably cannot be distinguished without historic records. Schaafsma (1976:200) makes the generally sound suggestion that the Apaches near Picuris and those in the Chama River area probably were basically the same groups of people. "During the seventeenth century the Apaches living in the Chama River gradually acquired the name 'Navajo' and those to the east acquired the name 'Jicarillas' " (Schaafsma 1976:200). In any case,

the Navajos of the Chama area apparently did not return after the Refugee period. To add to the confusion, another group of people, the Eastern Ute, also used both the Chama Valley and the Taos basin (Cordell 1979a:108).

San Juan Basin

Some Protohistoric sites in the San Juan Basin have already been referred to in the preceding discussion. This area is most significant for its abundance of early Athabaskan sites. Indeed, the Gobernador–Largo Canyon area has given rise to the type name — Gobernador— for early Navajo sites in the area (Farmer 1942; Keur 1944).

On the margins of the San Juan Basin, the Navajo Reservoir District contains numerous early Athabaskan sites (Eddy 1966; Hester and Shiner 1963). This region represents one of the few in the project area where systematic investigations of early Athabaskan settlement and subsistence has been conducted.

In general, the substantial developments seen in the San Juan Basin during the earlier Formative phases were followed by much less impressive adaptations, at least in terms of the archeological remains that they left. The majority of the large population aggregates, such as Chaco Canyon, were abandoned during this period. Numerous pueblito sites, however, were occupied into the Historic period. In addition, the remains of nomadic or seminomadic Athabaskan groups are relatively well documented in the San Juan Basin.

West-Central

In the Mount Taylor area of the West-Central subregion we also see, to a lesser degree than in the Upper Rio Grande Valley, the aggradation into larger pueblos (e.g., in the Zuni region). Some of these were occupied at the time of Spanish contact. By the same token, there apparently was the continuation of a hunter/gatherer adaptation in much of the Mount Taylor region (Stuart and Gauthier 1984:128–130).

Tainter and Gillio's (1980) overview of the Mount Taylor region divides it into several subareas. In general terms, from ca A.D. 1450 into the Historic period, there were few sites occupied. These ranged in size from small to large, and most were situated along major drainages and at lower elevations than previously. In the Zuni and Ramah–El Morro areas, the Protohistoric Zuni cities of Cibola were founded (Stuart and Gauthier 1984:123). A considerable amount of attention has been directed to the Zuni and Ramah–El Morro areas. Modern Zuni (and Acoma), along with the Hopi pueblos, generally are acknowledged as the descendants of the Western Pueblo archeological complex (Reed 1948) or the Western Pueblo culture (Johnson 1965). The development of this complex is often placed in the mountains of west-central New Mexico and east-central Arizona at around A.D. 1000. Johnson (1965:14–16) believed that the Western Pueblo culture is a blend of Mogollon, Anasazi, and Hohokam features. While these developments clearly occurred during the earlier Formative phases, a considerable amount of attention has been directed towards attempting to view the Protohistoric (and modern) pueblos as prehistoric reflections. This is a tenuous approach, and Tainter and Gillio (1980:93) caution against attempts to derive sociocultural entities (or cultures) from trait distributions.

In the eastern reaches of this region, along the lower Rio Puerco, late Pueblo occupation is documented. Pottery Mound (Hibben 1955, 1967, 1975; Brody 1964) is the best known late site. It is primarily a Glaze I site, which would place its occupation at ca A.D. 1300–1475 (Tainter and Gillio 1980:54). Some Navajo sites are known in the Rio Puerco region. Perhaps the best documented is Big Bead Mesa (Keur 1941); this site, however, is more properly considered Historic rather than Protohistoric. At least one pueblito site also is known for the Middle Rio Puerco area (Durand, personal communication).

In the south-central portion of the Mount Taylor region, a late Pueblo occupation is well documented, especially in the Acoma/Cebolleta Mesa area (Dittert 1959; Ruppe 1953; Ruppe and Dittert 1952, 1953). Three phases have been documented that relate to the Late Prehistoric/Protohistoric periods: Kowina (A.D. 1200–1400), Cubero (A.D. 1400–1600), and Acoma (A.D. 1600–present). During the Kowina phase, major changes occurred, with populations aggregating into large sites located on flat topped mesas. During the succeeding Cubero and Acoma phases, the major settlement was at Acoma Pueblo (Tainter and Gillio 1980:61–63).

The above has only briefly discussed some of the Late Formative/Protohistoric developments in the Mount Taylor region. Additional information on both late Puebloan and Navajo settlement in the area is provided by Tainter and Gillio (1980).

In the Socorro portion of the west-central subregion, there is substantially less information available on occupation during the Protohistoric period. The Salado issue has already been discussed in the previous chapter. After the Salado incursion (if, in fact, that is what it was), much of the Socorro area apparently was abandoned (Stuart and Gauthier 1984:134). Of interest, however, are developments in the eastern Rio Grande area, which Stuart and Gauthier consider as a subarea of the Socorro region. We should note, if it has not already become apparent, that there is a slight geographic problem in various discussions of this area (e.g., compare Stuart and Gauthier's discussion with that of Tainter and Gillio). Does it belong in the eastern part of the Mount Taylor area, or does it belong in the eastern reaches of the Soccoro area? The answer to this depends on where one draws the dividing lines. It seems that some investigators use the Upper and Lower Rio Puerco as a divider, which seems appropriate. In any event, though, the reader should be aware of the possibility for unnecessary confusion.

In any event, in the Rio Salado drainage (not to be confused with the Salado culture), late pueblo sites are documented. Stuart and Gauthier (1984:140) indicate that these include Glaze ware Pueblo IV sites and "Following the Glaze A period, sites are generally larger, located in less defensible positions and longer lived" (Wimberly and Eidenbach 1980). South of the Rio Salado, Marshall and Walt (1984) have also documented a substantial late Pueblo and Protohistoric occupation in the Rio Abajo area. Of particular significance to the present discussion is their designation of the Ancestral Piro phase, which spans the period from the inception of the glazeware industry, at ca A.D. 1300, until Spanish contact in 1540 (Marshall and Walt 1984:135–234).

Central

Sites in the central New Mexico subregion that are of particular relevance to this discussion are the pueblos that were occupied during the Protohistoric period and on into the Historic period. Specifically, the Gran Quivira complex is of importance here (Hayes 1981b; Hayes et al. 1981b). Toulouse and Stephenson (1960) have defined several phases for the Gran Quivira region; those pertinent here include the Gran Quivira, Pueblo Colorado, Pueblo Pardo, and Salinas foci (see additional discussion in Chapter 6 for detail).

During the final pueblo period in the area (the Salinas focus), sites such as Gran Quivira, Abo, and Quarai are representative. These are large pueblos with regular building patterns, arranged around plazas. In addition, several contain Spanish mission structures (Stuart and Gauthier 1984:323). These obviously fall into the Historic period, but many of the sites were also occupied prior to the Spanish entrada. In any event, early Spanish documents suggest that two distinct groups were living at Gran Quivira: one group practiced tattooing or body painting and the other did not. Vivian (1964) believes that the decorated group (often referred to as the *Jumanos* or *rayados*) was a remnant of the Jornada Mogollon who migrated north to the Gran Quivira area around A.D. 1400 (Stuart and Gauthier 1984:324–325).

Southwest

In the Mimbres region, there is very little information available on the Late Formative/Protohistoric periods. The later aspects of the Animas (A.D. 1150/1175 to 1400?) and Salado (ca A.D. 1300–1450?) phases are relevant here (Stuart and Gauthier 1984:206–210). In the Jornada region, the situation is similar. Historic groups are known to have occupied much of the Jornada area. These include the Lipan and Mescelero Apaches, the Mansos, and the Sumas. Many researchers have posited a break in the archeological record between ca A.D. 1450 and 1590, when the Castano de Sosa expedition encountered a group of Native Americans (Beckett and Wiseman 1979). Whether this break represents an actual hiatus in occupation or is a reflection of poor archeological coverage is not known at the present time.

Southeast

In the southeastern New Mexico subregion, a substantial amount of information is available on Late Prehistoric/Protohistoric occupations. Both Jelinek's (1967) and Speth's (1983; Parry and Speth 1984) more recent research is relevant here (see earlier discussion).

In Jelinek's original scheme, the Late McKenzie phase (A.D. 1250– 1350) witnessed a major shift to bison procurement. During this period, contact with Pueblo groups is documented. Diagnostic ceramics include Middle Pecos B/W, with traces of St. Johns Polychrome, Santa Fe B/W, and Three Rivers Red on Terracotta. The post-McKenzie phase (A.D. 1350–?) is characterized by temporary camps and the presence of small quantities of Rio Grande Glaze I (Stuart and Gauthier 1984:272).

Several sites in southeastern New Mexico have direct applicability to the shift in subsistence that occurred during the Late Prehistoric period. Many of these have been investigated by Speth and his colleagues. At the Maroon Cliffs site, two components are documented. One falls into the Maljamar phase (Leslie 1978), which predates the period of interest here. The other component, however, falls within the Ochoa phase (ca A.D. 1350–1450), and the presence of Harrell points may indicate that occupation continued after 1450 (Parry and Speth 1984). The Henderson site also partially dates to this period. It is a small E-shaped pueblo consisting of ca 20 rooms. Of significance is Speth's study of bison from this site, which he compares with the Garnsey Kill site (1984). The Angus site is another Late Prehistoric village (A.D.1100–1350) that falls into the period of interest here. Analysis of faunal remains from this site have provided insights into the economic changes that were occurring during the Late Prehistoric period (Speth and Scott 1983, 1985). The Garnsey Spring campsite, occupied from ca A.D. 800 up to the Protohistoric and Historic periods, is yet another investigated by Speth (Parry and Speth 1984). Unfortunately, preservation of the site was poor, thereby "precluding definite statements about the seasonality of the site, its overall function, or its placement within a regional settlement framework" (Parry and Speth 1984:109). Finally, the Garnsey Kill (Speth 1983) site itself has provided a substantial amount of information on specialized subsistence patterns during the Late Prehistoric period.

Also relevant are several of the sites investigated in the Brantley Reservoir area (Henderson 1976; Gallagher and Bearden 1980). These are primarily of interest in the context of this chapter because of their discussion of the Measlier Apache subsistence model.

While there has been an increase in the amount of research in southeastern New Mexico, Stuart and Gauthier's comments are still relevant: "In any case, cultural development in the eastern Jornada–Mogollon requires much further investigation. The general complexity, coupled with the lack of dated sites, and trade networks which, in later times, extended into Texas, all combine to leave us far from satisfied with our characterization of the southern portion of this study area" (Stuart and Gauthier 1984:275).

Trans–Pecos

We do not provide specific discussion on Protohistoric occurrences of the Trans–Pecos area because they are very similar to the Late Prehistoric patterns discussed in the previous chapter. Additional detail on the Protohistoric period, including the possible connections with the numerous historic tribal entities known for the area, may be found in many of J. C. Kelley's works (e.g., 1986).

ARCHEOLOGICAL CONSIDERATIONS OF THE HISTORIC PERIOD

Alan H. Simmons (with Douglas D. Dykeman and Patricia A. Hicks)

SYNTHESIS

The project area represents one of the richest historic regions of the United States. The primary intent of this document has been to deal with prehistoric cultural resources in the area. While the distinction between Protohistoric and Early Historic developments is vague at best, the archeological remains of these periods in the region are substantial. A detailed consideration of historic archeology, however, is far beyond the scope of the present work.

The blend of Protohistoric into Historic occupation of much of the project area is indistinct. Both periods often overlap. Historic contact occurred at different times throughout the region; contact for some groups did not mean contact for all. To further complicate matters, archeologists, anthropologists, and historians disagree on the exact dates for some events, such as the entry of the Athabaskans into the area. We have chosen 1539 as the beginning of the Historic period because this is when first Spanish contact is documented. Much of the discussion in the previous chapter, however, especially relating to early Navajo and late Puebloan developments, could appropriately be considered within the historic context. For logistical convenience, we deal with this time frame in two separate chapters, but it should be obvious that both are interrelated.

The Spanish were the first Europeans to enter the Southwest, and their imprint on the indigenous cultures is still felt today. Any discussion of ethnic groups must consider their impact. Once the first explorers entered the Southwest, they opened up the way for colonization with tales of riches. While these riches never materialized, the economic potential of the region was apparent, and the Spanish subjugation and colonization proceeded at a rapid pace, molding the future destiny of much of the Southwest.

Events occurred rapidly following the Spanish period. Anglo domination also left its mark on the project area, although the Spanish influence never was wiped out. The project area is located in the heart of the "wild west" and much of the history of United States expansion into the west occurred here. All of these events conspired to make the modern Southwest the amazing blend of cultures that it is today.

In this chapter we concentrate our attention on the Early Historic period, since this has received the most archeological attention. Our understanding of this time involves the efforts of both archeologists and historians. Tainter and Gillio make an observation that is worth repeating at length:

> The distinction between "history" and "prehistory" observed in this volume simply recognizes that, in 1539, representatives of a literate society first came into contact with earlier inhabitants of the study area. Archeologists deal with material remains of cultures by way of a set of techniques which are applicable to remains regardless of the existence of documentary materials. Historians study the written records of a people who either wrote or were written of by others. Historical archeologists are specialists who draw on both disciplines (Tainter and Gillio 1980:117).

Numerous excellent works are available that deal with the area's history. These include Beck (1962), Bolton (1950), Dozier (1970), Forbes (1960), Hammond and Rey (1953, 1966), Jenkins (1967, 1969), Jenkins and Schroeder (1974), McNitt (1972), Simmons (1977), and Twitchell (1911) to name but a few. Most of the overviews that have been prepared for the various regions within the study area have chapters that deal explicitly with the historic archeology of their respective areas. Finally, specific research is presented in the *New Mexico Historical Quarterly*, while other overviews can be found in the Smithsonian's *Handbook of North American Indians* (volumes 9 and 10).

The purpose of this chapter is to provide an abbreviated overview of some of the significant historic events and to point out some of the more important aspects of historic archeology in the project area. We are not historians and make no attempt at providing a detailed discussion of this period. Historic archeology represents an extremely important component of the cultural heritage of the project area, one of which both researchers and managers must be cognizant.

The first section of this chapter deals with specific historic archeological aspects of Spanish, Puebloan, non-Puebloan Native, and Anglo occupation of the region. In the final section on regional developments we present a compressed consideration of historic trends as they relate to the various major regions (i.e., south-central Colorado, New Mexico, and Trans–Pecos) under consideration in this volume. We do not provide any discussion on the subareas of each major region.

PERIOD DISCUSSION

Spanish

The Spanish were the first Europeans to enter the Southwest and their imprint on the indigenous cultures is still felt today. Any discussion of other ethnic groups must be entwined with the impact of the Spaniards.

Historians agree that the first Spaniards in the Southwest were led by the Franciscian Friar Marcos de Niza and the Black Moorish slave, Estevan, who served as a guide. In 1539, they entered the area around present-day Zuni, in search of the fabled Seven Cities of Cibola. While historians debate the precise route, it is generally agreed that Estevan entered the Zuni town of Hawikuh (excavated early in this century by Hodge (1918, 1937). This fateful encounter set off a chain of events that forever transformed the cultural landscape of the Southwest.

The de Niza expedition was largely a failure; Estevan was killed and his body hacked into pieces by indignant Zunis. News of this event reached the main body of the de Niza party, and the expedition was cut short, but not before the Friar entered the limits of Cibola and glimpsed the pueblo of Hawikuh. The Franciscian saw what he wanted to see: "It appears to be a very beautiful city; the houses ...all of stone, with their stories and terraces, as it seemed to me from a hill whence I could view it" (Bolton 1949:35–36). Native guides with de Niza told him of at least seven cities, and that another, far larger than any in Cibola, lay beyond. This was called Tontoteac and "it possessed so many houses and people that there was no end to it" (Simmons 1977:18).

While someone more skeptical may have questioned the presumed riches of these cities, de Niza had heard what he wanted to hear. He returned to Mexico (New Spain) with tales of gold and wealth. In the next year, 1540, the Francisco Vasque de Coronado expedition entered the area with an impressive array of modern technology. The pueblo of Hawikuh was taken with no Spanish casualties. Coronado's party was eager for additional adventures and traveled over much of the area. One scouting party reached the Grand Canyon. Another under the command of Lieutenant Alvarez traveled from Hawikuh through the Acoma and Rio Grande districts to Pecos Pueblo. The main body of the expedition later moved into the Rio Grande region and additional scouting parties were sent out, one of which is suspected to have traveled as far east as Kansas. Needless to say, none of these exploration parties found the fabled cities of Cibola. The Coronado expedition returned to Mexico in 1542.

After the Coronado expedition, there was an hiatus in exploration, largely due to Coronado's failure to find riches. This hiatus ended with the expeditions of Friar Augustin Rodriguez and Francisco Sanchez Chamuscado in 1581 and Don Antonio de Espejo in 1582. These expeditions took back to Mexico more accurate stories of conditions in the Southwest. Tales of potential treasures still were promulgated, but perhaps more important was the news of plentiful land available for colonists (Tainter and Gillio 1980:117). The first Spanish colonization of New Mexico was attempted by Gaspar Castano de Sosa in 1590. However, even then, as now, bureaucracy was a major force, and Don Gaspar had failed to obtain the necessary permits for his expedition. He was returned to Mexico in chains. In 1595, Don Juan de Ovate presented an acceptable proposal for the colonization of New Mexico and left Mexico for the Southwest in 1597 (Tainter and Gillio 1980:123). Thus began the Spanish subjugation of the Southwest. This was briefly interrupted by the Pueblo Revolt of 1680 (see below under Regional Discussion), but the Spanish became well entrenched during the late 1500s and the 1600s, and the future destiny of New Mexico was molded.

The archeological manifestations of the Spanish occupation are perhaps the most striking of the entire Historic period. Many of the missions and associated structures still stand. Most archeological investigation of the Spanish period has focused on such remains, although less impressive Spanish sites also have been studied. For example, Vierra (1987) claims to have discovered one of the early (Coronado?) Spanish camp sites, although this claim has been disputed (Snow 1987).

Discussion of the archeology of the early Spanish occupation of New Mexico cannot omit mention of Site 48 in Guadalupe County near Santa Rosa. The intense controversy surrounding this site represents the worst of archeology. It illustrates how insecure we are with our data base, even when it presumably dates to the Historic period where historic documentation should supplement archeological information. The present volume is not the place to deal with the controversy, beyond a very brief summary.

Site 48 was initially interpreted as a late eighteenth century Spanish rancho consisting of a plaza-oriented abode structure and several other features. This occupation consisted of two phases and was followed by a subsequent Comanchero occupation dated 1780 to 1820. It was proposed that this Comanchero village, consisting of Puebloan and Spanish elite structures, functioned as a specialized Comanchero trading center where Pueblos and Hispanics from the west met with Plains Indians from the east (Levine and Winter 1987:13–14).

A heated controversy ensued, and both the interpretations of the site and the veracity of the actual archeology were questioned. One side claimed that much of the site was faked, while the other supported the original interpretations and the press became involved. All in all, Site 48 represents a black mark against archeology's constant battle for public acceptance and credibility, especially in situations where federal funds are involved. The most recent and very detailed examination of this site was produced by the Office of Contract Archeology (OCA) at the University of New Mexico. Levine and Winter (1987) summarize both the controversy and the archeological composition of the site. Ward (1985) presents an opposing view of OCA's original draft report. Levine and Winter (1987) make fascinating reading of a situation that should never have been allowed to develop.

Puebloan

The Puebloans living in the larger villages along the Rio Grande and in the Zuni area received the brunt of Spanish impact. During the Early Historic period, however, they interacted not only with the Spaniards, but also with nomadic groups to the east and with the Navajos. This interaction was complex and is only partially discussed in historic records.

Interaction with other Native groups was an ongoing Puebloan pattern. Both trade and raiding alliances were established. During the Historic period, "the relationship between Pueblo Indians and Plains Indians was characterized by lively periods of trade and devastating periods of raids" (Stuart and Gauthier 1984:316). Stuart and Gauthier (1984:316–318) have proposed that several trends can be observed for this period. First, raids often correlate with periods of drought; for example, the drought period 1663 to 1670 is documented as a time of epidemics and severe Apache raids. Many Puebloans and Spaniards starved to death and the severity of these events led to the abandonment of the Jumano and Tompiro pueblos in the Salinas District. Thus, even in Historic times, the capricious nature of the Southwest's climate had severe effects on both Native and non-Native groups. Although the evidence is not conclusive, Stuart and Gauthier (1984:318) note that raids by Plains groups usually occurred during dry periods when game and wild plants were in short supply. This also would have been a time when the Puebloan groups would not have had crop surpluses to trade. Drought conditions would have been more severe for the sedentary Puebloans and their ability to survive "a drought would be limited by their capacity to store food. The option to disperse or return to a hunting and gathering strategy is already closed by existing hunters and gatherers—the Plains Indians—who are undergoing food shortages themselves. During such periods of drought, the Plains Indians could either simply disperse or raid the Pueblos" (Stuart and Gauthier 1984:318).

Stuart and Gauthier continue to discuss the impact of drought on the late Puebloan groups:

> The Pueblos lost more during dry climatic episodes. They not only had to cope with starvation; they also suffered from raids. Their losses were great—territory (i.e., the Saunas Pueblos) and lives (from starvation and raids), and their options consisted mainly of looking into an empty storeroom or finding another Pueblo group who would take them in. However, during favorable climatic episodes, a lively trade ensued, benefiting both sides. In addition, the Pueblo Indians and Spanish colonists could muster enough men for retaliatory raids and slave raids against the Plains Indians during these favorable periods (Stuart and Gauthier 1984:318).

Of course, not all interaction between the Puebloans and the Spanish were mutually beneficial. In many cases, symbiotic relationships emerged, but conflict was more common. Certainly the most significant impact on both Puebloan and non-Puebloan groups during this time was by the Spanish. The introduction of European diseases took its toll on Native populations, although the actual impact of this has been debated (Reff 1987; Upham 1986,1987).

Continuing their correlation of climatic events with cultural ones, Stuart and Gauthier (1984:316) note that Spanish slave-raiding expeditions and retaliatory raids appear to coincide with favorable climatic conditions, again with some exceptions. Puebloan uprisings against the Spanish, however, appear to have occurred during drought periods. Of course, drought was not the only factor behind the revolts. Principal causes of rebellion were the *encomienda* and *repartimiento* systems and the suppression of native beliefs. *Encomienda* refers to a grant of tribute from either a particular Pueblo or group of Natives to the person holding the grant. *Repartimiento* was the system of conscripting Native labor for Spanish facilities (Cordell 1984: 353). Since the Spanish collected tribute in the form of food and labor, a drought and subsequent decrease in food production would have had serious effects (Stuart and Gauthier 1984:318).

The subjugation of the Puebloans by the Spanish was complete after the Pueblo Revolt. Following the Revolt, Puebloan patterns that can still be observed today emerged.

The archeological expression of the Historic Puebloan period is rich. Many of the site types and issues discussed for the Formative also are pertinent to the Historic Puebloan period. Of particular interest are sites dating to the Refugee period (coinciding with the Pueblo Revolt), when both Navajos and Puebloans are believed to have lived together in defensive pueblitos (e.g., Brugge 1986:14–16; Carlson 1965). Equally important is a recent study of the Piro pueblos (Marshall and Walt 1984).

The Navajos

During the Historic period, many ethnographically defined Native groups left their mark on the project area. The Navajo are perhaps the best documented, especially in terms of archeology. There exists abundant historic documentation suggesting that Athabaskan peoples were in the northern Southwest by the early seventeenth century, or even earlier (Ayer 1916; Benavides 1945, 1954; Brugge 1980; Hammond and Rey 1953, 1966; Lummis 1900; Reeve 1956, 1957). Much of this information, however, is ambiguous. One problem is in explicitly identifying ethnic groups. The Spaniards at first used the term Querecho to refer to any nomadic group they encountered. This term often has been translated as Apache. Opler (1983), however, argues that Querecho was a generic term, and Upham (1982:47–51) suggests that some of the groups referred to as Querecho may have been indigenous Puebloans who were not living within compact villages, but rather were pursuing a more mobile settlement pattern (Cordell 1984:358).

A related problem is the identification of the Navajos as a distinct ethnic entity. The first Spaniard to use Navajo (as the term *Apachu de nabaju*) was Zarate Salmeron in reference to a location up the Chama River but east of the San Juan River (Wilcox 1981:230). A considerable amount of controversy exists over the interpretation of many of these historic documents, and the most recent summaries are not in complete agreement regarding either the ethnic identification of the Athabaskans or the timing of their entrance into the Southwest (see, for example, Brugge 1981a; 1983; Cordell 1979a:106–110; Schaafsma 1981; Wilcox 1981). In the following discussion, we emphasize Navajo archeology, with the understanding that this ethnic identification is a somewhat shaky one.

Despite several decades of Navajo archeology, many questions remain unanswered. The early part of this century witnessed a flurry of Navajo studies (Farmer 1942; Hall 1944a, b; Harrington 1940; Hibben 1938; Hurt 1942; Keur 1941; Kidder 1920; Malcolm 1939; and Morris 1916). More recently, the advent of cultural resource management studies has contributed significantly to early Navajo investigations (e.g., Eddy 1966; Hester 1962; Hester and Shiner 1963; Huse et al. 1978: 31–118; Simmons 1980, 1983; Ward et al. 1977). Nevertheless, we still cannot clearly identify when Navajo groups first made their appearance in the Southwest (Brugge 1972:2, 1986:i). (See previous discussion in Chapter 7).

One basic problem is simply the danger of equating archeological materials with ethnic groups, especially in prehistoric or protohistoric contexts. Cordell (1979a:109), as well as other researchers, warns against the hazards of tying cultural traits, such as ceramic types, to language groups or genetic affiliations, and one must approach such studies with caution. In spite of this largely negative summary and the lack of conclusive archeological data for early Navajo sites, Navajo archeology has supplemented historic records and contributed to a better understanding of early Navajo adaptations.

Hester (1962) recognizes four phases of Navajo occupation of northwestern New Mexico. These are the Dinetah (ca A.D. 1500?–1696), Gobernador (A.D. 1696–1775), Cabezon (A.D. 1775–1863), and Reservation (A.D. 1868–present) phases.

Documentation of the Gobernador phase (ca A.D. 1696–1776) is much better than that of the Dinetah phase. Farmer's (1942) and Keur's (1944) fieldwork in the Gobernador district of northwestern New Mexico provided the foundation for defining this phase, and more recent research supports it (e.g., Brugge 1986; Dittert and Shiner n.d.; Eddy 1966:508–513; Hester and Shiner 1963; Huse et al. 1978:88–89; Schoenwetter and Eddy 1964; Simmons 1980, 1983). The Gobernador phase is well documented chronologically, with over one hundred dendrochronological dates known (Hester 1962:79). Many of these are from the Gobernador region (Stokes and Smiley 1963: 11), and they represent the earliest securely dated Navajo sites in the Southwest (Brugge 1972:2). At least 20 eighteenth century Navajo sites also are known from the Chaco Canyon area (Brugge 1986:14).

The Gobernador phase includes Pueblo style ceramics, and architecture now makes an appearance into Navajo material culture. This Puebloan influence may be due to the influx of Pueblo refugees living with various Navajo groups after the Pueblo revolt (see following Regional Discussion). This ultimately resulted in a high degree of acculturation for the Navajo, who assimilated both Puebloan and Spanish traits.

Several artifactual components make up the Gobernador phase. Ceramics are very important. The study of early Athabaskan ceramics is complex and pivots on initial work by Colton (1956), Hawley (1936), and Mera (1935, 1938a). Brugge (1981b) and Carlson (1965) provide detailed descriptions on principal types. Both locally made and trade wares are common. Three types are locally manufactured, at least in the Navajo Reservoir district. These are Dinetah Utility, Gobernador Indented, and Frances Polychrome (Eddy 1966:404). Additionally, Brugge (1981b:3–7) describes three varieties of gray utility wares: Dinetah Gray, Navajo Gray, and Pinyon Gray (in the original version of this work, published in 1963, Brugge referred to these simply as Dinetah Utility).

The utility wares are the basic culinary ceramics of the early Navajos and generally are ubiquitous on most sites. While Brugge (1981b:4) considered Gobernador Indented a variety of Dinetah Gray, Eddy (1966:404–405) prefers to maintain it as a separate type in the Navajo Reservoir district. Eddy (1966) views Frances Polychrome as being a locally made Navajo copy of Gobernador Polychrome. The origin of the latter is unclear, but it may have been of Refugee Pueblo manufacture.

Trade wares are important for dating early Navajo sites. Two major districts are represented by these ceramics: the Rio Grande and the Western Pueblos. Rio Grande types include Jemez B/W and Rio Grande Glazes E and F. Western Pueblo types include Hawikuh Glaze Polychrome and Jeddita B/Y (Eddy 1966:405–407). In addition to ceramic trade wares, European trade goods are frequent on many Gobernador sites (Eddy 1966:510).

Other artifacts frequently associated with Gobernador sites include cloud blower pipes, bone awls, weaving tools, and tubular and shell beads (Eddy 1966:510). Ground and polished stone from Gobernador sites also is common. Forms include two-hand trough and slab manos, slab metates, palettes, shaft tools, pendants, and polishing stones (Eddy 1966:510; Hester and Shiner 1963:75–76).

Large quantities of chipped stone artifacts generally do not occur at Gobernador sites. Several researchers have suggested that this is due to a Navajo taboo against manufacturing chipped stone (although not necessarily using it). Consequently, it has frequently been assumed that early Navajos reused earlier Puebloan (and Archaic?) chipped stone artifacts (Gunnerson 1959; Hester and Shiner 1963:74; Ward et al. 1977:263). In any case, very little is known relating to early Navajo chipped stone technology.

The few chipped stone tools recovered from the Navajo Reservoir district include three forms of projectile points. These are: (1) triangular; (2) stemmed with indented bases; and (3) broad corner-notched, spur types. Other chipped stone includes flanged drills, knives, utilized flakes, scrapers, unifacial axes, pointed gravers, saws, unclassifiable cores, and symmetrical blades. Most of the archeologists who worked at these sites stress that many, if not most, of these artifacts probably were reused from earlier Anasazi sites (Eddy 1966:510; Hester and Shiner 1963:74–75).

Chipped stone artifacts are known from other Gobernador sites outside the Navajo Reservoir district. Significantly, projectile point forms have been identified that may not be reused forms, both in the Abiquiu region (Schaafsma 1979) and at the Doll House site in Chaco Canyon (Brugge 1986:125). The best evidence for actual Gobernador manufacture and use of projectile points, as well as possession of a relatively sophisticated chipped stone technology, however, comes from a site quite unique to Navajo archeology. This is LA 17483, a site excavated in association with the Navajo Indian Irrigation Project (Simmons 1980, 1983). At this site, which represented a specialized antelope kill/procurement locality (Lyman 1980), a lithic assemblage of over 9000 artifacts was recovered. This included over 200 projectile points in all stages of manufacture. The inhabitants of LA 17483 produced generally small and lightweight projectile points of three major types: two styles of side-notched triangular points and a stemless triangular point (Figure 19). While some of the LA 17483 projectile points do resemble those described from Puebloan sites (e.g., Vivian and Mathews 1965:86–87), the former are much smaller. They also resemble some early Apachean points, such as those recovered from the Glasscock site in Mora County, New Mexico (Gunnerson 1969, 1979:Figure 4c, d), but there is clear evidence at LA 17483 that the points were manufactured at the site (Rollefson 1980) and thus were not reused or traded.

Given these data, Cordell's statement that "[I]f there are any distinctive early southern Athabaskan stone tool technologies or types, these have not been identified by archeologists" (1984:357) is not quite accurate. However, there has been little systematic investigation of early Athabaskan chipped stone technology, and it would be a mistake to assume that all tools were simply reused artifacts curated from earlier sites. This clearly is an area that requires more research.

Architectural features of Gobernador sites are much better documented. Forked-stick and cribbed log hogans are common (Eddy 1966:508; Hester and Shiner 1963). The remains of these, however, often are ephemeral. Other structures include lean-tos, ramadas, sweat lodges, menstrual huts, occasionally occupied rockshelters, and masonry rooms (Eddy 1966:508). Certainly the most typical, and most studied, structures are the masonry fortresses, or pueblitos characteristic of the Gobernador phase. Many of these are located in defensive positions (Carlson 1965). The pueblitos represent an interesting archeological situation in that many researchers feel that these sites were occupied by both Navajo and Pueblo refugees following the Pueblo Revolt (see Chapter 8).

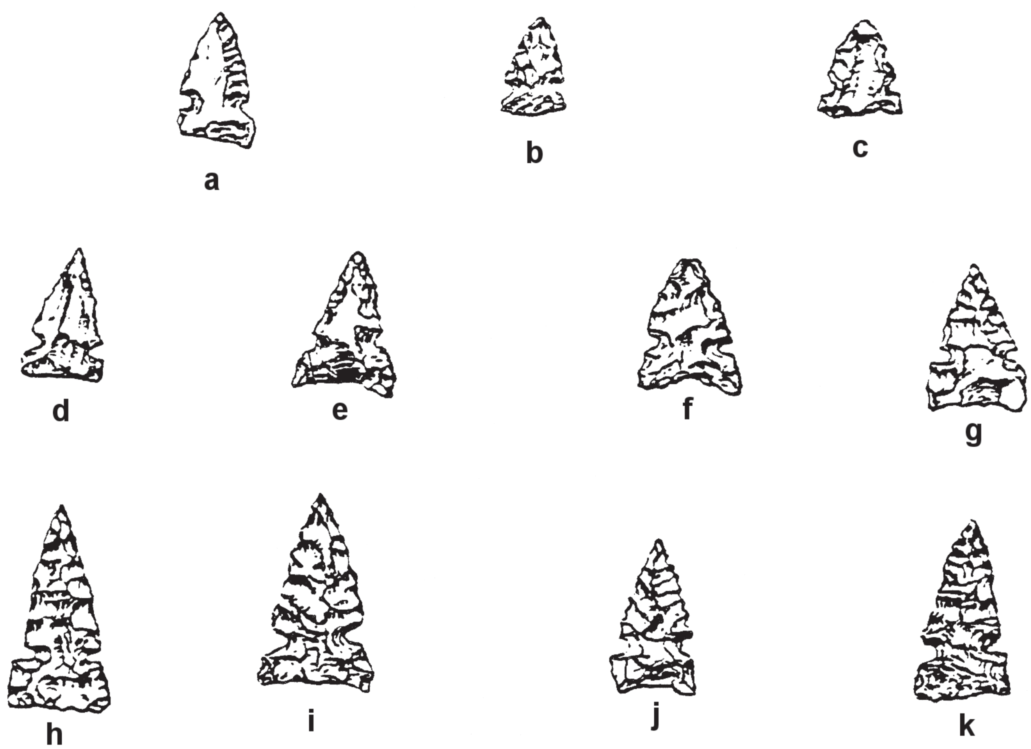


Figure 19. Early Navajo projectile points from LA 17483.
a–b, d–k. side-notched, elongated points; c. side-notched, equilateral/elongated points
(from Rollefson 1980)

The Gobernador phase settlement pattern is equally diverse. The best information for this comes from the Navajo Reservoir district, where over 170 Navajo components were located, the majority of which date to the Gobernador phase (Hester and Shiner 1963:3–5). Of these, researchers grouped the habitation sites into single unit, multiple unit, and village-sized sites, based on the number of hogans or masonry structures present (Eddy 1966:508). In addition to habitation sites, nonhabitation Gobernador occurrences also have been recognized (Eddy 1966:508–509).

In the Navajo Reservoir District, Gobernador phase sites generally cluster in communities, although some are scattered. The communities usually occur near junctures of major drainages in association with arable land. Both habitation and nonhabitation sites generally follow land-use patterns or distributions similar to the earlier Pueblo phases. In some areas of the Navajo Reservoir district, Gobernador site density is higher than during any other period (Eddy 1966:509).

Another area with a relatively high density of early Navajo sites is the Bisti–Star Lake region in the San Juan Basin. Huse et al. (1978:88–89) recorded eight habitation and 42 lithic and/or ceramic scatters that they feel are Navajo. Of these, four habitation sites and 27 artifact scatters yielded Gobernador phase materials. All of these occur on tops and ridges of high mesas, and all but one of the habitation sites contain multiple residential structures.

If the sites that Schaafsma (1978:53–61, 1979) reports on are Navajo, the Abiquiu Reservoir region is yet another area with a high density of early sites. Schaafsma recorded several such sites in the Abiquiu area, most occurring on bluffs above valleys, although a few were located on the first terrace above the Chama River.

Data relating to Gobernador economy are scant. While the central focus of traditional Navajo economy was herding, the origins of this pattern are not clear. Historic documents provide some evidence for early Navajo subsistence patterns. These indicate that agriculture, herding, and hunting were important (Carroll and Haggard 1942; Hackett 1937; Hill 1940; Twitchell 1914; Van Valkenburgh and McPhee 1938; Worcester 1947), but many of these documents relate to later (i.e., late 1700s–1800s) Navajo economy.

Based on archeological evidence from the Navajo Reservoir district, Eddy (1966:511–513) believes that Gobernador economy was comprised of hunting, collecting wild plants, and farming. Eddy maintains that the Navajo Reservoir district Gobernador peoples had access to European stock and orchard fruits, either through raiding or trade, although sites in the district do not exhibit much evidence for this.

Schaafsma (1978:54) interprets some of the Piedra Lumbre structures from Abiquiu Reservoir as animal pens. These contain evidence for the presence of both wild and domestic animals (Sjoberg 1978). Again, the problem with these sites is in determining if they are in fact Navajo. Recent enthnohistorical research and archeological investigations at these sites has resulted in a different interpretation of the ethinic affiliation of their inhabitants. Research reported in Lord and Cella (1986) suggests that these sites were constructed by Tewa herders around the time of the Pueblo Revolt.

The evidence from the Bisti–Star Lake survey points to a different adaptive pattern. Huse et al. (1978:88) see the Gobernador sites they recorded as being not well situated for any agricultural activities beyond gardening. They, therefore, posit an economy based on wild plant collection, herding, gardening, and possibly raiding.

Finally, the previously mentioned LA 17483, located south of Farmington, New Mexico, provided excellent economic data. These indicated a very specialized economic function, with the procurement of antelope being the focus (Lyman 1980).

A final point to note in this discussion is that Gobernador phase sites generally are not artifactually dense. While site areas may be large, artifact abundance often is low (LA 17483 is an exception). The Navajo Reservoir district sites generally exhibit extremely low artifact counts, especially among chipped stone items (Hester and Shiner 1963). Although Brugge (1972: 7–8) indicates that a large number of ceramics (over 10,000 sherds) were recovered from several early Navajo sites, he does not clarify what an average sample size, per site, is. He dealt with 106 sites, dating from 1700 to 1821, and it appears that he derived these ceramic counts from this sample. The majority of the ceramics fall into his early period, which encompasses the Gobernador phase. Based on the 25 sites Brugge considers from this period, the mean ceramic density per site is only 318.9 sherds. Of interest here is consideration of the traditional Navajo mode of disposing of broken ceramics. This could account for the low ceramic density in that it required that sherds be deposited in an out-of-the-way place (Brugge 1963:22). If this practice also existed during Gobernador times, it could account, at least in part, for the low number of ceramics at some sites, since archeologists do not tend to excavate in out-of-the-way portions of sites.

In conclusion, early Athabaskan archeology has a long history of research in the Southwest. While ethnic identification is difficult, most research has tended to focus on presumably early Navajo sites, although early Apache sites also have been investigated. Despite years of study, however, there still is no conclusive evidence for an extremely early entry of the Athabaskans in the Southwest. The earliest well defined Athabaskan archeological sites are all post-European contact. This does not mean that such remains do not exist, but, as Brugge succinctly states "[T]he early remains of the first Apaches de Nabaxo have probably been noted in various archeological surveys, but if so, they have gone unrecognized for what they are. Until we do learn to distinguish these remains, the earlier phases of Apachean settlement on the Colorado Plateau will be known only from the accounts of the early Spanish explorers and colonists" (Brugge 1986:i).

The early postcontact sites are well documented and constitute a substantial archeological record. Most of the sites investigated are pueblitos, although other site types also are known. Recent research suggests that the material culture and economic patterns of these early groups may have been more sophisticated than previously believed.

Following the Gobernador phase two additional phases have been proposed: the Cabezon (1775–1863) and the Reservation (1865–present). By the Cabezon phase, the Navajo were a well documented group and their traditional pattern of adaptation was becoming established. The Cabezon phase ends in 1863 with the infamous "long walk" and incarceration of thousands of Navajo at Fort Sumner (at Bosque Redondo) by federal troops. In 1868, the Navajo were allowed to return to their homeland, but the damage had been done. The impact of Fort Sumner on their spiritual values was tremendous, as was the economic effect. From a state of relative prosperity based on herding, many Navajo were reduced to reliance on the government dole (Bailey 1964; Tainter and Gillio 1980:135). Following this event, the Reservation phase begins and the Navajos increasingly were acculturated to Anglo ways while still retaining many of the traditional values that they hold to this day.

Other Non-Puebloan Native Groups

Other ethnically identifiable groups also emerged during the Early Historic period. Many of the Plains Indians had impacts on the Southwest (see previous discussion). Some of the groups that can be identified ethnically include the Comanches and Mescelaro Apaches, as well as the Puebloans who presently occupy the several pueblos of New Mexico and Arizona, to name but a few. In addition, Tainter and Gillio (1980:122–123) identify other groups who represented admixtures of various cultural groups. These include Mestizos, Hispanos, and Genizaros.

Many of the people referred to as Spanish never actually lived in Spain. There was a remarkable degree of racial mixture between the Spaniards and various Native groups. This new racial population came to be known as mestizo (Meinig 1971: 13) and was the majority from early in the colonization period until the Anglos became the dominant group (Tainter and Gillio 1980:122).

Another term widely used for reference to the mestizos is Hispano. In Tainter and Gillio's (1980:122–123) usage, Hispano designates those non-Natives who are culturally Spanish to a degree that precludes their inclusion as Anglo. They note that all of these terms represent wide points on a continuum of population variety rather than precisely defined concepts.

Another group that has received some attention are the Genizaros. They represent a social rather than a genetic group. The Genizaros were Natives captured from various tribes to serve as slaves of the Spanish. They had a complex interaction with both Native and Spanish groups, and in some instances separate towns were established where they could serve as buffers against hostile nomads. Culturally, the Genizaros became Spanish and lost their tribal identities (Tainter and Gillio 1980:123).

While historically documented, the archeological signature of many of these groups, especially the Native ones, is blurred. Many represent nomadic hunters, gatherers, and traders, and their cultural remains are not substantial. In many cases, limited activity sites resemble undiagnostic scatters that could be anything from Paleo-Indian or Archaic to Historic. Sites dating to the Historic period, but lacking historic artifacts, frequently are difficult to categorize in terms of cultural identity. More substantial sites, of course, are easier to identify, but have rarely been investigated.

Certainly the most active non-Puebloan Native archeology for the Historic period relates to the Navajos. Big Bend Mesa (Keur 1941) in the Middle Rio Puerco valley was a major site containing a large aggregation of hogans. In addition, pueblito sites from the Refugee period contain blends of both Puebloan and Navajo traits. Brugge (1980,1986) summarizes much of Historic Navajo archeology, and a recent ethnoarcheological work has investigated Navajo adaptations (Kelley 1986).

Anglo

Nineteenth century New Mexico was a melting pot of cultures and subcultures. While an astonishing blend of Native and Spanish groups occupied much of the project area, the nineteenth century witnessed the introduction of a group that can broadly be lumped as Anglos. During this time, the entire Southwest was becoming the focus of several migrations that resulted primarily from economic factors (Tainter and Gillio 1980:133). While the cultural blends observed earlier continued, the Anglos rapidly become the dominant force in New Mexico.

The archeological reflection of the modern Anglo period is extremely varied. In a legal sense, anything older than 50 years usually is considered archeological, thus even the remnants of World War II facilities are rapidly approaching archeological status. Tainter and Gillio (1980:134–144) identify several events of the Anglo period that have specific archeological correlates. These include: the Mexican War, the Indian Wars, the Civil War, military posts, exploration and survey, railroads, mining, agriculture, and homesteading and other partitions of lands.

Anglo archeological research has not been common throughout the project area. Most studies have come about as a result of cultural resource management investigations, and in recent years there have been several such works that supplement historic documentation, such as the study of the Seven Rivers community in southeastern New Mexico (Barnard and Gallagher 1980).

Summary

Tainter and Gillio provide a short summary of the entire Historic period that bears repeating here:

> Since 1539 the study area has been administered by Spain, Mexico, or the United States. Even as the Spanish entered the area, Athapascan peoples were drifting south to claim the same land. The stage was being set for the conflict of cultures based on disparate economies, religions and governments. Much of the history

> of the study area is the story of that conflict. Only after the American Civil War did lasting peace come with attendant population growth and economic advances (Tainter and Gillio 1980:148).

This abundance of history has left a rich archeological record. Aspects of it have been well studied, such as the late Pueblos and the Spanish missions. Other aspects are poorly documented in the archeological record. There has, however, been a recent reinterest in many facets of the Historic period. Much of this has been stimulated by the legal requirements of cultural resource management archeology. Whatever its source, our knowledge of the history of the project area is bound to increase. Historic archeology presents several specific problems, both in types of material culture and in interpretation of historic documents. These are issues with which properly trained historic archeologists have to deal, and it is essential that such individuals be involved on projects where the potential for historic remains is expected. The historic record of the project area is often as fragile as the prehistoric record, and it cannot be ignored, for it can supplement the often biased information available in written documents.

REGIONAL DISCUSSION

Colorado (Douglas D. Dykeman)

The first Spanish incursion into the south-central Colorado portion of the study area was the 1779 expedition of Governor Don Juan Bautista de Anza. This expedition first entered the San Luis Valley with the purpose of exterminating the Comanche (Ubbelohde et al. 1972). At this time, the Ute and Comanche each used parts of the valley, but it is not known whether this caused conflict. Having found no Comanches in the San Luis Valley, the de Anza expedition searched the Front Range area. The Governor caught up with the Comanche at the base of Greenhorn Mountain and soundly defeated the Natives (Ubbelohde et al. 1972). After reaching an accord with the Utes and Comanche, de Anza attempted to settle a village along the Arkansas River in 1787. The village, named San Carlos, was located near present day Pueblo; however, it failed early due to the mistrust of the local natives.

The Zebulon Pike expedition of 1806 was the first documented group of Anglos to set foot in the San Luis Valley. It is likely, though, that mountain men had explored the area for fur trapping prior to this time; the first documentation of Anglo penetration of the mountain area was a fur trapper named James Purcell in 1802 (Everett and Hutchinson 1963). After the establishment of the mountain route of the Santa Fe Trail in the nineteenth century, much of the region attracted Anglo fur trappers and mountain men who were quickly followed by settlers. Farming and ranching had begun by ca 1840 and continue to be factors in local economies. It was not, however, until 1851 that the "first permanent white settlement in Colorado was planted: San Luis on the Culebra River" (Ubbelohde et al. 1972:55).

Until they were moved out by Anglo–Americans, the mountainous region of south-central Colorado was a Ute stronghold rarely breached by other native groups (Martin 1974). Plains tribes were known to have entered the Arkansas Valley by 1820 (Everett and Hutchinson 1963) and probably visited the San Luis Valley as well. Perhaps in response to pressures from the Anglo–Americans, the Cheyenne and Arapahoe attempted to occupy parts of the Arkansas Valley in the mid-1800s, but they were quickly expelled by indigenous Ute bands (Everett and Hutchinson 1963; Martin 1974). The Ute groups could not resist the steady influx of Anglos seeking wealth in the gold and silver rushes of 1869 and 1879, respectively, and by 1882, nearly all of the Ute bands had been moved to reservations in Utah and southwestern Colorado (Stewart 1966).

The gold and silver rushes brought tens of thousands of would-be treasure seekers to areas such as Leadville. The gold mines played out within a few years under such heavy pressure. High concentrations of silver in the heavy, black sand, placer deposits were ignored until 1879. The ensuing silver rush was short lived, but the economy stabilized and the area supported a substantial population until the early 1900s (Bancroft 1960).

By the late 1800s, the railroads had come to the area primarily to gain access to the mountains. The mining of precious metals had created the need for cheap transportation of ore and supplies. With this transportation system in place, there was an expansion of the steel industry along the Front Range (Mehls and Carter 1984). Smelters and steel mills were established in Pueblo and Denver, and these were fueled by coal mines in the vicinity of Trinidad. The symbiotic relationship of coal and steel continues today along the Front Range, but with drastically reduced production due to competition from foreign and domestic sources.

Ranching and agriculture arrived in the region initially to service the booming mining communities. These activities proved to be stabilizing elements and, along with tourism, recreation (primarily the skiing industry), the military, and the steel industry, they continue to form the area's present economic base.

New Mexico

The Historic era of New Mexico is as fascinating and complex as the prehistoric periods. Dividing the Historic period into appropriate phases is a difficult task, especially given the cultural diversity apparent in the region. Tainter and Gillio (1980:117–144) provide an excellent summary of this period from the Mount Taylor region of New Mexico, but their discussion also is appropriate for most of the state. They define several time periods within the Historic period and discuss specific major events that had a lasting impact on the area. Figure 20 is a reproduction of the historic matrix that they developed and serves as a concise framework of the Historic period of much of the project area. The following discussion very briefly addresses the major Historic periods identified by Tainter and Gillio.

	Time					
Culture	1600	1800	1900	1970	Provenience	Comment
Pueblo	x	x	x	x		
Navaho		x	x	x		
Apache	x	x	x	x	Aboriginal	Sent to reservation in Oklahoma
Comanche	x	x				
Spanish	x				Immigrant	Largely officials and priests; withdraws or merges into Hispano
Hispano		x	x	x	Immigrant	Identity develops in place
Northern Anglo–American			x	x		Commerce and ranching; includes early Jewish merchants
Mormon			x	x		
Texan			x	x		
Mexican–American			x	x		
General Anglo–American				x	Immigrant	From all parts of U.S.
Afro–American				x		

x = Present in significant numbers.

(Table adapted from Meinig 1971:128)

Figure 20. Historic cultural groups from the project area (from Tainter and Gillio 1980:124)

Early Exploration Period (1539–1590)

Details of the early Spanish exploration of much of the project area have been provided in the previous discussion. During this time, initial contacts were made with Native groups and the beginning of Spanish domination occurred. When it became apparent that the fabled wealth of the area was a myth, attention turned towards land exploitation, use of Native inhabitants for cheap labor, and colonization.

Colonization Period (1590–1680)

During the Colonization period, the Spanish established several strongholds throughout the Southwest. The Spanish government of New Mexico, at this time, was a series of confrontations of interest groups. The principal Spanish protagonists represented the church on one side and secular government on the other. Both factions sought to gain maximum financial security from a Native economy that was, at best, marginal. Accusations and recriminations characterize correspondence between the New Mexico colony and Mexico during this time, with both lay and church groups each seeking to discredit the other. Throughout this, the Native groups in contact with the Spanish generally accepted domination. The colonists remained few in number and generally subsisted off the labor of the Natives rather than seeking to establish their own economic system (Tainter and Gillio 1980:123–125).

The new cultural adaptation that evolved as a result of the mixture of Puebloan and Athabaskan traditions, with Spanish influence, was in a sense extremely successful. The addition of pastoralism and new crops from the Old World and Central America to the aboriginal subsistence base provided a more dependable diet (Brugge 1986:142). However, this was a complex and difficult period in New Mexico's history, characterized by a high feeling of animosity between the Spaniards and the Natives. The tensions built to a boiling point, resulting in the Pueblo Revolt of 1680.

The Pueblo Revolt (1680–1692)

Prior to 1680, Native unrest was high, resulting in numerous murders and small uprisings. But the Puebloans lacked a tradition of mass cooperation that could have united them in a war against the Spanish, and these acts of violence were easily put to rest. However, by 1680, enough anger and cooperation had been developed by the Puebloans to present the Spanish with their first serious setback in the Southwest. The Pueblo Revolt is eloquently and concisely summarized by Jenkins and Schroeder:

> Under the leadership of Pope, a San Juan Indian living at Taos, Naranjo and others, the pueblos for the only time in their history united and exploded into revolt in August 1680. Most of the settlers and Franciscans in the outlying areas were massacred. Those who escaped fled into Santa Fe or concentrated in the present Albuquerque area. The rebels laid siege to the Palace of the Governors within whose walls the surviving northern colonists gathered. Lack of water and provisions forced the Spanish, led by wounded Governor Otermin, to retreat southward, taking with them only the barest of necessities and the small wooden image of Our Lady of the Assumption, their most revered religious saint which had originally been brought to New Mexico in 1625. Simultaneously, the surviving settlers in the Rio Abajo (lower river) had also begun their retreat, accompanied by some loyal Piro allies from the pueblos of Alamillo, Senecu, and Socorro and some Tiwas from Isleta. The two parties joined forces near present El Paso and crossed the river where Otermin established his headquarters close to the Manso Indian mission of Our Lady of Guadalupe. Both he and his successor, Domingo Jironza Petriz de Cruzate attempted to recapture New Mexico, but to no avail.
>
> Indian governors ruled New Mexico for the next twelve years from headquarters which they, too, established in the Palace of the Governors. Pope tried to keep the Indians united, but individual rivalries among various pueblos were too strong, and the leaders soon fought among themselves and with the Apaches who had joined them in the revolt (Jenkins and Schroeder 1974:22).

Spanish Colonial Period (1692–1821)

As the above quote indicates, despite the success of the Revolt, this period of freedom from the Spanish was characterized by civil unrest. Droughts and raids by nomadic groups compounded this, and the reestablishment of Spanish control in 1692 occurred with relatively little resistance. Captain General Diego de Vargas Zapata Lujan Ponce de Leon y Contreras, the new Spanish governor of New Mexico, took Santa Fe and the Palace of the Governors without fighting a single battle.

During the Spanish Colonial period, several major changes occurred throughout the project area. The use of Native labor and the large land grants of the earlier period were replaced by smaller farming units (ranchos) settled by Hispanics. During this period, several events outside the Southwest conspired to cause the Spaniards to erect a buffer in New Mexico to protect the more valuable interior of their empire. Consequently, labor was imported into the Southwest. The decrease in the number of Natives was an important variable in bolstering the needed population increase. At the time of the Pueblo Revolt, an estimated 30,000 Puebloans inhabited the region. This dropped to ca 10,000 at the end of the eighteenth century and diminished to ca 8,000 in the 1800s. The number of Puebloan towns dropped by about a third from the 60 that originally were captured by the Spanish (Tainter and Gillio 1980:129–130).

During this period, the numerous quarrels between the secular and religious leadership of Spanish New Mexico intensified. Additionally, hostility with various Native groups did not abate. While the Puebloans were peaceful during this time, the constant wars with nomadic groups were a drain of both men and money. Despite all of the negative factors, however, Hispanic population growth increased throughout the area.

Mexican Period (1821–1846)

The brief period of Mexican rule in New Mexico is poorly documented. The major political event of the period was the severance of ties with Spain and the formation of the Republic of Mexico. By now, of course, the United States had come into being as a major force, and the Mexican government of New Mexico feared the expansionist tendency of the U.S. During this period, Mexico feared threats of invasion from both Texas and then later from the U.S. The governors of New Mexico were successively killed, disgraced, or persuaded to resign and native groups continued their unrest. The Hispanics also continued making slave raids into Navajo country. These conditions set the stage for intervention by the United States and on August 12, 1846, Colonel Kearney rode unopposed into Sante Fe to accept the surrender of New Mexico (Tainter and Gillio 1980:133).

American Period (post–1846)

Following Kearney's victory, New Mexico entered the American period, although it did not become a state until 1912. Tainter and Gillio summarize the impact of the American period very well:

> From Texas there came an inexorable push of cattlemen seeking new range and assuming that the low population density of New Mexico signified that the land was unused. Farmers swelling out of Oklahoma made the same assumptions about the seemingly vacant lands they found in northeast New Mexico. Californians began to move east in search of new opportunity as the gold fields lost their attraction, and Mormons began setting up their exclusive little settlements in backwaters communicating only with Utah. Mixed into the whole area were Jewish merchants who had followed first the Army and then the railroads to set up shop wherever opportunity allowed. Binding all together was the railroad which provided two east to

> west lines of communication through an area which for centuries had mainly thought in terms of north to south movement.
>
> As in all of the American Southwest, the U.S. Army played a major role in the history of the study area after 1846. Its influence went beyond purely military matters into such areas as survey (Goetzmann 1959) and social change (Miller 1979). When the United States fell heir to New Mexico it inherited several hundred years of unsolved problems which often found expression in violence. It became the prime function of the U.S. Army to find a final solution to the Indian problem, one which had multiple causes and expressions but which was seen as reducible to the one issue of imposing peace on the land (Keleher 1952:286).
>
> The traditional hostility of Athapascan–Hispanic–Pueblo had been reduced in the nineteenth century to the simpler equation of the Athapascans versus everybody else. The Americans were lumped with the "everybody elses" when it became known that the defeated Hispanics were now to be treated as U.S. citizens. This was a fact of life that came to have more significance for American military decisions than did the attitudes of the Pueblos and Hispanics (Tainter and Gillio 1980:133–134).

Several events during the earlier part of the American period had a significant impact on the project area (e.g., Indian, Mexican, Civil wars, railroad, mining, etc.) and are succinctly summarized by Tainter and Gillio (1980:134–144). Of these events, perhaps the railroad was the most significant. Population in much of the project area always had been low, and with the decision to build a transcontinental railroad that passed through New Mexico, access to the area was greatly facilitated. With the coming of the railroad, the development of boom towns and frontier society, mining, and the sheep, cattle, and farming industries, New Mexico began to take on the unique flavor that characterizes it today.

Trans–Pecos (Patricia A. Hicks)

In the following synopsis of the Historic period in the Trans–Pecos, the work of J. Charles Kelley will be cited frequently in discussions of the Spanish period. Kelley's work (e.g., 1952b) continues to be the best review of Spanish archival sources pertinent to the region. In discussing the later occupations of the region, Tyler's (1975) history of the Big Bend will be freely referenced. Although his overview was written specifically about Big Bend National Park, many of the trends that are discussed are pertinent to the wider region.

The Historic period in the Trans–Pecos begins in 1535, four years earlier than in New Mexico, although the incursion was not made by an actual expedition. In this year Cabeza de Vaca and a small party that had survived a shipwreck along the Gulf Coast seven years earlier escaped from Native captors and made their way across the southern portion of the Trans–Pecos (Kelley 1952b:263; Tyler 1975:22). The Espejo expedition of 1582 was the first to travel south along the Pecos River, and through the Big Bend on their return to northern Mexico (Kelley 1952b:265). Because of the rugged and barren nature of the terrain, Spanish settlement of the Trans–Pecos was slow to occur. The first frontier outpost and mission was established in the El Paso area in 1659. This area received a sudden influx of population following the Pueblo Revolt of 1680. In 1683, the first missions were established in the La Junta area at the request of the local natives (Kelley 1952b:266). These missions were abandoned when the French landing on the Texas Gulf Coast forced the Spanish to withdraw their military forces from the frontier (Tyler 1975:26). As a result, little is known about these early missions (Kelley 1952b:266). Efforts were made to reestablish these missions in 1715. They were temporarily abandoned in 1718, and reoccupied, only to be abandoned again in 1725 as a result of an Indian uprising in that year. In 1732 or 1733, the missions were again staffed and remained so through the rest of the Spanish period (Kelley 1952b:270).

As early as 1667, consideration was being given to the defense of the Trans–Pecos frontier. In this year a plan was set forth for the construction of a series of presidios located along the northern frontier. It was not until 1729 that attempts were finally made to implement this plan. At this time the isolated settlements along the frontier were being preyed upon by marauding bands of Apaches and Comanches, and some system of defense was needed (Tyler 1975:31). The first attempts to establish a presidio along the Rio Grande failed. It was not until 1738 that construction was completed on the first presidio, located 30 miles south of present-day Del Rio, Texas (Tyler 1975:33). In 1760, another presidio was established farther to the north in the La Junta region but did little to avert the depredations of the Apache (Tyler 1975:37). Successful and unsuccessful attempts to establish presidios and other defensive works continued throughout the remainder of the Spanish and Mexican administrations, and into the American period. In 1787, Ugalde carried out extensive campaigns against Apaches and other Indian groups who were using the Trans–Pecos region as a refuge. Military pressure was maintained until 1791 when a program for peace was outlined and accepted by all parties. Under this program the Spanish agreed to protect the various Indian groups (primarily from one another), provided that they agreed to live peacefully (Tyler 1975:49). Shortly thereafter, the Spanish withdrew from the Big Bend area of the Trans–Pecos. The peace agreement would not hold, as the Comanche continued to push southward placing pressure on Apache groups in the Trans–Pecos.

In 1839 a new era began in the Trans–Pecos. In that year Dr. Henry Connelly successfully traveled through the Trans–Pecos on a freighting trip from New Orleans to Chihuahua in Mexico. Although the trip ended less than profitably, it did stir the interest of some merchants (Tyler 1975:51–52). In 1848, the Hays–Highsmith expedition left San Antonio for El Paso. They failed to reach their destination, but after numerous hardships did succeed in blazing the route that was to become known as the Chihuahua Trail (Tyler 1975:54–55).

Following the end of the Mexican War and the signing of the Treaty of Guadalupe Hidalgo, the United States acquired a significant amount of territory from Mexico. One of the first orders of business in the Trans–Pecos was to gain some knowledge of the land. In 1850, the first accurate map was made of the southern portion of the Trans–Pecos (Tyler 1975:77) and in 1852, the Boundary Commission survey completed work (Tyler 1975:81). In 1854, Andrew Gray completed a survey of west Texas for the Texas Western Railroad Company that led him across the Llano Estacado and the northern portion of the Trans–Pecos. In this same year, the Army established Fort Davis to protect the western road laid out four years previously (Tyler 1975:101).

The Chihuahua trade with San Antonio and other cities in Texas was well established by 1851. The Chihuahua Trail served two important functions in the history of the region. First, it diverted some of the trade from Santa Fe and El Paso to San Antonio, which led ultimately to its growth as a regional distribution center. Second, it served to open the Trans–Pecos to settlement. The Chihuahua Trail continued to be an important regional artery for transportation until completion of the railroad across west Texas in 1882 (Tyler 1975:113).

During the Civil War it was not possible to maintain a military presence in the Trans–Pecos to deter raiding by Apache and Comanche bands. Consequently, Fort Davis was deserted and raiding increased. The fort was rebuilt some two years following the end of the war (Tyler 1975:115). Military pressure succeeded in bringing in the larger bands of Mescaleros to Fort Stanton in New Mexico, where they agreed to a peace that lasted only four years. By 1876, raiding had again increased and civil authorities were demanding action. In 1878, dissatisfied with conditions on their New Mexico reservation, a group of 80 individuals under the leadership of Victorio left that area for the Big Bend region in the Trans–Pecos. Raiding in the region ceased with Victorio's death in 1880 (Tyler 1975: 117–119).

Settlement in the Trans–Pecos began in earnest after the arrival of the railroad in 1882. Ranchers were some of the first to lay claim to the land (Tyler 1975:121). Parts of the Trans–Pecos proved to be rich in mineral resources. As early as 1860 a small silver mine was established in the Chinati Mountains, and later several other mines were developed in the Marfa area. Coal seams were located in various areas, but none proved very profitable. In 1894, quicksilver was discovered 90 miles south of Alpine, and mining rapidly became one of the more profitable industries in the region (Tyler 1975: 138–145).

In 1911, the first large candelilla wax factories were established in the Big Bend region. Waxmaking continues to be a major industry on both sides of the border (Tyler 1975: 147–148). It should be noted here that the Office of the State Archeologist has requested that candelilla wax camps be recorded when encountered during clearance surveys, as they are considered a significant resource for ethnoarcheological study and model building (e.g., Tunnell 1981).

The Trans–Pecos has served as refuge for a variety of fugitives and outcasts. The most serious problems with bandits in the area occurred after the beginning of the Mexican Revolution in 1911. While never heavily populated, the region was dotted with widely scattered small towns and isolated ranches. Law enforcement officials were thinly scattered over the landscape. In 1912, in response to raiding by Mexican revolutionaries under the leadership of Pancho Villa, 25 members of the calvary were stationed along the Rio Grande near La Noria, but shortly after, were withdrawn. In 1916, raiding intensified and over 100,000 National Guard troops were called out to protect the border. By 1921, conditions had stabilized in Mexico, the raids ceased, and the troops were withdrawn (Tyler 1975:157–187). Following this, the pattern largely intact in the area today emerged.

BACKGROUND OF THE BIOARCHEOLOGICAL RESOURCES SURVEY

Ann Lucy Wiener Stodder

The results of the Bioarcheological Resources Survey of the Basin and Range region are presented in the next three chapters. In this chapter, the history of bioarcheological research in the area is reviewed, and some of the central issues in current research are briefly discussed. The sources, methodology, and rationale for the survey are described, and the geographic distribution of the bioarcheological resources is summarized by county and region. In Chapter 10, the bioarcheological resources (assemblages of human remains from a site or locality) are summarized by cultural affiliation and by adaptation type. Some of the research questions relevant to each group are discussed. In Chapter 11, a portion of the bioarcheological data (the biological information obtained from osteological analysis) is presented. The significance and limitations of the data base are discussed and recommendations are made for its improvement.

This represents a first step in bioarcheological synthesis for a portion of the Southwest. No doubt there are data missing, but we hope that the present study provides a useful basis for further work. The recent volume of papers on Southwestern bioarcheology edited by Merbs and Miller (1985) demonstrates the wide variety of current research in this area, but there is no synthesis of Southwestern bioarcheology, and there is no real precedent for this sort of effort in the Southwest. Human remains have played a role in the study of mortuary behavior, but with a few exceptions it is only quite recently that bioarcheological data have been acknowledged as a valuable source of data with direct relevance to research problems in Southwestern archeology. In the era of contract archeology, the bioarcheological data base is growing steadily but haphazardly, with little standardization or integration. Given this situation, and the pressures for reinterment, it is a timely undertaking indeed to assess the resources and review the data base for bioarcheology.

HISTORY AND CURRENT ISSUES

The study of human skeletal remains from archeological sites in the Basin and Range region has its historical roots in the traditions of craniometry—the quantification of skull shape and size. The great majority of research, not only the larger, problem-oriented studies, but also the multitude of brief descriptions of human remains from sites in the Southwest, consist of cranial (and also postcranial) measurements reflecting the tradition of techniques and topics established in Hooton's *The Indians of Pecos Pueblo* (1930), and Hrdlicka's *Catalog of Human Crania in the United States National Museum Collections* (1931).

Paleopathology—the study of disease in bones—is not a new field, but the particularistic, diagnostic emphasis on the antiquity of disease has only recently been transformed into paleoepidemiology—the systematic observation of health indicators in skeletal populations, and the interpretation of this biological data in a specific cultural framework. Thus, there is a large body of more or less systematically collected metric data, but most of the information on health and disease of prehistoric Southwestern populations consists of anecdotal and incidental observations rather than a regular accounting of the presence or absence of well described and illustrated pathological features.

The research emphasis in American archeology has shifted from what Willey and Sabloff (1974) term the Classificatory–Historical (chronology-oriented) period to the Explanatory period with the functionalist view of culture as part of an integrated feedback system with the environment. The prehistoric population is now viewed as, "an active partner with cultural systems in a process of selective screening whose result is the sequential changes documented by the archeological record" (Gruber 1981:481).

Early Expeditions and Collections

The earliest written observations on the biological status of the Native Americans of the Southwest were made by the chroniclers of the Spanish exploratory parties in the sixteenth century. Luxan, chronicler of the Coronado Expedition in 1540, wrote that, "the natives of all those (New Mexico) provinces are large, more vigorous than the Mexicans, and healthy, for no illness was observed among them" (Hammond and Rey 1966:230). This may not qualify as a set of systematic observations, but it is likely that the New Mexico natives were more healthy than the natives in the densely populated Basin of Mexico where there had already been epidemics of several European imported diseases (Gibson 1964). Later, the Franciscan missionaries recorded biologically significant events such as droughts, famines, and epidemics (Forrestal 1954; Chaves 1957).

Early descriptions of skeletal remains date from the 1870s. Bessels (1876) described several skulls from southwestern Colorado and from Abiquiqu in north-central New Mexico, and Hoffman (1878) described crania from W. H. Jackson's excavations at Chaco Canyon (Reed 1963a). In an early study of North American paleopathology, Whitney (1886) sought to, "establish in so far as possible what diseases existed on this continent among its original inhabitants" (1886:433). Whitney's study predated the large Southwestern archeological expeditions and the skeletal collections that resulted from them. His work does not contribute much to our knowledge of Southwestern bioarcheology, but his statement as to the importance of collecting the postcranial skeleton, as well as the skull, for age and sex determination and for paleopathological interpretation is interesting, for this sound advice has many times gone unheeded by archeologists and physical anthropologists alike.

Excavations by the members of the Hemenway Expedition of 1884–1888 generated a large collection of human remains from the Hohokam site of Los Muertos in Arizona, and a smaller collection from the Zuni area sites of Hawikku, Halona, and Heshotauthla. These collections were sent to the Army Medical Museum. The report by Matthews et al. (1893) contains some craniometry data on the Zuni area remains. Another early collection was made by Fewkes (1904) in his work at Hopi area sites for the Bureau of American Ethnology. Hewett's (1904, 1909a, b) work in the Pajarito Plateau area produced early collections. The Hendricks–Hodge Expedition, which began in 1917 and continued for several seasons into the 1920s, was jointly sponsored by the Bureau of American Ethnology and the Heye Foundation. Hodge's excavations at Hawikku and Kechiba:wa resulted in a large collection of human remains (Smith et al. 1966). Kidder's excavation of Pecos Pueblo produced the largest and most well known of the Southwestern skeletal population samples.

Several of these early expeditions also included medical doctors. Herman Ten Kate (1892) accompanied the Hemenway Expedition, during which he studied living Zuni and Papago. Ales Hrdlicka was part of an expedition to study the Seri in 1895, and of the Hyde Expedition in 1899. He published his medical observations on the Navajo in 1900, and a larger report on the Pueblos and other Native Americans of the Greater Southwest in 1908. Dr. Henry Fleming (1924) of the Hendricks–Hodge Expedition wrote on the medical condition of the Zuni.

Craniometry

The research of Hooton, Hrdlicka, and those who have followed them in the study of Southwestern craniometry addresses three major questions about the biology of Southwestern populations. Most fundamental is the question of the racial origins of Southwestern (and of all North American) natives. Another question is whether the cultural groupings of Southwestern peoples based on ethnographic, linguistic, and archeological data are supported by biological evidence; what are the biological relationships of the Southwestern populations to each other and to people of other regions? The third question was whether the more advanced group, the Pueblo people, had migrated into the area and replaced the more primitive Basketmakers, or whether the "long heads and short heads" were related.

The idea that the Basketmaker and Pueblo peoples were two different races was based on the difference in head form (now known to be due to different styles of cradleboard deformation) observed by Retzius in his 1890s study of cranial material recovered by Nordenskold at Mesa Verde (Reed 1963a). The different head forms were generally accepted as evidence of a major migration (vs. in situ cultural evolution) until the 1930s, when work by Seltzer (1936) and Stewart (1937) clarified the role of artificial cranial deformation. Stewart distinguished between the lambdoidal (or horizontal) and occipital (or vertical) forms of deformation and Reed (1949) discussed their chronological significance. It was only late in the 1940s that the biological continuity of the Basketmakers and Pueblos was accepted (Reed 1963a:130).

The issue of migration was also at the heart of Native American racial origin theories. Ten Kate (1892) asserted that Native Americans were of Mongolian stock, not a separate race. Hooton attributed Amerinds to Asian stock, but he maintained that there was considerable heterogeneity in the Pecos population at all time periods. Hooton identified a series of morphological types within the population by sorting crania according to resemblance of facial features (1930:183). After sorting, the groups of crania were measured and quantitative descriptions of the various types, Pseudo-Australoid, Basketmaker, Pseudo-Negroid, etc., were generated. Each type was supposed to represent a different migration. "In terms of method and rationale, Hooton's (1930) analysis of the Pecos Pueblo remains exemplifies a historical migrationist genre in physical anthropology" (Adams et al. 1978:514).

A similar approach to racial classification, but on the continental scale, was used by Neumann (1952). Based on his study of native North American races, Neumann argued for racial unity of Southwestern natives.

Hrdlicka argued against a prevailing European theory that Native Americans were of Melanesian origin (Neumann 1935: 460), and like Hooton, he observed considerable heterogeneity among the Pueblo crania he studied, and among other Southwestern populations (Neumann 1931). Hrdlicka's 1931 *Catalog of Human Crania* contains craniometric data on prehistoric Southwestern population samples including Puye, Otowi, Tsankawi, Guisewa, some Mimbres specimens collected by Hough (1923) in the Upper San Francisco and Tularosa drainages, specimens from Hawikku, Chaco Canyon, and a few Navajo of poorly documented provenience and temporal affiliation.

Like Hooton's morphological types at Pecos, Hrdlicka's (1931) classifications by craniometry cut across time and geography in constructing biologically affiliated groups. Hrdlicka concluded that there were two distinct strains of Pueblos. The dolichoid group included the Utah Basketmakers, the Salt River (Arizona) Hohokam, the Hawikku Zuni, and some of the Rio Grande Pueblos. This group, he thought, were most similar to the Algonkian tribes of the eastern United States. The second, brachycranic, group included the people from Puye and the Hopi sites as the major components, related most closely to the Gulf area people from Louisiana and Arkansas (1931:91). An intermediate group included the samples from Jemez and the Tewa sites other than Puye.

In his study of Zuni racial prehistory, Seltzer (1944) concluded that Basketmakers and all later Pueblo populations came from only one racial stock. Using Hrdlicka's data, he came to the opposite conclusion from Hrdlicka. Discussing the early research on Southwest population affiliations and racial origins, Corruccini (1972) states that, "Seltzer and Neumann, while drawing opposite conclusions to those of Hooton and Hrdlicka, shared with them the fault of using the same traditional data in an unimaginative, statistically rudimentary manner" (1972:374).

Hrdlicka's is one of many craniometry studies comparing Southwestern populations with respect to (or in his case without respect to) linguistic, geographical, and temporal groupings. He concluded that the Navajo, although Athabaskan speakers, are not related to Apachean peoples, but are essentially Pueblo, and stated that the Navajo were, "one more of the many cases among American tribes where the language and the physical make-up of the group have but little relation" (Hrdlicka 1931: 95).

Turner's (1981a) research on dental evidence for the peopling of the New World shows that prehistoric American dental traits are similar to those of North Asians, and unlike all other populations (1981a:1). The distribution of dental traits suggest that there were at least two and perhaps three pre-Holocene migrations from Siberia by a relatively small number of individuals (1981a:11).

Biological Distance Studies

Since the 1950s, the study of Southwestern skeletal populations has in large part been aimed at testing the biological validity of hypothesized prehistoric cultural taxonomies based on ethnographic, linguistic, and archeological evidence. Biological distance data from cranial, dental, and postcranial measurements and from the study of discrete, or discontinuous, skeletal and dental traits are used.

Seltzer's (1944) Zuni study is one of dozens which are based on or use part of Hrdlicka's (1931) published craniometric data. Spuhler (1954) gathered anthropometric data on several living populations which he combined with Hrdlicka's data. His findings generally uphold the archeological and historical reconstructions of population relationships and migrations of Southwestern peoples. Spuhler also demonstrated the biological separation between the Mogollon and Anasazi. Giles and Bleibtreu (1961) utilized analyses of variance statistics on metric data from Pecos, Puye, Colorado, and Utah Basketmaker samples, and Kayenta (northern Arizona) Anasazi. Their findings are in general agreement with archeological evidence.

Corruccini (1972) used selected measurements and discrete cranial and dental traits in a gene flow-oriented study of the Pecos, Puye, and Hawikku skeletal populations. He concluded that, statistically, the Pueblos form several different populations which are appropriately considered as a single racial population when making comparisons to other, non-Pueblo populations (1972:384). Corruccini's work indicates that cultural factors (not successive migrations) such as kinship-based, nonrandom mating systems which determined the nature and extent of contact and intermarriage between villages were probably the most important factors influencing Pueblo gene frequencies (1972:387).

El-Najjar used original craniometric data and data from Hrdlicka (1931), Hooton (1930), and Seltzer (1944) to "examine whether the biological parameters correspond in any meaningful way to the cultural taxonomies and chronological subdivisions of the prehistorians" (El-Najjar 1978:153). Despite the presence of some discrepancies in the coefficient of divergence data he presents, El-Najjar concludes that the craniometric data are in agreement with the archeological data, and that the differences between the populations are relatively slight and probably result from the genetic isolation of prehistoric villages (1978:156).

Hypotheses that the protohistoric populations from Hawikku and Gran Quivira (Las Humanas Pueblo) interbred with Spaniards in the 1600s were tested with biological distance data. Corruccini (1972) found no evidence of European admixture in the Hawikku population. McWilliams (1974) and El-Najjar (1981) also found no evidence of European genetic influence in the Gran Quivira population.

Research by Heglar (1974) on the Cochiti Pueblo skeletal population, by Ferguson (1980) on Tijeras Pueblo, and by Mackey (1980) on Arroyo Hondo Pueblo sample investigated degrees of biological affinity between these and various neighboring populations in the Rio Grande Valley and elsewhere in the Southwest. Broadly speaking, their results concur with accepted archeological reconstruction, but their different data collection methods and statistical techniques seem to have led in slightly different directions.

Lumpkin (1976) used craniofacial morphology data to test several archeologically derived hypotheses. Lumpkin's research supports the biological distinction between the Anasazi and Mogollon, the relatedness of the Mesa Verde people with the late component occupants of Aztec Ruin, and the biological distinctiveness of the Pueblo Bonito population from their contemporaries.

Akins' (1986) multivariate analysis of the Chaco Canyon cranial collections demonstrates the existence of two biologically distinguishable groups of people in the Pueblo Bonito burials sample (1986:75), which supports the architectural evidence suggesting bilocal organization at this site (Vivian 1970a).

Mackey (1977) used craniometric data on 14 skeletal populations to investigate the question of the linguistic and biological affiliation of Pecos Pueblo. Spanish accounts suggested that the people at Pecos spoke a different language from their neighbors, but Pecos is generally included in the Towa-speaking Pueblo group. Differences in cranial morphology are not the equivalent of differences in language use, but Mackey asserts that in this case the linguistic and genetic isolation of Pecos from other Towa populations is supported by craniometric data.

Biological distance studies of non-Pueblo (non-Anasazi) populations from the Basin and Range region are apparently quite rare. As mentioned above, Spuhler (1954) and Lumpkin (1976) contributed to our knowledge of the separation of the Mogollon and Anasazi. In one of the few reports on remains from Mimbres sites (using skeletal samples from Penasco Bend, the Harris site, Mogollon Village, and Starkweather Ruin), Neumann (1940) suggested that they were probably related to the Apache or Caddoan peoples.

Rocek and Speth (1986) found the small sample from Henderson Ruin, a Jornada site in Chaves County, New Mexico, to be intermediate morphologically between populations from west Texas and the Pueblos (1986:187).

Bioarcheology in South Central Colorado

The history of bioarcheological research in the Colorado portion of the study area is brief. The earliest work on skeletal analysis seems to be that of E. B. Renaud who led the University of Denver's Archeological Survey of the High Western Plains and the Archeological Survey of Eastern Colorado during the 1930s and 1940s (Renaud 1933, 1947). Renaud wrote two treatises describing human remains: *Western and Southwestern Indian Skulls* (1941), and *The Nasal Index of Prehistoric Pueblo Indians* (1944). These contain craniometric data mixed with descriptions of the facial features and the probable mental capacities of his specimens.

Skeletal data on Archaic, Colorado Woodland, and Ute burials are reported in the Colorado Archeological Society's journal, *Southwestern Lore*, and in *Plains Anthropologist*. Finnegan described the Archaic burial from the Draper Cave site (1976) and recently summarized the available demographic data on Central Plains Archaic burials (1981).

Data on Colorado Woodland burials have been summarized several times (Breternitz and Wood 1965; Scott and Birkedal 1972), most recently by Butler et al. (1986) in a discussion of the Red Creek Burial which is described by J. Michel Hoffman. Most Colorado Woodland burials have been found in Arapahoe, Jefferson, and Adams counties, to the north and east of the Basin and Range region.

The emphasis of research on the Woodland and Archaic burials has been in dating and in defining the characteristic mortuary behavior, rather than on the biological attributes of the skeletal remains. As the small samples slowly accumulate, there is increasing potential to build a biological data base. The summary articles by Finnegan (1981) and Butler et al. (1986) serve the important purpose of making others aware of this potential.

A few Ute burials have been recovered in the study area, but most of these have not been adequately documented or analyzed. The most notable exception is Hoffman's study of the Cochetopa Dome burial (Scott et al. 1984).

Under an agreement between the State of Colorado and the Colorado Indian Commission, burials of Ute and other affiliations may be reinterred on a parcel of state land. Ute burials are rare, and there are strong sentiments regarding what some feel amounts to their desecration. When given permission to study the remains before reinterment, we must honor this privilege by assuring that the analysis, salvage bioarcheology that it is, be done by a qualified individual who will gather data in such a manner as to add to a research-oriented data base, with scientific rigour and deliberate and respectful purpose. The study of Ute burials in Colorado is but one example of a realm of research which might benefit from the development of a structured research program similar to the recommendations and priorities for archeological work set forth in state management plans.

Formative peoples in the Colorado portion of the study area are not well documented in the bioarcheological literature. Campbell's (1969, 1976) often cited work on the Panhandle aspect of the Chaquaqua Plateau indicates that a number of burials were found, presumably of Graneros and Apishapa affiliation, but apparently these were not analyzed. The exception to this dismal situation is the work on human remains from the Upper Purgatoire complex (predominantly Sopris phase) sites excavated by Trinidad State Junior College for the Trinidad Lake Reservoir Project (Ireland 1974; D. A. Miller 1980; Turner 1980; Wood 1980; Wood and Bair 1980).

Bioarcheology in Trans–Pecos Texas

There is a fairly long history of archeological investigation in the Trans–Pecos region of Texas (Marmaduke 1978), but very little skeletal analysis has been done. Reports of excavations of burials in the El Paso area date back to Roberts' 1921 season (Roberts 1929), Alves (1930), and the Cosgroves (1947), but these accounts do not include any biological information on the human remains.

Early work in the Big Bend area was aimed at investigating the so called Big Bend Basketmakers and their relationship to the Pueblos. Excavations by Victor J. Smith (1931, 1933) for Sul Ross State University, by Frank Setzler (1932, 1933, 1934) for the Smithsonian, by E. B. Sayles (1935) for Gila Pueblo, and by E. F. Coffin (1932) for the Heye Foundation produced human remains, but their reports do not contain any physical anthropology. Early summaries of Big Bend archeology (Fletcher 1931, Smith 1931, Reed 1936) do not provide any biological data. Lehmer (1958) discusses the context and mortuary attributes of burials from several sites, but again, there are few data for the bioarcheologist.

Jackson's (1937) work for the University of Texas in Culberson County produced human remains, and he concluded that the residents of the northeast Trans–Pecos were, "a combination of the round-headed Pueblo type with the long-headed Big Bend type" (1937:191). In addition to Jackson's statement, we have Stewart's (1935) comparison of the "Texas Cave Dwellers" morphology to that of several other skeletal samples including Pecos Pueblo and Arizona and Utah Basketmakers. Stewart concluded the Texas Cave Dwellers were not biologically identical to the other Basketmaker populations to the west (1935:228).

Oetteking (1930) included at least one Big Bend area skeleton (from Bee Canyon Cave) in his study of skeletal remains from Texas, but most of his sample was from the outside the present study area. Goldstein's (1948) research on the dentition of prehistoric Texans probably includes some Trans–Pecos area specimens in his west Texas sample, but a list of individual burials is not provided.

Recent cultural resource management work in the El Paso/ Fort Bliss area, and perhaps elsewhere in the region, may well have produced additional human remains, accounts of which are not yet available. A recent summary of mortuary data on Lower Pecos Archaic (Turpin et al. 1986) suggests that, like the Colorado Woodland and the Central Plains Archaic, a sample suitable for bioarcheological analysis now exists.

Current Issues in Southwest Bioarcheology

In some areas, the current task for bioarcheologists is the basic description and documentation of small, gradually accumulating population samples, particularly those with non-sedentary, low density adaptation types. But in the study of the formative peoples of the Southwest, the Anasazi and Pueblo, the Mogollon, the Hohokam, etc., there are several research issues which are briefly mentioned here as they may help to characterize the nature of current bioarcheological research.

The "disappearance" of the Anasazi from the twelfth and thirteenth century population centers of the Colorado Plateau—Mesa Verde, Chaco Canyon, the Kayenta area—has been attributed to both cultural and environmental causes including population pressure (Davis 1965), poor sanitation and disease (Colton 1936), and decreased population fitness due to climatic deterioration and undermining of the agricultural resource base (Kunitz 1970; Kunitz and Euler 1972). The generally accepted explanation is that climatic fluctuations, such as changing precipitation patterns, drought, reduced length of growing season, reduced agricultural yields and necessitated migration as an adaptive response (Eider et al. 1979). But no single environmental or cultural factor explains the multiple abandonments and variation in settlement patterns and land use during Southwestern prehistory (Cordell 1984:312; Kohler and Matthews 1988:538).

The question for bioarcheologists is whether abandonment era skeletal populations exhibit evidence of demographic decline and increased physiological stress at periods for which dendroclimatological and palynological data document environmental fluctuations detrimental to agricultural production. Two studies that addressed this question (Berry 1983; Stodder 1984) led to similar conclusions: that amplifications in physiological stress patterns in Anasazi populations are more immediately attributable to increased population density in aggregated settlements (aggregation being one adaptive response of the Anasazi to climatic disturbance) than to the effects of environmental fluctuation on diet and subsistence (Berry 1983:432; Stodder 1984:162).

Environmental constraint on agriculture is certainly a crucial factor to be considered in the investigation of prehistoric health in the Southwest, but diet is only one of several aspects of adaptation which in combination ultimately produce the specific patterns of morbidity and mortality recorded in the remains of human populations. This leads to more fundamental questions about the nature of Anasazi diet and the degree of agricultural dependence and sedentism in a region where the accumulating paleoclimatic evidence indicates that the inhabitants must have been adapted to environmental diversity caused by both high and low frequency fluctuations in precipitation, temperature, etc. (Dean et al. 1985:542).

Cribra orbitalia and porotic hyperostosis, cranial lesions that are fairly common in prehistoric Southwestern and other populations, were once thought to be evidence of fatal inherited anemia (Miles 1975; Zaino 1967). Subsequent studies attributed the lesions to iron deficiency anemia, related to the low amount of available iron in a high corn diet El-Najjar 1976). Endemic dietary anemia, caused by the synergistic enhancement of weaning stress syndromes and high carbohydrate, low iron diet, has served as somewhat of a paradigm in Anasazi paleopathology. Kent (1986) argues however, that the anemia evidenced by cribra orbitalia and porotic hyperostosis is independent of diet and is the result of aggregated settlement and the enhancement of infectious disease transmission attendant to increased human population density (1986:605).

Where we once understood the Anasazi to be sedentary agriculturalists, increasingly dependent upon corn as the major dietary staple, recent (and somewhat controversial) suggestions are that the Anasazi were not as sedentary as imagined (Gilman 1987), and that prehistoric Anasazi diet was not primarily dependent upon corn or other plant foods (Kent 1986:627). Long-held assumptions about Anasazi subsistence and settlement patterns are being questioned, and bioarcheological research is of increasing relevance.

As more detailed information about prehistoric adaptation is available through paleoclimatic evidence, coprolite studies, elemental analysis of bone, and the increasingly complex and detailed archeological data base, it becomes more difficult and decreasingly justified to generalize over long time periods or broad geographical areas. (Pecos Pueblo should not serve as the stereotypical prehistoric Southwestern population, nor should Pueblo Bonito.) At the same time, we must recognize that the questions we ask are, above all, questions about human biocultural evolution. Research on life expectancy, disease, and stress profiles portrayed in bioarcheological studies of human populations will reflect some trends common to biocultural development in all cultures. The increase in infectious disease with increased population density is one such trend.

The investigation of the nature of Chacoan social and economic organization (see Simmons, Chapter 6 this volume for a discussion of the Chaco Phenomenon) is another area in which Southwestern bioarcheology plays a role. Biological distance studies (e.g., Corruccini 1972) have demonstrated the morphological (genetic) distinctiveness of the Pueblo Bonito skeletal sample, and Akins (1986:75) distinguished between two groups from Pueblo Bonito. Additionally, Akins documents a difference in average stature between the population sample from Pueblo Bonito and that from small sites at Chaco Canyon (1986:137). This could be interpreted as the combined result of genetic differences in stature capacity and differential access to quality diet based on social divisions. Questions about the relationship (genetic and socio-economic) between residents of Chacoan outliers and of the Canyon proper could perhaps be addressed through bioarcheological studies.

Southwestern bioarcheology has much to add to our understanding of human adaptation, both in the regional context and in the broader context of human evolution. An almost limitless number of bioarcheology-related questions can be posed in considering the richness and variability of the prehistoric and the historic past in the Basin and Range region. But to address these questions we must begin with the systematic gathering of data at the site level, and at the level of the individual. If this survey of bioarcheological resources aids in the process of basic documentation at this level, then one of our goals will have been met.

THE BIOARCHEOLOGICAL RESOURCES SURVEY

Materials and Methods

The emphasis of this study is not on presenting or reanalyzing the bioarcheological data (although an attempt at this is made in Chapter 11), but rather on an effort to define and summarize the resource base in an archeologically and biologically meaningful manner, and to characterize and assess the extant bioarcheological data base. It is impossible to design research when the potential resources have not been defined.

The extent to which the bioarcheological resources of the New Mexico portion of the Basin and Range region remain an unquantified and undefined enigma is revealed in New Mexico's state plan for cultural resources management:

> We fervently hope someone will, one day, be encouraged to draw all the burial data together for each developmental period in New Mexico. We think such a sample would exceed 5,000 burials in all and be quite worthwhile (Stuart and Gauthier 1981:245).

In fact, the results of this survey, incomplete as it must surely be, indicate that more than 11,000 burials have been excavated from archeological sites in New Mexico. Stuart and Gauthier pose many research questions which could and should be addressed with bioarcheological data, but unlike questions pertaining to archeological sites, there is no way for them to assess the feasibility of addressing any of the bioarcheological research problems they identify. We hope that this report will aid in the design and implementation of bioarcheological research in the Basin and Range region and adjacent parts of the Southwest.

SOURCES

Information from several types of sources was used to compile the bioarcheological data presented here. The archeological site files from the Office of the State Archeologist of Colorado, the Historic Preservation Division of New Mexico, and the Texas Historical Commission were queried, with varied results. None of these systems is designed for retrieval of burial-related data. In Colorado and Texas, the site lists seem to be relatively complete given the particular problems of both systems, but there were some surprising omissions, including some sites with burials described in recent publications.

In the New Mexico Archeological Records Management System, the process of condensing site data into a brief list of significant features results in a peculiarly biased representation of sites with burials. The great majority of New Mexico sites yielding burials are Anasazi habitations, and burials are rarely perceived as significant or definitive features of such sites. Thus Salmon Ruin, where more than one hundred individuals were recovered, is not among the sites listed as having burials, while, for many partially excavated or salvaged sites, a fragmentary burial constitutes a definitive and significant feature. In fact, this was helpful in obtaining information on small sites, but it does demonstrate the relative insignificance afforded to human remains by archeologists.

Other sources of data include published books, monographs and journal articles, dissertations and master's theses, papers and records on file at the Colorado Preservation Office, the Laboratory of Anthropology of the Museum of New Mexico and at several museums and universities, papers presented at professional meetings, and the so-called gray literature—the cultural resources management reports which abound with information, but which are not readily available outside their general region of concern. Although a concerted effort was made to systematically search for burial data in CRM report series, it is probable that specific reports and perhaps whole series of reports were overlooked due to time constraints and to the very limited geographic distribution of these reports. This might especially be true of the southeastern New Mexico and the Texas portions of the study area, as these areas were not visited by project personnel.

Data Recording

Data for each site were recorded on bioarcheology site forms. Site data collected includes: the site name, number, location—state, county, geographic province or topographic region—site type, cultural and temporal affiliation, whether the skeletal material was collected during testing, salvage, or larger scale excavation, the number of individuals in the assemblage from the site, references pertaining to the site and/or burials, and the types of bioarcheology data available on the burials.

Data on specific burials were recorded on skeletal data forms. Age, sex, estimated stature, pathologies and anomalies, and culturally induced modifications of skeletal elements (such as artificial cranial deformation) were recorded. The inclusion of osteometric data and observations of nonmetric discrete and anthroscopic traits in a report was noted on the skeletal data form, but, in general, these data were not recorded. No additional analysis of skeletal material was undertaken in the context of this research.

Several sets of codes were used in recording the bioarcheological data. The most important are for the cultural affiliation and adaptation types. The cultural affiliation codes are listed in Table 12. This list reflects the majority, but not all, of the codes developed for the annotated bibliography of the Basin and Range portion of the Southwestern Division Overview. The cultural affiliation code system represents a compromise between the proliferation of highly localized phase sequences for the project area, and the opposite extreme of culturally meaningless lumping. Some lumping has inevitably resulted, particularly in the use of the Mimbres phase sequence for the (non-Jornada) New Mexico Mogollon.

The list of adaptation types used to group bioarcheological resources from the Basin and Range region is presented in Table 13. The adaptation types provide a basis for the assessment and interpretation of archeological and bioarcheological resources on a broad, multiregional biocultural level.

Table 12.
Cultural Affiliation Codes used for Basin and Range Bioarcheological Survey

Period	Code	Affiliation
Paleo-Indian	4171	Cody Complex
Archaic: General	4007	Archaic Period
	4008	Early Archaic Period
	4009	Middle Archaic Period
	4010	Late Archaic Period
Trans–Pecos Texas	4022	Early Archaic Period (8000–6000 B.C.)
	4023	Middle Archaic Period (6000–3000 B.C.)
	4024	Late Archaic Period (3000–500 B.C.)
Northeast New Mexico/Southeast Colorado	4025	Plains Archaic Period (5000 B.C.–A.D. 1000)
South and Central Colorado	4150	McKean Complex
Late Prehistoric and Protohistoric Pueblo/Pecos Stages	4129	Pueblo
	4016/4027	En Medio Phase
		Basketmaker II (A.D. 0–400)
	4028	Basketmaker III (400–700)
	4029	Pueblo I (700–900)
	4030	Pueblo II (900–1100)
	4031	Pueblo III (1000/1100–1275/1300)
	4032	Pueblo IV (1275/1300–1600)
	4033	Late Pueblo IV/Contact (1539–1600s)
Mogollon/Mimbres	4035	Pine Lawn Phase (1/250–500/550)
	4036	Georgetown Phase (500/550–650/700)
	4037	San Francisco Phase (650/700–850/900)
	4038	Three Circle Phase (850/975–1000)
	4039	Mangus Phase (925–975)
	4040	Classic Mimbres Phase (975–1150)
	4041	Animas Phase (1150/1175–1375/1400?)
	4042	Salado Phase (1300?–1450?)
	4043	Mogollon
Mogollon/Jornada North	4044	Jornada North
	4045	Capitan Phase (900–1100)
	4046	Three Rivers Phase (1100–1200)
	4047	San Andres Phase (1200–1400)
Sierra Blanca Region	4068	Glenco Phase (900–1200)
	4069	Corona Phase (1100–1200)
	4070	Lincoln Phase (1200–1300+)

Period	Code	Affiliation
Mogollon/Jornada South	4049	Jornada South
	4050	Mesilla Phase (900–1100)
	4051	Dona Ana Phase (1100–1200)
	4052	El Paso Phase (1200–1400)
Mogollon/Eastern Periphery	4063	Querecho Phase (950–1100)
	4064	Maljamar Phase (1100–1300)
	4065	Ochoa Phase (1300–1450+)
Upper Middle Pecos	4073	18 Mile Phase (800–1000)
	4074	Mesita Negra Phase (1000–1200)
	4075	McKenzie Phase (1200–1350)
	4076	Post McKenzie Phase (1350 –?)
Late Prehistoric Trans–Pecos Texas	4054	Late Prehistoric Period (500 B.C.– A.D. 1500)
Big Bend and Junta de los Rios Areas	4058	La Junta Focus (1200–1400)
	4059	Concepcion Focus (1400–1700)
Late Prehistoric: Northeast New Mexico, South-central Colorado, Colorado Front Range	4080	Plains Woodland
	4081	Pueblo (200–1000)
	4153	Early Ceramic Period (A.D. 1–1000)
	4154	Colorao Plains Woodland (A.D. 1–1000)
	4155	Graneros Phase (500–1000)
	4158	Middle Ceramic Period (1000–1550)
	4159	Apishapa Phase (1000–1200)
	4160	Upper Republican Phase (1100–1300)
	4161	St. Thomas Phase (1000–1150)
	4162	Sopris Phase (1150–1250)
	4163	Upper Purgatoire Complex (1000–1250+)
Historic: Native Americans	4098	Eastern Pueblo
	4099	Western Pueblo
	4100	Navajo
	4101	Navajo
	4102	Navajo
	4103	Navajo
	4107	Ute
	4109	Southern Pueblo–Jumano
	4111	Apache
	4114	Plains affiliation
	4116/4132	Historic Native American affiliation unkown
Historic: Hispanic and Anglo	4118	Spanish Contact/Colonial Period (1539–1821)
	4119	Mexican/Santa Fe Trail Period (1821–1846)
	4120	U.S. Territorial Period (1846–1912)
	4121	(New Mexico) Statehood Period (1846–1912)
	4122	Historic
	4133	Hispanic
Additional Unknown Categories	4128	Prehistoric unknown
	4134	Historic unknown
	4135	Unknown

Notes: These codes and others were developed for use in the annotated bibliographic citation listings. Only those code sequences used in bioarcheological classification are listed here.

Sources: Cassells (1983); Eighmy (1984); Irwin–Williams (1973); Jelinek (1967); Kelley et al. (1940); Kelley (1984); Lehmer (1958); Lent (1982); Mallouf (1985); Museum of New Mexico (1982); Stuart and Gauthier (1981).

Table 13.
Adaptation Types Used in Classifying Bioarcheological Resources

Code	Description	Cultural Groups/ Periods
4202	Focalized hunter–gatherers	Paleo-Indian
4203	Broad spectrum highly mobile hunter–gatherers	Archaic; Trans–Pecos Late Prehistoric
4204	Hunter–gatherers with experimental horticulture	Terminal Archaic/Initial Formative
4205	Semi-sedentary horticulturalists with considerable reliance on hunted and gathered resources	Most Formative-type groups: Mimbres; Jornada; Anasazi; Upper Purgatoire Complex/Sopris Phase
4206	Sedentary primary horticulturalists	Classic Chacoan; Protohistoric and Historic Pueblos
4207	Semi-sedentary specialized hunters/horticulturalists	Late Prehistoric and Protohistoric SE New Mexico; Querecho Phase and Post-McKenzie Phase; Carlana Focus (prehorse) Apache
4208	Exploration	Contact Period/Early Historic Europeans transitory in area (ca 1539–1600)
4209	Mission	Colonial Period/Early Historic Europeans residing in area—soldiers; colonists; missionaries (ca 1600–1700)
4211	Horse nomads	Ute; Apache
4212	Herder/horticulturalists	Navajo
4213	Assimilated natives	Genizaros (European/Native mixed)
4215	Ranchers; agriculturalists; miners; military	Historic Hispanic and Anglo
4216	Reservation adaptation	Historic to early modern native

Three additional sets of codes were used to record bioarcheological data. The different types of literature and other sources yielding bioarcheological data are enumerated in Table 14. These range from standard archeological site forms and museum catalog records—the only sources of data on many burials—to intensive analyses reported in journal articles, dissertations, and monographs.

Even without knowing the number of burials and the volume of relevant literature that would be encountered during the course of the present research, it was clear from the outset that it would be impossible to record all the actual data. In order to document the existence of as much of this data as possible, thereby allowing for description and evaluation of the extant data base, the specific categories of bioarcheology data available for each assemblage were listed. These categories, summarized in Table 15, range from age and sex data on burials (the minimal information set) to intensive population-oriented paleodemography and paleoepidemiology studies.

As a further means of characterizing the resource base, sites were classified according to a series of general site types, listed in Table 16.

Data Presentation

The bioarcheological data base for the Colorado, New Mexico, and Texas portions of the Basin and Range region is presented in Appendixes A, B and C, respectively. In addition to the site data, cultural affiliation, adaptation type, and other information described above, the number of subadults and adults from each site are listed in these tables. Subadults include all individuals aged 16 and younger. Multicomponent sites are listed with more than one cultural affiliation code, and sometimes with more than one adaptation type. Many of the sites are either multicomponent or imprecisely dated, with, for example,

Table 14.
Bioarcheology Citation Types

Type	Description
1	Osteology (physical anthropology) book or monograph
2	Chapter in osteology book or monograph
3	Journal article
4	Published archeology report or monograph
4A	Appendix of archeology report or monograph
5	Master’s thesis or doctoral dissertation
6	Paper presented at professional meeting
7	Cultural resource management limited distribution report
7A	Appendix of limited distribution report
8	Newspaper or magazine story
9	Annual report
10	Unpublished report or correspondence
11	Museum records
12	Archeological site form
13	Archeology or history book
14	National Register of Historic Places nomination form

Table 15.
Bioarcheology Data Categories

Category	Description
1	Age estimation
2	Sex assessment
3	Craniometric data
4	Postcranial metric data
5	Cranial nonmetric traits
6	Postcranial nonmetric traits
7	Skeletal or dental pathology
8	Skeletal (or dental) congenital or developmental anomalies
9	Cultural modification of skeletal or dental elements
10	Histological
11	Synthetic

Table 16.
Site Types Used in Recording Bioarcheological Resources

Site Type	Description
1	Quarry or mine
2	Rockshelter (or cave) with habitation structure
3	Rockshelter Wimited activity area or artifact scatter
4	Open site–camp
5	Open site–limited activity area or artifact scatter
6	Burial site–crevice
7	Burial site–cairn
8	Burial site–tree/scaffold
9	Burial site–pit
10	Shrine
11	Isolated structure –jacal
12	Small pueblo/unit site
13	Pueblo/pithousevillage–3+roomblocksor5+pitstructures
14	Large village/town–15+ roomblocks or 4 large houses
15	Cemetery
16	Mission
17	Site type unknown
18	Military installation–fort or presidio
19	Burial site–multiple prehistoric
20	Burial from a salvaged or disturbed site or feature

a time range of Pueblo I through Pueblo III. But individual burials were rarely dated or identified as belonging to one component or another. In the rare cases where there were specific burials from two or more components of a site, the site was listed separately for each component, and the number of burials adjusted per affiliation.

Documenting the number of individuals from each site proved to be more complicated than expected. For many sites the number of individuals listed in the field report or site description (N–F in the tables) differs from the number of individuals recorded after laboratory analysis (N–L). These discrepancies arise from several sources. First, the number of burial features does not always equal the number of individuals, as in the case of a double or multiple burial. Field determination of the number of individuals represented by an assemblage of bone is not always the same as that determined in the laboratory. Human remains from nonburial contexts scattered or disturbed are not always recognized as human in the field, and many times this bone is not even included in the written analysis of the human remains assemblage. Incomplete, immature, or otherwise poorly preserved portions of collections were routinely discarded by some archeologists, and by some physical anthropologists as well. Specimens exhibiting pathologies or other features of particular interest were retained.

Methods of reporting, of analysis, collection, and curation regularly introduce bias into the bioarcheological resource base, in addition to those which result from mortuary behavior and excavation strategy. As our interest is in identifying what resources actually exist, and in assessing their research potential, the laboratory count (N–L) rather than the field count (N–F) is used in this report; it is presumably more accurate.

In addition to the site data tables, Appendix tables A.5, B.15, and C.2 list the references for each site by county. The appendixes hardly constitute good reading, but as data not elsewhere presented in a systematic, unified manner, they are almost certainly the most useful product of this bioarcheological resources survey. (The reader interested in the bioarcheology of Chaco Canyon is referred to Akins' 1986 report, the detail and quality of which we have not attempted to reproduce here.)

In the succeeding chapters, the bioarcheological resource data base is described and summarized at three levels. First in terms of geographic distribution, by state and county, and as distributed in several subareas of the Basin and Range region, which are illustrated in Figure 21. Some of the subareas are

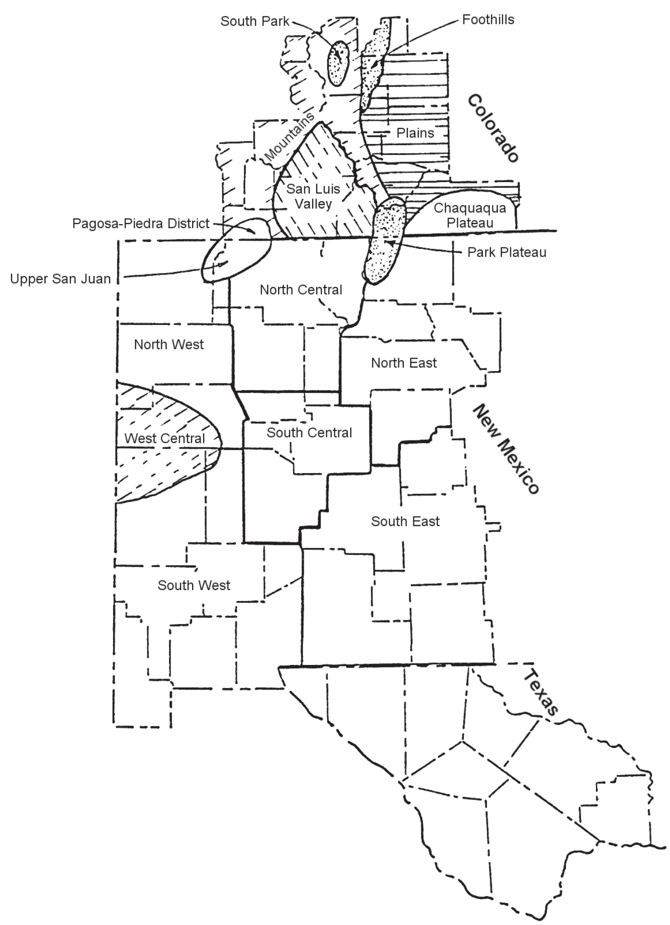


Figure 21. Subdivisions in the Basin–Range bioarcheological resources survey

essentially the same as those used in the preceding chapters, but others have been introduced here as a more convenient means of identifying specific groups of bioarcheological resources which are affiliated either culturally or by their location in a recognized geographic or topographic area.

In Chapter 10, the bioarcheological resources are summarized at the second and third levels—by cultural affiliation, within the framework of the adaptation types. The bioarcheological data, what we know about the biology of these populations from skeletal (and other) analyses, are summarized in Chapter 11.

THE GEOGRAPHIC DISTRIBUTION OF THE BIOARCHEOLOGICAL RESOURCES

Colorado

Bioarcheological resources are not abundant in south-central Colorado. A great proportion of recorded sites are open lithic (or other) artifact scatters, and much of the area is undersurveyed. The non-sedentary adaptation and specific types of mortuary behavior of the Plains and Mountain area peoples, both historic and prehistoric, are not conducive to the preservation or location of human remains. In the southernmost parts of the study area, Las Animas and Archuleta counties in particular, there are sites with more permanent architecture of Pueblo and Upper Purgatoire affiliation.

Sixty-one sites in the Colorado portion of the study area were identified as yielding bioarcheological resources. Thirty-eight of these are prehistoric sites and fourteen have historic cultural affiliations. A total of 15,368 cultural resources have been identified from the project area, in Colorado, but when isolated finds and sites of historic Anglo affiliation are deleted, the adjusted count is 8,029. The percentage of the adjusted total yielding bioarcheolgical resources is 0.76, as shown in Table 17.

The distribution of bioarcheological resources in the Colorado counties generally mirrors that of the number of sites. The greatest concentration of resources for purposes of the present study is in Las Animas County, particularly in the Trinidad area. No bioarcheological resources are known from Chaffee, Hinsdale, Mineral, or Teller counties.

Four physiographic subareas were defined within the Colorado portion of the Basin and Range region: Foothills, Plains, San Luis Valley, and Mountains. The subareas are generally based on those defined in the Colorado "RP–3" Resource Protection Planning Process reports on the Mountains and Plains Units (Guthrie et al. 1984 and Eighmy 1984), and on the writings of Baker (1964) and Simpson (1976) on southeastern Colorado. Bioarcheological resources from these areas are summarized in Table 18.

Table 17.
Archeological and Bioarcheological Resources in Colorado Counties

County	Sites Adjusted N	Bioarcheological Resources Prehistoric	Historic	Total	%
Alamosa	395	3	1	4	1.01
Archuleta	940	5	0	5	0.53
Chaffee	172	0	0	0	0.00
Conejos	308	2	0	3	0.97
Costilla	72	0	1	1	1.39
Custer	3	1	0	2	66.67
Douglas	480	0	0	1	0.21
El Paso	211	1	1	3	1.42
Fremont	297	1	0	1	0.34
Hinsdale	99	0	0	0	0.00
Huerfano	224	1	2	3	1.34
Lake	237	0	0	0	0.00
Las Animas	3,329	19	2	23	0.69
Mineral	84	0	0	0	0.00
Park	148	2	1	3	2.03
Pueblo	379	2	3	6	1.58
Rio Grande	188	0	2	2	1.06
Saguache	568	1	1	4	0.18
Teller	37	0	0	0	0.00
TOTAL	8,029	38	14	61	0.76

Notes: Adjusted sites or components exclude isolated finds and Historic Anglo; Totals include sites of unknown affiliation

Table 18.
Number of Excavated Sites with Bioarcheological Resources In Colorado Study Areas

Study Area	Total	Prehistoric	Historic	Unknown
Foothills	3	1	1	1
Plains	34			
Plains area		6	4	2
Chaquaqua Plateau		8	0	2
Park Plateau		9	3	0
San Luis Valley	12	6	4	2
Mountains	12			
Mountains		2	2	2
South Park		1	0	0
Pagosa–Piedra		5	0	0
TOTAL	61	38	14	9

The Foothills area includes parts of the Colorado Front Range in Teller, Douglas, and El Paso counties. Three sites in the bioarcheology resource data base, listed in Appendix A.1, are from this small portion of the project area.

The Plains area extends along the eastern third of the study area, south to the Chaquaqua and Park plateaus in Las Animas County. These are part of the Mesa de Maya in the Raton Mesa Group which extends southwest into the Taos/Cimmarron area of north-central New Mexico. Thirty-four bioarcheological resource sites (six prehistoric, four historic, and two of undetermined affiliation) are known from this area which includes Las Animas County, the eastern three-fourths of Huerfano County, Pueblo County, eastern Fremont and Custer counties, Teller, El Paso, and eastern Douglas County. Bioarcheological resources from the Plains portion of the study area are listed in Appendix A.2.

The San Luis Valley, which includes Rio Grande, Alamosa, Costilla, Conejos, and part of Saguache County has twelve sites known to have yielded bioarcheology resources. Given that this has been an area of relatively enthusiastic activity by avocational archeologists, this number might be too small. The San Luis Valley sites are listed in Appendix A.3.

The Mountains area encompasses Lake, Chaffee, Fremont, Hinsdale, Mineral, western Saguache, western Custer, and the higher portions of Park County. This is a varied region—both topographically and archeologically. Within Park County is the South Park subarea. The Pagosa–Piedra District located in the southwesternmost part of the Colorado study area in Archuleta County, is also included in the Mountains area. Although the bioarcheological resources from Archuleta County are poorly documented (the number of sites is far too low), the Pagosa–Piedra District is rich in Anasazi archeology. The twelve bioarcheology sites in the Mountains area are listed in Appendix A.4.

New Mexico

The New Mexico Archeological Records Management System contains approximately 63,000 prehistoric and historic archeological resources at the time of this writing; 59,941 of them are located within the Basin and Range region. Excavated or collected bioarcheological resources are known from 0.87% (523) of these sites. (Sites at which the presence of bone was noted, but from which no human remains were collected are not included here.) There is no doubt that this survey is incomplete, perhaps more so for some areas (southeast and northwest New Mexico) than for others, although there was no intentional geographic bias in data collection. Priority was given to documenting prehistoric resources over the historic resources.

The distribution of the prehistoric and historic archeological and bioarcheological resources in New Mexico counties are shown in Tables 19 and 20. Approximately 45% of the bioarcheological resources in New Mexico are from San Juan, McKinley, and Rio Arriba counties which encompass the San Juan Basin. Bioarcheological resources are also relatively abundant from Grant and Catron counties—the Mimbres area, and Santa Fe and Sandoval counties in the Upper Rio Grande

Table 19.
Prehistoric Archeological and Bioarcheological Resources in New Mexico Counties

	All Sites	Bioarcheological Resources	
County	N	N	%
Bernalillo	803	15	1.87
Catron	2,177	38	1.75
Chaves	1,071	7	0.65
Colfax	726	3	0.41
DeBaca	108	1	0.93
Dona Ana	1,636	1	0.61
Eddy	1,729	16	0.93
Grant	1,171	30	2.56
Guadalupe	397	1	0.25
Harding	28	1	3.57
Hidalgo	199	8	4.02
Lincoln	304	10	3.29
Los Alamos	909	7	0.77
Luna	364	4	1.10
McKinley	6,228	86	1.38
Mora	41	0	0.00
Otero	1,147	13	1.13
Rio Arriba	3,025	60	1.98
Sandoval	5,079	31	0.61
San Juan	10,873	81	0.74
San Miguel	464	4	0.86
Santa Fe	1,428	32	2.24
Sierra	944	2	0.21
Socorro	1,001	9	0.90
Taos	269	13	4.83
Torrance	180	3	1.67
Valencia	355	5	1.41
TOTAL	44,526	494	1.11

Table 20.
Historic Archeological and Bioarcheological Resources in New Mexico Counties

	All Sites	Bioarcheological Resources	
County	N	N	%
Bernalillo	243	1	0.41
Catron	181	2	1.10
Chaves	83	0	0.00
Cibola	568	1	0.18
Colfax	280	0	0.0
DeBaca	15	0	0.00
Dona Ana	173	0	0.00
Eddy	190	0	0.00
Grant	165	2	1.21
Guadalupe	195	0	0.00
Harding	11	0	0.00
Hidalgo	34	0	0.00
Lincoln	104	1	0.96
Los Alamos	286	0	0.00
Luna	61	0	0.00
McKinley	3,793	2	0.53
Mora	25	1	4.00
Otero	200	0	0.00
Rio Arriba	1,114	1	0.90
Sandoval	1,145	1	0.87
San Juan	5,368	4	0.74
San Miguel	176	2	1.14
Santa Fe	384	2	0.52
Sierra	173	0	0.00
Socorro	243	0	0.00
Taos	106	0	0.00
Torrance	47	1	2.13
Valencia	52	0	0.00
TOTAL	15,415	21	0.14

area which includes the Galisteo and Santa Fe districts.

To facilitate presentation and summary of the bioarcheological resource data for New Mexico, seven geographical study areas, listed in Table 21, are used. These are based on the distribution of the bioarcheology resources, and they divide culturally meaningful groups of bioarcheology sites less than Stuart and Gauthier's (1981) discussion units. Bioarcheological resources from these areas, and the geographically or culturally defined groups of sites within them (i.e., the Chaco Canyon, Jornada South, and Gallina site groups), are listed in Appendix B.1–B.14. (For a list of bioarcheology sites by site number for each county, see Appendix B.15.)

The area most abundant in bioarcheological resources is of course northwest New Mexico—the San Juan Basin in San Juan, McKinley, and part of Cibola counties, the Upper San Juan/Navajo Reservoir Area in San Juan and Rio Arriba counties. Thirty-one percent of the bioarcheological resources (sites, not individuals) from the New Mexico portion of the study area are from the Northwest quadrant.

Table 21.
Number of Excavated Sites or Components with Bioarcheological Resources in New Mexico Study Areas

Study Area	Total	Pehistoric	Historic
Northwest New Mexico*	163		
Chaco Canyon		44	0
San Juan, McKinley counties		88	4
Upper San Juan area		22	3
West Central New Mexico	48	47	1
Southwest New Mexico	85		
Mimbres		80	0
Non-Mimbres		0	5
Southeast New Mexico*	50		
Jornada North		29	0
Jornada South		12	0
Non-Jornada		7	0
South Central New Mexico	32	29	3
North Central New Mexico*	135		
Taos/Cimmarron District		16	0
Gallina Sites		41	0
North Central		73	2
Northeast New Mexico*	10	6	3
TOTAL	523	494	21

* These area totals include sites of unknown affiliation

Twenty-six percent of the bioarcheology sites are in the area designated here as north-central New Mexico: Santa Fe, Sandoval, Los Alamos, and Taos counties, and most of Rio Arriba County. This includes the Middle and Upper Rio Grande Valley, the Taos/Cimmarron District in the extreme northern part of the state, and the Gallina (or Largo–Gallina) culture sites in the highlands of Rio Arriba and Sandoval counties.

Mogollon/Mimbres and non-Mimbres sites in Hidalgo, Luna, Grant, Dona Ana, Sierra, southern Catron, and western Socorro counties in southwest New Mexico account for 16% of the bioarcheology sites recorded here. Fifty sites in southeast New Mexico—DeBaca, Lincoln, Chaves, and Otero counties—are known to have bioarcheological resources, comprising 10% of the New Mexico sample. These are grouped into non-Jornada, Jornada South (sites in the Hueco Mountains, the Guadalupe Mountains, part of Dona Ana County, Fort Bliss, and the Carlsbad area in Eddy County), and Jornada North (sites in the Capitan Mountains, the Three Rivers area, the Sacramento and Sierra Blanca mountains, the Roswell area, and Mesacalero Ridge in Chaves County).

West-central New Mexico, which includes the Acoma–Laguna District, the Zuni and Zuni Salt Lake–Quemado areas, the Datil and Gallinas mountains, and McKinley County south of Gallup, has 9% of the bioarcheological resources, 48 sites.

The south-central New Mexico study area includes the Salinas District (Torrance County, Valencia, and Bernalillo counties), the Rio Grande and Rio Puerco valleys, southernmost Santa Fe County, and the eastern two-thirds of Socorro

County. Thirty-two sites, 6% of the New Mexico sample, are located in this study area.

Northeast New Mexico (Colfax, Harding, Mora, San Miguel, and Guadalupe counties) has the smallest number of bioarcheological resources—10 sites; or 2% of the sample. This eastern frontier area includes Pecos and Fort Union National Monuments, both sources of bioarcheological materials.

Texas

The Texas portion of the Basin and Range region includes nine counties, eight of which are known to have bioarcheological resources. The distribution of these and of the archeological resources by county are shown in Table 22, which is based on information provided by the Texas Historical Commission and in the Commission's publication by Biesaart et al. (1985), *Prehistoric Archeological Sites in Texas, a Statistical Overview*. The total number of sites in the counties, 4,242, was adjusted by subtracting the sites which were not excavated or tested. Uncollected human remains are not considered here as bioarcheological resources. The 39 prehistoric bioarcheology sites comprise 2.27% of the adjusted site total of 1,718. The two historic sites equal 0.86% of the 234 historic sites or components (not given in the table) in these counties.

The bioarcheology sites cluster in Brewster County and the Alpine and Big Bend areas, in the Hueco Mountains area in El Paso County, and in the Guadalupe Mountains and Rustlers Hills regions of northern Culberson County. Other sites are sparsely scattered in Hudspeth, Jeff Davis, Pecos, Presidio, and Terrel counties. No bioarcheological resources are known from Reeves county. Locational data on these sites are generally poor. As many could not be assigned to a provenience more specific than county, the subareas in Hicks' discussion of Trans–Pecos Texas archeology are not used here. The bioarcheological resources from the Texas portion of the study area are listed in Appendix C.1.

Table 22.
Archeological and Bioarcheological Resources in Texas Counties

	All Sites	Bioarcheological Resources		Adjusted Sites	
County	N	N	%	N	%
Brewster	598	12	2.00	398	3.02
Culberson	276	9	3.26	249	3.61
El Paso	2,407	*10	0.42	507	1.78
Hudspeth	380	3	0.79	257	1.17
Jeff Davis	66	2	3.03	34	5.89
Pecos	97	*1	1.03	64	0.00
Presidio	277	3	1.08	121	2.45
Reeves	5	0	0.00	7	0.00
Terrell	136	1	0.74	81	1.24
TOTAL	4,242	39 (+2 historic)	0.97	1,718	2.27

* Includes one site of historic affiliation

Note: Adjusted sites are tested and excavated prehistoric sites

CULTURAL AFFILIATIONS AND ADAPTATION TYPES FOR THE BIOARCHEOLOGICAL RESOURCES

Ann Lucy Wiener Stodder

This chapter consists of a series of tables in which the bioarcheological resources from the Basin and Range region are summarized by cultural affiliation and by adaptation type. The tables condense the site-specific affiliation and adaptation type data in the appendix tables, and allow us to identify gaps in the resource base and to briefly discuss some of the potential research topics relevant to each group of resources.

Synthesis and interpretation of a portion of the bioarcheological data, the biological information on these skeletal samples, are presented in Chapter 11. The nature and extent of the bioarcheology data base are quantified here in a general way, however, by listing the number of sites per cultural affiliation and per adaptation type for which information beyond age and sex assessment (data in categories 3–11; see Table 21 for the category list) for at least one individual is available. This is a generous measure of data availability because it does not require that all or even most individuals from a site have information in a category other than age and sex.

The data base would be more accurately represented by counting the number of individuals with data in each of the 11 categories, but in many instances it is impossible to make such a count because of the casual, anecdotal manner in which skeletal data are so often reported. For example, when we read that two individuals from a site exhibit cribra orbitalia, we do not know whether these were the only cases observed because there were only two individuals with the orbits preserved, or because in fact no other individuals with orbits have cribra orbitalia. This might seem persnickety, but in population-oriented research the importance of sample sizes and negative data (the absence of certain pathologies or traits) cannot be overstated. Preservation of skeletal remains is so variable that in any assemblage the observable sample size may differ for virtually every measurement, trait, and feature.

Focalized Hunter–Gatherers: Paleo-Indian

A single tooth constitutes the entire sample of human remains of Paleo-Indian affiliation from the Basin and Range region. Obviously this period represents a major gap in bioarcheological resources and data. The tooth was found in association with a Cody complex projectile point at site 5LA2232 on privately owned property in Las Animas County, Colorado. Notes attached to the site form indicate that the tooth was supposed to be analyzed, but no further information was available.

What could we learn about Paleo-Indian adaptation from one tooth? This of course depends upon what kind of tooth it is, deciduous or permanent, molar, canine, incisor or premolar, and how well it is preserved. Turner's investigations on the peopling of the New World—a topic of utmost importance in discussing the Paleo-Indians—are based on dental morphological traits including shovel-shaping of the incisors and the three-rooted first molar (Turner 1981a). In addition to recording data on these and other traits, odontometric (dental measurement) data from this individual could be compared to other Paleo-Indians and to later populations. Tooth size and morphological complexity (and attendant musculature and craniofacial features) are known to have decreased over time with the adoption of agriculture, the increase in cariogenic carbohydrates and softer foods in the diet (Carlson and Van Gerven 1973; Martin et al. 1984; Smith et al. 1984). Caries and dental wear also inform us about diet. The presence of enamel hypoplasias, depressed lines or bands in the surface of the tooth which form when enamel development is arrested during illness or other physiological disruption, would be informative as to the timing of stress incidents during early childhood, and might suggest the individual's age at weaning. This, in turn, is related to birth spacing in the population.

We would prefer a large and well preserved sample for every time period and cultural affiliation, but there is much to be learned from a tooth, as demonstrated by the years of paleontological research on the scanty remains of our homonoid ancestors, many of whom are represented solely by fragmentary dentition.

There are, of course, skeletal remains from Paleo-Indian sites outside the Basin and Range region, including the Cordon Creek Burial site in Larimer County, Colorado (Breternitz et al. 1971), and there are several research questions which might be addressed in addition to those mentioned with respect to the above tooth. Analysis of the ratios of strontium and calcium in bone samples would be useful in assessing the extent to which the so-called Big Game Hunters were dependent upon plant vs. animal food resources (e.g., Schoeninger 1979, 1981; Schoeninger and Speilmann 1986; Smith et al. 1984). Skeletal robusticity data on these highly mobile people would contribute to our understanding of the relationship between activity patterns and bone morphology (e.g., Brock 1985; Ruff and Hayes 1983a, b).

Highly Mobile, Broad Spectrum Hunter–Gatherers

Bioarcheological resources representative of these prehorticultural and nonhorticultural hunter–gatherers, summarized in Table 23, come from 34 sites in the Basin and Range region. Sites of McKean complex and Plains Archaic affiliation in Colorado have yielded five individuals, all adults. Other Archaic burials are located just outside the Basin and Range region in central Colorado including the Witkin Burial site in Adams County (Swedlund and Goodman 1966) and the Bradford House site III in Jefferson County (Finnegan 1978). Finnegan (1981) lists other Central Plains Archaic burial sites.

We found information on only one New Mexico Archaic site with human remains (Burnet Cave in Eddy County); I suspect there are at least a few more.

Most of the bioarcheology sites within this adaptation type are in Trans–Pecos Texas, and many of these are not very finely dated. Fifteen sites are classified as Mid-Archaic to Late Prehistoric, and five as Late Archaic to Late Prehistoric. This is partly due to the early excavation of the sites, but it also reflects the very long (ca 8,000 years) period of adaptive stability and conservatism in the Big Bend and Lower Pecos area foraging strategies (Shafer 1981).

As discussed in Chapter 9, human remains from the Archaic and from peoples with Archaic-type adaptation are not abundant, nor are they likely to become so. But these constitute slowly accumulating collections which should be systematically analyzed. The 70 individuals found at sites documented here are largely unstudied; bioarcheological data other than age and sex were available for assemblages from only four of the 34 sites in this adaptation type.

Hunter–gatherer adaptation is based on the utilization of a diverse resource base, and extraction regimes are highly specialized at the local, or catchment area level. It would be interesting to compare hunting and gathering populations from different environmental settings within the Southwest–Big Bend/Lower Pecos area, the Hueco Bolson, and the Little Colorado or San Juan Basin areas. If sample sizes someday permit (currently they do not), skeletal analysis might also be addressed to Reed's suggestion that Archaic peoples of Upper Rio Grande complex affiliation from the area of Rio Grande, Hinsdale, and Mineral counties in southern Colorado are a local variant of the Oshara tradition of northwest New Mexico, while Archaic people from the east slope of the Rockies are more closely associated with Plains Archaic traditions (Reed 1984:30).

Hunter–Gatherers with Experimental Horticulture: Terminal Archaic/Initial Formative Peoples

The era of transition, when people first began to utilize horticulture as a limited source of supplementation to the hunted and gathered subsistence base, is represented by a sample of 54 adults and 10 subadults collected from 15 sites in the project area. As indicated in Table 24, there is a substantial discrepancy between the number of individuals reported excavated in field reports (84) and the number reported in the bioarcheology literature (64). This reflects selective curation of poorly preserved bone from the Pine Lawn phase SU site (Kelly 1940, 1941; Martin 1940, 1941). This is typical of Mogollon/Mimbres sites in southwestern New Mexico.

The Late Archaic in southeastern New Mexico is represented by 14 burials from five sites. Four are in Eddy County and Fresnal Shelter is in Otero County. In northwest New Mexico, three sites in the Upper San Juan/Navajo Reservoir District yielded a total of 11 burials from the Los Pinos phase

Table 23.
Bioarcheological Resources Summary for Adaptation Type 4203 – Broad-Spectrum, Highly Mobile Hunter–Gatherers: Archaic and Trans–Pecos Late Prehistoric

Affiliation	Code	N	Sites F	L	Individuals S	A	Categories 3–11
Colorado							
Plains Archaic	4025	3	4	4	0	4	1
McKean Complex	4150	1	1	1	0	1	1
Texas							
Middle Archaic	4023	1	9	9	2	7	1
Mid-Late Archaic	4023–24	1	1	1	1	0	0
Early to Late Archaic	4022–24	1	2	1	0	1	0
Late Archaic	4024	3	4	9	3	6	0
Mid-Archaic to Late Prehistoric	4023–54	15	17	16	5	12	1
Late Archaic to Late Prehistoric	4024–54	5	19	19	4	15	0
Late Prehistoric	4054	3	8	8	1	7	1
New Mexico							
Archaic	4007	1	2	2	0	2	0
TOTAL		34	67	70	16	55	5

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

Table 24.
Bioarcheological Resources Summary for Adaptation Type 4204 – Hunting and Gathering with Experimental Horticulture: Terminal Archaic and Initial Formative

Affiliation	Code	Sites N	Sites F	Sites L	Individuals S	Individuals A	Categories 3–11
Colorado							
Early Woodland	4154	5	5	5	0	5	2
New Mexico							
Late Archaic	4010	5	14	14	2	12	1
En Medio Phase/Basketmaker II	4016–27	4	11	11	4	7	2
Pine Lawn Phase	4035	1	54	34	4	30	1
TOTAL		15	84	64	10	54	6

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

(Basketmaker II): the Power Pole site, the Cemetery site (early component), and Valentine Village (Berry 1983; Eddy 1966). Stuart and Gauthier observe that sites from this time period (800 B.C.–A.D. 200) are difficult to identify; at the time they were writing, there were only about 200 of them recorded in New Mexico (1981:408). The eight bioarcheology sites actually constitute a fairly high percentage of these compared to the overall proportion, 1.11% of prehistoric sites with burials in the New Mexico portion of the Basin and Range region.

In the Colorado portion of the study area, there are five bioarcheology sites of Early Woodland affiliation, each with a single adult burial. These include two sites in the Plains area: the Red Creek Burial site in El Paso County (Butler et al. 1986), the Dave Fountain site in Pueblo County (Finnegan 1979), sites 5AL7 and 5AL8 in the San Luis Valley, and the Lake George Burial in the Foothills. Additional Colorado Woodland burial sites are listed in Butler et al. (1986).

The human bone assemblages (or portions of them) from six of the 15 sites in the Terminal Archaic/Initial Formative adaptation type group have been analyzed.

In discussing the "acceptance of agriculture," Cordell (1984:173) points out that although population pressure has generally been invoked as the reason for adopting this labor-intensive subsistence strategy, maize, squash, and beans may at first have been casually planted, with little subsequent labor input, as a supplement to the Archaic dietary mix (1984:178). This suggests the best of both worlds; a broadly based diet enhanced by an additional, optional resource that could perhaps allow a greater degree of sedentism, while not requiring labor intensification. If maize was harvested after the fruiting season of most wild plant foods, it would not have disrupted the seasonal round.

In this optimistic model of the adoption of cultigens, we would expect Terminal Archaic and Initial Formative populations to be epidemiologically intermediate between hunter–gatherers and horticulturalists. They might have been less vulnerable than other hunter–gatherers (and less than those more dependent upon agricultural production) to the effects of seasonal fluctuations in food supply and the effects of irregular climatic fluctuations on agricultural yields. They could be more sedentary than other hunter–gatherers, but while living in small, dispersed settlements, they would not have undergone the extent of epidemiological transition in communicable disease frequencies that characterize larger, denser population aggregates. Paleoepidemiological evidence characterizing this adaptation type is discussed in Chapter 11.

Semi-sedentary Horticulturalists/Hunter–Gatherers: Southwestern Formative Adaptation

The richness of the archeological record left by Formative Southwestern people is astounding. The great majority of bioarcheological resources from the Basin and Range region are the remains of Formative peoples who lived in villages and cultivated crops to supplement hunted and gathered (and perhaps also traded) resources. Within the bounds of the Basin and Range region, and over a thousand or so year period, there was of course a great deal of variation in Formative adaptation in the extent to which people were dependent upon cultivated crops (and domesticated animals), in the size and organization of settlements, in domestic architecture, the extent of trade—both regional and extraregional—and in the degree to which people were sedentary. All of these are important factors in biological status of populations.

As we learn more about the variability of Formative adaptation in the Southwest, it is imperative that we understand the local adaptation systems without ignoring the potential for, and the biocultural implications of, economic and social integration at higher levels. We can no longer assume that there was a uniform chronological progression to increasing sedentism and agricultural intensification. New interpretations of these fundamental aspects of Southwestern Formative adaptation should provoke intensive and fruitful bioarcheological research.

The bioarcheological resources representing prehistoric Formative adaptation in the Basin and Range region are summarized in Table 25. These are divided into four groups: the southern Colorado Formative, the Anasazi, the Mimbres

Table 25.
Bioarcheological Resources Summary for Adaptation Type 4205–Semi-sedentary Horticulturalists/Hunter–Gatherers: Formative

Affiliation	Sites N	F	L	Individuals S	A	Cat. 3–11
Southern Colorado Formative: Ceramic Period, Upper Purgatoire Complex, Pueblo	21	54	54	16	38	8
Anasazi	308	3,554	3,055	910	2,221	125
Mimbres	79	3,870	1,251	302	953	11
Jornada and SE Extension	47	279	264	77	189	13
TOTAL	445	7,757	4,624	1,305	3,401	157

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

(western New Mexico Mogollon), and the Jornada (southeastern New Mexico Mogollon) plus the peripheral Southeastern extension of the Mogollon into Texas. The 455 sites in this adaptation type account for 77% of the bioarcheological resources in the project area; 308 of these sites are Anasazi, 79 are Mimbres, 47 are Jornada, and 21 are from the southern Colorado Formative. The bioarcheological resources from each cultural affiliation within these four groups are summarized in Tables 26–29.

The Southern Colorado Formative

Bioarcheological resources from southern Colorado Formative cultures amount to 54 individuals, or 50 individuals if we do not count individuals from four sites which could be of either St. Thomas phase, Sopris phase, or Carlana Apache affiliation. As shown in Table 26, the sample is distributed sparsely among the Graneros and Apishapa phases and the "Pueblo" manifestations in the San Luis Valley, with the majority of individuals being from the Sopris phase sites of the Upper Purgatoire complex. The latter group, excavated during the Trinidad Lake Project (Ireland 1974; Wood and Bair 1980), have received the greatest amount of attention from physical anthropologists. Except for minimal information on one Apishapa phase burial, the other resources in this group remain unanalyzed.

The relationships, both genetic and economic, of the southern Colorado Formative people to adjacent populations of Plains and Pueblo (Taos and Cimmarron area) affiliation are questions of considerable interest.

The Anasazi

Documentation of bioarcheological resources from 308 Anasazi sites was found during this survey, as summarized in Table 27. These range in affiliation from Basketmaker II–III (A.D. 0–700) to Pueblo IV (A.D. 1275/1300–1600). Forty-three sites (210 individuals) date from late Basketmaker through early Pueblo (Pueblo I, A.D. 700–900). A total of 948 burials has been recovered from 185 sites or components dated between Pueblo II (including eight dated Pueblo I–II) and Pueblo III, a time range roughly between 700 and 1275 or 1300. Forty-three sites with burials have Pueblo IV (1275/1300–1600) components. Excavations at these late prehistoric sites have yielded 1,821 burials. Bioarcheological data are available for 125, about 40%, of the 308 sites.

While the resources for the study of Anasazi bioarcheology are abundant, the burials from many sites are not as precisely dated as might be hoped considering these are some of the best dated archeological components in North America. Some, but by no means all, of the temporal lumping in this data base

Table 26.
Bioarcheological Resources Summary for Adaptation Type 4205: The Southern Colorado Formative

Affiliation	Code	Sites N	F	L	Individuals S	A	Categories 3–11
Ceramic Period							
Graneros Phase	4155	1	1	1	0	1	0
Graneros or Apishapa Phase	4155–59	5	5	5	0	5	0
Apishapa Phase	4159	1	1	1	0	1	1
Upper Purgatoire Complex, Park Plateau							
Sopris Phase	4162	8	41	41	14	27	5
St. Thomas, Sopris, or Carlana Apache	4161–62–65	4	4	4	2	2	2
"Pueblo" San Luis Valley	4080	2	2	2	0	2	0
TOTAL		21	54	54	16	38	8
Excluding sites of uncertain affiliation		17	50	50	14	36	6

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

Table 27.
Bioarcheological Resources Summary for Adaptation Type 4205: Anasazi

Affiliation	Sites N	F	L	Individuals S	A	Cat. 3–11
Basketmaker III	10	31	31	0	31	2
Basketmaker III–Pueblo I	12	65	49	7	42	5
Basketmaker III–Pueblo II	1	30	33	16	17	1
Pueblo I	18	54	53	19	35	9
Pueblo I–II	8	35	39	15	25	5
Pueblo II	36	104	84	18	87	14
Pueblo II–III	68	475	353	122	251	30
Pueblo I–III	12	263	166	37	125	2
Pueblo III	61	324	306	79	247	25
Pueblo III–IV	11	293	294	137	157	4
Pueblo II–IV	3	399	394	63	331	2
Pueblo IV	29	1,356	1,133	394	758	15
Date Unknown	37	99	85	12	81	11
TOTAL	308	3,554	3,055	910	2,221	125

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

is undoubtedly due to time limitations on the present study: it is often difficult and always time-consuming to extract the dates associated with specific burials from site reports. Anasazi burials are often not dated beyond the multicomponent phase assignment of the site as a whole if they are found without temporally diagnostic grave goods (usually ceramics). Anasazi mortuary behavior was certainly not uniform, and has never been thoroughly studied, but it seems safe to suggest that a substantial proportion of individuals were interred without grave goods, and therefore must be dated by careful attention to stragtigraphic context, especially those interred in midden deposits and intruded into the post-occupational fill or under the floors of structures. Perhaps more of these burials could be dated than has been the case; their research potential would be considerably enhanced.

As discussed in Chapter 9, some of the main issues being addressed in the study of Anasazi bioarcheology pertain to the biological distances between specific populations, the quality and extent of the horticultural component of Anasazi diet, the impacts of population aggregation and climatic fluctuations on health, and the etiology of porotic hyperostosis and cribra orbitalia.

The Mimbres (southwestern New Mexico) Mogollon

The cultural affiliations of 79 Mogollon sites from southwestern New Mexico are listed in Table 28. Sites from the Pine Lawn, Reserve, Mimbres, Gila, and San Francisco River areas are categorized using the Mimbres chronological system used by Stuart and Gauthier (1981). The sites range from Pine Lawn–Georgetown phase(s) to Salado phase; from A.D. 1/250 to possibly as late as 1450.

The most striking result of this survey with respect to the Mimbres/Mogollon is that approximately 68% of the 3,870 burials reported excavated were discarded. We assume this was due to poor preservation. Archeologists have long lamented the destruction of Mimbres sites, especially Classic Mimbres, by pothunters, but the combined results of field discard and looting are really shocking.

Human remains from 11 (14%) of these sites have been analyzed beyond age and sex assessment, but even this rather

Table 28.
Bioarcheological Resources Summary for Adaptation Type 4205: Mimbres

Affiliation	Code	N	Sites F	L	S	Individuals A	Categories 3–11
Pine Lawn–Georgetown	4035–36	1	6	6	0	6	0
Georgetown Phase	4036	3	10	10	0	10	1
Georgetown–Three Circle	4035–38	5	71	72	0	72	1
San Francisco–Three Circle	4037–38	2	1,181	88	14	74	2
Three Circle	4038	5	497	40	2	38	1
Georgetown–Mimbres	4036–40	1	173	173	50	123	0
Mimbres Phase	4040	19	1,543	495	176	319	2
Georgetown–Animas	4036–41	1	57	13	5	8	0
Mimbres–Animas	4040–41	4	15	16	5	11	1
Animas Phase	4041	16	167	194	26	168	2
Animas–Salado	4041–42	2	8	4	3	5	0
Salado Phase	4042	4	62	62	2	60	1
Phase Unknown	4043	16	80	78	19	59	0
TOTAL		79	3,870	1,251	302	953	11

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

low figure is misleading. It is hoped that some data exist in publications and manuscripts which were not obtained for this study (e.g., Provinzano 1968), but it appears at this point that we know virtually nothing about Mimbres bioarcheology. The excavation of the NAN Ranch site (Hinton Ruin) (Shafer 1980, 1983, 1985, 1987; Shafer and Murry 1978; Shafer and Taylor 1986; Shafer et al. 1979) and the work by the Mimbres Foundation (e.g., Anyon and LeBlanc 1984; Nelson and LeBlanc 1986) give us hope that this situation will soon be ameliorated.

The analysis of fragmentary and poorly preserved bone is too frequently neglected in the Southwest. It is difficult and frustrating to be sure, but to neglect these remains is just as surely a waste of excavation funding and of nonrenewable archeological resources. Our attention to Mimbres remains, however fragmentary, is long overdue.

Stuart and Gauthier pose some interesting bioarcheology-related questions about the Mimbres. They cite data on the increase in the "number of corpses per room" from Pine Lawn phase to Classic Mimbres phase sites: 1.2 to 1.8 burials per room at early sites, under 1 per room at small Classic sites, compared an average 5.5 burials per room at large Classic Mimbres sites (1981:245). They suggest that the very large number of burials found at Classic Mimbres sites is indicative of high mortality rates in the Mimbres core area (1981:207).

> Our tentative argument is that...mortality during the Classic Mimbres increases by several fold in large sites while in small sites it remains like that of the Early Pithouse period. Until someone is able to argue from age/sex data of skeletal remains or obtain dates from excavation that indicate twice the generational depth (length of occupation) is the norm for Classic rooms on large Mimbres sites, we will stick with the argument of proportionally higher mortality in the larger Mimbres sites. (Stuart and Gauthier 1981:246)

They contrast this to the situation at Chaco, where the number of burials found at Bonito style (greathouse) sites is small relative to site size. Their interpretation is that the Chacoan system was more successful at its height than the Classic Mimbres system. Greathouse Chacoans should have been healthier than small site Chacoans, while residents of small Classic Mimbres sites should be healthier than those who lived at large Classic Mimbres sites.

It would indeed be fascinating to investigate the relative success of Chacoan and Classic Mimbres adaptation with skeletal remains from these four classes of sites. But first we might ask whether the number of burials per room is really a measure of mortality. The age distribution of the burials, i.e., infant and pre-adult mortality rates, is more informative than the number of burials. Second, do we know enough about mortuary behavior to assume that interment at a given site indicates that an individual actually lived at that site? What was the functional difference between the large and small Classic Mimbres sites? If small Classic sites were only seasonally occupied (as suggested by Blake et al. 1986:460), then we would not expect as many people to be interred there as at a site more frequently occupied.

The nature of Postclassic Mimbres adaptation and the biological affiliation of the Animas (were these people from Casas Grandes or were they Mimbres?) and Salado phase (were they from the Gila–Salt area of Arizona?) populations need also to be addressed (Stuart and Gauthier 1981:206–209). Bioarcheological data should provide the basis for the formulation of testable hypotheses about Mogollon population affiliations, demographics, and health trends before, during, and after the Classic Mimbres phase.

The Jornada Mogollon

Bioarcheological resources from Formative sites in southeastern New Mexico and in the Hueco Bolson and Junta de los Rios areas of Texas are summarized in Table 29.

Twenty-eight sites of Jornada North affiliation yielded 203 burials. Dates for these sites range from Capitan phase (900–1100) through San Andres phase (1200–1400), Querecho through Maljamar phase (950–1300), and from Glenco through Lincoln phase (900–1300+) in the Sierra Blanca region. Besides the Sierra Blanca region, Jornada North bioarcheology sites are located in the Capitan Mountains, the Three Rivers area, the Sacramento Mountains, the Roswell area, and the Mescalero Ridge area of Chaves County, New Mexico. Bioarcheological resources from eight, or 28%, of the 28 Jornada North sites have been analyzed to some extent, half of them being from sites in the Sierra Blanca Region, tested and excavated by Kelley (1984) and Wiseman (1976).

Jornada South bioarcheology sites are located in the Fort Bliss area and in the Hueco and Guadalupe Mountain ranges which cross the New Mexico–Texas border, and in parts of Dona Ana and Eddy counties in New Mexico. Two sites are from the Dona Ana phase (1100–1200), and one site is dated to the El Paso phase (1200–1400). Most of the 52 individuals recovered from Jornada South sites are not assigned to a specific phase and are listed as Jornada South, phase unknown. This is probably a shortcoming of the present research and not of the archeological documentation. Just under 30% of the Jornada South bioarcheology sample is analyzed to some extent.

There are two bioarcheology sites, the Millington site and Loma Alta (or San Juan Evangelista), in the Junta de los Rios area in Presidio County, Texas. The nine individuals from these sites are dated to either the La Junta (1200–1400) or Concepcion focus (1400–1700). No bioarcheology data were obtained for these sites, but again, this may be due to our inability to visit the Texas portion of the project area.

As is typical in the study of geographically peripheral manifestations of prehistoric cultures, the biological questions that archeologists ask of the Jornada Mogollon pertain to genetic affiliations of populations as a means of testing migration hypotheses. Stuart and Gauthier (1981:277) raise the question of the origins and identity of the Jornada—were they Anasazi or Mogollon or an admixture of one or both of these with Plains people? Tainter (1985:145) cites McWilliams' (1974) study of cranial discrete traits in the Gran Quivira population as evidence refuting the hypothesized migration of the Jornada Mo-

Table 29.
Bioarcheological Resources Summary for Adaptation Type 4205 – Jornada and Mogollon of the Hueco Bolson

Affiliation	Code	Sites N	Sites F	Sites L	Individuals S	Individuals A	Categories 3–11
JORNADA NORTH							
Capitan Phase	4045	4	14	14	3	11	0
Three Rivers	4045–46	1	2	2	0	2	0
Three Rivers	4046	2	15	16	4	12	0
Three Rivers–San Andres	4046–47	1	3	3	1	2	1
San Andres Phase	4047	2	15	12	3	9	2
Querecho–Maljamar	4063–64	2	4	4	0	4	0
Sierra Blanca Region: Glenco Phase	4068	3	45	45	16	29	1
Glenco–Corona	2068–69	1	11	11	0	11	1
Corona Phase	4069	1	28	28	19	9	1
Lincoln Phase	4070	3	64	44	17	27	1
Jornada North, Phase unknown	4044	8	23	24	6	18	1
Jornada North TOTAL		28	224	203	69	134	8
JORNADA SOUTH							
Dona Ana Phase	4051	2	8	9	0	9	2
El Paso Phase	4052	1	1	1	0	1	0
Phase Unknown	4049	14	44	42	4	40	3
Jornada South TOTAL		17	53	52	4	50	5
JUNTA DE LOS RIOS AREA, TEXAS							
La Junta or Concepcion Focus	4058–59	2	2	9	4	5	0
JORNADA and SE EXTENSION AREA							
TOTAL		47	279	264	77	189	13

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

gollon to the Salinas province of south-central New Mexico in ca 1350–1400.

In addition to questions about migration and population affiliations, Jornada archeology has been concerned with defining the range and function of site types in the different ecozones such as the playas and riverine zones of the Hueco Bolson area (Carmichael 1985b) and the highlands of the Sierra Blanca and Sacramento Mountains (Spoerl 1985). The identification of food remains including bison, fish, Pecos River mussels, water fowl, and turtles in addition to the more typical corn, antelope, and rabbit in Jornada midden deposits from Rocky Arroyo does indeed, "suggest a subsistence picture which differs rather markedly from other reconstructed prehistoric Southwestern diets" (Wiseman 1985:31).

Jornada bioarcheology, when it is seriously initiated, will probably not have the benefit of large skeletal samples, but it will be conducted in the context of archeological inquiry which is perhaps hampered by fewer traditional, untested assumptions as archeology in the Southwestern core areas.

Sedentary Primary Horticulturalists

The traditional interpretation of Southwestern Formative adaptation is this Classic Puebloan adaptation type—sedentary (occupied year round) villages with subsistence primarily based upon cultigens of maize, beans, and squash. The distinction between nomadic hunter–gatherers and sedentary horticulturalists is not as clearcut as previously assumed. We now recognize that the Paleo-Indian Big Game Hunters must have utilized nonanimal resources, remains of which are not preserved. In the same vein, we recognize that sedentary or semi-sedentary Formative people in the Southwest did not have a diet composed solely of cultigens. The distinction between the Classic Puebloan adaptation type and the previous adaptation type, semi-sedentary horticulturalists/hunter–gatherers, is one of degree. The Classic Puebloan diet was certainly supplemented with hunted and gathered resources, but this adaptation is also characterized by agricultural intensification: the construction and use of large and small scale irrigation systems, larger and longer inhabited villages and towns, and evidence of a higher, regional level of economic organization (see Simmons, Chapter 6 of this volume for more extensive discussion).

Two groups of populations are categorized in this Classic Puebloan adaptation type: the Classic Chacoan people and the Protohistoric and Historic Pueblos. The Chacoan sample, sites of Pueblo II (greathouse) affiliation from Chaco Canyon includes 24 sites and 284 individuals, as summarized in Table 30. There may well be some Chaco sites (or components) which are erroneously included here, and perhaps the populations from the Chacoan outliers should be included, i.e., from Aztec Ruin, Salmon Ruin, Village of the Great Kivas, Bis sa 'ani, Tocito, Casamero etc. But as the nature of the outliers' relationship—biological, spiritual, and socio-economic—to the Canyon is a matter of considerable debate, we do not include

Table 30.
Bioarcheological Resources Summary for Adaptation Type 4206 – Prehistoric Primary Horticulturalists: Chaco Canyon

iAffiliation	Sites N	F	L	Individuals S	A	Cat. 3–11
Pueblo II	4	17	15	2	13	3
Pueblo II–Pueblo III	14	259	218	89	129	9
Unknown	6	156	51	14	37	4
TOTAL	24	432	284	105	179	16

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

them here. Bioarcheological data should be applied in investigations of the outliers, but there have not been many large scale excavations at these sites, and the skeletal samples are either small (Casamero, Bis sa 'ani, Tocito), unstudied (Village of the Great Kivas), or largely of post-Chacoan affiliation (Aztec Ruin). The remains from Salmon Ruin have been studied (Shipman 1980; Berry 1983), but many questions remain to be asked. Stuart and Gauthier suggest that the Chacoan outliers (and their outliers) hold evidence for the regional effects of the Chaco system's collapse:

> if the archeologists look for it, they will find evidence for an episode of increased infant mortality, disease, malnutrition, reduced age at death, etc. in the settlements surrounding the Chacoan outliers at roughly A.D. 900–1000. (Stuart and Gauthier 1981:40)

In addition to the issue of the biological status of the outlier populations, there are questions as to the health of the Chaco greathouse versus small site residents, and the health status of Chaco people as a whole compared to other Anasazi and to the Classic Mimbres—populations included in the previously discussed semi-sedentary, less horticultural adaptation type. Akins' (1986) and Palkovich's (1984a, b) findings on Chaco bioarcheology are included in Chapter 11.

Protohistoric and Historic Sedentary Primary Horticulturalists

The Protohistoric and early Historic Pueblo were sedentary horticulturalists, but contact with European explorers (beginning with Fray Marcos de Niza in 1539 and Coronado in 1540), with the Mexican natives in their employ, with Franciscan missionaries, and then with colonists (beginning in 1590), superimposed many new elements upon the fundamental adaptation. Twenty-seven sites, dating from late precontact times (the late 1400s and early 1500s) to about the time of the Pueblo Revolt in 1680, are best categorized with a mixed adaptation type which reflects the disruption caused by the imposition of European religion, foods, diseases, warfare, social organization and settlement systems, trade disruption, and commercial exploitation.

This was a period of incredible turmoil, about which it is difficult to generalize. In the central area of Spanish occupation, the Middle Rio Grande Valley, the impact was probably greatest (Simmons 1969). Pueblos located on land desired for use by the Spanish *encomenderos* (settlers who were given title to land in New Mexico by the King of Spain and the Viceroy of New Spain), had their fields taken for pasture. Others were converted to Catholicism and diverted from their own subsistence labor (and other activities) to build the chapels and missions. They cultivated wheat and other non-native crops in the mission fields with metal tools. Native Americans worked in textile workshops. They herded sheep and cattle. They planted and tended orchards (Scholes 1937).

More remote settlements were also affected. The eastern and western frontier settlements around Zuni and in the Pecos and Galisteo Basin area were repeatedly raided by nomadic Apache (and other groups whose identity is a matter of dispute), with whom they had been (intermittently, at least) trade partners prior to Spanish intervention (Hodge 1937; Riley 1975; Spielmann 1983). Some Jemez and Piro populations left their settlements and turned to "Pueblo nomadism" (Schroeder 1972:46). Seasons of drought, famine, and epidemic disease are recorded in the history of seventeenth century New Mexico (Bancroft 1889; Hackett 1937; Hammond and Rey 1953; Scholes 1937; Schroeder 1972).

The sites in this adaptation type are divided into three geographical groups: Eastern Pueblo, Western Pueblo, and Southern Pueblo or Jumano (see Table 31). These are Pueblo sites with Late Prehistoric and/or Protohistoric or Historic components. (Some of the larger Late Prehistoric sites are listed in the Appendix tables with adaptation types 5 and 6, but for purposes of this discussion they were grouped with the sites in the semi-sedentary horticulturalist adaptation type.)

Table 31.
Bioarcheological Resources Summary for Adaptation Types 4206,4207,4208,4209: Mixed Economy of the Protohistoric and Early Historic Pueblos: Pueblo IV/ Contact

Affiliation	Sites N	F	L	Individuals S	A	Cat. 3–11
Eastern Pueblo	17	1,476	709	247	641	6
Western Pueblo	4	1,167	337	67	270	1
Southern Pueblo/ Jumano	6	607	581	237	349	3
TOTAL	27	3,250	1,627	551	1,260	10

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

The group of 17 Eastern sites include Pecos, Yunque, Guisewa, Galisteo, San Cristobal, San Marcos, Cieneguilla, and others, from which there are just over 700 individuals. The Western group, Hawikku, Kechiba:wa, Dittert's site LP4:3A, and Acoma, has 337 individuals. The Southern Pueblos include San Antonio de Padua, Gran Quivira, Tabira, Pueblo Pardo, Quarai, and Abo Mission. There are 581 individuals in this group.

Most of these are large sites which yielded large skeletal samples (depending upon the amount of excavation), and, for this reason, a relatively high percentage—37% of the assemblages—have been analyzed to some extent. The human remains from Pecos are the subject of Hooton's (1930) book, the best known work in Southwestern physical anthropology. The burials and cremations from the excavation of Mound Seven at Gran Quivira were the subject of extensive research by Reed (1981) and several individuals at Arizona State University (Turner 1981a). Hawikku, Guisewa, San Cristobal, and other sites in this group are included in several of the craniometry and biological distance studies which were summarized in Chapter 9 (see Table B.15 for references for each site).

Physical anthropologists have used these skeletal collections, especially those from Pecos and Hawikku, in a fairly diverse array of research. The collection from Pecos was used by Ruff and Hayes (1983a, 1983b) in their study of long bone geometry and morphometrics. Pecos is also the subject of an article documenting bias in the original age and sex assessments of the population sample (Ruff 1981). Mobley (1980) and Palkovich (1983) examined the demographic characteristic of the Pecos sample, and the problems in life table construction from this collection. Schoeninger and Spielmann (1986) examined the ratios of stronitum and calcium in bone samples from Pecos skeletons in order to assess the relative amount of meat in the diet, which they relate to Plains–Pueblo trade relations. These studies use research techniques which were not available during Hooton's era. They serve well as contributions to our understanding of Pecos population biology, and also as evidence of the tremendous importance of long term curation and the restudy of bioarcheological resources (Buikstra and Gordon 1981).

It seems in a way as if Hooton's work stands as an intimidating monument to the research potential of large Southwestern skeletal samples. For, besides these examples of the benefits of restudy and new technology, there is a surprising lack of basic descriptive research on the paleodemography and paleoepidemiology of the Protohistoric and early Historic Pueblo populations. Perhaps the current resurgence of interest in the Protohistoric period (Wilcox and Masse 1981), in the arrival date of European epidemic disease in the Northern Southwest (Reff 1985, 1987; Upham 1986, 1987) and the rate and causes of Pueblo population decline in the sixteenth through eighteenth centuries (Palkovich 1985; Stodder 1986a; Wilson 1985) will stimulate new bioarcheological research on these samples.

Late Prehistoric and Protohistoric Semi-sedentary Specialized Hunter–Gatherers

A small sample of bioarcheological resources from six sites represent this adaptation type, as shown in Table 32. The Red Tank (Boot Hill) site in Eddy County, New Mexico was the source of an unknown number of burials (but see Corley and Leslie 1960 for a possible source of additional information) which are dated to the Ochoa phase, 1300–1450.

Eleven burials were found at the Henderson site in the Pecos Valley near Roswell (Rocek and Speth 1986). This site is dated to Post-McKenzie phase, about 1350. The Henderson site is believed to have been seasonally occupied. Faunal remains indicate that "tremendous quantities of bison were processed" (Rocek and Speth 1986:14). Cultivated crops, fish, rabbits, deer, antelope, and mollusks were also utilized. Ochoa phase people also utilized bison (Stuart and Gauthier 1981: 275). Stuart and Gauthier suggest that climatic shifts produced bison-optimal conditions at this time (1981:274).

Comparative analysis of the Henderson site skeletal morphology indicates that this small sample exhibits, "a form distinct from, but with some similarities to, both the Pueblo and Texas groups" (Rocek and Speth 1986:161). They also noted, surprisingly, that the Henderson burials are morphologically quite distinct from the geographically and temporally close sample from Smokey Bear Ruin (LA2112), a Lincoln phase (1200–1300) site in the Capitan Mountains (Wiseman et al. 1971). The study of additional skeletal samples from southeastern New Mexico are needed to clarify the biological affinities and to investigate the effects of bison-oriented subsistence on health and demography.

Burials from four sites on the Park Plateau in Colorado are thought to be those of Carlana focus Apache, but at three of the sites, burials appear to be intrusive into earlier Sopris or Saint Thomas phase sites, and their affiliation is tentative (Ireland 1974; Wood and Bair 1980). These components predate

Table 32.
Bioarcheological Resources Summary for Adaptation Type 4207 – Late Prehistoric and Protohistoric Specialized Hunter–Gatherers

Affiliation	Code	Sites N	Sites F	Sites L	Individuals S	Individuals A	Categories 3–11
Southeast New Mexico Ochoa Phase	4065	1	"many"	?	?	> 2	0
Southeast Colorado, Park Plateau Upper Purgatoire 4162 or Carlana Focus	4165	4	4	4	2	2	2
TOTAL		6	> 15	> 15	> 5	> 12	3

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

the acquisition of horses by the Apache; they lived in small horticultural hamlets (Eighmy 1984:149). (No records of human remains from later, Dismal River aspect, components were found.) The genetic distance between these and other early Historic or Protohistoric populations from the Plains and Pueblo area would be of interest in reconstructing migration history of Athabaskan peoples into the Southwest.

Horse Nomads

Bioarcheological resources in this adaptation type are summarized in Table 33. The cultural affiliations represented include Ute, eight individuals from eight sites; Apache, one individual which has not been studied; and six individuals from possible or unspecified Plains affiliations.

As mentioned in Chapter 9, Ute burials are rare and are not always subject to very thorough analysis. The small assemblage recorded includes several individuals which were specifically dated with historic artifacts. The transition to the Historic period affords the bioarcheologist the opportunity to utilize ethnohistoric records—written descriptions of subsistence strategy, settlement patterns, social organization, linguistic data, census data, etc. in addition to archeological evidence. These are resources which should not be overlooked in the interpretation of bioarcheological data.

The bioarcheology of horse nomads is certainly not well known from the Basin and Range region. As non-sedentary people, their mortuary practice does not generate large samples. The likelihood of reburial is generally greater for Historic Native American remains where tribal affiliation and genealogical information are known. Analysis of these remains should be as thorough as possible, with attention to such cranial and dental traits as are indicative of racial and ethnic affiliation, as well as information pertinent to reconstruction of diet and disease. Skeletal morphology could be profitably contrasted to that of nomadic people prior to the introduction of horses, and to sedentary horticulturalists.

Herder/Horticulturalists

The bioarcheological resources in this adaptation type (see Table 34) are of Navajo affiliation. There are five Early Historic Navajo burials, all adults, which are dated to the pre-Gobernador and Gobernador or Refugee phase—to about 1750. One site dates to Middle Historic, between 1753 and 1880. Two sites are Late Historic, post-1880. These might also be considered as having a Reservation adaptation type, but this is not necessarily meaningful in a biological sense.

Bioarcheological data are available for assemblages from four of the seven sites: Big Bead Mesa, dated 1745–1812 (Keur 1941), Manzanares Mesa, Early Historic (Hefner, personal communication), Site LA2706, Late Historic(?) (Reed 1956), and Site LA34135, dated 1890–1910 (Moore 1981).

We know very little about Navajo skeletal biology. Most studies have focused on craniofacial morphology (e.g., Hrdlicka 1931; Morice 1906; Shufeldt 1886). The Navajo are very strongly opposed to the disinterrment of any human remains. Biological research could certainly be pursued with ethnohistoric and census records, and through the study of nonhuman archeological resources.

Table 33.
Bioarcheological Resources Summary for Adaptation Type 4211 – Horse Nomads

			Sites		Individuals		Categories
Affiliation	Code	N	F	L	S	A	3–11
Southern Colorado: Ute	4107	8	8	8	0	8	3
Southwest New Mexico: Apache	4111	1	1	1	0	1	0
Plains Affiliation	4114	1	3	3	0	3	
Possibly Plains	4112	3	3	3	0	3	
TOTAL		13	15	15	0	15	3

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

Table 34.
Bioarcheological Resources Summary for Adaptation Types 4212 and 4216* – Navajo Herders and Horticulturalists

			Sites		Individuals		Categories
Affiliation	Code	N	F	L	S	A	3–11
Early Historic	4100	4	5	5	0	5	2
Middle Historic	4101	1	2	1	0	2	1
Late Historic*	4102	2	2	1	0	2	1
TOTAL		7	9	7	0	9	4

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.
*Site LP:4:3–A, Cibola County, is not included in Navajo count; doubtful affiliation.

Historic Anglo and Hispanic Adaptations

Six sites with historic Hispanic or Anglo (and possibly Genizaro) remains were recorded in the course of this survey (see Table 35), but it seems quite likely that there are others as well. These sites range from Late U.S. Territorial period (1821–1846) to the relatively recent past. These are the remains of ranchers, farmers, possibly miners, and soldiers from Fort Stanton and Fort Union. Two cemeteries are included, the Sininger site near Las Vegas, New Mexico (Cobb 1986; Mills 1978; Rhine 1978) and the Cucharas Cemetery in Huerfano County, Colorado (Eck 1983). Analyses of these combine osteology, archeology, and historic research.

Summary

The number of sites and individuals in each adaptation type are summarized in Table 36 and the percentage distribution of bioarcheological resources (sites, adults, and subadults) in each adaptation type are shown in Table 37. The total number of sites in the bioarcheology data base for the Basin and Range

Table 35.
Bioarcheological Resources Summary for Adaptation Type 4215 – Historic Anglo and Hispanic Ranchers, Miners, Military, Agriculturalists

			Sites		Individuals		Categories
Affiliation	Code	N	F	L	S	A	3–11
Late U.S. Territorial, Statehood Period	4120–21	6	103	103	39	64	2

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older); 3–11 – number of sites with data in categories 3–11.

Table 36.
Summary of Sites and Individuals by Adaptation Type

		Sites		Individuals	
Adaptation Type	N	F	L	S	A
Focalized hunter–gatherers: Paleo-Indian (4202)	1	1	1	0	1
Mobile hunter–gatherers: Archaic (4203)	34	67	70	16	55
Hunter–gatherers with experimental horticulture: Terminal Archaic and Initial Formative (4204)	15	84	64	10	54
Semi-sedentary horticulturalists with hunting and gathering: Formative (4205)	455	7,757	4,624	1,305	3,401
Prehistoric sedentary horticulturalists: Chaco (4206)	24	432	284	105	179
Sedentary horticulturalists with mixed economy: Protohistoric/ Contact Pueblos (4206–4209)	27	3,250	1,627	551	1,260
Specialized hunter–gatherers: Late Prehistoric/Protohistoric (4207)	6	> 15	> 15	> 5	> 12
Horse nomads: Historic Apache and Ute (4211)	13	15, 15	0	15	
Herders and horticulturalists: Navajo (4212, 4216)	7	9	7	0	9
Agriculturalists, miners, ranchers, military: Hispanic and Anglo (4215)	6	103	103	39	69
TOTAL	588	11,733	6,810	2,031	5,050
Adaptation type unknown: Prehistoric	19	22	23	1	22
Adaptation type unknown: Historic	9	9	8	0	10
GRAND TOTAL	616	11,764	6,841	2,032	5,082

Notes: F–data from field report; L–data from laboratory report; S–subadults (aged 16 years and younger); A–adults (17 years and older)

Table 37.
Distribution of Sites and Individuals by Adaptation Type*

Adaptation Type	Sites N	Subadults %	Adults %
Focalized hunter–gatherers: Paleo-Indian	0.2	0.0	0.0
Mobile hunter–gatherers: Archaic	5.8	0.8	1.1
Hunter–gatherers with experimental horticulture: Archaic/Formative transition	2.5	0.5	1.1
Semi-sedentary horticulturalists with hunting–gathering	77.4	64.3	67.3
Prehistoric sedentary horticulturalists	4.1	5.2	3.5
Sedentary horticulturalists with mixed economy	4.6	27.1	25.0
Specialized hunter–gatherers: Late Prehistoric/Protohistoric	1.0	0.2	0.2
Horse nomads: Ute/Apache	2.2	0.0	0.3
Herders and horticulturalists: Navajo	1.2	0.0	0.2
Agriculturalists, miners, ranchers, military: Historic Hispanic, Anglo	1.0	1.9	1.3

* Based on total sites and individuals assigned to adaptation types.

region is 616, of which 588 could be assigned to one or more adaptation type. The total number of individuals reported excavated is 11,764, but only 58% of those (6,841 individuals) appear in nonfield report contexts such as osteology appendixes and reports, museum records, bioarcheology articles, etc. In part, this discrepancy is due to different assessments of the number of individuals in archeological assemblages at different stages of archeological and bioarcheological research, but the major cause is the loss of resources and data due to discard of poorly preserved or otherwise undesirable specimens.

It is clear that the Formative adaptation types—semi-sedentary prehistoric and the sedentary historic and prehistoric horticulturalists—dominate the bioarcheological resource base from the Basin and Range region. Together they comprise about 86% of the resources in terms of sites, and account for 97% of the subadults, and 96% of the adults. Just under 6% of the sites are those of Archaic type mobile hunter–gatherers, but these yielded only 1.1% of the adults, and less than 1% of the subadults. The Archaic to Formative transitional adaptation type has 2.5% of the sites, 0.5% of the subadults, and 1.1% of the sample of adults.

Compared to the Formative horticulturalist samples, non-Formative prehistoric and historic resources seem almost non-existent, but in fact they are not! The research potential of any sample depends upon many factors—its size, age and sex distribution, chronological and temporal provenience, the manner in which they are curated, and how well they accommodate the needs of a particular research design. We should not be dissuaded from designing research that maximizes the research potential of the specific samples.

Most of the bioarcheological research published in the past 15 or so years is based on long term study of large skeletal samples from a rather small number of sites or localities. The unstated agreement seems to have been that Pecos is the only worthwhile skeletal sample from the Southwest—because it is the biggest! There are at least nine sites in the Basin and Range region with assemblages of over 100 individuals. In size, these approach and, in some cases, exceed the temporal components of the Pecos collection (see Mobley 1980). Nine sites in the study area have skeletal populations of between 70 and 100 individuals. But, perhaps more importantly, there are hundreds of small assemblages from as many sites which could and should be integrated into local and regional bioarcheological data sets through systematic and consistent skeletal analysis. Bioarcheology has evolved from the clinical diagnostic, idiosyncratic approach to skeletal analysis to a population-oriented science. But this should not result in the neglect of small, and thus very important, samples representing non-Formative peoples.

BIOARCHEOLOGICAL RESEARCH IN THE BASIN AND RANGE REGION

Ann Lucy Wiener Stodder

In this chapter, we address the status of bioarcheological research in the Basin and Range region in two ways: quantitatively, by determining the proportion of site assemblages for which relatively complete osteology data sets are available, and qualitatively, by drawing together selected categories of reported data for a series of sites and examining this composite data base for indications of populational responses to adaptive transitions. The bioarcheological data on the non-Formative populations are summarized first, then data on Formative populations—Anasazi, Mogollon, and Pueblo.

It is far beyond our present scope to enumerate, much less present or interpret, all of the bioarcheological data ever generated in the project area. We do not want to waste these data or make judgments about its value, but there is too much, of too many categories, collected with too many different methodologies and purposes to enable a thorough synthetic analysis here. By listing the categories of bioarcheological data available for each site assemblage and the references for each site in Appendixes A, B, and C, we hope to make this multitude of information more accessible. In the final portion of this chapter, we present some recommendations for the management and improved utilization of bioarcheological resources from the Basin and Range region.

Levels of Analysis and Distribution of Bioarcheological Data in Major Citation Types

Tables 23–35, which summarize the bioarcheological resources by cultural affiliation and adaptation type, indicate the number of assemblages in each group for which some bioarcheological data other than age and sex assessment (categories 1 and 2) are available. Table 38 reiterates this, expressed as the percentage of assemblages in each adaptation type, and also indicates the number and percentage of sites in each adaptation type for which data in eight or more bioarcheology data categories are available (for one or more individuals in an assemblage). In addition to age and sex, the bioarcheology data categories include craniometric data, postcranial metric data, cranial nonmetric traits, postcranial nonmetric traits, skeletal or dental pathology, skeletal or dental anomaly, cultural modification of skeletal elements, histological, x-ray, or CT scan data, and inclusion in a population-level paleodemographic or paleoepidemiological study. Counting categories of data is certainly not the only way, and perhaps is not the best way to estimate thoroughness of analysis, but it seems reasonably objective. More data types do not necessarily indicate higher quality research; it may be a better indicator of preservation and sample size.

Table 38.
Levels of Analysis Recorded for Bioarcheological Resources in Each Adaptation Type

		Sex and Age +		8 + Categories	
Adaptation Type	N	N	%	N	%
Focalized hunter–gatherers: Paleo-Indian	1	0	0	0	0
Mobile hunter–gatherers: Archaic	34	4	12	1	3
Hunter–gatherers with experimental horticulture: Archaic/Formative transition	15	6	40	0	0
Semi-sedentary horticulturalists with hunting–gathering	455	157	35	43	9
Prehistoric sedentary horticulturalists	24	17	71	16	67
Sedentary horticulturalists with mixed economy	27	10	37	7	26
Specialized hunter–gatherers: Late Prehistoric/Protohistoric	6	3	50	2	33
Horse nomads: Ute, Apache	13	3	23	0	0
Herders/horticulturalists: Navajo	7	4	57	0	0
Agriculturalists: miners, ranchers, military: Historic Hispanic, Anglo	6	2	33	0	0
Total	588	196	33	69	12

Only three sites of non-Formative adaptation have bioarcheological data in eight or more categories: one is in the mobile hunter–gatherer adaptation type, two are Late Prehistoric specialized hunter–gatherers. These constitute only 4% of the 69 assemblages with relatively complete data. There are no completely analyzed individuals or assemblages of Paleo-Indian affiliation, or in the Archaic or Formative transitional adaptation type, or of Ute, Apache, Navajo, Hispanic, or Anglo affiliation.

Of the 455 sites in the semi-sedentary horticulturalist/hunter–gatherer adaptation type, which includes 77% of the bioarcheology sites in the Basin and Range region, only 35% of the assemblages are analyzed beyond age and sex identification (and even this information is frequently based on the casual, eyeball approach), and only 9% of the assemblages have eight or more of the 11 data categories.

The Prehistoric sedentary agriculturalists, the Pueblo II Chacoans, have the highest frequency (67%) of completely analyzed assemblages. This is attributable to Akins' (1986) monograph, *A Biocultural Approach to Human Burials from Chaco Canyon, New Mexico*, one in the series of Chaco Center (National Park Service) reports.

Twenty-six percent of the assemblages from sedentary horticulturalist sites (Protohistoric and Historic Pueblos) have eight or more data categories reported. This is not very much considering that the 27 sites in this adaptation type account for 27% of all the subadults and 25% of the adult skeletal remains from the project area.

Overall, only 12% of the bioarcheological resources (skeletal assemblages) from the Basin and Range region have been analyzed in a relatively complete manner (as measured by the number of categories of bioarcheology data). Only 33% of the assemblages have ever been analyzed beyond age and sex assessment. The scarcity of resources in the non-Formative adaptation types makes any data on those remains of great significance. If complete, consistent analysis and the presentation and interpretation of data in a well informed biocultural framework constitute the most valuable contribution to bioarcheology (which we believe it does), then Akins' (1986) work should demonstrate that one monograph is worth immeasurably more than a dozen site report appendixes.

As shown in Table 39, some or most of the bioarcheological data on more than half of the completely analyzed assemblages are found in osteology books or monographs. Master's theses and doctoral dissertations are the second most frequent source; they are usually much longer and more thoroughly documented in terms of research methods, background, and rationale than other sources. Journal articles are more frequently written about the systematically studied and restudied collections.

Perhaps most interesting in Table 39 is the 11% greater frequency with which bioarcheological data from the more completely analyzed sites were reported in CRM report appendixes as opposed to the text of a CRM report. In general, the larger the sample of bone, the more likely an appendix, and the larger the sample, the more completely it will be analyzed. But, ironically, it seems that when appendixes or report manuscripts written by osteologists are condensed and paraphrased by archeologists instead of reproduced in entirety as part of the report, data loss occurs. Osteological data, when presented in the appendix section of the report, are more valuable than when selected bits of information are incorporated into the text of the report. Given that the majority of bioarcheological data are produced in the gradual incremental manner dictated by contract archeology, it is of the utmost importance that we maintain the integrity of data as reported by the osteologist, without editing out seemingly irrelevant negative data, element lists, and the like.

BIOARCHEOLOGICAL DATA ON NON-FORMATIVE POPULATIONS

Mobile Hunter–Gatherers: Colorado Archaic

In a study of Central Plains Archaic burials, Finnegan (1981) generated a composite life table using all the available demographic data. He calculated the average life expectancy at age 1 to be 27.66 years. There are several methodological

Table 39.
Distribution of Citation Types for 69 Sites for Which Eight or More Categories of Bioarcheological Data Are Reported*

	Citation	Sites N	Sample %
1, 2	Osteology book/monograph or chapter in same	37	54
5	Thesis or dissertation	26	38
3	Journal article	19	28
7A	Appendix of a cultural resource management limited distribution report	17	25
4,13	Archeology book or monograph	17	25
10	Unpublished manuscript	7	10
6	Meeting paper	6	9
7	Cultural resource management report text	6	9
4A	Appendix of an archeology monograph	5	7

* Almost all of these 69 sites are reported in more than one citation and citation type, so that the number of sites adds up to more than 69, and the percentages add up to more than 100%.

problems and limitations to the use of composite life tables, but they can also be useful in assessing the biological representativeness of a sample of skeletal remains, and the usefulness of the available data. The Central Plains Archaic life table is based on a sample of 104 individuals which includes only three infants (0–1 years) and a total of only 17 individuals that died during infancy and early childhood, ages 0–5. We cannot measure infant and childhood mortality from this sample, but it is informative that 32% of the individuals in the sample died by age 16 (Finnegan 1981:87), before or shortly after reaching reproductive age.

The average life expectancy at age 20 is 22 years (Finnegan 1981:88); an individual who lives until age 20 will, on average, live until age 42. (This seems to be artificially high, presumably due to the age bias in the sample.) For comparison, we can look at the Archaic hunter–gatherer population from the Indian Knoll site in Kentucky, where average total life expectancy for those living past age 20 is calculated at 35 years for females and 37 years for males (Cassidy 1972:64). The life table for the Late Woodland hunter–gatherers and the Mississippian Acculturated Late Woodland (horticulturalists and hunter–gatherers) population sample from Dickson Mounds, Illinois indicates a life expectancy of 41 years at age 20 (Goodman et al. 1984a:275). In the semi-sedentary Formative (Basketmaker III–Pueblo II) population from the Navajo Reservoir sites in New Mexico, life expectancy for those living until age 20 in this sample population is estimated at 37 years (Berry 1983:507).

The sample of Central Plains Archaic burials includes two from the project area: the Draper Cave site (5CR1), and the Muldoon Hill Burial (5PE420). Three other Archaic burial sites are located just outside the Basin and Range region: the Witkin Burial site (5AH6), Site 5JF211, and Bradford House III (5JF111). The fragmentary remains of the Draper Cave burial are those of an adult male, around 25 years old at death. His stature was estimated at 159.27 cm. The dentition exhibited no caries, no antemortem tooth loose, and no alveolar or periapical abscesses. No other skeletal pathology or anomaly was reported for this individual (Finnegan 1976).

As far as we know, the Muldoon Hill burial has not been completely analyzed, but the site form indicates that the remains are those of an adult male, about 50 years old at death, with no antemortem tooth loss and a possible traumatic injury to the postcranial skeleton.

The Witkin site burial is that of a male between 25 and 35 years old, whose stature is estimated to have been 165.03 cm. The dentition exhibits extreme tooth wear and slight abscessing in the alveolar region, but no antemortem tooth loss (Swedlund and Goodman 1966).

For Site 5FJ211, we have only the age and sex data as reported by Finnegan (1981:86). Three individuals were found at this site: a male, 55 ± 5 years of age, a female between 30 and 40 years old, and an infant who died between the ages of 4 and 6 months.

The remains of a 45 to 55 year old male were found at the Bradford House III, and are reported upon by Finnegan (1978). This individual's stature was estimated at 162 ± 3.8 cm. There were no abscesses or caries observed in the dentition, but there had been antemortem tooth loss in both the maxillary and the mandibular dentition. A pattern of extreme wear on the lingual surfaces of the mandibular teeth, also present in the dentition of the Draper Cave burial, is related to the use of teeth as tools in fiber processing. Periosteal lesions were observed on the fibula, indicative of a localized infectious reaction, perhaps secondary to traumatic injury. Degenerative arthritis is present on the cervical vertebrae. The right humerus was observed to be much more robust than the left. Finnegan interprets this as disuse atrophy of the left arm caused by a supernumerary (extra) cervical rib resting on the brachial (nerve) plexus which resulted in partial use impairment of the arm. Finnegan compared metric data on the Bradford House burial to data on the Witkin burial, Draper Cave, and a Kansas Archaic site. Bradford House and Draper Cave were most similar morphologically.

To summarize, this small sample suggests that Colorado Archaic people had rather good dental health (especially compared to Formative people in the Southwest) with few caries or abscesses, and in the younger individuals, no antemortem tooth loss. This is presumably due to the nonagricultural diet, and to relatively rapid tooth wear which limits caries formation. The use of the teeth in fiber working resulted in a particular pattern of dental wear in some individuals. It is notable that no cases of cribra orbitalia or porotic hyperostosis have been reported in Archaic burials from central and southern Colorado. We do not have enough data to gauge the frequency of infectious pathology, but given the low population density we would expect a low rate of crowd-dependent, human host-specific diseases. On the other hand, the seasonal use of habitation structures would promote germ and parasite transmission, as would the presumably frequent contact with animals and their pathogen loads. The three stature estimates cover a rather broad range, but the average figure of 162 cm is in the middle range of male stature reported for Formative population samples (see Table 46). Demographic data suggest that life expectancy in adults may have been higher than in other hunter–gatherer and later Formative populations, but this remains to be demonstrated.

Mobile Hunter–Gatherers: Archaic through Late Prehistoric in Trans–Pecos Texas

Although most of the bioarcheological resources in the mobile hunter–gatherer adaptation type are from the Texas portion of the project area, we found very little indication of analysis. Bioarcheological data are somewhat more abundant for the Lower Pecos area to the east of the Basin and Range region (see Olive and Steele 1987).

The only recent analysis of hunter–gatherer remains from Trans–Pecos Texas is for the assemblage from the ELCOR Burial Cave in Culberson County (Skinner et al. 1980). Seven fragmentary crania were found at this site. Skull 1 exhibits antemortem loss of 12 teeth. Skull 6 is reported as having three caries, five abscesses, and sinusitis infection. Two abscesses were observed in Skull 7 and evidence of traumatic injury was reported for Skull 4.

In his study of the Texas Cave Dwellers (presumably the collections made by Coffin and Setzler in the 1930s), Stewart also mentions frequent antemortem tooth loss (1935:230), and he comments that injuries, especially fractures, were frequent, but all of the specimens he lists with fractures are from Val Verde County, outside the Basin and Range region. Stewart (1935:230) observed that the Texas Cave Dwellers had longer but less robust long bones than Pueblo and Utah Basketmaker populations.

Goldstein's (1948) study of dental health in Texas Native Americans indicates that the West Texas Cave Dwellers (some of whom we assume were from the present project area) had pronounced dental wear, but fewer caries (32% of the sample of 19) than males at Pecos Pueblo, 46% of whom had caries, females from Pecos Pueblo with 50% caries, or a sample of Navajo, 50% of whom exhibited caries (Goldstein 1948:68). Goldstein recorded 37% frequencies of both antemortem tooth loss and abscesses, and the common co-occurrence of both, which increased with age.

Analysis of coprolites from Caldwell Cave, a Late Archaic site in Culberson County, documents the consumption of *Ephedra* sp. and Larrea, plants which are ethnographically known to have been used in treatment of diarrhea (Holloway 1985). Food remains in the coprolites include cacti, chenoams, oak, sage, and rabbit bone. Food remains found at Brooks Cave, also in Culberson County, include mostly small mammal bones but also buffalo, deer, and antelope, and cacti and mesquite beans (Jackson 1937:191).

We do not know much about the biological status of the hunter–gatherers in Trans–Pecos Texas. There are bioarcheological resources from this area which are worthy of analysis.

As mentioned in Chapter 10, only one site in New Mexico seems to have bioarcheological resources which would be categorized in the highly mobile hunter–gatherer adaptation type: Burnet Cave in Eddy County. Howard (1932) reported finding two cremations when testing this site in 1930, but no other information was provided on the human remains.

It should be clear from this brief discussion, and from previous treatment of hunter–gatherer bioarcheological resources, that these remains (especially of infants and subadults) are rare in the project area and that their systematic study, which has recently begun in Colorado at least, is important and long overdue.

Terminal Archaic and Initial Formative: Colorado Woodland

As mentioned in Chapter 9, Colorado Woodland mortuary data have been summarized several times (Breternitz and Wood 1965; Scott and Birkedal 1972; Butler et al. 1986), but the bioarcheological data have never been addressed.

Three of the Woodland burials from the project area have no bioarcheological data available (the Lake George Burial from Site 5PA44, and the burials from Sites 5AL7 and 5AL8). Two Early Woodland burials have been analyzed: the Red Creek Burial, 5EP773 (Butler et al. 1986), and the burial from the Dave Fountain site, 5PE79 (Finnegan 1979). The Red Creek burial contained the remains of a 20–25 year old woman. She exhibited no caries, abscesses, or antemortem tooth loss, some periodontal disease, moderate dental wear, and alveolar recession. Butler et al. (1986) also report that this individual exhibits sinusitis infection, partial fusion of the sacroiliac joint perhaps due to childbearing, and inactive lesions of cribra orbitalia and porotic hyperostosis. The burial from the Dave Fountain site was a female of about 54 years, whose stature was estimated at 152.75 cm (Finnegan 1979). This individual had no evidence of caries, abscesses, or antemortem tooth loss, but exhibited extreme dental wear.

Outside, but near the Basin and Range region in Colorado, several Woodland ossuaries have been excavated: the Hazeltine Heights site in Adams County (Buckles et al. 1963), the Hutcheson site in Larimer County (Wade 1966), the Kerbs–Klein site in Weld County (Scott 1979), and the Gahagan–Lipe site in Morgan County (Scott and Birkedal 1972). These are multiple interments. A double burial was recovered from the Aurora Burial in Arapahoe County (Cassells 1983:169). Single interments were found at the Michaud Site A in Arapahoe County (Wade 1971), and in Golden Gate Canyon in Jefferson County (Nickens 1977). Burials from these sites add up to a sample of at least 22 individuals, but many of them are incomplete because of poor preservation. The burials from the Kerbs–Klein site are secondary bundle burials.

Colorado Woodland people exhibit extreme wear on the occlusal (chewing) surfaces of their teeth.

> The explanation for this extreme wear...lies in the nature of the diet and the preparation of plant food. From the high percentage of broken milling stones present at Woodland sites, it appears that plant foods, especially seeds, were an extremely important element in the diet. Most of these milling stones, like the ones found at the Gahagan–Lipe site, are manufactured from soft sandstone slabs which when used add small grains of sandstone to the food being ground. (Scott and Birkedal 1972:6)

This extreme wear is accompanied by recession of the alveolar bone in many individuals, and sometimes by abscesses, but caries formation was apparently suppressed.

In addition to cribra orbitalia, porotic hyperostosis, sinusitis, and partial sacroiliac fusion in the Red Creek burial, the descriptions of Colorado Woodland skeletons also include one case of periosteal infection, a possible Brodie's abscess, Harris lines (growth arrest lines), and a fractured clavicle (Scott and Birkedal 1972). An individual with an infectious condition secondary to traumatic injury is described from the Hazeltine Heights assemblage (Buckles et al. 1963),

Stature estimates are recorded for three female adults, including the burial from the Dave Fountain site, 152.75 cm

(Finnegan 1979), Burial 6 from Kerbs–Klein, 152.53 cm (Scott 1979), and the burial from Michaud A, 149.547 cm (Wade 1971). The average of these, 151.6 cm, is within the low end of the stature range reported for Formative Southwestern populations (see Table 46). Estimated stature was reported for one adult Woodland male, Burial 4 from the Gahagan–Lipe site: 155.037 cm (Scott and Birkedal 1972). This is considerably shorter than the average of estimated stature of three Archaic males, 162 cm, but is closer to the average 154.9 cm for adult males from the Sopris phase (Colorado Formative) population (Ireland 1974; Wood 1980). One must bear in mind however, that the Archaic and Woodland samples are small, and that different researchers used different formulae for stature estimation.

The information on Colorado Woodland burials is rather sketchy, and not all of it has been presented here since most of the sites are outside the Basin and Range region. The Colorado Woodland burial assemblages which were excavated in the 1960s and 1970s need to be reanalyzed with a bioarcheological orientation, rather than with the major intent to define the Woodland mortuary complex.

Terminal Archaic–Early Formative: New Mexico

This transitional adaptation type is not well represented in the New Mexico bioarcheological data base. Pine Lawn phase (ca 100–500) burials were excavated at the SU site (Martin 1940, 1941), but the information presented on the burials pertains to mortuary behavior and cranial typology (Kelly 1940, 1941). Dittert's (1959) site LP4:3–A in Cibola County included one possible Late Archaic burial, but no data on the remains were provided.

In the Upper San Juan/Navajo Reservoir area in northwest New Mexico, six individuals of Basketmaker II or Los Pinos phase affiliation were found (at Site LA3646, Valentine Village and the Power Pole site). Metric data are available for some of these remains (Bennett 1966), but the paleopathological observations are included with grouped data for the Navajo Reservoir Anasazi sites in Berry's (1983) dissertation. Therefore, these data are included in the discussion of Formative population.

Only one of the five burials of Late Archaic affiliation from southeastern New Mexico has been analyzed, an infant from Fresnal Shelter (LA10101). The infant is estimated to have died 7 to 8 months after birth. No pathologies or anomalies were observed (Hall 1973).

It seems likely that there are more bioarcheological resources from this adaptation type in New Mexico, but they are difficult to identify. Burials at Basketmaker II–III, or Pine Lawn through Georgetown or San Francisco phase sites for example, might not be assignable to one specific component. Or they might be reported in such a way as to prevent the separation of osteological data for burials from the different components.

Late Prehistoric and Protohistoric Semi-sedentary Specialized Hunter–Gatherers

There are six bioarcheology sites assigned to this adaptation type: the Ochoa phase Red Tank or Boot Hill site in Eddy County, New Mexico; the Post-McKenzie phase Henderson site in Chaves County, New Mexico; and four sites in Las Animas County, Colorado—5LA1523, the Blasi Place site, 5LA1426, and 5LA1424—which have possible Carlana focus Apache burials. Unfortunately none of the possible Apache burials was included in the sample of dental material from the Trinidad Lake project to be examined by Turner (1980) for the presence of the three rooted mandibular first permanent molar (3RM1), because the aim of his study was to assess the affiliation of the earlier Sopris population. Bone samples from two of these burials (Blasi Place and 5LA1424) were tested for ABO blood group antigens in a paleoserological study, but neither sample provided conclusive aggluntination data (D. J. Miller 1980). Like Turner's 3RM1 study, Miller's work was an attempt to determine whether the Sopris phase people were of Athabaskan or other (Puebloan) affiliation, but the sample was quite small, and results of the study were inconclusive.

The eight adults and three subadults from the Henderson site in southeastern New Mexico are described in Rocek and Speth's (1986) monograph. They conclude that the residents of this site were more dependent upon horticultural resources than previously thought, and that Henderson should be considered a Formative population with a mixed economy. (Therefore, we also included the Henderson paleopathology data in the Jornada group data presented later in this chapter.)

The Henderson diet was at least partially and probably heavily agricultural. This conforms to the archeological evidence from the site of food-processing and cultivated plant remains (especially corn), but it is somewhat surprising in light of the large quantity of bison bones that were recovered from the East Plaza. The dental data suggest that processed foods typical of an agriculturalist diet predominated at the Henderson site, although the caries rate is at the lower end of the agriculturalist range. The evidence of combined dental and faunal data point to a mixed economy, making extensive use of both agricultural resources and of buffalo (Rocek and Speth 1986:166).

Caries were observed in six out of eight individuals in the sample (75%), but only 5% of the total sample of teeth (deciduous and permanent) are carious. Two of the eight adults had abscesses, and only one out of 10 individuals had antemortem tooth loss. The frequency of individuals with caries in Formative Southwestern populations ranges from 8% in the Pueblo I–III Chaco Canyon sample, to 85% in the Historic population sample from Gran Quivira (these data are listed in Table 44, sources are listed in Table 48). In terms of this measure then, the Henderson sample is towards the high end of the horticulturalist range for caries frequency. But a valid comparison of caries occurrence can really only be made between populations of similar age distribution. The Henderson site sample is relatively young, and the number of affected teeth per individual is low. The frequency of individuals affected with periapical or alveolar abscesses is 25% in the Henderson sample. The frequency of individuals with abscesses in the project area horticulturalist populations range from 4% in the Sopris sample to 66% in the Historic component at Gran Quivira. There is a low frequency of antemortem tooth loss in the Henderson sample compared to the other horticultural populations in the survey, which range from 4% (Sopris phase) to 62% (Chaco Canyon Pueblo I–III). This may be partly a function of a younger sample age.

Average male stature reported for the Henderson sample (N=4) is 168.3 cm, and average female stature (N=4) is 154.1 cm (Rocek and Speth 1986:163). Compared to the average stature of Colorado Archaic males, 162 cm, and to other Southwestern Formative populations (see Table 46), the Henderson males are markedly tall, and the population sample from this site exhibits a fairly large degree of sexual dimorphism in stature.

Rocek and Speth observed only one case of possible porotic hyperostosis in the Henderson burials (Feature 8, an adult female), and one infectious condition—an adult male (Feature 25) with a mild case of periostitis. No fractures or other traumatic injuries were observed (1986:164). Interpretation of this data is limited by the small sample size. If additional bioarcheological resources from the Henderson site were to be studied, the frequencies of these nutrition and infection-related skeletal pathologies would be important in determining just how different the Henderson population was from other horticulturalists and from other populations, like Pecos, with buffalo-related economies.

> In closing, it is worth noting an issue of theoretical interest that is raised by the Henderson burials. The relatively sudden appearance, in an area characterized by ephemeral hunter–gatherer sites, of a substantial horticulturally based community like Henderson, with its obvious architectural and artifact similarities to horticultural communities in an adjacent region, most likely would be interpreted "as a case of migration or 'site unit intrusion'." In the case of Henderson, the intermediate character of the population's physical form, as well as the intermediate nature of their economy which combines farming with a heavy reliance on buffalo hunting, does not comfortably fit a simple model of migration or site unit intrusion of Mogollon peoples from the west into the eastern Jornada periphery. Instead, these characteristics raise the possibility of a rapid in situ transformation of local hunting and gathering economies into horticulturally based systems; and the adoption by these local groups of many of the cultural trappings of their contemporaries to the west (Rocek and Speth 1986:167).

Horse Nomads: The Ute

The bioarcheological resources from the Colorado portion of the study area include eight burials of Ute affiliation, from the following sites: Cochetopa Dome (5SH99), The Park County Burial (5PA33), The Upper Graeser Petroglyphs site (5NR12), Site 5PE1, the La Veta site (5HF75), the Pueblo County Burial, a site north of Colorado Springs, and a site designated as Rio Grande del Norte, which we presume is in Rio Grande County. The small amount of information from these sites is summarized below.

The remains of an adult male from the La Veta site are described by Renaud (1941:18–21). No antemortem tooth loss or abscesses were observed, but four teeth were carious. Stature was estimated at a very tall 171 to 172 cm. No traumatic or infectious pathologies are indicated.

Stature of the adult male from Cochetopa Dome, 30–40 years old at death, is estimated at 162 cm (Scott et al. 1984). The dentition was poorly preserved, but no caries were present on the remaining teeth. Inactive porotic hyperostosis was observed on the cranium, and mild degenerative changes are present in the lower thoracic vertebrae. There is no evidence of infection or trauma. This individual, who lived between about 1830 and 1831, is believed to be of Uncomphagre or Tabeguache Ute affiliation (Scott et al. 1984).

The Pueblo County Burial was analyzed by Bass and Kutsche (1963). The estimated age of this female adult is between 39 and 42 years. A medium stage of degenerative osteoarthritis was observed in the lumbar vertebrae (1963:42). All teeth were lost antemortem, and all but two of the root sockets had been remodelled. Her stature was estimated at 4 feet 11 inches or 149.9 cm.

The Park County Burial was excavated and reburied in 1984. Based on the accompanying artifacts, the burial is dated at about 1870. Although the site form included a list of skeletal elements found, there is no information about the age or sex of the individual, and no indication that the remains were ever examined by an osteologist.

No other bioarcheological data from the study of Ute, Apache, or other horse nomads were found during the survey.

Herders and Horticulturalists: The Navajo

Navajo burials were found at seven sites in the New Mexico portion of the project area: Big Bead Mesa (LA15231), Site LA2706, Manzanares Mesa, Slender Warrior's Grave (LA 34135, reburied), Tapacitoes Ruin (LA2298), and Sites LA4072 and LA54175. On the Navajo Reservation, graves are excavated only when avoidance is impossible, and disposition of the remains is arranged according to tribal and federal policies (Klesert 1986). The appropriateness of and opportunity for osteological analysis varies with the particular situation. It is crucial that when given the opportunity, a conscientious and thorough analysis should be conducted by a qualified individual.

The date of arrival in the Southwest and the route travelled by Athabaskan peoples has been the subject of considerable inquiry and speculation (Brugge 1983). Corollary to this issue is the question of racial affiliation. There seems to have been some early confusion in Navajo physical anthropology. Shufeldt (1886) described a Navajo skull with lambdoidal cranial deformation, but Stewart (1950) corrected him and stated that the skull was not that of a Navajo (Reed 1963b).

As mentioned in Chapter 9, Hrdlicka (1931) concluded that the Navajo were not biologically distinct from the Pueblos, even though they are Athabaskan speakers (1931:95). Based on a sample of 18 Navajo crania, he found greater similarity between Navajo and Pueblo than between Navajo and Apache. In 1941, Keur wrote that,

> Navajo physical characteristics show so much variation, it is believed that they probably indicate a mixed type. The meager data available show variation especially in stature and facial characteristics such as facial height, bizygomatic breadth and nasal length.... Hence the evidence of cultural fusion offered by history and archeology is substantiated by the variability of Navajo characteristics. They give indication of a probable altering of the original physical type by long continued or much diversified miscegenation. (Keur 1941:66, 67)

Navajo remains are generally identified as such on the basis of cranial measurements and dental traits. But there are very few bioarcheological data in the literature that one could interpret in an adaptation-oriented context.

The earliest remains are from the Gobernador period sites in the Upper San Juan area. Two burials, an adult female and an adult male, were found at Tapacitoes Ruin, dated at 1693–1753 (Stuart and Gauthier 1981:107; Lange 1940). One cremation, an adult male, was found at LA4072 which is dated at 1700–1775 (Bennett 1966; Eddy 1966). The remains of an adult female and an additional isolated mandible were found at Big Bead Mesa, a large settlement dated to 1745–1812 (Keur 1941; Stuart and Gauthier 1981:105). The grave of Slender Warrior, the head of a matrilineal family in Catalpa Canyon, dates from about the late 1890s to 1910 (Winter et al. 1982). No specific dates are available for LA2706, Manzanares Mesa, or LA 54175. The small amount of bioarcheological data pertaining to adaptation and health of these individuals is listed below.

In his analysis of the adolescent male remains from LA 2706, Reed (1956) observed that the molars were very worn, and that there was crowding of the right maxillary canine and first premolar, which suggests some developmental disturbance.

The recently studied skeleton from Manzanares Mesa is that of an adult male, aged 20 to 30 years. The dentition exhibits enamel hypoplasia, which indicated developmental disturbance during early childhood, and two large alveolar abscesses were observed. When x-rayed, both the tibiae exhibited growth arrest lines (Hefner, personal communication).

BIOARCHEOLOGY OF HISTORIC ANGLO AND HISPANIC POPULATIONS

Six sites with burials of Hispanic or Anglo affiliation are included in this survey; our data are probably not complete. Three individuals were excavated at Fort Stanton (LA8744) in Lincoln County, New Mexico. They are apparently of Anglo affiliation (soldiers?), and were buried during the U.S. Territorial period, 1846–1912. No additional data were obtained on these burials. Site LA10025 in Catron County, dated to the same period, is recorded as having two Anglo burials and a log cabin (Anderson et al. 1986), but the excavation status of the site is uncertain, and we did not obtain additional information about the burials. At Fort Union National Monument in Mora County, the graves of four men of Euramerican extraction, dated to 1863–1872, were found during construction activities. All four are reported to have died of bullet wounds (Morrison 1975). Site LA49791 in Bernalillo County is a Hispanic cemetery dating between 1846 and 1912. Ten graves were reportedly disturbed by construction activities, but no further information was obtained on this site.

The majority of individuals in the historic Anglo and Hispanic group are from two cemetery sites. Between 70 and 85 individuals were recovered during salvage excavations at the Sinninger site near Las Vegas, New Mexico, and 14 individuals were excavated at the Cucharas Cemetery in Huerfano County, Colorado.

The Cucharas Cemetery is dated between 1850 and 1880. The nine subadults (including three who died before age 1) and five adults from this site are of Hispanic affiliation. Cribra orbitalia was observed in a 4–5 year old. One individual, a male about 40 years old at death, exhibited a fractured tibia and femur. The estimated stature of one adult male is between 160 and 165 cm. Stature was estimated for two females at 149.86–157.48 cm and at 152.4–161.3 cm for a third (Eck 1983).

The Sinninger site is dated to New Mexico's Territorial period, 1850 to 1879 (Cobb 1986). Salvage operations recovered the mixed remains of 40–50 adults and 30–35 subadults (Rhine 1978). Church records indicate that in addition to Hispanic people, Genizaros, and Native Americans were probably buried in this cemetery as well (Cobb 1986).

Rhine (1978) reports four cases of infectious inflammation in the long bones, numerous cases of osteoarthritis in the vertebrae, elbows, and hip joints, 10 ribs with healed fractures (from an unknown number of individuals), at least one individual with osteoporosis, nearly universal occurrence of antemortem tooth loss, caries, abscesses, and hard dental wear. Only a few individuals had fillings, suggesting very limited access to dental care. Skeletal pathologies noted by Cobb (1986:32) include cribra orbitalia or porotic hyperostosis, osteomyelitis, numerous growth arrest lines in x-rayed long bones, and periodontal disease.

Estimated stature ranges from 4 feet 8 inches (142.2 cm) in the shortest female, to 5 feet 8 inches (172.7 cm) in the tallest male.

Cobb's interdisciplinary study of the site, in which she drew together information from osteological analysis, historic artifacts, church records, and the social history of Las Vegas as a community, is a good example of historical bioarcheology.

Bioarcheological Data on Formative Populations: Semi-sedentary and Sedentary Horticulturalists

Sedentary and semi-sedentary horticulturalists account for 86% of the bioarcheological resources in the Basin and Range region. These are from Anasazi, Mogollon (Jornada and Mimbres), Colorado Formative, and Protohistoric and Historic Pueblo sites. Bioarcheological research has focused on these resources because of the relatively larger assemblages. As discussed in Chapter 9, the bulk of data collected on these populations is in the tradition of craniometry or part of biological distance studies based on univariate or multivariate analyses of continuous and discrete traits. This research addresses the racial affiliation of Southwestern Native Americans and the relationships between specific populations.

Population genetics provide an important basis for our interpretation of other kinds of skeletal data. When we examine the health and demographic status of a population, we are looking at the composite result of the interaction of the genetic potential of each individual human organism with the physical environment, as mediated by the buffer system provided by cultural adaptation. Stature is the classic example of the genetics and environment interaction. Potential stature is inherited, but the extent of growth attained by the individual is mediated by nutritional status, disease, altitude, and other sources of physiological stress or well-being. Similarly, dental health is the product of one's inheritance, but also of prenatal and perinatal health, childhood diseases and trauma, diet, hygiene, and the quantity of certain nutrients in drinking water. In the study of Prehistoric health and demography, we do not often have the opportunity to examine the results of the inheritance and environment interaction on a very fine scale, but the parameters of population genetics even on the broad scale, are important in our understanding of biocultural evolution. When we interpret the patterns of paleoepidemiology and paleodemography in Prehistoric populations, we do so against the background of known and hypothesized degrees of biological affinity based on skeletal and archeological data.

The bioarcheology of non-Formative populations is difficult to characterize or interpret because of the small sample size and the general lack of systematic data. It is equally difficult to synthesize and interpret the vastly larger array of data on Formative populations. In addition to the fact that the data are hidden in hundreds of reports which are not easily acquired, the kind and quality of skeletal data reported are wildly variable. And for each kind of data, the techniques of analysis, the methods of recording, and the format for presenting the data differ from researcher to researcher, report to report. The wealth of information cannot be simply or easily synthesized.

In order to avoid some of the worst problems encountered in synthesizing so many different sources of information, we chose categories of data which were recorded most consistently by different researchers, and which required the least reinterpretation on our part. Some kinds of information are omitted—data on osteoarthritis and osteoporosis, growth arrest lines, dental wear—not because they are unimportant, but because they are too difficult to present in this context without violating the integrity of the original data. This is indeed an uncomfortable task, and although more satisfactory results might have been obtained by a bolder, more interpretive approach, it seems more appropriate in this context to present the data as reported in the literature with as little manipulation as possible.

PALEODEMOGRAPHY

Perhaps the best known fact about Southwestern paleodemography is that the number of burials excavated from a site rarely if ever equals the number of individuals thought to have lived at the site. In other words, the burial sample does not live up to the archeologically based population estimate. (In some instances this is obviously due to previous excavation or looting.) We cannot fully address here the question of whether or not this is true, but it serves to point out some fundamental problems with Southwestern paleodemography. First, although the samples of Formative populations are quite large compared to those of non-Formative people, there are sites which yield very few or no burials. Second, although most excavation reports describe in some detail the grave types, the orientation and position of the interred individual(s), and artifacts or other features associated with burials, it is rare that the implications of these data are considered beyond the typical search for evidence of high status burials. More in-depth considerations of mortuary behavior generally do not take into account any biological data except age and sex.

The gap between the biological and the archeological approach to paleodemography gets even wider when the human bones from nonburial contexts (which are often encountered during excavation) are not analyzed. Sometimes these remains are not even included in the skeletal remains inventory. Ignoring isolated nonburial incidences of bone introduces an additional level of distortion into a data base which is already the product of a complex, long term sequence of behavioral and taphonomic processes. Fragmentary and disturbed remains—occurrences of bone that never were or no longer are burials—may be especially common in sites exhibiting extensive architectural remodeling. Regardless of the integrity of the sampling design guiding excavation, bioarcheological and mortuary data will be incomplete and biased if these remains are not considered. The number of individuals and the range of mortuary behavior represented by the human remains from a site are easily underestimated.

Prehistoric population estimates are based on ethnographic data, on the area and distribution of habitation space in a community, the volume of food remains, estimated carrying capacity of a given catchment area, regional distribution of wild resources or arable land, architectural rubble, etc. (see Hassan 1981 for discussion). For Southwestern Formative cultures, the interpretation and dating of architectural features is key to population reconstruction. Structure function, site function, use-life, and rates of abandonment are critical variables in estimating the momentary and long term population size of a community.

Ahlstrom (1984), Schlanger (1985), and Wilshusen (1985) estimate the use-life of earth-roofed pit structures in the Prehistoric Southwest at about 15 years average; less than the life-time of one generation, and considerably shorter than the use-life of masonry structures (Wilshusen 1985:6). Gilman (1987) has recently argued that pit structures were only occupied seasonally. On Black Mesa, in Northern Arizona, some of the largest Anasazi (and also Navajo) sites were created through sequential occupation by small groups, not by the contemporaneous occupation of the site by a large population (Nichols and Powell 1987:201). If the distinct components of this type of site are not identified, the architecturally based population estimates may be inflated.

The point of this discussion is that as we utilize the full bioarcheological data base in population reconstruction, and as we reconsider site function and longevity, settlement and subsistence patterns, the number of individuals represented in the human remains assemblages from certain classes of sites might be much closer to the estimated population.

An additional limitation in the study of Southwestern paleodemography is that very little state-of-the-art demographic analysis, life table analysis, has been done. (The life table allows one to mathematically estimate the vital statistics, life expectancy, and probability of dying, for certain age classes of a population based on the age distribution of the skeletal population.) In part, the lack of life table data for the Southwest is due to the fact that many of the sites that yielded sufficiently large population samples were excavated before the life table model was adopted for use in archeology.

The life tables that have been constructed for population samples in the project area seem, for the most part, to be based on the false premise that the most important criteria for eligibility of a sample for life table analysis is sample size. As Cordell et al. (1987), and Howell (1982) have discussed in criticizing life tables from Grasshopper Pueblo in Arizona and from the Libben site in Ohio, a large number of individuals does not automatically comprise a biologically representative sample of the population. The representativeness of each skeletal sample is a product of the age and sex distribution of the skeletons, of the original burial locations with respect to excavation strategy, and of selective preservation, curation, and analysis.

Five population samples from the Basin and Range region have been used in multiple cohort (based on more than one generation) life table analysis. They are listed in Table 40. Of these five samples, only the Arroyo Hondo table (Palkovich 1984a) seems to be based on a sampling of people from a relatively discrete (50 years) temporal and geographical provenience. The Navajo Reservoir and Chaco Basin life tables are based on skeletal collections from several sites which span several centuries (Berry 1983). The Salmon Ruin remains, which overrepresent the subadult portion of the population, are from a single site with several components (Irwin–Williams and Shelley 1980). Subadults are underrepresented in the burial clusters excavated at Pueblo Bonito (Palkovich 1984a).

Mobley's (1983) life table for the Pecos skeletal sample is based on the burials of known age and sex, which could be dated to one of the occupation periods which cover more than six centuries at Pecos. Mobley also generated several separate life tables for the different components at Pecos, based on the 573 dated burials (as opposed to the 1,824 total). Palkovich (1983) recalculated the total Pecos life table using all of the burials (even undated and unaged individuals), and showed that the two population samples were significantly different in age and sex distribution; a life table based only on dated burials (this generally means burials accompanied by ceramics) is not representative. Meanwhile, Ruff reexamined a portion of the Pecos sample using currently applied age and sex estimation techniques, and found that in Hooton's original work, adults were overaged by an average of nine years, and that the ratio of males to females was overestimated by about 10% (Ruff 1981). According to Ruff, a life table based on Hooton's (1930) published data on the Pecos population, the traditional standard for Southwestern osteology, underestimates infant mortality rates and overestimates life expectancy in the population.

The specific circumstances of excavation, curation analysis, and reporting have as much (if not more) impact on the paleodemographic profile of any assemblage of human remains as the mortality patterns of the population from which it is drawn. Life expectancy figures (Table 40) for Salmon Ruin (12.75 years at age 5) and for Pueblo Bonito (26.46 years at age 1, and 25.75 years at age 5) demonstrate this. The internal problems with these samples are also shown in Table 41. The Pueblo Bonito sample contains a very small percentage of subadults compared to the other samples listed from the project area; only 7% are in the 0–5 year age category.

Given this dismal accounting of problems with the paleodemographic data from the project area, do the data in Tables 40 and 41 tell us anything about these populations? To the extent that there was a chronological increase in population density and degree of sedentism, we would expect evidence of associated demographic transitions, such as increased fertility and infant mortality in the Classic Mimbres settlements and at large Protohistoric and Historic Pueblo sites. Galaz Ruin and Cameron Creek Village do seem to have had relatively high rates of mortality in the 0–3 year age range, as do Hawikku, San Cristobal, and Gran Quivira. But so do the much earlier Navajo Reservoir sites, while the Chaco Basin and Cochiti samples have smaller proportions of subadults in the 0–3 year range than Navajo Reservoir.

Table 40.
Selected Life Table Data from Six Anasazi/Pueblo Population Samples

Sample/Size	Stage/Date	Life Expectancy Years	Source
Navajo Reservoir	Basketmaker III–Pueblo II	16.82	
(N = 118)	400–1100	19.75	Berry 1983
Chaco Basin	Pueblo I–Pueblo II	26.51	
(N = 91)	700–1100	25.58	Berry 1983
Salmon Ruin	Pueblo II–Pueblo III	12.75	
(N = 111)	900–1275	20.00	Berry 1983
Pueblo Bonito	Pueblo II	26.46	
(N = 95)	900–1100	25.75	
		20.97	Palkovich 1984a
Arroyo Hondo	Pueblo IV	16.23	
(N = 108)	1300–1350	20.86	
		21.49	Palkovich 1984a
Pecos Pueblo	Pueblo III–Historic	27.43	
(N = 1,722)	1150–1838	32.63	Mobley 1983
Pecos, Corrected	Pueblo III–Historic	28.18	
(N = 1,824)	1150–1838	33.23	
		29.71	Palkovich 1983

The data as reported in the literature, and selected data presented, do not lend themselves to much fruitful interpretation. Many specific bioarcheological studies present the demographic data for individual sites more thoroughly. The results of this exercise suggest that one needs to use raw data (versus a count of burials by 5 year age interval) to investigate paleodemography at more than the site-specific level. Ironically, the larger the skeletal sample, the less likely one is to obtain raw data in the published format.

Comparable data from just one or two samples will not suffice, nor will the use of life table analysis on inappropriate samples, to describe the paleodemography of Formative (or non-Formative) populations from the Southwest. Most archeological sites in the project area and elsewhere in the Southwest simply have not and will not provide us with ideal, life-table-ready skeletal assemblages. But by adapting our analytical approach to the data base, we should be able to obtain useful data about paleodemography from skeletal assemblages using broader categories of information such as the percentage of individuals surviving the first few years of life, and the proportion of the population that does not survive to reproductive age (e.g., Lebo 1988). It is the ability to produce viable offspring (children who will also live long enough to reproduce) that enables a population to maintain itself. This ability is determined by the nature and degree of age and sex-specific stress patterns: most importantly, those stressors which affect maternal and infant health. As Benfer (1984:550) states, paleodemographic analysis is expensive as it requires large samples. Where we cannot obtain these samples, we can still learn about paleodemography by documenting the patterns of physiological stress that act upon specific, crucial portions of the population, and which ultimately create the patterns of mortality.

To more fully investigate paleodemography in the Basin and Range region, we need to reconsider archeologically based population estimates and restudy many of the skeletal samples. In many instances, the collection of paleoepidemiological data that allows us to describe the patterns of physiological stress in the population will be the more productive approach to demographic inquiry.

Cribra Orbitalia, Porotic Hyperostosis and Anasazi Diet

As discussed in Chapter 9, the nature of Anasazi diet, and the relationship of two types of cranial lesions, cribra orbitalia and porotic hyperostosis, to Anasazi subsistence is presently the topic of some debate among paleopathologists and archeologists.

The literature displays marked variability in interpretation of Anasazi diet and nutritional status. About the Pecos skeletal population, Ruff and Hayes (1983:361) wrote that, “no evidence of food stress or serious malnutrition are apparent from either the archeological or osteological investigations of the site.” This is certainly contradictory to Hooton’s interpretation:

Table 41.
Percentages of Population Samples Reported Dying During Infancy and Early Childhood

Sample/Size	Date/Stage	0–3 Years %	Source
Colorado Formative			
Upper Purgatoire/Sopris (N=43)	1150–1250	16	Ireland 1974 Wood 1980
Mimbres			
Cameron Creek Village (N=475)	850-1000	33	Bradfield 1931
Galaz Ruin (N=995)	975–1150	22	Anyon and LeBlanc 1984
Navajo Reservoir (N=166)	Basketmaker III–Pueblo II	22	Berry 1983
Chaco Basin (N=91)			
Salmon Ruin (N=111)	Pueblo II–Pueblo III	29	Berry 1983
Pueblo Bonito (N=95)	Pueblo II	0–1:1 0–5:7	Palkovich 1984a
Pecos Pueblo (N=1842?)	Pueblo III–Historic	24	Kidder 1917 Ruff 1981
Cochiti (N=175) (LA 70, 6455, 6462)	Pueblo III–Pueblo IV	13	Heglar 1974
Tijeras, Paa 'ko, San Antonio (N=292)	Pueblo III–Pueblo IV	30	Ferguson 1980
Arroyo Hondo (N=108)	Pueblo IV	0–1:27 0–5:45	Palkovich 1984a
Pottery Mound (N=110)	Pueblo IV	30	Schorsch 1962
Protohistoric/Historic Pueblo			
San Cristobal (N=271)	Pueblo IV–Historic	22	Stodder 1986a
Hawikku (N =191)	Pueblo IV–Historic	19	Stodder 1986a
Gran Quivira (N=82) (N =189) (N=138)	Pueblo IV Historic 1550–1672	18 21 23	Turner 1981
San Juan and Santa Clara (N=450)	1930	0–1:25 0–3:34 0–5:40	Aberle 1932

> Probably the inferior quality of the Indian's teeth is to some extent referable to the diet of maize and vegetables which must have been the rule throughout the period of occupation. Some game and fish may have been added to this diet occasionally and buffalo meat may have been an exceptional luxury. It is fairly certain from a study of the teeth that the Pecos Indians were in most cases undernourished. (Hooton 1930: 119)

More recent research on diet at Pecos indicates that the Late Prehistoric and Protohistoric people of Pecos exchanged corn for bison meat with hunter–gatherers from the Texas Panhandle (Schoeninger and Spielmann 1986).

Palkovich (1984a:436) states that, "the diets of prehistoric Anasazi were always marginal—and with the advent of agriculture, the biological impact went from bad to worse:"

On the actual content of diet: "Corn appears to have been most important in Chacoan diet and it occurs in all of the (35 coprolite) samples" (Clary 1984:270). Kent (1986:627) notes that these same coprolites contain animal bone, and based on this and other evidence, she states that, "the prehistoric Anasazi diet was not primarily dependent upon plant species—particularly maize."

These seemingly contradictory statements reflect our changing interpretation of Anasazi settlement and subsistence, but they also indicate that there was considerable temporal and spatial variability in the diets of Formative people in the Southwest.

The link between porotic hyperostosis, a skeletal indicator of iron deficiency anemia, and a high corn/low meat, and therefore, low iron diet in Southwestern agriculturalists, was demonstrated by El–Najjar et al. (1976). They compared the frequency of porotic hyperostosis in six skeletal samples which they divided into two ecological groups: sage plain and canyon bottom. The sage plain samples, from Gran Quivira and the Navajo Reservoir sites, lived in areas which are less well suited to horticulture than the canyon bottom Basketmaker and Pueblo populations from Canyon de Chelly, Chaco, and Inscription House. Porotic hyperostosis was shown to be more frequent in both adults and subadults in the canyon bottom populations where diet was presumably more restricted to corn and less game was available (El–Najjar et al. 1976:44).

Recent analysis of coprolites from several of these same sites—Navajo Reservoir, Gran Quivira, Inscription House, and Antelope House (which is in Canyon de Chelly)—suggest the reverse of the original interpretation of dietary differences in canyon bottom and sage plain, or mesa top, sites (Reinhard 1986). Corn (pollen and cupules) was found in essentially equivalent frequencies in coprolites from the two groups of sites, but animal bones were found in nearly twice as many of the canyon bottom samples than in coprolites from the mesa top sites (Reinhard 1986). The greater frequency of porotic hyperostosis (and anemia) in the canyon bottom populations appears to be the result of greater rates of infection by intestinal parasites (also indicated in the coprolite study), perhaps related to sanitary conditions and crowding in cliff dwellings, and not of the corn/meat ratio in the diet.

The general concensus at present is that porotic hyperostosis and cribra orbitalia do indicate iron deficiency anemia, but that we cannot attribute it simply to diet. Iron absorption and utilization are mitigated by several variables, and the presence of physiological stress is an important factor in the intake, utilization, and adequacy of dietary iron supply. Given the synergistic nature of disease and malnutrition, we can still identify specific segments of the population which will be generally more susceptible to iron deficiency anemia: infants with iron deficient mothers, children at weaning age, females of reproductive age, and any individual with dysentery or another condition resulting in blood loss or fever.

On the populational level, we would still expect higher frequencies of cribra orbitalia and porotic hyperostosis to be associated with agricultural intensification insofar as this is indicative of increased community size, greater population density, and sedentism. But the prevalence of the lesions cannot be treated as an index of corn consumption. Recent work by Minnis (1988) and Decker and Tieszen (1988) suggests that in the Four Corners area at least, Anasazi diet was consistently high in corn throughout the Basketmaker III through Pueblo III stages. Important differences in diet resulted from the variation in resource mix at specific localities. The importance of local, site specific ecology and behavior in affecting health is also emphasized in Reinhard's (1988:362) review of coprolite data from Colorado Plateau sites.

Cribra orbitalia and porotic hyperostosis are among the most frequently recorded pathologies in skeletal samples from the project area (and elsewhere). Active (unremodelled lesions of) porotic hyperostosis is generally most prevalent in infants. Cribra orbitalia frequency peaks in slightly older children, but is also observed in adults. Most researchers present data on these lesions in terms of frequencies in specific age groups of the sample. As is evident in Tables 42 and 43, the age groups used are not universal, and some of them probably obscure patterns in the data (especially the 0–10 years and over 10 division used by El–Najjar et al. 1976 and others). Another problem lies in the variable criteria for diagnosis. Investigators differ in their opinions of what constitutes presence versus absence, active versus remodelled, and severe versus nonsevere lesions (see Walker 1985 for further review). We counted only active lesions when there was a distinction in the original study. Again, there is a substantial amount of information, but it is not easily summarized, nor examined in a comparative framework.

The frequencies of porotic hyperostosis reported in the 0–3 year old portions of sample populations (see Table 42 and see Table 48 for sources of data in Tables 42–47) range from 0% in the sample from the Navajo Reservoir sites, to 78% at Paa 'ko. (The Navajo Reservoir site group studied by Berry (1983] includes the following sites: LA3646, LA4053, LA4151, LA4242, Sambrito Village, Mascarenas Village, the Power Pole site, Valentine Village, Uells site, Todosio Rockshelter, and the Cemetery site.) For the 0–10 year old category, the range is from 6% in the Canyon de Chelly Basketmaker III sample, to 83% in the Pueblo II–III sample from Chaco Canyon. The skeletal samples from the Protohistoric and Historic sedentary horticulturalist populations do not have the highest recorded frequencies of porotic hyperostosis, but the various subsets of the Chaco area population (the Prehistoric sedentary horticulturalists) do seem to have high frequencies of the lesions in 0–3 year olds, and the 0–10 year olds as well.

Reported frequencies of cribra orbitalia are listed in Table 43. In the 0–3 year olds, the frequencies range from 0% in the Navajo Reservoir Basketmaker III–Pueblo II sample to 74% in the Pueblo IV–Historic Hawikku sample. Berry (1983) reported cribra orbitalia in 38% of the small sample of 0–3 year olds from his Chaco Basin sites (this group includes Aztec Ruin, Thoreau Pueblo, Bc 53, Bc 59, and Bc 248–Kin Kletso). The frequency data for cribra orbitalia in infants do exhibit a temporal trend of increase; the earliest assemblage (Navajo Reservoir) has the lowest frequency, and the latest assemblages (San Cristobal and Hawikku) have the highest frequencies. But this trend is not as apparent in the data on 0–10 year olds, where El–Najjar's (1974) Canyon de Chelly sample is the earliest and has the highest reported frequency of cribra orbitalia, 78%. (The El Morro sample exhibits 100% occurrence, but the sample is very small.) San Cristobal and Hawikku still have high frequencies of cribra orbitalia, but Pecos and Gran Quivira, which are also late sites with large populations, have very low reported frequencies of cribra orbitalia: 3% in the Pecos population with ages and temporal components pooled, and 9% in the Gran Quivirans.

Table 42.
Frequencies of Porotic Hyperostosis Reported for Project Area Population Samples

		0–3		0–10		All Ages	
Sample/Site	Stage/Date	N	%	N	%	N	%
Canyon de Chelly*	Basketmater III			(36)	6		
Navajo Reservoir	Basketmaker III–Pueblo II	(36)	0			(117)	1
Navajo Reservoir	Pueblo I–Pueblo II			(44)	16	(92)	13
Mesa Verde Area*	Pueblo I–Pueblo III	(40)	50	(76)	30		
Chaco Canyon	Pueblo I–Pueblo III	(23)	13	(36)	61	(65)	35
Chaco Canyon	Pueblo II–Pueblo III			(12)	83	(32)	72
Chaco Basin	Pueblo I–Pueblo III	(15)			47	(91)	10
Pueblo Bonito	Pueblo II			(20)	25		
Canyon de Chelly*	Pueblo II–Puebio III			(15)	40		
Salmon Ruin	Pueblo II–Pueblo III	(33)	42			(104)	18
Kayenta Sites*	Pueblo II–Pueblo III			(17)	35		
Gallina Sites	Pueblo II–Pueblo III					(45)	2
Pindi Pueblo	Pueblo II–Pueblo	IV 0–2:(24)	0	0–12(34)	0	(86)	0
Grasshopper*	1275–1400	(162)	9	(267)	11		
Paa ’ko	Pueblo III–Pueblo IV	(18)	78			(57)	33
Arroyo Hondo	Pueblo IV	0–5(44)	23	(48)	21	(104)	13
Tijeras Pueblo	Pueblo IV	(19)	16			(64)	5
Pottery Mound +	Pueblo IV	(13)	62				
San Antonio	Pueblo IV	(7)	57			(28)	29
San Cristobal	Pueblo IV–Historic	(35)	20	0–13(63)	13		
Hawikku	Pueblo IV–Historic	(21)	29	0–13(35)	20		
Gran Quivira	Pueblo IV–Historic			(66)	18	(177)	15

* These sites are located outside of the project area: Canyon de Chelly and Kayenta sites are in Northeastern Arizona; Grasshopper Pueblo is in West Central Arizona; the Mesa Verde sites are in Southwestern Colorado.

Notes: + Pottery Mound data includes porotic hyperostosis and cribra orbitalia; (N) = sample size; % = percentage exhibiting pathology.; for sources, see Table 48.

Akins (1986) reports a 10% occurrence of cribra orbitalia in Chaco Canyon children (a sample which does not include Pueblo Bonito). In surprising contrast, there is a 20% frequency in the Pueblo Bonito, high status Chaco sample (Palkovich 1984a). Palkovich concluded that,

> high status may not have been enough to buffer the marked biological effects of dietary inadequacies that affected the prehistoric group interred in the Pueblo Bonito room cluster. Apparently neither subsistence strategies nor the privileges of social status were sufficient to buffer against dietary inadequacies in Chaco Canyon. (1984a:432)

The suggestion that there was more frequent anemia in high status than low status Chacoans is provocative indeed. Closer scrutiny of the literature might indicate that observer variability is a factor here (and in any comparison of paleopathology data sets), but the discrepancy also suggests the impact of different settlement patterns on Anasazi health. Greathouse dwellers may or may not have had access to better nutrition (we expect high status populations to have better diets), but if they lived in a more crowded, dense community, they may have had more communicable disease or sanitary problems which would be reflected in more prevalent anemia. With respect to nutrition, it is worth noting here that the reported stature for male and female Pueblo Bonitans (in Akins 1986) is the highest of any prehistoric population sample in the project area (stature data are presented in Table 46, and is discussed later in this chapter). Further comparative study of the greathouse and small site Chacoans is certainly warranted, although remains of the former are not abundant (Akins 1986).

Part of the difficulty in interpreting the cribra orbitalia and porotic hyperostosis data is that many of the samples cover a rather long time span, Pueblo I through Pueblo III, ca A.D. 700–1300, for example. Patterns within and between regional populations might be masked by the grouped data, just as they are probably obscured by age groupings. As the interpretation of the etiology (cause) of these cranial lesions becomes broader, their patterns of occurrence in communities and populations should be more systematically studied (with explicitly documented methodology), and related to the full range of archeological

Table 43.
Frequencies of Cribra Orbitalia Reported for Project Area Population Samples

		0–3		0–10		All Ages	
Sample/Site	Stage/Date	N	%	N	%	N	%
Canyon de Chelly*	Basketmaker III			(36)	78		
Navajo Reservoir	Basketmaker III–Pueblo II	(17)	0			(112)	8
Chaco Canyon	Pueblo I–Pueblo III	(18)	17	(31)	10	(59)	10
Chaco Basin	Pueblo II–Pueblo III	(8)	38			(90)	9
Kayenta Sites*	Pueblo II–Pueblo III			(20)	25		
Pueblo Bonito	Pueblo II			(20)	20		
Canyon de Chelly* I	Pueblo II–III	(15)	53				
Salmon Ruin	Pueblo II–Pueblo III	(16)	13			(105)	19
Pindi Pueblo	Pueblo II–Pueblo IV	0–2(24)	25	0–12(34)	29	(86)	15
Arroyo Hondo	Pueblo IV	0–5(44)	11	(48)	10	(104)	9
El Morro	Pueblo IV			(7)	100		
Grasshopper*	1275–1400	(162)	22	(267)	20		
Pecos Pueblo	Pueblo III–Historic					(581)	3
San Cristobal	Pueblo IV–Historic	(37)	57	0–13(65)	42		
Hawikku	Pueblo IV–Historic	(19)	74	0–13(31)	65		
Gran Quivira	Pueblo IV–Historic			(66)	9	(177)	10

* These sites are located outside the project area. (N) = sample size; % = percentage exhibiting pathology; for sources see Table 48.

and bioarcheological indicators of subsistence, settlement, and health in local populations.

Dental Pathology

Observations on dental pathology (and morphology) are a part of almost every bioarcheology report. Caries, abscesses, periodontal disease, dental wear patterns, crowded teeth, missing teeth, impacted, rotated and fused teeth are commonly reported. The dentition provides important information about the life history of an individual, and about the genetic background, diet, and health of a population.

Reported data on three rather simple categories of dental pathology from Formative population samples in the project area are presented in Table 44. Although the collection and reporting of data on the frequencies of caries, antemortem tooth loss, and abscesses are more straightforward than much of the bioarcheological data, the frequencies can be misleading. These conditions are all interrelated and are also related to age and to dental wear. Populations with more older individuals will exhibit fewer caries and more antemortem tooth loss, while younger populations would be expected to retain more teeth, and will therefore have a greater frequency of individuals with caries.

As discussed earlier in this chapter, Prehistoric non-Formative populations in the project area (Archaic and Woodland hunter–gatherers, Terminal Archaic and Initial Formative peoples) exhibit infrequent caries, but their rapid dental wear led to abscesses and to antemortem tooth loss.

The Sopris phase people of south-central Colorado have the lowest occurrences of caries (13%), abscesses (4%), and antemortem tooth loss (13%) of the Formative populations listed in Table 44. The Chaco Canyon population has consistently high reported frequencies: 85% of the sample had caries, 62% had abscesses, and 63% had some antemortem tooth loss. The dental data on Sopris and Chaco agree with the interpretation that they were probably the least and most horticultural of the Formative groups in the project area. The low rate of caries (8%) in the Chaco Basin sample misleadingly implies good dental health, but this sample also exhibits 39% abscesses and 37% and 33% antemortem loss of maxillary and mandibular teeth (respectively).

The caries and abscess rates are also high in the Gran Quivira population, and the Pottery Mound and El Morro samples have high caries prevalence. The Swarts Ruin Mimbres sample exhibits moderate caries frequency (26%), but a great deal of tooth loss (53%). The pattern is similar in the pooled sample from Paa ’ko, Tijeras, and San Antonio. The Navajo Reservoir, Pindi Pueblo, and Jornada samples have relatively low dental pathology frequencies. (The Jornada sites include: LA36970, Smokey Bear Ruin, Henderson Ruin, Last Chance Canyon Cave, and Goat Cave.)

Caries were reported in the deciduous dentition of only one of the samples, Gran Quivira. There is a marked increase in caries in both deciduous and permanent dentition over time at this site, perhaps reflecting a more horticulturally based diet and restriction of foraging during the last occupation of the site just prior to the Pueblo Revolt in 1680.

In general, the results of this abbreviated summary of dental pathology in Formative populations illustrate the changes in dental health which result from increasing cereal components in the diet. A multifactorial, age-controlled approach to dental pathology is very important. We have not dealt with several significant categories of information such as dental wear, periodontal disease and alveolar recession and dental morphology.

Table 44.
Frequencies of Dental Pathologies Reported for Project Area Population Samples

Sample/Site	Stage/Date	Caries N	Caries %	Abscesses N	Abscesses %	Antemortem Loss N	Antemortem Loss %
Navajo Reservoir	Basketmaker III–Pueblo II	(4)	15	(48)	23	*(4)	29
						**(12)	17
Swarts Ruin	600–1000	(62)	26	(62)	11	(34)	53
Chaco Basin	Pueblo I–Pueblo III	(49)	8	(62)	39	*(43)	37
						**(30)	33
Chaco Canyon	Pueblo I–Pueblo III	(27)	85	(39)	62	(46)	63
Salmon Ruin	Pueblo II–Pueblo III	(20)	20	(23)	35	*(12)	25
						**(13)	15
Sopris Phase	1150–1250	(24)	13	(24)	4	(24)	13
Pindi Pueblo	Pueblo II–Pueblo IV	(52)	13	(52)	19	(52)	19
Jornada Sites	900–1400	(45)	13	(45)	16	(45)	16
Paa ’ko, Tijeras, San Antonio	Pueblo III–Pueblo IV	(149)	23	(149)	13	(149)	47
Pottery Mound	Pueblo IV	(49)	76				
El Morro	Pueblo IV	(15)	53				
Cochiti	Pueblo IV			(101)	30		
San Antonio de Padua	Pueblo IV	(15)	20	(14)	7	(14)	36
Pecos Pueblo	Pueblo IV–Historic						
Precontact	1300–1550	(126)	44	(126)	41	(126)	15
Early Contact	1550–1600	(68)	53	(68)	44	(68)	22
Historic	1600–1800	(68)	43	(68)	46	(68)	43
Gran Quivira	Pueblo IV–Historic						
Precontact	1315–1550	(15)	d13				
		(51)	p69				
Historic	1550–1672	(13)	d46				
		(41)	p85				
Combined	1315–1672	(97)	p81				
				(111)	66		

Notes: (N) = sample size; % = percentage exhibiting pathology; * = Maxilla, ** = Mandible; d = deciduous, p = permanent; for sources, see Table 48.

In spite of the abundance of information on dental pathology, we found very little attention to the pathology or morphology of deciduous dentition, and only very rare mention of dental enamel hypoplasia. These result in an especially serious data gap for prenatal, infant, and subadult paleoepidemiology. Enamel hypoplasia analysis is a valuable source of information on age and sex-specific patterns of physiological stress events that should be pursued. Both adult and subadult dentition can be analyzed macroscopically (nondestructively) or at the microscopic level with thin sections, and the chronology of developmental arrest during childhood of males and females characterized for the population. The prevalence of hypoplastic defects (e.g., Berry 1983) does document physiological stress, but more informative profiles of stress patterns can be generated by estimating the age at which the defects were formed on the basis of clinically documented rates of enamel matrix formation (Goodman et al. 1980; Goodman and Armelagos 1985; Stodder 1984). Information on subadult health disturbances can thus be obtained from adult skeletal samples.

Infectious Disease

Skeletal responses to infection are conservative and generalized; bone is reduced or increased locally or systemically. It is rare that we can diagnose a specific disease from the skeleton, especially from incomplete or poorly preserved remains. Cases that are apparent are likely to be the advanced stages of severe or chronic, long term conditions. Acute conditions that cause rapid death are not recorded in the skeleton.

Paleoepidemiology utilizes direct evidence of pathology from skeletal remains and coprolites, and also indirect evidence—evaluating the potential for infection in a population from contact with other people or animals, and the potential for endemic and epidemic diseases to persist in a population over time. Subsistence strategy, settlement patterns, and overall population health and resistance are critical variables; greater population density, interregional and long distance contacts through trade networks, contact with wild and domesticated animals, and low resistance on the part of a malnourished or otherwise stressed individual may increase disease rates.

Direct evidence of several diseases is documented in the bioarcheological literature from the project area and adjacent portions of the Southwest. Tuberculosis is recorded in skeletal remains from at least seven sites in the Basin and Range region: an 8–10 year old from Pueblo Bonito (El–Najjar 1979b:609; Ortner and Putschar 1981:170–173), an adult from Talus Unit at Chaco Canyon (Akins 1986:55–58), a 4–5 year old from the Tocito site (Fink 1985), a 20–30 year old woman from Site 4 in the Pinedale Series (El–Najjar and Bussey 1980), an adult male and adult female from Pecos Pueblo (Hooton 1930), an older adult female from Gran Quivira (Coyne 1981:155), and a young adult female from Hawikku (Stodder 1986a). Tuberculosis was observed in Prehistoric human remains from several sites in Arizona including Point of Pines (Micozzi and Kelley 1985), Black Mesa (Sumner 1985), and Chaves Pass (El–Najjar 1979b).

Tuberculosis was once thought to have been introduced to the Americas from the Old World, but it now appears to have been endemic in Precolumbian Southwestern (and other American) populations (Clark et al. 1987). Actual outbreaks of the disease may have been quite rare, it was probably present in its benign, primary form and was reactivated when host resistance was lowered (El–Najjar 1979b; Steinbock 1986). Tuberculosis might be considered a sort of index of general health and of population density, since it is more prevalent in densely settled populations. Hrdlicka (1908, 1909) observed very high frequencies of tuberculosis in economically depressed Native American tribes, especially the Hopi.

The question of whether treponematoses, specifically venereal syphilis (*Treponema pallidum*), were present in precontact Southwestern populations is not yet resolved. The current opinion seems to be that treponematoses, although characterized by different syndromes, was endemic in both the New and Old Worlds. Epidemics of venereal syphilis in fifteenth century Europe were probably caused by the exchange of treponemal syndromes or the mutation of a new strain at the time of Euramerican contact (El–Najjar 1979a; Steinbock 1976).

Treponemal infections, some of which are attributed to syphilis, are recorded for human remains from at least five sites in the Basin and Range region and from several other sites in the Southwest. Hooton (1930:319) reported three individuals with osseous syphilis from the precontact occupation of Pecos: two adult males and one adult female. An adult female at Tijeras Pueblo exhibits probable syphilis (Ferguson 1980: 144). Moodie (1923:478) observed two cases of osteitis suggestive of syphilis from San Cristobal Pueblo. Treponomal syndromes which may be syphilis are present in at least one individual from the Late Prehistoric Zuni site Kechiba:wa (M. Lahr, personal communication), and in an adult from Hawikku (Stodder 1986a). Syphilitic osteomeyelitis is present in an individual from the Smokey Bear Ruin, a Jornada Mogollon site (El–Najjar and Bruder 1976; El–Najjar 1979a). Cole et al. (1955) report osseous syphilis in human remains from Kinishaba (ca A.D. 1230– 1300) and Vandal Cave (which has Basketmaker III and Pueblo III components) in Arizona, and Denninger (1938) describes syphilis in a cranium from Tuzigoot National Monument, Arizona, dated to 1000–1350.

Other skeletal pathologies noted in the bioarcheological literature for the project area include possible rheumatoid arthritis (Reed 1981:90) and numerous congenital, developmental, and degenerative conditions. The osseous manifestations of nonspecific infections such as mastoiditis, periostitis, osteomyelitis and periodontal disease are fairly common in the literature, but they are not always clearly described or illustrated.

Parasitic infection in Prehistoric Southwestern populations is documented through coprolite analyses. In summarizing the current knowledge of parasitism among Fremont, Sinagua, and Anasazi farming populations, Reinhard and Clary (1986:184) list eight species of helminth: *Strongyloides* sp. (threadworm), *Trichuris Trichiura* (whipworm), *Ascaris lumbricoides* (intestinal roundworm), *Acanthocephalans* (thorny-headed worm), *Trichostrongylus* (hairworm), *Taeniid* tapeworm, *Hymenolopid* tapeworm, and *Enterobius vermicularis* (pinworm). Within the project area, coprolites from Salmon Ruin and Chaco Canyon (Pueblo Bonito, Pueblo Alto, and Kin Kletso) have been analyzed (Reinhard and Clary 1986; Reinhard 1986). The Chaco specimens have a high rate (20%) of parasitism (Reinhard and Clary 1986:183), which is probably related to high population density. Reinhard and Clary's (1986) tentative identification of *Strongyloides*, which causes anemia, in a Chaco specimen lends support to the interpretation that the Pueblo Bonitans exhibit greater frequencies of cribra orbitalia than small site Chacoans because of the difference in residence patterns. In addition to poor sanitation, contamination of food and drinking water, etc., parasitic infections like Salmonella and Schigella are thought to have spread from domesticated turkeys, which were kept in many Anasazi dwellings (Kunitz and Euler 1972). The frequency of parasitic infection in coprolites from Turkey Pen Cave, a Basketmaker III site in Utah, is 17% (Reinhard and Clary 1986:183).

Other diseases which might have affected Prehistoric Southwesterners include tick-borne fevers and rabies, sylvatic plague, tularemia, Girardia, and amoebic dysentery. Viruses thought to have been present in the New World include poliomyelitis, some form of hepatitis virus, herpes virus, staphylococcal, streptococcal, and rhinoviruses, and pertusis (Van Blerkom 1985). The so-called crowd diseases, the major epidemic diseases in the Old World—bubonic plague, smallpox, measles, rubella, mumps, chickenpox, influenza, cholera, diptheria, typhus, typhoid fever, malaria, leprosy, yellow fever, etc.—were not present in the Precolumbian New World (Ackerknecht 1972; Brothwell and Sandison 1967; Cockburn 1971; Newman 1976; Steinbock 1976; Van Blerkom 1985).

The question of when and by what mechanisms Old World diseases, especially smallpox, measles, influenza, typhus, and malaria, reached the northern Southwest is a matter of current debate. The devastation of the Aztecs (and other populations along the route from Spain) by smallpox imported by Cortez' army is well documented in primary and secondary sources (Crosby 1972; Gibson 1964) but tracing the northward spread of epidemic disease through Mexico and into what are now New Mexico, Texas, and the lower Colorado River area is difficult.

In 1966, Dobyns hypothesized that there was a catastrophic, hemispheric pandemic in the New World between 1519 and 1526. Archeologists and ethnohistorians largely ignored this suggestion and its implications for Southwestern cultural and biological history, namely that Native American populations in the Southwest had already been decimated by European epidemic diseases before de Niza's and Coronado's expeditions led them to New Mexico in search of the mythical Seven Cities of Cibola in 1539 and 1540. If so, our reconstructions of population size, social organization, settlements patterns, and political organization of the Protohistoric Southwestern cultures would be in need of major revision. Upham (1986) uses Dobyn's hypothesis to explain the discrepancies between ethnohistoric documentation, archeological interpretations, and his model of western Pueblo social and political organization, which requires considerably larger populations than generally accepted.

Politics aside, the major problem in reconstructing the epidemiological history of the northern Southwest is that the accessible primary sources, which include the journals from the exploratory and colonizing parties and various types of records kept by civil and ecclesiastical authorities, do not document an unequivocally identifiable epidemic of European disease in New Mexico until 1719, when the records of the Archdiocese of Santa Fe indicate an epidemic of smallpox at Nambe Pueblo (Chaves 1957). This does not mean that there were not epidemics in the fifteenth century; there were, but we do not know exactly what they were, and what their effects were.

Our knowledge of these events is limited by problems in translating the descriptive medical terminology which is a combination of fifteenth century Spanish, Nahuatl, and other native Mexican languages, sometimes mixed with Latin. Epidemics usually involved more than one disease, and the Spaniards described symptoms rather than naming diseases, some of which were not recognized or named at the time anyway. Most of the early missionary records from New Mexico were destroyed in the Pueblo Revolt of 1680, and only some of the relevant archival materials in Mexico City and Seville have been translated or copied. The available (published versions of) primary sources have been studied many times, and such mention of disease as they contain is summarized by Schroeder (1972), Scholes (1937), Reff (1986, 1987), and Stodder (1986a).

Reff's (1986) intensive study of the Jesuit archives pertaining to the epidemiological history of northern Mexico provides invaluable data on the spread of disease and its impact on Native American demography. Until additional archival research is purposefully undertaken for the American Southwest, the epidemiological history of the Protohistoric and Contact period populations is a product of extrapolation from data on Northern Mexico, gleanings from the ethnohistoric literature, and studies like Upham's (1986) based on modeling disease vectors.

We do know that during the 1600s, between contact and the Pueblo Revolt, there were epidemics in 1630 (Forrestal 1954), and in 1640 (Scholes 1937), and after the revolt in 1700 and at 5 to 10 year intervals thereafter (Simmons 1966). There were years of drought and famine, and warfare between Spaniard and Native American, Apache and Pueblo. Native American populations fluctuated in number and location (Schroeder 1968, 1979; Palkovich 1986). The general assumption has been that there was profound decline in postcontact population size. Current work on historic demography indicates that the rates, causes, and timing of population decline in the Southwest, the products of complex local and regional events and adaptive processes, are not clearly documented, nor are they easily interpreted (Palkovich 1986; Stodder 1986a; Wilson 1985). Bioarcheological analysis of Protohistoric and Early Historic populations should be of use in evaluating the degree of biologically based population decline, but relatively little attention has been directed at paleoepidemiological analysis of this time period (Stodder 1986a).

After the reconquest and recolonization of New Mexico, there were regular epidemics from about 1700 on, and a pandemic of smallpox in 1781 (Chaves 1957; Simmons 1966). At least five epidemics of smallpox occurred in New Mexico between 1800 and 1850, as well as outbreaks of measles and other diseases (Chaves 1957). Epidemics also struck the early missions and settlements in Texas (Bolton 1906, 1907).

Returning to the bioarcheological data on Prehistoric Formative populations in the Basin and Range region, the reported frequencies of infectious skeletal pathology are listed in Table 45. We include all specific and generalized infectious conditions here, except dental abscesses and periodontal disease. Like other bioarcheological data sets, the diagnosis and recording of skeletal pathology varies among researchers.

Low rates of infection are indicated for the Navajo Reservoir population (2%), for the Sopris phase (4%), and for the Pueblo III and IV sites in the Rio Grande Valley area: Paa 'ko (4%), Arroyo Hondo (5%), Tijeras (3%), Pottery Mound (3%), and Cochiti (4%). Infection is reported somewhat more frequently for skeletal samples from Pecos Pueblo (6%), Salmon Ruin (6%), the Jornada site group (7%), El Morro (8%), and Berry's Chaco Basin site group (8%).

Infectious pathology is present in 12% of the Gallina skeletal sample (which includes individuals from the following sites: Nogales Cliff House, Chupadero Ranger Station, LA 6163, LA11841, LA11843, LA11850, the Simon Burial, the Cuchillo site, Rattlesnake Point Community, the T–site, and Adams State College Sites G–8, G–3, G–4, G–38, and G–189). The Pueblo II–IV Pindi Pueblo skeletons have a 14% rate of infection. The Pueblo I–III Chaco Canyon sample—the Prehistoric sedentary horticulturalists—has, as we would expect, the highest frequency of infection (17%) among the Prehistoric samples.

The Protohistoric and Historic population samples from San Cristobal and Hawikku have 29% and 49% frequencies of infection—considerably higher than earlier populations. The magnitude of difference between the Protohistoric and the Prehistoric populations may be partly the result of different research emphasis, but the high prevalence of infection in these populations also reflects the large size of the sites and the population density in the Galisteo Basin and Zuni areas, the impact of compromised resistance during times of drought, social disruption, or warfare, and possibly the results of disease spread through extraregional trade and European contact.

Table 45.
Frequencies on Infectious Pathology Reported for Project Area Population Samples

Site/Sample	Date/Stage	N	%
Navajo Reservoir	Basketmaker III–Pueblo II	82	2
Chaco Canyon	Pueblo I–Pueblo III	135	17
Chaco Basin	Pueblo I–Pueblo III	36	8
Salmon Ruin	Pueblo II–Pueblo III	97	6
Gallina Sites	Pueblo II–Pueblo III	41	12
Sopris Phase	1150–1250	25	4
Jornada Sites	900–1400	45	7
Pindi Pueblo	Pueblo II–Pueblo IV	86	14
Paa ’ko	Pueblo III–Pueblo IV	57	4
Arroyo Hondo	Pueblo IV	101	5
Tijeras Pueblo	Pueblo IV	64	3
Pottery Mound	Pueblo IV	94	3
El Morro	Pueblo IV	26	8
Cochiti (LA 70,6455)	Pueblo IV	101	4
Pecos Pueblo	Pueblo III–Historic	581	6
San Cristobal	Pueblo IV–Historic	234	29
Hawikku	Pueblo IV–Historic	173	49

Notes: N = sample size; % = percentage of N exhibiting pathology; for sources see Table 48.

In general, the rate of infection in these populations corresponds to site size and population density, but as we have emphasized throughout, samples with better controlled temporal provenience enable more confident interpretation. In many assemblages the burials are more precisely dated, but they are reported in grouped data. The Pecos remains, for example, might be quite profitably reexamined in a diachronic paleopathological framework if provenience data are available for the skeletal material (which one should never assume to be the case). There are very few data on the early, Basketmaker and Pueblo I, Anasazi in this and many other categories, and we found no paleopathology data on Mimbres Mogollon.

Stature

Average estimated stature reported for adult males and females from Formative populations are listed in Table 46. Most of the stature estimates were made by researchers using methods of Genovese (1967) or Trotter and Gleser (1952), and a few are based on Pearson’s (1899) formula. The small sample size from some assemblages also introduces a limitation to the comparability of the data, and of course stature is under genetic influence.

The estimated stature for the female population samples are shown in Figure 22. The averages for most of the female samples range between 150 and 155 cm. Females from Pueblo Bonito and the Chaco Canyon small (non-Greathouse) sites have the tallest estimated statures: 162 and 157.4 cm.

The historic Pecos Mission sample has the shortest estimated stature, 148 cm. The average of the stature estimates for three Woodland (Terminal Archaic–Initial Formative) females is 151.6 cm. The stature data suggest that female stature may have increased during early phases of horticultural adaptation, then decreased.

The distribution of male stature estimates is shown in Figure 23. The Pueblo Bonito sample also has the tallest average stature (169.3 cm) among the males. The Protohistoric/Historic Galisteo Pueblo males also have high estimated stature (167.8 cm). The shortest sample of males is from the Sopris phase sites in Southern Colorado, whose average estimated stature is 154.9 cm. Males from Salmon Ruin, Navajo Reservoir, and Tijeras Pueblo also have relatively short estimated stature. The average of stature estimated for three males in the Archaic hunter–gatherer sample from Colorado is 162 cm., taller than the males in several of the horticultural population samples, including Sopris phase. Estimated stature among the male samples is considerably more variable than among the female samples. This probably reflects the fact that males are more susceptible to growth disturbances than females (Stini 1972).

The percentages of sexual dimorphism in stature of Formative populations in the project area are shown in Figure 24. Theoretically, sexual dimorphism in stature should be greatest in those populations under the least amount of stress, because males will be subject to less growth disruption. But as Goodman et al. observe,

> The analysis of sexual dimorphism is confounded by potential genetic variation in the degree of dimorphism among populations and the likelihood that males are more protected from stress in many societies. Furthermore, in archeological analysis the same traits which are used to determine sex are often used to assess the degree of dimorphism, thus engendering circularity. (Goodman et al. 1984b:20)

The greatest degree of dimorphism (8.88%) is in the Pecos Mission population. The lowest (2.52%) is in the Sopris phase population, which is outside the general range of dimorphism

Table 46.
Average Adult Stature and Percentage of Dimorphism in Project Area Population Samples

		Females		Males		Dimorphism
Site/Sample	Stage/Date	N	cm	N	cm	%
Navajo Reservoir	Basketmaker III–Pueblo II	?	150.8	?	158.8	5.04
Chaco Basin	Pueblo I–Pueblo III	9	153.9			
Chaco Small Sites	Pueblo I–Pueblo III	22	157.4	15	164.7	4.43
Pueblo Bonito North	Pueblo II	7	162.0	7	169.3	4.31
Salmon Ruin	Pueblo II–Pueblo III			4	157.2	
Sopris Phase	1150–1250	6	151.0	12	154.9	2.52
Gallina Sites	Pueblo II–Pueblo III	4	153.1	6	162.1	5.55
Te' ewi	Pueblo III–Pueblo IV			7	164.3	
Pueblo Largo	Pueblo III–Pueblo IV	5	153.4	5	162.9	5.83
Paa 'ko	Pueblo III–Pueblo IV	17	151.6	11	164.4	7.79
Jornada Sites	900–1400	6	154.5	8	165.8	6.81
Cochiti	Pueblo IV	22	154.6	46	163.9	5.67
Tijeras Pueblo	Pueblo IV	19	150.4	23	160.1	6.06
San Antonio	Pueblo IV	11	153.0	9	162.6	5.90
Pottery Mound	Pueblo IV	21	151.4	25	163.5	7.40
Galisteo Pueblo	Pueblo IV			5	167.8	
San Antonio de Padua	Pueblo IV–Historic	3	154.8	4	162.3	4.62
Gran Quivira	Pueblo IV–Historic	101	152.0	60	162.4	6.40
Pecos Pueblo	Pueblo III–Historic	81	150.1	142	161.7	7.17
Pecos Mission	Historic	5	148.0	9	162.6	8.98

Notes: N = sample size; cm = average stature in centimeters; for sources, see Table 48.

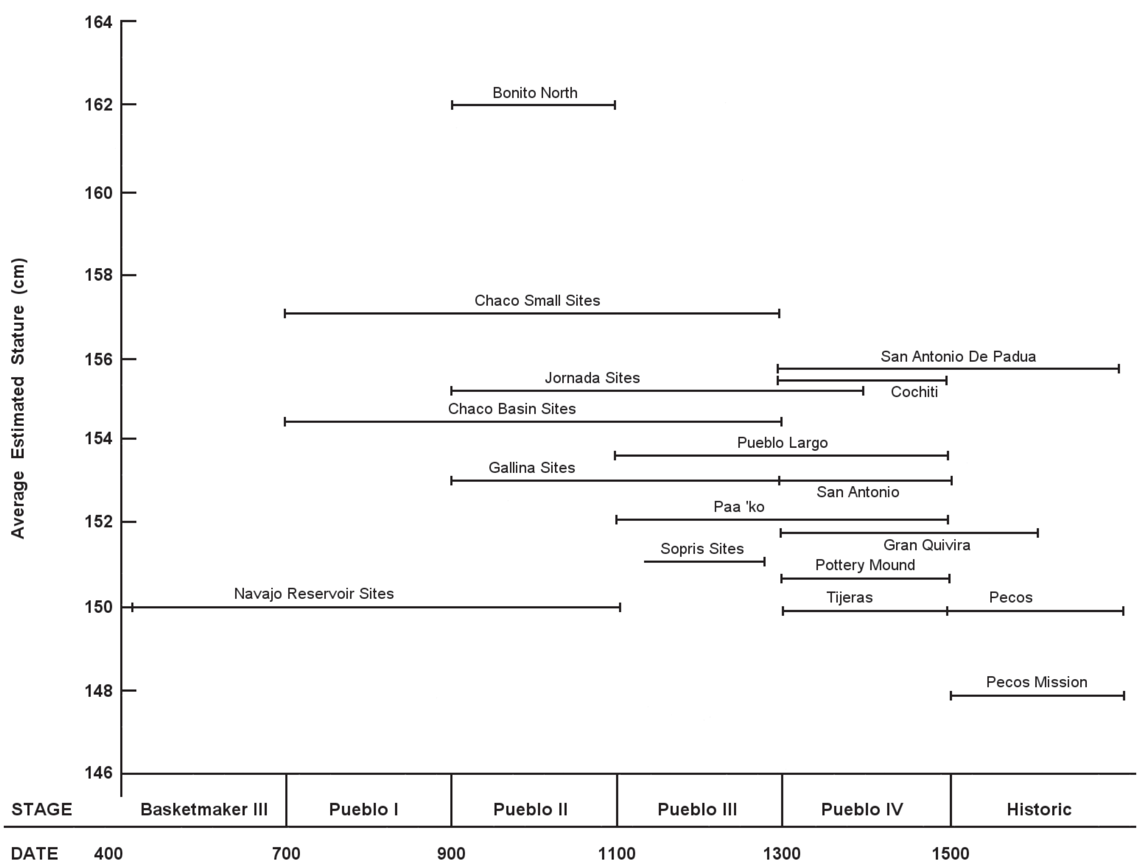


Figure 22. Average estimated stature, female

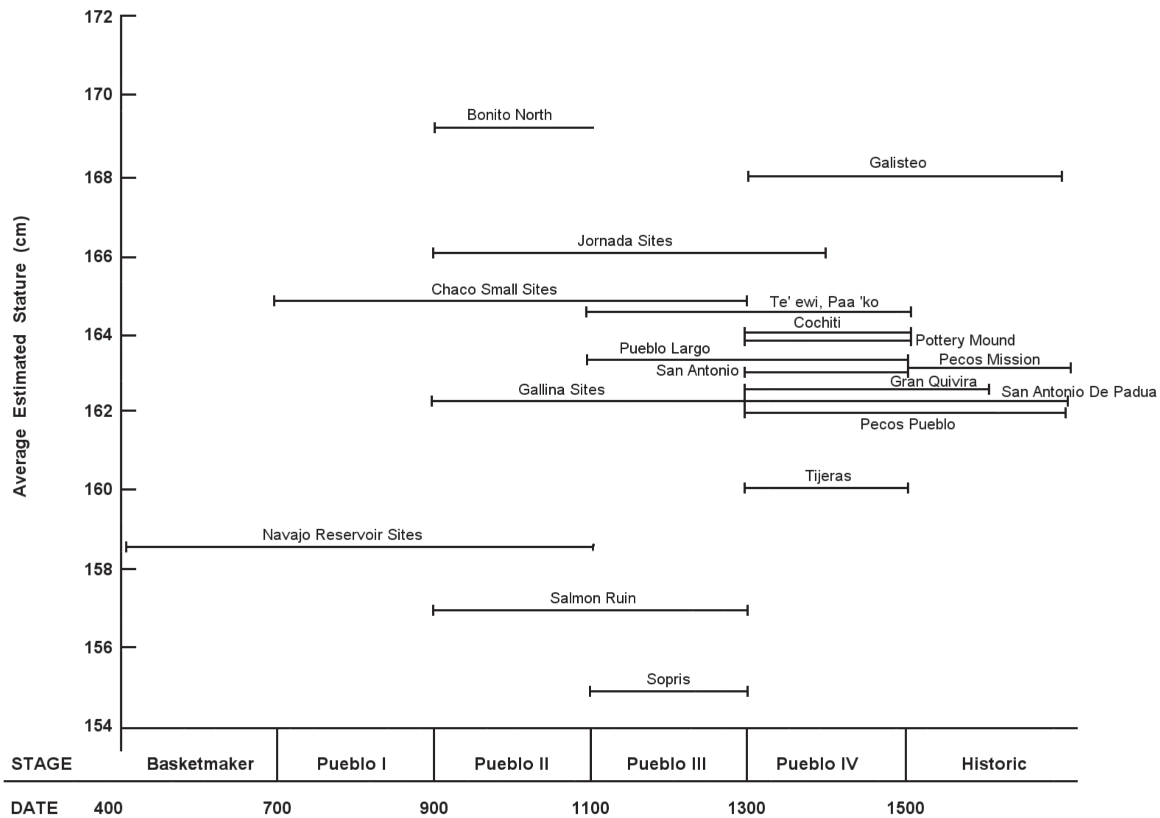


Figure 23. Average estimated stature, males

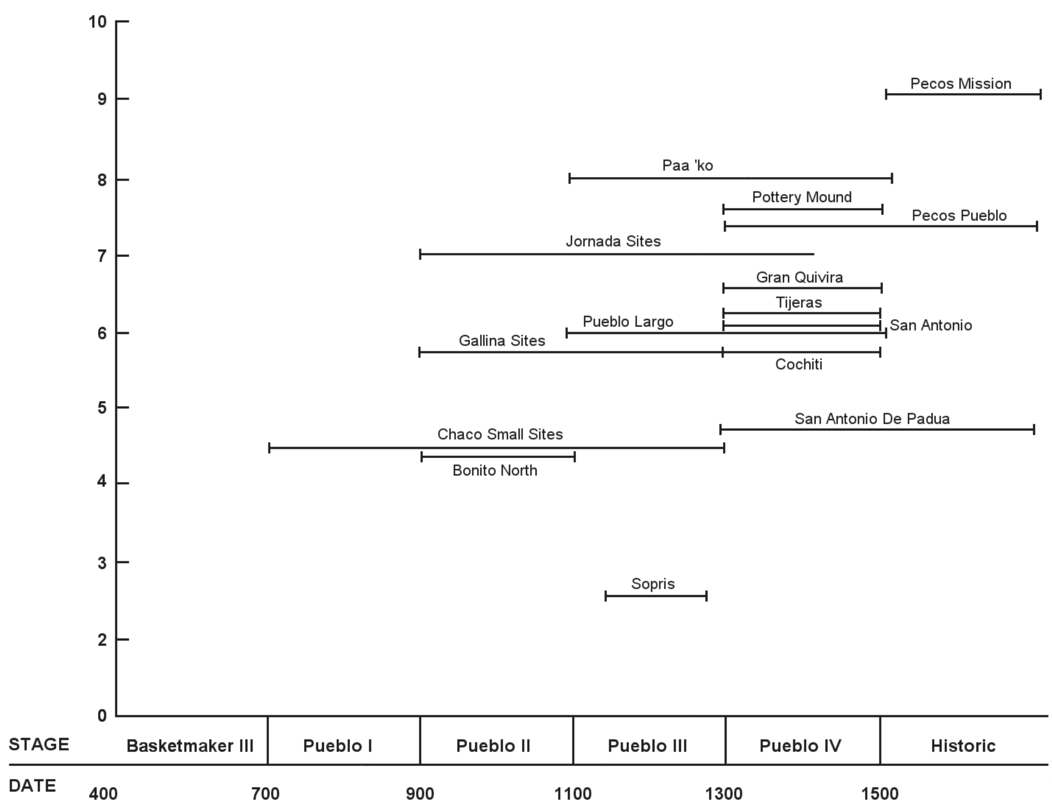


Figure 24. Percent dimorphism in stature

in stature, 4–11%, indicated by Stini (1985:214). On the basis of dimorphism, the Sopris, Chaco, and Pueblo Bonito, and San Antonio de Padua populations seem the most stressed, and the Pecos Mission, Paa ’ko, Pottery Mound, and Pecos Pueblo populations the least stressed. The paleopathology data for some samples seem to contradict this, for example, the low rate of infectious pathology and cribra orbitalia in the Sopris phase sample, and the high frequency of porotic hyperostosis in the Paa ’ko sample. Except for the Sopris phase sample, dimorphism does appear to have increased over time in Formative populations in the project area, implying that there were either fewer growth-disrupting events during childhood, or that the capacity for catch-up growth improved.

Trauma, Cannibalism, Mass Burials

The frequencies of cranial and postcranial trauma reported for Formative population samples are presented in Table 47. (Table 48 which lists the sources for data used in Tables 42–47 is also presented here.) Fractures and dislocations are included here because they inform us about occupational accidents and interpersonal violence. Vertebral compression fractures, which are more indicative of age-related demineralization and degeneration, and partuition scars are not included.

That the Gallina sample exhibits the highest reported frequencies of postcranial and cranial trauma is not surprising, as they are most often identified as warlike, with defensive architecture in relatively isolated locations (Cordell 1979b: 142–143; Stuart and Gauthier 1981:93). Cordell suggests however, that this reputation may be an artifact of excavation bias (1979b:142). Evidence of violence and cannibalism is noted for several assemblages of Gallina remains. Pattison (1968), and Chase (1976) report that seven individuals were massacred at Nogales Cliff House. Chase reports that some of the human bone found at the Adams State College Gallina sites was altered as funerary offerings, had cut marks, or showed evidence of dismemberment and cremation (1976:75, 79). Burned remains were also found at the Cuchillo site (Lange 1940:13). Evidence for cannibalism at Site Bg 20, Rattlesnake Point Community, is discussed by Flinn et al. (1976), Turner (1982), Mackey and Green (1979), and Miller (1985a).

The San Cristobal population sample has the second highest frequency of cranial trauma (8%). Cranial injury is particularly prevalent among the males, suggesting they were engaged in warfare. Located on the eastern frontier of Pueblo territory, sites in the Galisteo Basin might have been vulnerable to attack (Stodder 1986a). The other Protohistoric/Historic population samples, from Hawikku and San Antonio de Padua, and Pecos have 5% frequencies of cranial trauma. Postcranial trauma is high in the San Cristobal and Hawikku samples, and in the Paa ’ko and Tijeras populations. A closer examination of the traumatic injuries in these populations would provide additional insight as to the nature and origin of the injuries and of behavior patterns.

Cannibalized remains were found at two sites in the Navajo Reservoir area, Burnt Mesa (LA4528) and Sambrito Village (LA4195). Taphonomic analysis of these assemblages is discussed by Flinn et al. (1976), and by Turner (1982). The interpretation of cannibalized remains from sites in the Southwest has focused in large part on the analysis of bone fragments and butchery patterns, and less on interpreting the behavior they represent. Starvation is the motive most often invoked (Berry 1983; Flinn et al. 1976; Hartman 1975; Luebben and Nickens 1982; Nickens 1975), but alternative behavioral explanations such as ritual, warfare, or ancestor worship, have never

Table 47.
Frequencies of Traumatic Injury Reported for Project Area Population Samples

		Cranial		Postcranial		Total	
Site/Sample	Stage/Date	N	%	N	%	N	%
Chaco Canyon	Pueblo I–Pueblo III					(135)	17
Gallina Sites	Pueblo I–Pueblo III	(41)	20	(41)	22	(41)	41
Sopris Phase	1150–1250	(25)	4	(25)	0	(25)	4
Jornada Sites	900–1400					(45)	7
Pindi Pueblo	Pueblo II–Pueblo IV					(86)	22
Paa ’ko	Pueblo III–Pueblo IV	(57)	3	(57)	16	(57)	19
Arroyo Hondo	Pueblo IV					(89)	12
Tijeras Pueblo	Pueblo IV	(64)	2	(64)	14	(64)	16
Pottery Mound	Pueblo IV					(94)	3
El Morro	Pueblo IV	(26)	4	(26)	8	(26)	12
Cochiti	Pueblo IV	(101)	4	(101)	5	(101)	9
Pecos Pueblo	Pueblo III–Historic	(581)	5	(581)	4	(581)	9
San Cristobal	Pueblo IV–Historic	(247)	8	(232)	14	(245)	15
Hawikku	Pueblo IV–Historic	(181)	5	(151)	17	(182).	14
San Antonio de Padua	Pueblo IV–Historic	(40)	5	(40)	0	(40)	5

Notes: (N) = sample size; % = percentage exhibiting pathology; for sources, see Table 48.

**Table 48.
Sources of Bioarcheological Data Used in Preceding Tables**

Site/Sample	Source
Arroyo Hondo	Palkovich 1980a
Canyon de Chelly	El–Najjar 1974
Chaco Basin	Berry 1983
Chaco Canyon	Akins 1986; El–Najjar et al. 1976
Chaco Small Sites	Akins 1986
Chochiti (LA70,6455)	Heglar 1974
El Morro	Wheeler 1985
Gallina Sites	Chase 1976; Miller 1985; Pattison 1968; Sullivan and Katzenberg 1982; Weaver 1976
Galisteo Pueblo (Las Madres)	Reed 1981
Gran Quivira	
porotic hyperostosis	El–Najjar et al. 1976
dental pathology	Swanson 1976
stature	Scott 1981
Grasshopper Pueblo	Hinkes 1983
Hawikku	Bartlett 1938; Beckes 1977
Jornada Sites	Bartlett 1938; Beckes 1977; Reed 1971; Rocek and Speth 1986
Kayenta Anasazi	Ryan 1977 in Walker 1986
Mesa Verde Region	Stodder 1984
Navajo Reservoir	Berry 1983; El–Najjar et al. 1976
Paa ’ko	Ferguson 1980
Pecos Mission	Moore 1979
Pecos Pueblo	Hooton 1930
Pottery Mound	
dental pathology, stature	Schorsch 1962
skeletal pathology	O’Neill and Van Sickle 1979
hyperostosis	Thompkins 1985
Pueblo Bonito	Palkovich 1984a
Pueblo Bonito North	Akins 1986
Pueblo Largo	Reed 1981
Salmon Ruin	Berry 1983
San Antonio	Ferguson 1980
San Antonio de Padua	El–Najjar et al. 1980
San Cristobal	Stodder 1986a
Sopris Phase	Ireland 1974; Wood 1980
Swarts Ruin	Howells 1932
Te’ ewi	Reed 1953
Tijeras Pueblo	Ferguson 1980

been seriously considered (Stodder 1986b).

Mass burials not attributed to cannibalism have been found at a number of sites in the project area. Reed (1953) interprets the Te’ ewi remains, 18 adults (primarily young adult males) and six subadults, found in the burned fill and roof fall of a kiva, as the victims of accidental death during some type of ceremony, although he admits the possibility of a more sinister scenario. At Salmon Ruin, the charred, commingled remains of two adults and 33 subadults, mostly infants and young children, were found in the Tower Kiva. No cut marks were observed on the bones, and they were still vital when burned. The people are thought to have been standing on the roof when the kiva burned (Shipman 1980; Irwin–Williams and Shelley 1980). A “mass cremation and burial which hints of homicide, possibly genocide” (Wiseman et al. 1974:10) was found at Smokey Bear site.

An adult female from the Pinedale site series in McKinley County (Pinedale 4) was decapitated (El–Najjar and Bussey 1980). Stuart and Gauthier (1981:208) state that, “when the Classic Mimbres sites begin to lose their magnet effect, we see evidence of decapitated bodies, burned structures, etc. in the Mimbres and Animas Valleys.”

Inhumation is clearly the most common method of disposal of the dead in project area populations (although there were large numbers of cremations found at Gran Quivira and also at Hawikku), but even this incomplete accounting of the more unusual features suggests that these assemblages of human remains require more attention and interpretation. Whether or not interpersonal violence increased in the periods following the decline of the Chaco system and the Classic Mimbres as Stuart and Gauthier suggest (1981:208), is but one of the questions that could be addressed through the study of skeletal trauma.

Conclusions and Recommendations

In concluding this discussion of bioarcheological resources and research in the Basin and Range region, it is important to emphasize that the data set presented here is admittedly incomplete. By examining a limited number of categories of data for a small percentage of the sites, much of the information on specific sites is not presented. While this approach has allowed us to suggest certain generalized trends in health and adaptation over time in the region, a more intensive analysis of better controlled regional data would obviously demonstrate these (and certainly other) patterns more clearly.

The changes in human demography and health resulting from the transition to sedentism and food production have been investigated in many parts of the world (see Cohen and Armelagos 1984). We fully expect the broad patterns of human biocultural change to be the same in the Southwest as elsewhere. In the Southwest we have the opportunity to address this transition, but also to examine the health correlates of adaptive diversity among Formative and non-Formative populations on a finer scale. Precision dating enables the archeologist to trace the development and decline of prehistoric communities structure by structure, household by household, in increments of time shorter than one human generation. But the bioacheologist, constrained by small sample sizes, generally combines skeletal data from several site components to obtain a statistically valid sample. A skeletal sample spanning two or three centuries is of limited use in the interpretation of short term adaptive responses. This discrepancy in time scale is in part inevitable, but if the dates and proveniences of all human remains (not just complete burials) are provided, and systematic analysis is designed to maximize the potential of the bioarcheological resources, then archeologically relevant information can be generated from small, well dated samples.

The microenvironmental diversity and variability of the Southwest are mirrored in the variety of adaptation types observed in both synchronic and diachronic frameworks. Even within the general adaptation types, the archeological record presents a plethora of discrete cultural entities, the genetic, demographic, and socio-economic relationships of which remain to be fully investigated at the local, regional, and inter-regional levels. Through bioarcheology we should be able to examine the biological parameters of adaptive diversity at multiple levels, and address some of the broad issues in Southwestern prehistory.

Data Gaps

Major gaps in bioarcheological resources and data in the Basin and Range region are apparent. Very few data exist on the Mimbres Mogollon. It is difficult to determine what resources there are for study, because so many of the sites were excavated early on, and written accounts claim extremely poor preservation of human remains from Mimbres sites.

Bioarcheological data on hunter–gatherers and on Late Archaic/Initial Formative people are also quite rare, especially from New Mexico. We wondered how many sites there were in the New Mexico Archeological Records Management System (ARMS) which might contain burials from these adaptation types. To assess the potential for this specific area of bioarcheological research, we requested data on the frequency of certain feature types which we thought were most likely to have associated burials. (The ARMS data include features recorded at excavated and unexcavated sites.) For the Archaic, the ARMS system (in June 1987) listed 28 features: 4 caves, 19 rockshelters, 1 fieldhouse, 1 midden, and 3 burials.

Thirteen Late Archaic features were listed in the ARMS data: 6 middens, 3 pithouses, 3 rockshelters, and 1 roomblock. From Basketmaker II components, 32 features were listed: 5 middens, 2 pithouse villages, 15 pithouses, 3 roomblocks, and 7 isolated jacal or masonry rooms. Twelve features of Basketmaker II–III affiliation were listed: 1 burial, 1 midden, 5 pithouses, 1 pueblo, 2 roomblocks, 1 rockshelter, and 1 isolated room.

For the early Mogollon culture, 26 features are recorded for Mogollon I period, 300 B.C.–A.D. 400: 16 pithouses, 7 pithouse villages, 1 pueblo, 1 fieldhouse, and 1 roomblock. For the Mogollon II period, A.D. 400–600, 16 features are listed: 2 middens, 6 pithouses, 4 pithouse villages, 1 roomblock, 1 rockshelter, and 2 isolated rooms.

To summarize, there are at least 99 features of Late Archaic and Initial Formative affiliation in New Mexico which might contain burials. There are only 28 of such features associated with hunter–gatherers. These data give us a very general indication of potential bioarcheological resources for the study of Archaic and Initial Formative populations in New Mexico. Above all, it should emphasize the rarity and significance of such resources.

Improving the Data Base

Data gaps are not only created by the rarity of resources or by the lack of analysis of certain skeletal populations. Data are lost during excavation, processing, and curation through the incomplete documentation of provenience and context, the inaccurate reconstruction of skeletal or dental remains, improper washing or drying, and by the application of inappropriate consolidants or preservatives which obscure skeletal and dental features and may prevent chemical analysis of the bone.

Besides preservation of the skeletal remains, the quality of provenience data, both temporal and spatial, is a crucial determinant in the usefulness of human remains for bioarcheological research and for the study of mortuary behavior. Burial and nonburial occurrences of human remains should be as finely dated as possible. Fragmentary burials and isolated bones should be addressed as potentially valid sources of biological and behavioral data. The archeological and biological integrity of a skeletal assemblage should be maintained in curation as well.

The importance of extensive reanalysis of museum collections of Southwestern bioarcheological resources can hardly be overstated. As discussed above, traditional concepts of Prehistoric Southwestern adaptation are currently being revised, and bioarcheological data have an important role in the reformulation of subsistence and settlement models. Buikstra and Gordon's study of journal articles (written between 1950 and 1980) utilizing bioarcheological museum collections, indicated that 62% of the 228 articles based on reuse of collections resulted in altering previous conclusions (Buikstra and Gordon 1981: 459).

Large skeletal series, the Pecos collection for example, are the subjects of valuable osteological studies that do not pertain specifically to Southwestern archeology (e.g., Jurmain 1980; Ruff and Hayes 1983a, b), but the extent to which such a series can be used to study microevolutionary trends in the Pecos (or any other) population in a cultural context is severely limited when provenience data are not available. The potential for restudy of Southwestern bioarcheological collections is also adversely affected by dispersal of collections from a single site or locality to different institutions, and of course, by lack of funding for such seemingly unambitious research.

Bioarcheological data are also lost when the full analytical results of osteological analysis are not included in publications and the highlights and significant (to the archeologist) points are abstracted into text instead. Of course, the bioarcheological data should be an integral part of the interpretation of the site where possible, but tedious and space-consuming as it must seem, the inclusion of negative data, of high quality illustrations, trait lists, measurements, and other standard osteological data is truly imperative if we are to build a data base from the multitude of small projects and small sample analyses that are the products of cultural resource management and archeological salvage projects.

Data must be systematically gathered by qualified osteologists, especially when reburial is imminent. Standard bioarcheology data forms might be used in the same manner as standard site forms. Every osteologist has their particular realm of interest—dental traits, paleopathology, craniofacial morphology; not every osteologist collects the same data. Thus, we might benefit from the development of guidelines or standard categories of data to be recorded, which can be supplemented as is appropriate to the researcher and the material.

Significance

Results of this survey indicate that fewer than 1% of the cultural resources in the Basin and Range region yield bioarcheological resources. Only 33% of the skeletal assemblages appear to have been analyzed beyond age and sex assessment. Relatively complete data (8+ categories) are available for only 12% of the assemblages. We should not assume an abundance of human biological data just because there is an abundance of archeological data. Where skeletal remains seem abundant, there are remarkable gaps in the bioarcheological database. For cultures where skeletal remains are rare and samples are small, there is limited awareness of the need to slowly accumulate systematic information for integration into a usable data base. The study of human remains reveals intimate and invaluable information about peoples' lives and about human biocultural evolution. Such information is never irrelevant, but its usefulness depends upon the integrity of data.

ADAPTATION TYPES—A METHOD OF CULTURAL COMPARISON AND INTEGRATION

Alan H. Simmons (with Ann Lucy Wiener Stodder)

As the preceding chapters have illustrated, the prehistoric and historic archeology of the project area is immensely complex. Discussion has attempted to provide the general framework for cultural development without becoming mired in the intricate details of local or regional sequences. In this chapter, we attempt to summarize the basic conceptual "gestalt" of previous human occupation in the project area. We do this, not without some hesitation, by employing the concept of adaptation types initially proposed by W. Fitzhugh (1975).

The concept of adaptation type will be used by each component of the Corps of Engineers Southwestern Division's overview and management plans. It will largely follow the format used in the previous Southwest Division overview prepared by the Arkansas Archeological Society (Sabo et al. 1988). In that work, three factors were identified for justifying the adaptation type concept. The first was the need for "an incisive yet generalizing conceptual framework" (Sabo et al. 1988:1–4); that is, a summary with detail, but not so much detail as to be lost in regional issues. Secondly, this conceptual framework had to be comparative if a meaningful synthesis were to be developed. Finally, the bioarcheological issue had to be dealt with as a specialized class of information. It was decided that adaptation types were an appropriate manner by which to address these concerns (Sabo et al. 1988:1–4).

We provide a brief summary here of the reasoning behind using adaptation types, drawing from Sabo et al.'s discussion. To best capture their usage of adaptation types in relationship to a cultural resources overview, we quote them at length:

> The complex ecological relationships between human populations and their environments may be expressed in simplified outlines as "adaptation types" (Fitzhugh 1975:341). The adaptation type is a construct that attempts to relate regional environmental potential with specific levels of socioeconomic and technological organization in human culture. General models of adaptation types can be developed which integrate essential features of particular human adaptive systems with the specific environmental context of this system in any given region. In addition to their comparative merit, these adaptation types can also be used to develop management recommendations to be used by the Corps of Engineers in cultural resource management programs.
>
> By using the adaptation type concept to summarize the complex ecological relationships between cultural systems and their environments, we may derive reasonably valid expectations concerning the distribution of human subsistence and settlement activities, or patterns of land use, within and across specific ecological zones. This in turn allows us to infer a distribution of archeological materials resulting from these activities. The use of the adaptation type permits the development of broad based interregional syntheses. Instead of focusing on the detailed differences between various locally defined and state bounded archeological units, the adaptation type emphasizes broader comparison and synthesis. Local archeological variation can be subsumed within larger adaptation types. The adaptation type approach is, therefore, a useful device for expanding the overview from this to other study areas with the Southwest Division.
>
> The adaptation type can also serve as a vehicle to organize areal management recommendations. Since similar resources can be grouped within the appropriate adaptation type, assessments and recommendations can be made on a regionally comprehensive basis rather than by locality. (Sabo et al. 1988:1-4–1-9)

The adaptation type is a nonspecific unit used to characterize and categorize broad relations between technology, human adaptation, and environment. A key element in using adaptation types is that they are not necessarily restricted chronologically or geographically; they have wide applicability and can serve as useful comparative units.

Earlier, we expressed some reservation about the use of adaptation types. This is more of a cautionary hesitation rather than an actual problem with the concept itself. There are two aspects to this that require explanation.

First, the adaptation types that have been devised for the study area are similar, though not identical, to the adaptation types used in the companion volumes for the entire Southwest District. This is intentional, since a primary goal is to emphasize broad similarities between regions without masking the cultural diversity between them. This is fine, but it should be realized that the regional differences on a large scale (e.g., between the Southwest and the Great Plains) are very real, and that one must be cautious in overapplying a concept such as the adaptation type. While adaptation types are a mechanism to simplify cultural characterizations and comparison, the very real fact is that culture is not simple. We must be careful in the quest for regional comparisons not to deemphasize the very characteristics that make one region distinct from another.

Our second concern involves the nature of adaptation types itself. We initially devised several adaptation types for the project area, prior to conducting the in-depth research that was necessary for this document. After completing this task, it became obvious that the adaptation types were not necessarily mutually exclusive, but rather represented a continuum. Any one type may well characterize a particular cultural adaptation, but some elements of that adaptation may more appropriately be similar to another type. For example, two of the primary criteria for establishing adaptation types are settlement and subsistence. Both of these are not static conditions. While the primary settlement pattern of, for example, the Formative period Puebloans may have been sedentary village life, it is clear that a semi-sedentary patterns also existed. The same can be said for the often cited hunter–gatherer/agricultural dichotomy. As the preceding chapters should have demonstrated, this dichotomy is artificial and even during the classic Formative developments, hunting and gathering were important economic variables.

We have devised several adaptation types for both the prehistoric and the historic periods. Most of our attention will focus on the prehistoric adaptation types. The historic types will be discussed in more summary fashion, since the principal emphasis of this volume is on prehistory. References will be kept to a minimum since the adaptation types are built from data discussed in the preceding chapters.

In order to facilitate discussion and comparisons, each adaptation type will be summarized by using 11 separate categories, again following the lead of Sabo et al. (1988):

- 1. Date Range
- 2. Environmental Context
- 3. Cultural Context
- 4. Distribution of Subsistence Activities
- 5. Settlement Pattern/Site Distribution/Site Types
- 6. Bioarcheology
- 7. Social Organization
- 8. Trade/Exchange
- 9. Ideology
- 10. Sensitive Areas of High Site Probability
- 11. Data Gaps and Critical Research Questions

The bioarcheological sections are authored by Ann Lucy Wiener Stodder. Our intention in this chapter is to provide brief encapsulations, and not detailed discussion. This more general format preserves the comparative value of the adaptation type concept.

PREHISTORIC ADAPTATION TYPES

For the project area we have defined seven prehistoric adaptation types (Table 49). For general comparative purposes, Table 49 also lists the most commonly associated cultural periods encompassed by these adaptation types. In some cases, these types extend into the protohistoric and historic periods.

First Occupants

Date Range

This adaptation type dates, by definition, to earlier than any of the well established Paleo-Indian sequences. In the project area, this would be earlier than the Clovis complex, which dates between 9500–9000 B.C. (Cordell 1984:131; Haynes 1970). The beginning date for this adaptation type is strongly debated. If a consensus opinion exists in "mainstream" archeology, dates up to ca 20,000 years ago would be realistic. There have been claims, however, for much earlier dates, including those that would involve human populations ancestral to *Homo sapiens sapiens*. These are not well founded.

Environmental Context

Given the possibly long time span associated with the First Occupants adaptation type, environmental conditions cannot be established. If the early claims are valid, this type would fall within the Late Pleistocene/Early Holocene. In some areas, this would involve glacial conditions, although this is unlikely in the project area. In any case, it is a reasonable assumption that environmental conditions were considerably different than those prevailing today. If this adaptation exists and if it has a long temporal span to it, a considerable amount of environmental change would have accompanied the period.

Cultural Context

The First Occupants adaptation type refers to the presence of human populations in the project area that can be demonstrated to be earlier than the Paleo-Indians. This adaptation type is a hypothetical (and controversial) construct, in a sense analogous to the "Basketmaker I" phase, but much less well founded. It would include any "pre-projectile point" or "pre-Paleo-Indian" developments. Although claims have been made for such occurrences, supporting archeological data are extremely weak.

The First Occupants would have practiced a hunting and gathering configuration. Since we have virtually no hard evidence documenting this type, it is not known if a "pre-projectile point" phase population would have practiced a focal hunting and gathering adaptation, employing only a few resources, or a more wide-ranging pattern. The latter may be more likely, since no specialized tools have been claimed for these populations. Of the claimed sites, the artifact inventories are notoriously nondescript.

Distribution of Subsistence Activities

The economic focus would undoubtedly have been on generalized hunting and gathering, and probably was similar to that proposed for the Archaic (Broad Spectrum, Mobile Hunters and Gatherers). Both plant and animal resources would

Table 49.
Prehistoric Adaptation Types and Some General Corresponding Cultural Periods

Adaptation Type	Cultural Periods
1. First Occupants	Pre-Paleo-Indian; hypothetical phase
2. Focal Hunters and Gatherers	Paleo-Indian
3. Broad Spectrum Mobile Hunters and Gatherers	Most Archaic; initial Athabaskans
4. Experimental Horticulturalists/Primary Hunters and Gatherers	Late Archaic
5. Semi-sedentary, Mixed Economies	Basketmaker through most Puebloan phases including Late Prehistoric/Early Historic pueblos; most other Formative developments
6. Sedentary, Primary Agriculturalists	"Classic" Puebloan/"Chaco Phenomenon"
7. Semi-sedentary, Specialized Hunters/Agriculturalists	Some Late Prehistoric, Protohistoric, Early Historic

have been exploited. It is possible that a greater emphasis was placed on animals, however, since groundstone implements usually associated with plant resources are not commonly represented in First Occupant assemblages. Given the possibly massive environmental differences during this period, the suite of plants and animals exploited was probably quite unlike present day species, and it is likely that extinct species were one component of the economic system.

Since a long time span may be involved for this adaptation type, it is unlikely that a static subsistence pattern existed. A considerable amount of subsistence flexibility and change, associated with previous environmental conditions, is likely to have characterized this adaptation type. Since so little is convincingly documented for this type, the distribution of subsistence activities is unclear. Whether or not favored locales were consistently exploited cannot be determined without a much more substantial data base.

Settlement Pattern/Site Distribution/Site Types

Settlement patterns would reflect a highly mobile system. The settlement pattern would have been influenced by resource availability and technological limits. Site distribution would reflect this eclectic pattern. Site types would consist of ephemeral, limited activity occurrence representative of short term occupations. "Base camps" and "specialized activity" loci are likely site types. These would probably be limited in the density of their material remains.

Bioarcheology (Ann Lucy Wiener Stodder)

There are no known bioarcheological resources associated with the First Occupants adaptation type in the project area. Human remains could provide important data on the genetic affiliation of the earliest populations in the region, possibly on their date of arrival, and on their health and subsistence patterns.

Trade/Exchange

Again, there is virtually no information available for any possible trade or exchange patterns that might have been practiced by populations belonging to this adaptation type. Given the presumed low population, it is unlikely that any formalized trade networks existed.

Ideology

Ideology is one of the most elusive aspects of cultural life to demonstrate archeologically, especially when dealing with hunters and gatherers. There is, once again, no information available for the ideological beliefs of the First Occupants.

Sensitive Areas of High Site Probability

Since there is so little documentation of this adaptation type, virtually any landform could be considered as a sensitive area for investigation, although some are more likely to contain remains than others. In any of the numerous highly eroded regions of the Southwest there is an extremely low likelihood of recovering in situ evidence. Conversely, eroded regions do have a high potential of exposing such sites if they exist, although it is unlikely they would be in primary context. Given the presumed antiquity of this adaptation type, it is likely that deposits may be deeply buried and therefore would have little chance of archeological discovery. Especially promising areas would be landforms that can clearly be dated to the Late Pleistocene and areas where buried deposits of considerable antiquity might be revealed. Caves with well stratified cultural materials could represent one of the better chances of documenting this adaptation type although, by and large, such sites are not well represented in the project area.

Data Gaps and Critical Research Questions

As the preceding discussion has clearly indicated, there are several severe data gaps and research questions for the First Occupants adaptation type. Virtually no baseline data exist. Most claims for sites belonging to this adaptation type have focused on demonstrating an antiquity in excess of Paleo-Indian materials and relatively little attention has been given to other aspects. A host of other questions obviously can be asked of this adaptation type. Since we have so little information on this type, any verifiable contribution would make a significant addition to our knowledge. The following are some of the most critical research questions and data gaps.

1. The first and foremost data gap is simply in documenting the existence of this adaptation type.

2. Assuming that this type exists, establishing a chronological framework is critical. Is it a long lived or a relatively short lived phenomenon?

3. If this adaptation type's existence can be verified, is it just slightly older than Paleo-Indian materials, and possibly antecedent, or is it of considerably greater antiquity?

4. If it is of considerably greater antiquity, would populations be ancestral to the Paleo-Indians or would they represent completely different groups who might have died out prior to the Paleo-Indian period?

5. Was there a temporal gap between this type and the Paleo-Indian period?

6. What were the prevailing environmental conditions?

7. We have virtually no information regarding site typology, artifact assemblage composition, social structure, trade, or ideology. These all represent major gaps.

8. Was the economy based on a broad spectrum system or was it focalized on large game?

Focal Hunters and Gatherers

Date Range

This adaptation type appears with the first clearly demonstrated presence of human populations in the project area at ca 9500 B.C. and ends at about 6000–5500 B.C. It subsumes the Paleo-Indian period in the project area, but is most pronounced during the latter aspects of that period (ca 8500 B.C. to ca 5500 B.C.). Although data are extremely rare, it is possible that this adaptation type also could extend into the early phases of the Archaic (Jay phase in the northern part of the project area, thereby extending the chronology to ca 4800 B.C.).

Environmental Context

Depending upon where one draws the boundaries, this type falls in the Late Pleistocene/Early Holocene. Early Paleo-Indian groups colonized much of North American prior to, or just after, the Wisconsin glacial maximum, and environmental conditions would have reflected a high diversity of potential resources. Later Paleo-Indian groups, however, occupied areas of less ecological diversity and these are best reflective of this adaptation type.

Unfortunately, only a few areas within the Southwest have been subjected to the detailed paleoenvironmental studies that are necessary to provide an accurate view of the environmental context of this time. The best information comes from Blackwater Draw in New Mexico and the San Pedro River Valley in Arizona (Cordell 1984:138).

What paleoenvironmental data are available suggest that the earliest manifestations of this type appear slightly after a period of greatly increased effective moisture. There are, however, no marked depositional changes correlating with the introduction or disappearance of specific Paleo-Indian complexes. The later part of the Paleo-Indian period may have witnessed major desiccation, but this was not a synchronous event. Despite relatively favorable conditions, the widespread occurrence of Clovis, Folsom, and Cody materials does not appear to be related to especially favorable environmental conditions (Cordell 1984:142). Several researchers (e.g., Stuart and Gauthier 1984; Judge 1973, 1974) have commented on the environmental correlates of the late Paleo-Indian adaptations that are encompassed within this adaptation type. Focalized adaptations, where an emphasis is placed on only a few resources, can be expected in areas of relatively low ecological diversity. On the other hand, a more broad spectrum economic adaptation emphasizing a variety of resources might be expected to occur in areas of high ecological diversity. Accordingly, most of the examples of this adaptation type occur in the eastern part of the study area, where ecological diversity is relatively low.

Cultural Context

This adaptation type includes most of the Paleo-Indian period. It is particularly relevant, however, to the later Paleo-Indian manifestations where a focalized economy is more obvious in the archeological record. Earlier aspects of the Paleo-Indian period may reflect a more diversified adaptive strategy that is similar to that posited for the Archaic period. Judge (1974), at least, feels that the earlier Paleo-Indian adaptations were oriented toward more diverse ecological settings, whereas later groups occupied regions with less diversity. This resulted in fewer resources and more emphasis on highly effective hunting strategies.

The material remains of this adaptation type are relatively scarce in the archeological record. The most characteristic artifacts, however, are well manufactured projectile points. Other elements of the chipped stone assemblage are not as well documented as are projectile points, but a varied assemblage is indicated. Many of the implements are well made and exhibit a considerable degree of technological sophistication. Groundstone implements are very rare in Paleo-Indian assemblages.

There are some analogies to this adaptation type near the opposite end of the chronological spectrum, when we see a resurgence of a focal economic pattern. This latter pattern is, however, sufficiently distinct to merit a different adaptation type that will be discussed shortly.

Distribution of Subsistence Activities

The stereotypic view of Paleo-Indian populations is that they subsisted by hunting big game and little else. This is a misconception, and more balanced research has illustrated that Paleo-Indian populations did in fact practice a more balanced economic strategy. Nonetheless, at least the late elements of the Paleo-Indian period do reflect an economic strategy that focused on big game. It was not, however, the sole component of late Paleo-Indian diets.

This strategy was oriented towards the procurement of large animals, some of which are now extinct. The role that humans played in these extinctions is one of considerable controversy. While hunting undoubtedly exploited these animals, some researchers have suggested that scavenging also may have played a role. After the extinction of several species of fauna, this adaptation type continued to focus on herd animals such as bison. In fact, it was during the Folsom and later Paleo-Indian phases that this subsistence pattern is more clearly reflected in the archeological record. Although a major focus of subsistence activity was on these large animals, other elements of Paleo-Indian assemblages indicate the subsistence activities also included the procurement of smaller game and wild plants.

Settlement Pattern/Site Distribution/Site Types

The settlement pattern practiced by members of this adaptation type and its associated site distribution already have been alluded to in an earlier discussion on the environment. Following Judge's argument, a focal Paleo-Indian economic pattern would have been most prevalent in areas with relatively low ecological diversity. While the Southwest in general is not extremely rich in resources, the most appropriate regions for this adaptation type would have been in the eastern portions of the project area where ecological diversity is relatively low.

The settlement pattern appears to have favored areas near water resources, such as playas, streams, and springs. Altitudinal variables also may have affected late Paleo-Indian settlement patterns, as Stuart and Gauthier (1984:31–33) argue, with an increasing emphasis on higher elevations towards the end of the period and into the Archaic. Mobility was a characteristic of these hunters and gatherers, in most instances, undoubtedly tied to the migration patterns of the animals they hunted.

Until relatively recent times, site types reflective of these hunters and gathers was subject to research bias, with kill sites being the preferred focus of investigation. Judge (1974), however, has presented a more balanced perspective, identifying several site types. These include maintenance, armament, base camp, processing, quarry, and kill localities. Judge also suggests that many of the presumed kill sites may actually represent "unsuccessful kills" or processing sites. Most sites belonging to this adaptation site are relatively small and indicate short term occupations.

Bioarcheology (Ann Lucy Wiener Stodder)

This adaptation type is represented by a single occurrence of human remains from the project area—the tooth found with a Cody Complex point in southern Colorado. Obviously the Paleo-Indian period is a major gap in bioarcheological resources and data.

Social Organization

Very little is known about the social organization or structure of populations belonging to this adaptation type. Most researchers assume that population densities were low and that Paleo-Indian groups consisted of small family bands. On some occasions, these may have joined together on a seasonal basis, both to participate in communal hunts and to share information. Analogies have been made with modern groups of hunters and gatherers, but these must be viewed with extreme caution, especially since most modern groups practice an economic strategy more similar to the Archaic rather than the Paleo-Indian period.

Trade and Exchange

As with social organization, there is very little information available regarding trade and exchange networks. Exchange in lithic raw materials is likely. Given the often harsh environmental conditions that prevailed during much of this period, the exchange of information, especially as it related to the locations of herds, undoubtedly also occurred. However, given the low population densities, it is unlikely that much in the way of formalized trade or exchange patterns existed.

Ideology

Information of Paleo-Indian ideology is even rarer than it is on social organization and trade or exchange. We might reasonably assume that these groups had animistic religious views that were associated with success during the hunt, but this is exceedingly difficult to document archeologically.

Sensitive Areas of High Site Probability

Given the antiquity of this adaptation type, the best chances of recovering intact deposits would be in long buried landforms and in caves. The former, however, are the least likely areas to be investigated archeologically. Exposed landforms that can be dated to the appropriate time period also have great potential, although if these have been exposed for a great length of time, in situ deposits may be unlikely. In point of fact, most Paleo-Indian sites that have been located in the project area occur in areas of significant erosion (Stuart and Gauthier 1984:28). In areas where Paleo-Indian materials are not well known, this may simply be because they are buried. The flip side of this, however, is that in highly eroded areas, it is unlikely that in situ deposits will be preserved. River and stream terraces, caves, and playas are other landforms that have a high potential for containing sites belonging to this adaptation type.

Data Gaps and Critical Research Questions

There are several critical data gaps and research questions relating to the focal hunters and gatherers adaptation type. These include the following:

1. Does this adaptation type extend to the earlier phases of the Paleo-Indian period and to the earliest phases of the Archaic period?

2. Exactly how focalized was this adaptation type? Can other subsistence activities beside the extensive hunting of large game be demonstrated?

3. Were populations belonging to this adaptation type responsible for the extinction of Pleistocene fauna?

4. We have virtually no information on social organization, trade/exchange networks, and ideology for this adaptation type. These represent critical data gaps.

5. Can the environmental and elevational distinctions that some researchers have proposed for this adaptation type be verified?

6. What techniques can be used to enhance site discovery?

7. Are the several regional absences of this adaptation type real or do they reflect problems with archeological recovery?

8. Is the material culture of this adaptation type richer than reflected in the presently available archeological record?

Broad Spectrum Mobile Hunters and Gatherers

Date Range

Three distinct chronological periods define this adaptation type. The first falls within much of the Archaic period and can be roughly dated to ca 5500 B.C. to ca 1 A.D. The second includes developments several thousand years later and spans the time when the first Athabaskans entered the project area. Depending upon when this occurred, the date range would be from ca A.D. 1000 (if one believes early claims) or ca A.D. 1700 to about A.D. 1750 or 1800. The third time period occurs ca 500 B.C. to the time of European contact. This, however, occurs only in some portions of the project area, such as Trans–Pecos, and is generally referred to as the Late Prehistoric period.

Environmental Context

The initial aspects of this adaptation type coincided with environmental changes that were occurring in many parts of the project area. In several regions, a decrease in effective moisture is postulated at ca 6000 B.C. On the Llano Estacado, this resulted in an essentially treeless prairie. In the nearby Guadalupe Mountains, a juniper–oak woodland was replaced by desert scrub and grassland communities.

Much of this adaptation type is subsumed under what Antevs (1955) called the Altithermal, dated from ca 5500 to ca 2900 B.C. This was characterized by relatively hot and dry conditions. The nature, and even the very existence of the Altithermal, however, is a subject of considerable debate. At the end of the Altithermal, there was an increase in effective moisture in many parts of the project area (Antevs' Medithermal). This coincided with the Late Archaic in many localities.

Some researchers have suggested a very different environmental scenario. Gillespie (1981), for example, argues that for the San Juan Basin a warm wet mid-Holocene was characteristic, with grasslands replacing sagebrush as the pattern of precipitation shifted from winter to summer dominance.

There is a considerable amount of controversy regarding environmental conditions during the Archaic, and resolution is not in sight. Whether or not Antevs' classification proves to be accurate, it is clear that a considerable amount of environmental change occurred during the long time span associated with this adaptation type.

Cultural Context

The primary cultural context of this adaptation type is within most of the Archaic phases. In a sense, this is the most generic type in that "mobile hunters and gatherers" have populated the world for most of mankind's existence. During the Archaic, this adaptation type is reflected by a highly efficient broad spectrum economic pattern in which a wide variety of seasonally available plants and animals were exploited. Their material culture was simple but efficient. Well manufactured projectile points are the most diagnostic chipped stone artifact, although other tools are documented. Groundstone represents an extremely significant component of the material culture. In the rare instances where preservation has been good, other normally perishable items have been recovered, such as baskets, bone artifacts, and ornamental gear. Architecture is poorly documented and undoubtedly consisted of ephemeral structures that left little in the way of archeological remains.

The Athabaskan and Late Prehistoric components of this type are quite similar to the Archaic, which, of course, demonstrates the utility of the adaptation type concept. A key issue involved is the proposition recently put forth by some researchers that a basic "Archaic" lifestyle was much more enduring than previously believed. They feel that this adaptation continued up to and including contact with Europeans in much of the project area. Whether or not these groups should be referred to as Archaic is at question here; there is little doubt that in terms of adaptations a striking similarity is apparent.

Distribution of Subsistence Activities

The primary subsistence mode of this adaptation type was one of hunting and gathering in which a wide range of resources were exploited. The seasonal availability of these resources required efficient scheduling of activities, and the settlement pattern of these groups was structured around this. Unlike the adaptation discussed earlier, this type involved a broad spectrum of resources. While in a sense eclectic, this does not mean that exploitation occurred in a haphazard manner, or that these people ate virtually anything they could get their hands on. There is perhaps a stereotypic view of hunters and gatherers subsisting on a very low level of "humanity," scavenging whatever resources they could. Recent research has gone a long way in dispelling this myth. It is apparent that this adaptation was a highly efficient method of exploiting a wide range of resources with limited technological sophistication. The success of this type is evident by its long lived duration.

In terms of specific resources exploited in the project area, archeology has contributed relatively little direct information, much of it being inferential. Sites associated with this adaptation type generally are small, ephemeral, and poorly preserved, and features are rare. Accordingly, the recovery of actual subsistence remains is rare, although they have been documented. A variety of grasses were exploited, with Indian Ricegrass being one of the preferred species. Chenopodia also were a common and frequently exploited resource. Most animal remains from sites associated with this adaptation type represent a wide range of small species, although occasionally larger game animals also were hunted. This is particularly true with those groups belonging to the later aspects of this type.

This was a highly efficient adaptation and the distribution of subsistence activities reflects this. During the Archaic, there frequently was an emphasis on sand dunes as procurement sites. These landforms often served as a "magnet" for resources, particularly in arid environments. In the less arid regions of the project area, however, a wide variety of habitats was exploited.

Settlement Pattern/Site Distribution/Site Types

The settlement pattern practiced by groups belonging to this adaptation type was quite variable, and it would be incorrect to postulate one "typical" pattern. A few generalized statements, however, can be made. These were highly mobile hunters and gatherers. Sites were small and frequently represented brief occupations. The settlement pattern varied considerably on a regional basis and was clearly influenced by the distribution and seasonal availability of key resources. Some researchers have suggested that relatively small areas were occupied on a yearly basis, while others believe that a more widely ranging settlement pattern was characteristic. In many instances, the reoccupation of favored locales has been demonstrated.

Site distribution was equally variable. As noted above, there was a distinct preference for sand dune locales. Several researchers have used variants of a model of vegetative diversity to explain Archaic settlement patterns, and based on numerous large scale surveys it is apparent that the distribution of key resources did play a major role in the settlement pattern.

When researchers first investigated sites left by these groups, there was a tendency to oversimplify associated site types. Generally the dichotomy of base camps and limited activity sites was used to characterize this period. Recent research, however, has shown that a more sophisticated site typology can be generated from the available evidence. The concept of base camp was been questioned, although in general this remains a useful construct. Several types of limited activity sites have been identified by various researchers. These include lithic quarry sites and a variety of economically oriented site types (e.g., grass procurement sites, hunting stands, etc.). Variation within base camps also has been demonstrated; some represent a limited range of activities while others are suggestive of a wide range of activities. Rockshelters and caves also were favored site locales for these groups.

In general, sites associated with this adaptation type do not reflect long term occupations. Few sites with structures have been documented. Features are common at many sites, but these often are not very complex. The most common feature type is the hearth. In a few instances, other features such as storage cists also have been documented. Intrasite patterning is evident at many sites, but studies attempting to document this are still somewhat rare.

Sites belonging to the latter aspects (i.e., Late Prehistoric and early Athabaskan) of this adaptation type generally mirror the same patterns described above. The settlement pattern of the early Athabaskans changed dramatically, however, within a short time after their contact with other more sedentary Native groups and with early Europeans in the project area.

Bioarcheology (Ann Lucy Wiener Stodder)

Human remains are not abundant for mobile populations, and the study of bioarcheological resources in this adaptation type is far from complete. In all, 34 sites in the project area yielded human remains in this adaptation type—a total of 70 individuals. The distribution of bioarcheological assemblages in this adaptation type is as follows: Colorado Archaic: 4 assemblages; New Mexico Archaic: 1 assemblage; Trans–Pecos Texas Archaic: 6; Trans–Pecos Mid-Archaic through Late Prehistoric: 8; and Trans– Pecos Late Prehistoric: 15 assemblages. No bioarcheological resources are known from Early Athabaskan populations. Relatively little research has been conducted on these assemblages. Only 12% of the assemblages are documented beyond age and sex determination, and only 3% of the assemblages appear to have been more or less completely analyzed. The Colorado Archaic people seem to have had good dental health, but a rapid rate of dental wear. No cases of cribra orbitalia or porotic hyperostosis have been reported, and presumably the low population density would have minimized disease transmission. Even less is known about the biology of the Trans–Pecos hunter–gatherers. Pronounced dental wear, antemortem tooth loss, and skeletal trauma have been observed. Coprolite evidence suggests a broad dietary mix and possible use of medicinal plants in treatment of diarrheal conditions (Holloway 1985).

Systematic study of hunter–gatherer remains from the project area would enable us to investigate trends in local adaptation and to compare the biological status of different hunter–gatherer groups in the Southwest with foraging peoples elsewhere.

Social Organization

As with the adaptation types discussed earlier, there is little direct archeological evidence for social organization for the Broad Spectrum Mobile Hunters and Gatherers adaptation type. Most reconstructions of social organization and structure rely on ethnographic comparisons to both modern hunters and gatherers and to those Native groups with whom Europeans first had contact.

Many of the reconstructions of social organization followed Julian Steward's classic ethnographic studies of Great Basin groups. Generally, three social groups are recognized in most societies that would have belonged to this adaptation group. These are the domestic group, representing nuclear or extended families; the minimal band, consisting of several households and usually containing about 25 individuals; and the maximum band, based primarily on intermarriage, visiting, and other forms of social interaction. The size of a maximum band is quite large, averaging between 300 to 500 individuals.

Most of the project area represents a semi-arid environment. In such settings, social units usually were relatively small due to the scarcity and sparse distribution of resources. The minimum band level of ca 25 individuals often is used as a convenient number to represent an estimated size of groups belonging to this adaptation type. These bands were probably structured along egalitarian lines. It is likely that larger groups (the maximum band) did get together, perhaps on a scheduled, seasonally oriented basis, to share information, trade, and marry. The archeological expression of such "get togethers," however, is quite rare in the project area.

Trade/Exchange

There is some evidence for trade and exchange by populations belonging to this adaptation type. This is most commonly reflected in the form of nonlocal artifacts and raw material types. Both of these appear with frequency at small sites associated with this type. Whether or not systematic trading patterns were in existence is not known, but it is unlikely that any elaborate trade networks existed.

Ideology

Once again, there is virtually no evidence for ideological beliefs of these groups. Such information often is best expressed in burial data, and burials from this adaptation type are extremely rare. As with the earlier adaptation types discussed, it is likely that animistic forms of religious beliefs were in operation and that both success in the hunt and fertility for productive seasons of wild plants were desired outcomes.

Sensitive Areas of High Site Probability

As with the adaptation types previously discussed, this one tends to be represented by small sites with low archeological visibility. This makes their discovery a more difficult task and it also makes it easier for such sites to be dismissed in a management perspective. Fortunately, this situation is changing for the better.

The long time span encompassed by this adaptation type has resulted in the deposition of thousands of sites on the landscape. The nature of the subsistence mode of this type is such that sites can be expected to be found within a wide ranging context of landforms, from high elevation contexts to lowland desert areas. Areas with high potentials for containing such sites include those that have been exposed to reveal deposits dating to the appropriate periods. In areas where deposition has been rapid and relatively recent, sites may be buried. One very sensitive landform consists of sand dunes. In some parts of the project area, one can be certain that nearly every sand dune or sand sheet will contain Archaic materials. These often are buried or only partially exposed by "blowouts." Another locale with a high potential of containing pertinent cultural remains are rockshelters and caves. Much of our best information on this adaptation type comes from such sites.

Data Gaps and Critical Research Questions

This adaptation type has been given only cursory research attention until recent years, with a few notable exceptions. Within the last 15 years our knowledge of the Archaic has accelerated rapidly and represents a considerable improvement over past information. Despite this, several critical data gaps and research questions remain unanswered. Some of these are identified below.

1. What is the relationship of this adaptation type to the Focal Hunters and Gatherers type? In other words, what was the transition from the late Paleo-Indian to the Archaic like, and when did it occur?

2. Is the preference for dune locales during the Archaic real or a pattern of archeological bias? If it is real, is it regionally based or does it occur throughout the project area?

3. Critical data gaps exist in information on ideology, social organization, and trade/exchange.

4. Although we know a fair amount about the general subsistence strategies of these groups, relatively little specific evidence is available regarding precisely what species of plants and animals were exploited and how these were incorporated into a seasonal scheduling system. The subsistence issue requires additional precision.

5. What data detection methods will improve our ability to locate and adequately record such sites?

6. More precise information is required on the nature of artifact assemblages, especially on classes of artifacts other than projectile points.

7. How long lived was the Archaic? Is it appropriate to call those adaptations lasting up until historic times "Archaic?"

8. For these latter groups, what was the nature of their relationships with other, more sedentary groups?

9. Finer chronological resolution of the Archaic is required, especially as it relates to individual phases.

10. Additional paleoenvironmental data are critically required, especially during the Archaic component of this adaptation type.

11. When did the first Athabaskan groups enter the Southwest, what was their route, and how long did they continue to

practice the economic focus characterized by this adaptation type prior to being influenced by other, more sedentary groups?

12. Additional information on site structure and function is required. This adaptation type represents "small site archeology" and to adequately characterize it requires the use of specialized techniques, often involving interdisciplinary participation.

Experimental Horticulturalists/Primary Hunters and Gatherers

Date Range

The date range for this adaptation type is ca 2000 B.C. to ca A.D. 500. Earlier dates have been claimed but cannot be substantiated. Even the 2000 B.C. date is controversial, but accumulating evidence supports a determination this early.

Environmental Context

Many of the environmental comments made for the previous adaptation type also are relevant here. Of particular concern is the issue of what the environmental conditions were like during the initial introduction of cultigens into the project area. This boils down to a simple question of: were conditions relatively favorable or unfavorable? There presently is little consensus opinion of what environmental conditions were like at roughly 2000 B.C. If the Altithermal concept is valid and does in fact represent a xeric period, cultigens may have been introduced under relatively marginal conditions. The dating of the Altithermal obviously is critical here. For example, Judge (1982) thinks that the Altithermal lasted until ca 1000 B.C., while Irwin–Williams (1973, 1979) believes that the more favorable conditions represented by the Medithermal occurred earlier, at ca 3000–2500 B.C. Simmons (1982e) has suggested a middle line position, believing that cultigens were initially introduced during the latter part of a dry period. Other important environmental variables relate to altitudinal differences, water availability, and growing season. Much of the project area has a short growing season and one can assume that the initial introduction of cultigens was quite experimental and, in many cases, may have been unsuccessful. In the Chaco Canyon area, where one of the first instances of horticulture has been demonstrated, rainfall patterns are unpredictable, and it is clear that water was a limiting factor in the success of horticulture. A key environmental issue is in determining the limits of the growing season in areas where early cultigens have been documented.

Cultural Context

This adaptation type represents a very specific economic focus that initially occurred during the Late Archaic. This was the transition from food procurement to food production (what in many other contexts has been referred to as the Neolithic Revolution). Its impact cannot be overestimated, for once reliable food resources were available, the stage was set for subsequent cultural developments. The initial impact of food production in the project area apparently was quite limited and had humble beginnings. Many of the statements made about the previous adaptation type and the Archaic also are relevant to this discussion and will not be repeated. A significant aspect of this period is that all available evidence indicates that the initial introduction of cultigens into a primary Archaic economy did not greatly affect the prevailing settlement and subsistence patterns. This adaptation type continues into the very early Formative period, represented by early Basketmaker occurrences.

The experimental nature of this type is critical to its definition. It is likely that primitive horticulture, once introduced into the area, was not universally embraced. A large portion of the population continued to practice a basic Archaic lifestyle and in some instances this pattern continued up until historic contexts. In other words, this adaptation type represents a small slice of the total Late Archaic universe.

Distribution of Subsistence Activities

The primary subsistence element of this adaptation is, of course, the introduction of cultigens into the economic system. This is a subject of considerable controversy and has not been satisfactorily resolved. Some researchers (e.g., Berry 1982) have suggested that agriculture, once it arrived in the Southwest, was not a gradual process but rather a more discrete event and that once in place it involved a full time, labor intensive operation. Other researchers (e.g., Simmons 1986) have suggested that the introduction was much more gradual. They regard the initial incorporation of limited horticulture into existing economies as a mechanism to provide secondary food resources, which allowed for a more reliable subsistence base during times when wild resources were not plentiful.

Based on available data from both northwestern New Mexico (e.g., Simmons 1982e, 1986) and southern New Mexico (e.g., Upham et al. 1987), where very early dates have been documented for the introduction of cultigens, it appears that horticultural activities were only components of a larger and more "traditional" Archaic economic system. It is likely that cultigens were planted on small plots, in many cases sand dunes, and that they represented only one additional element within the existing economic system. We have used the term horticulture rather than agriculture to refer to the secondary nature of the initial adoption of cultigens.

The earliest cultigen in the project area was maize. Squash also has been documented at ca 1000 B.C. (Simmons 1986). These two crops form two-thirds of the classic Southwestern domestic repertoire of "corns, beans, and squash."

Settlement Pattern/Site Distribution/Site Types

Once again, the predominate settlement pattern in operation during this time appears to have been quite similar to that of nonhorticultural Late Archaic groups. The patterns discussed for the previous adaptation type accordingly also are relevant here.

Perhaps the most surprising aspect of settlement pattern during this period is its static nature. That is, once crops were introduced, they do not appear to have had a major impact on many aspects of life, including settlement pattern and site distribution. If there was a Neolithic Revolution in the Southwest, it is more appropriately viewed as an evolution.

Evidence for early cultigens has been found in both rockshelter and sand dune sites. It is likely that the dunes, with their water retention capabilities, served as small horticultural fields. Other localities, such as flood plains, also cannot be ruled out. All of these locales, however, also reflect the distribution of other, nonhorticultural Late Archaic groups.

For at least the initial introduction of cultigens into the project area, there was not a dramatic change in site typology. Those site types discussed for the previous adaptation type still were used during this period. The agricultural sites that have been documented do not differ substantially from other Late Archaic sites. In fact, they even do not have large amounts of the accouterments normally associated with agricultural activities, such as groundstone, and no field-related features have been defined. At some sites, bell-shaped features, presumably for storage, are documented (e.g., Simmons 1986:77), but otherwise these sites differ little from other Late Archaic sites in the vicinity. What all this suggests is that the initial introduction of cultigens into the project area did not result in any observable degree of sedentism. Sedentism frequently is associated with population growth and the beginnings of food production, but this is too general an assumption to be of much practical value. Only during the latter years of this adaptation type was there a substantial shift in site types. This was towards small pithouse villages as represented by the Basketmaker II period.

Bioarcheology (Ann Lucy Wiener Stodder)

Bioarcheological resources from this adaptation type include assemblages from 15 sites with cultural affiliations as follows: Colorado Early Woodland—5 assemblages, 5 individuals; Late Archaic (Southeast New Mexico)—5 assemblages, 14 individuals; En Medio phase or Basketmaker II—4 assemblages, 11 individuals; Pine Lawn phase—1 site, 54 individuals. None of the burials in any of these assemblages have data beyond age and sex determination.

Most of the research on the Colorado Woodland burials focuses on defining the Woodland mortuary complex, and not on bioarcheological investigations. The Colorado Woodland burials (from within and adjacent to the project area) exhibit very rapid dental wear, as do their Archaic predecessors. Hoffman's identification of cribra orbitalia and porotic hyperostosis, skeletal indicators of iron deficiency anemia, in the Red Creek Burial (Butler et al. 1986) suggests that the health of Woodland people may have been more similar to that of Formative populations than to hunter–gatherers. This is the type of question that must be addressed in future research. Infectious and traumatic conditions as well as evidence of developmental arrest have also been identified in Woodland skeletal remains.

The lack of data on New Mexico populations in this adaptation type appears to be the combined result of field discard and lack of systematic analysis of the early Mimbres burials, and of the difficulty of extracting data on specific burials from reports on burial samples from multicomponent sites.

Social Organization

Once food production became an established practice and resulted in a primary rather than secondary resource, profound changes occurred in social organization. These, however, cannot be documented for this adaptation type. As noted earlier, the only real difference in this type and the preceding one is the introduction of cultigens. This initially appears to have had little impact on any other aspects of society. A major problem, of course, still remains in documenting social organization, especially in small and mobile groups.

It is likely that as cultigens became more significant elements of the subsistence economy, there were changes in social structure. Food production and resultant surpluses require a division of labor, and this, in turn, ultimately demands a social system more complex than an egalitarian structure. Given the marginal environmental nature of much of the Southwest, food surpluses would have provided a powerful incentive for the incorporation of power.

Another variable associated with food production is population growth. This often is presented as a "chicken or egg" dilemma: did food production allow for accelerated population growth, or did population pressure demand the implementation of a new subsistence strategy (i.e., agriculture)? In the project area, at least, it appears that food production preceded substantial population growth, although this is a somewhat tenuous assumption.

Trade/Exchange

Again, the comments made for the previous adaptation type also pertain here. It is likely that once cultigens became more important and storage of surpluses was possible, trade and exchange may have accelerated. Previous trade patterns primarily involved raw materials. Food production introduced another variable into the system: food. Excess subsistence goods in an environmental setting such as the Southwest would have been a valuable trade commodity. An allied issue is related to the exact mechanism by which cultigens made their way into the Southwest. Their origins were in Meso-America; were they traded into the Southwest?

Ideology

At the risk of being redundant, little is known of the ideology of groups associated with this adaptation type. Once again, the comments for the previous adaptation type are relevant here. A major new variable, however, would have been the likely emphasis on fertility. This, of course, is difficult to demonstrate archeologically, but once the potential of food production was realized, there likely was an ideological shift towards emphasizing the fertility of the earth.

Sensitive Areas of High Probability

The comments on the previous adaptation type are equally relevant here. Sites representing this type are low visibility manifestations, thus complicating both their discovery and arguments for their significance. It is important to realize that most sites where early cultigens have been recovered do not appear substantially different from basic "lithic scatters." Thus they are easy to overlook. Only by using precise data recovery techniques has it been possible to even document the presence of early cultigens.

Once again, sand dunes are likely site landforms, especially since these may have represented some of the first agricultural "fields." Rockshelters also have been very productive in providing evidence of this adaptation type, since they are conducive to good preservation.

Data Gaps and Critical Research Questions

This adaptation type involves a very controversial issue, the initial introduction and impact of cultigens to the Southwest, and several research questions remain unanswered. The following lists some of the more significant.

1. The initial appearance of cultigens into the project area is still controversial. Additional hard data are required to present a totally convincing argument of the antiquity of this event. Related to this is the problem of documenting the use of cultigens archeologically. Many previous claims have been inferential, and it is essential to employ data recovery techniques that will retrieve the often minute and subtle remnants of early horticulture.

2. The apparently low impact of cultigens for perhaps 2000 or more years is an issue that requires much more additional attention. For example, did the incorporation of cultigens have a beneficial or detrimental effect on diet?

3. Was population pressure a significant variable in the early introduction of cultigens?

4. Do more substantial sites associated with this adaptation type exist, possible reflecting some degree of sedentism?

5. How significant were cultigens in the overall subsistence strategy, and how did their significance increase through time?

6. Why was there a nearly "retarded" "Neolithic Revolution" in the project area?

7. What species of cultigens were involved and were they strains adapted for short growing seasons?

8. What was the relationship between the early food producers and their neighbors?

9. What were the stimuli that led to semi-sedentary communities?

10. What social structure and ideological changes occurred as a result of food production?

11. Was the first experimentation with food production successful and long lived, but with a faint archeological signature, or was it initially an unsuccessful adaptation?

12. How did cultigens first get into the project area? We know their ultimate origins were in Mexico. Were they traded into the Southwest within a systematic framework or did they arrive through some other diffusion?

13. Documentation of prevailing environmental conditions is essential in determining the context in which cultigens were introduced and incorporated into the subsistence strategy.

Semi-Sedentary, Mixed Economies

Date Range

This adaptation type occurs in the project area from around A.D. 500 and continues into the historic period. The terminal date varies by region, but aspects of this adaptation are apparent quite late (ca mid-1800s). The strongest archeological reflection of this adaptation type, however, dates to ca A.D. 900–1400, during the Formative period.

Environmental Context

The environmental context of this adaptation is relatively close to present day conditions. By the time this type became established, conditions quite similar to the present were prevalent throughout the project area; however, this is not to say that no environmental change occurred. In fact, environmental variables have been directly tied to cultural events during this time (e.g., Dean et al. 1985; Euler et al. 1979). A characteristic of this adaptation was dependency on agriculture, and the environmental restrictions and constraints noted in the discussion of the previous type were even more significant here. Thus, water and rainfall were crucial variables.

Although conditions may have generally been similar to those prevalent today, some substantial changes are documented. Perhaps the ones that have received the most attention have been the cyclical occurrences of drought (and associated arroyo cutting). In many cases, these can be quite specifically documented, and their impact on communities who relied on agriculture as one subsistence resource is obvious.

Cultural Context

Our conception of this adaptation type has changed since the beginning of this project. As we evaluated the literature, and examined some of the current theoretical discussion on Formative subsistence, it became apparent that this adaptation was much more widespread and long lived than we initially had believed. Initially, we felt that the Sedentary, Primarily Agriculturalists adaptation type would be the most common one characterizing the majority of prehistoric Formative peoples. After examining the literature exhaustively, however, it is more appropriate to consider most of these developments within the Semi-sedentary, Mixed Economies adaptation type.

This may alarm many Southwesternists, since almost by definition the "classic" Formative developments in the Southwest, those responsible for the strikingly large pueblos, have been assumed to represent the remains of populations whose primary subsistence base was agriculture. We do not think, however, that these claims can be verified. A more realistic perspective places them within this adaptation type. Following this reasoning, we feel that only developments such as the Chaco Phenomenon can realistically be considered as reflecting a prehistoric sedentary, primary agricultural type of adaptation, and even this has been questioned.

A considerable degree of variation exists within the Semi-sedentary, Mixed Economies adaptation type. This relates to both the subsistence and settlement modes. These vary by time and by region and are most appropriately viewed along a dual continuum of settlement and subsistence. In other words, some populations practicing this adaptation type were more sedentary than were others, while some also were more reliant upon agricultural than were others. More often than not, there is a direct relationship, with those more sedentary also being more reliant upon agriculture, but this is not necessarily a one-to-one correlation.

Most of the populations associated with this adaptation fall within the Formative period. They were characterized by a relatively sophisticated technology, and ceramics were now well established. Small villages were common; the first of these were represented by pithouses, while later architectural forms included a variety of above-ground structures.

This adaptation type was nearly as widespread as the one just discussed. It occurred not only in the northern Anasazi/Pueblo regions, but also in the southern parts of the project area, where its archeological signature is not as pronounced. It also is associated with several protohistoric groups, and continued long after contact with Europeans.

Distribution of Subsistence Activities

As just implied, this adaptation type is more common than previously believed. A principal subsistence resource was agriculture, and small agriculturally oriented villages were common during the time that this type was in operation. These, however, were not necessarily dependent upon agriculture; hunting and gathering remained important components of the economy. Even at the larger sites with substantial architectural presence, current thought places an emphasis on hunting and gathering. Upham's (1984) arguments for mobile mixed economy groups during the Formative are especially relevant to this adaptation type.

The classic Southwestern economic trio of "corns, beans, and squash" was well established by this time. These three items formed a major proportion of the diet, but they were supplemented by a wide variety of both wild plants and animals.

At excavated sites where direct economic data have been recovered, there is a sometimes surprisingly high proportion of wild resources represented. The available economic data suggest a very efficient and wide ranging pattern in which numerous resources supplemented one another. An important point to keep in mind is the difficulty of successfully conducting intensive agriculture in most of the project area. Given this marginality it is not surprising that wild resources continued to represent significant economic components.

Settlement Pattern/ Site Distribution/Site Types

Settlement pattern and site distribution during this time were remarkably varied throughout the project area. Major sites tend to be located in areas with ready access to arable land, as well as to other resources. A wide variety of ecological zones were inhabited during this period, ranging from arid desert areas to well timbered mountainous zones. Stuart and Gauthier (1984) have observed several elevational differences between sites belonging to different Formative phases during this time, and these often reflect variations on the mixed economy strategy.

In the northern portion of the study area, sites belonging to the early reflection of this adaptation tend to be located in defensive positions. This may reflect the more risky nature of agriculture in these areas and the increased need for protection. In general, though, it is difficult to characterize the settlement pattern associated with this adaptation type, because it varied from region to region. While access to arable land was clearly an important variable, several other factors also were important for the distribution of sites. Not all of these are clearly understood. Depending upon the region under consideration, though, Formative settlement systems of groups associated with this adaptation usually consisted of either aggregated or dispersed patterns (cf. Cordell 1984).

A remarkably wide variety of site types characterize this adaptation type. These range from small villages to large pueblos. The initial architectural reflection of this type consists of subsurface pithouses. In many areas, these gave way to above ground structures initially consisting of small units but gradually evolving into multiroom pueblos. These later pueblos also reflect a considerable degree of heterogeneity in construction materials and techniques. In many parts of the project area (primarily in the eastern regions), however, pithouses continued to be constructed into the Historic period.

Internal variation in sites also is considerable. Many of the later pueblo villages have several discrete features. These include habitation and storage rooms as well as a variety of associated features. Ceremonial chambers (kivas) also were common.

Villages are not the only site type associated with this adaptation type. Part of the definition of this type indicates that associated populations were semi-sedentary. A variety of short term occupational and specialized activities sites also have been documented. While they have not been intensively investigated, the ubiquitous "artifact scatter" is a very common site type. In addition, several specific site types associated with agricultural activities also have been documented. These include field houses and a variety of water control features.

Bioarcheology (Ann Lucy Wiener Stodder)

The variability in settlement and subsistence patterns among Formative peoples in the project area poses a number of crucial questions about the degree of sedentism, population aggregation, agricultural intensification, dietary mix, and the short and long term biological significance of this adaptive variation.

The osteological data examined in this study (and others) suggest that the degree of population aggregation is a critical determinant of prehistoric health status. The frequency of infectious pathologies, degree of dimorphism in stature, and prevalence of dietary anemia in subadults all appear to be related to population density and hence to subsistence strategy and social organization. On a broad scale we would expect Southwestern populations to have undergone the same kinds of epidemiological and demographic transitions as populations in other parts of the world, but we have yet to adequately investigate these transitions at the regional level in the project area. Nor have we fully considered the biological implications of local variations in subsistence and settlement, which suggest a nonlinear trajectory of biocultural evolution in the Southwest.

Seventy-five percent of the bioarcheological assemblages from the project area fall into this adaptation type, but of these only 35% are analyzed beyond age and sex determination, and relatively complete bioarcheological data are available for only 9%. While there are several very valuable bioarcheological studies of populations in this adaptation type, well controlled diachronic studies are rare. The lack of standardization in data collection and reporting detracts from the potential utilization and integration of the multitude of small studies.

Social Organization

For the first time in the archeological record, there is considerable evidence for social organization during this period. Much of this is direct, although much also is inferential. This does not imply that specific social organization associated with this adaptation type can be identified, but we are on much firmer ground when discussing this complex issue.

Unlike earlier periods, once village life became established it was necessary for more formalized social controls. Some degree of leadership had to be in place, to manage both village and agricultural activities. Extended families may at times have superseded the importance of nuclear units, and centralized authority undoubtedly became a more significant component of the social structure.

Several researchers have used the modern pueblo groups as a guideline for reconstructing Formative social organization and structure. In this context, the concept of clans, frequently tied to kiva associations, becomes important. While not without difficulties, many of these analogies probably are correct, at least in broad outline.

A wide range of social organization scenarios has been proposed for the Formative. For example, Martin's (1950) research in the Mogollon region indicated Formative development characterized by matrilocal residences, matrilineal descent, matrilineal inheritance, monogamy, and political independence for villages. More recent discussions on this issue introduced the concept of village leaders for early village society (e.g., Lightfoot and Feinman 1982).

Once the Formative entered its later stages and large puebloan villages became common, the issue of social organization becomes even more complex. While many researchers have argued for a social organization reflecting egalitarian society, there is some evidence for social stratification. This comes in the forms of burial differentiation and the presence of exotic trade goods. The presence of kivas, and especially great kivas, also is reflective of complex social organization as well as of ceremonial behavior.

Trade/Exchange

There is a considerable amount of information available suggesting that trade and exchange networks were well established. This involved trade on both local and regional levels. Trade goods are evident at many sites and it is clear that there was a great deal of communication between communities. In later reflections of this adaptation type, during the Protohistoric period, there also is evidence for exchange between Puebloan and nomadic groups to the east.

One aspect that must be considered here is trade and exchange outside the Southwest. Some researchers have proposed that an elaborate system of trade existed with Mexican Pochteca groups. In many instances, these researchers have suggested that the foreign groups were, in fact, responsible for much of the cultural development that can be seen in the project area. These arguments are weak. While there is no doubt that contact with Meso-America existed (macaws and copper objects of Mexican origin have been found in Southwestern contexts), to suggest that this was responsible for Formative developments in the Southwest is to belittle the capabilities of the indigenous groups.

Ideology

Ideology is associated with social organization, and the comments made for that category also are partially relevant here. Although the data base is much improved over previous adaptation types, it still is difficult to define ideology for preliterate societies. There are, however, aspects of the material culture of Formative groups that hint at ideological beliefs.

By far the most commonly cited feature that relates to ideology is the kiva. These structures have been presumed to represent ceremonial features, although this interpretation has been questioned. The religious practices of Formative groups probably were inextricably linked to everyday life, unlike modern society. It is, therefore, difficult to isolate specific examples of pure ideological significance.

Several kiva features also relate to ideology. Perhaps the most impressive are the rare mural paintings that have been recovered. While these may represent art forms, they also have given rare insights into ideological beliefs that are rarely preserved in the archeological record.

Other material culture items that may relate to ideological beliefs are so-called prayer sticks, painted wooden objects, and carved zoomorphic forms. In some parts of the project area, ceramic vessels were apparently “killed” by having a hole punched through their bottoms. This presumably represents some ceremonial treatment.

By and large, the populations associated with this adaptation type had a complex ritual life. Many aspects of it may resemble those that have been observed ethnographically among the modern Puebloan groups. While our data base is vastly improved over other adaptation types, ideology still remains an elusive element to document archeologically.

Sensitive Areas of High Site Probability

Due to the widespread nature of this adaptation type, several areas have high potentials for containing sites. In many instances, arable land was a contributing factor to the settlement pattern, and likely landforms that might contain sites include sand dunes, alluvial terraces, and other locales that are arable; proximity to water also is an important variable and locations near major drainages are likely areas for high site densities. Additionally, given the hunting and gathering component of this adaptation type, numerous other landforms also are likely locales for site placement.

Unlike the adaptation types previously discussed, many sites belonging to this type will not be substantially buried; thus their archeological visibility is good, especially at sites consisting of substantial architecture. On the other hand, those sites representing limited occupations without structures will have a much lower visibility.

The late Formative pueblos that were occupied at the time of European contact were concentrated along the Rio Grande and in the Zuni area. Accordingly, both of these regions contain a high site density.

Data Gaps and Critical Research Questions

Many of the questions relating to the basic outline of developments for this adaptation type have already been answered. There are, however, several substantial issues that are unresolved. Sites belonging to this type have the potential of addressing some very specific issues regarding subsistence, social organization, ideology, and a host of other topics of considerable interest. Some of the more pertinent data gaps and research questions are outlined below:

1. Perhaps the most pressing research question regarding this adaptation type is to better document its subsistence base. Although we know that both agriculture and the procurement of wild resources were major activities, more detail is required in documenting the precise nature of the subsistence economy. What specifically requires much additional investigation is to determine exactly how significant wild resources were, and how emphasis of these changed through time. Additional paleoepidemiological study, coprolite data, and bone mineral analyses are needed. Another area of interest is in documenting specific land-use patterns.

2. A related issue is to examine the relationship between the subsistence economy and the environmental changes that have occurred throughout the project area. For example, did hunting and gathering become more important during times of environmental stress, when agriculture was even more unpredictable than in normal circumstances? Do changes in health status correspond to times of environmental stress?

3. Yet another related issue is in determining the degree of sedentism practiced by populations associated with this adaptation type. Particularly intriguing would be an examination of sedentary vs. semi-sedentary occupations of large pueblos. The issues of structure use-life and local population sizes need to be addressed in examining the degree of sedentism of local populations.

4. The documentation of limited activity sites associated with this adaptation type is critical. Were the numerous small sites that are known to have been contemporary with larger villages representative of limited activity excursions from those villages or did they represent different, coexisting populations?

5. Community patterning studies would contribute substantially to a better definition of this adaptation type. Emphasis must be placed on smaller, less impressive sites as well as on the large villages.

6. Although chronological placement of this adaptation type is relatively well controlled, further precision would help to determine the longevity of specific phases.

7. Additional paleoenvironmental research is necessary in order to “fine tune” climatic variables that might have influenced cultural adaptations.

8. Additional research into the ideological and religious aspects of this adaptation type is required. This is a difficult concept to elucidate archeologically, and new techniques need to be developed, including a more inclusive approach to mortuary behavior.

9. Additional research into the social and political organization of populations belonging to this adaptation type is required.

10. The issue of abandonment has not been resolved. Many sites belonging to this adaptation type were apparently abandoned during the twelfth and thirteenth centuries. Does this represent population shifts or actual abandonments? Is there bioarcheological evidence for actual decline in population sizes independent of migrations? Were these populations responsible for the aggradation of groups in the Rio Grande Valley? What was the cause for the population reshifts?

Sedentary, Primary Agriculturalists

Date Range

This adaptation is relatively restricted in terms of time. Most activity associated with it falls between A.D. 900–1300.

Environmental Context

The same environmental concerns expressed for the previous adaptation type (Semi-sedentary, Mixed Economies) also are relevant here. This adaptation falls within a slice of the Formative period, and several environmental issues for its 400-year span are critical for a better understanding of the associated cultural developments. Key issues once again relate to climatic stress, precipitation, and the availability of arable land.

Cultural Context

This adaptation type falls firmly within “classic” Formative period developments and most of the comments made for the previous type also are relevant here. We initially felt that this adaptation type would, in fact, represent most of the Formative period, or at least the Puebloan aspects of it. Upon considerable reflection, however, we have decided to make this a much more restrictive type. For the project area, this type is only witnessed prehistorically as a part of the Chaco Phenomenon.

The Chaco Phenomenon was the closest entity to a state system to ever exist in the prehistoric Southwest. Stuart and Gauthier (1984:40), in fact, believe that it represented a low level state system. As detailed in Chapter 6, the Chaco Phenomenon was an elaborate cultural development with far reaching associations. Despite this, however, some researchers have perhaps tended to overemphasize its significance because, despite its impressive nature, the Chaco Phenomenon did not achieve the status of a “civilization.” After reviewing an exhaustive amount of literature, we believe that the Chaco Phenomenon can accurately be classified as the sole representative of the Sedentary, Primary Agriculturalists adaptation type. But even at this level, although agriculture was primary, hunting and gathering still was an element of the subsistence economy. Furthermore, some researchers have hinted that even the large pueblos of Chaco Canyon may not have represented permanent, year-round occupations (Lekson 1984).

The material culture associated with the Chaco Phenomenon represents some of the most impressive in North America. Not only were huge pueblo sites common, but the portable material culture was equally impressive. Elaborately decorated ceramics were frequent, although these do not approach the stylistic sophistication of the famous Mimbres ceramics. In addition to ceramics, numerous other artifact categories characterize this period. These include a variety of ceremonial objects.

Distribution of Subsistence Activities

Agricultural activities are presumed to have been the primary subsistence base for populations associated with this adaptation type. Several specific agricultural features can be associated with Chacoan sites. These include systems of terracing and water control. Actual economic data recovery from sites participating in the Chaco Phenomenon, however, have revealed the presence of wild plants and animals, and it is likely that even during this period of cultural florescence these remained important resources.

Most models attempting to explain the Chaco Phenomenon are based to one degree or another on trade, and one presumable trade good was excess agricultural products. Given this scenario, we feel that only Chacoan related sites can realistically be assumed to have had a primary dependence on agriculture.

Settlement Pattern/Site Distribution/Site Types

The comments made for the preceding adaptation type also are relevant here, although it was not as widespread. The Chaco Phenomenon did, however, have a far reaching impact, and it consisted of what Cordell (1984) has termed a system of regional integration.

The Chacoan settlement pattern consisted of the core group of sites situated in Chaco Canyon proper and a series of Chacoan outliers that were linked to the canyon by an elaborate system of “roads.” Stuart and Gauthier (1984:40) have made the apt analogy of the Chacoan system being similar to a large wheel, with Chaco Canyon as the hub, the Chacoan road system as the spokes, and the outliers as the rim.

Sites within Chaco Canyon consist of both planned and unplanned villages. The most famous of the former are the large pueblos, such as Pueblo Bonito. Many of these contained hundreds of rooms consisting of residential, storage, and ceremonial features. Large “great kivas” also are a Chacoan feature. Some researchers consider Chaco Canyon as a large city rather than a network of largely independent villages (Lekson 1984: 69–71).

The outliers consist of either individual sites or of Chacoan communities. In the latter situation, a large outlier is linked to a series of smaller villages. It should be noted that the actual definition of an “outlier” is not universally agreed upon, and few complete Chacoan communities have been adequately investigated.

As might be expected, a wide range of site types characterizes this adaptation type. The huge pueblos are the most substantial sites, as are the great kivas. Smaller villages also were a major component, however, as were specialized sites. These include possible communication towers, agricultural features, and the Chacoan road system.

Bioarcheology (Ann Lucy Wiener Stodder)

Recent analyses of human remains from sites in Chaco Canyon by Akins (1986) indicate that there are certain biological correlates to the divisions in social status identified archeologically in the Canyon. Akins’ study of femur lengths suggests three levels of status in the Canyon populations (Akins 1986:137). The average stature of males and females in the Pueblo Bonito population is higher than the reported stature estimates for any other population in the project area. But twice as many of the subadults from Pueblo Bonito exhibit skeletal evidence of anemia (as reported by Palkovich [1984a]) than the non-Bonito Chaco sample. These findings suggest that the biological reflection of social status is not a matter of simply better or worse health, and additional research would be fruitful in the investigation of status and health in this population.

The Chaco Canyon population as a whole exhibits a high frequency of dental pathology (compared to the other populations reported upon here), which would be expected with a more agriculturally based diet. They also have the highest reported prevalence of infectious skeletal pathology of the prehistoric populations in the project area, which may in part be attributable to higher population density.

Additional research is needed in the study of the Chaco Canyon population, but also on their relationship, both biological and economic, to the outlier community residents.

In the bioarcheology chapters of this volume we have included an historic counterpart to the sedentary, primary agriculturalists adaptation type which includes several of the longer inhabited, larger protohistoric and early historic pueblos in the project area. While many aspects of the Chaco Phenomenon are presumably unique, several significant biological aspects of adaptation are similar in these later populations—large settlements, significant agricultural components of diet, and a greater degree of sedentism than other Formative populations in the project area. Clearly, not all of the protohistoric and historic Puebloan populations fit into this adaptation type, and even for those that do, the degree of reliance upon agriculture, and the degree of sedentism, are the subject of present debate that we cannot resolve here. The easternmost late prehistoric pueblos like Pecos and Galisteo might also be considered within the semi-sedentary specialized hunters/agriculturalists adaptation type, as their subsistence strategy probably involved more bison resources than other pueblos. These populations could also be considered in the General Native Acculturation/Contact adaptation type (discussed later in this chapter), but this general category is not as useful for biologically based discussion.

The 27 sites included in the bioarcheological category of the late prehistoric/early historic Sedentary Agriculturalists adaptation type have yielded a substantial amount of bioarcheological resources, and like those from earlier sites, these skeletal populations merit a great deal more study to better define native adaptation at this time, and to investigate the nature and timing of the biological impact of the European presence.

The prevalence of infectious skeletal pathologies in the Hawikuh (Zuni) and San Cristobal (Galisteo Basin) population samples is considerably higher than in earlier, prehistoric pueblo populations. Again this is probably related to the rate of endemic diseases in large settlements, but might also be a result of European intrusion. The prevalence of nutrition-related pathologies is relatively high. Considerable violence is suggested by the frequency of cranial trauma in these populations especially at San Cristobal on the eastern Pueblo frontier. Life expectancy at Gran Quivira (Las Humanas Pueblo) appears to have declined during the early historic, pre-Pueblo Revolt occupation of the site (Turner 1981:121).

Social Organization

Once again, the comments made for the preceding adaptation type also are relevant here. Social organization associated with this adaptation, however, undoubtedly was more complex than that seen in other Formative developments. If the elaborate redistribution models that some researchers have proposed are accurate, a sophisticated social organization must have existed.

There are claims for social stratification or ranked status in Chacoan society. This has been suggested by burial patterns and associations with exotic artifacts. Some researchers have suggested that "priest classes" may have existed and wielded considerable power. While these are aspects that are difficult to demonstrate archeologically, most researchers believe that Chacoan society was hierarchically organized. Doyel et al. (1984) have suggested that two types of communities characterized Chacoan society—scion and ancestral. These have social organization implications. They further suggested the concept of the Chacoan Halo to characterize the relationship between Chaco Canyon and the outliers. Whether one describes the Chaco Phenomenon as a halo, an interaction sphere, a chiefdom, or whatever, it is apparent that the system was maintained by a well organized social structure. As Lekson (1986:272) has noted, the organization of labor required to build the sites associated with the Chaco Phenomenon suggests a level of social and political organization far more complex than what can be seen in the modern ethnographic pueblos.

Trade/Exchange

There is little doubt that trade and exchange played key roles in this adaptation type. Most models attempting to explain the Chacoan Phenomenon have used elaborate trade networks as a major explanatory element. The presence of imported goods at Chacoan sites is well documented. Many of these came from as far away as Mexico.

The redistribution of resources frequently is cited as one of the more significant elements of the Chaco Phenomenon. Some researchers have suggested that the great kivas functioned as redistribution centers. Actual items traded could have included raw materials and luxury goods, but it is likely that a major trade commodity was surplus agricultural products.

The previously mentioned Pochteca model has frequently been applied to Chaco to account for both its development and fluorescence. As noted earlier, it is unlikely that this system was the origin or stimulus behind developments such as the Chaco Phenomenon, but there is good evidence that relatively sophisticated local and regional trade networks were a key component of this adaptation type.

Ideology

Again, the comments for the previous adaptation type also pertain here. The suggestion of a priest class, or of some sort of elite group, has been noted in the discussion under Social Organization. Such a class undoubtedly was associated with complex ritual behavior. While it is difficult to say if any form of organized religion existed during this time, it is likely that this was the case to one degree or another. Presumed ceremonial objects have been found in relative abundance at Chaco sites. These include carved zoomorphic figures, plume holders, prayer sticks, painted wooden objects, and phallus symbols. There also have been claims for specific ceremonial or ritual sites relating to astronomical events, although these remain controversial. Many of these artifacts undoubtedly were related to ideological beliefs that we can only guess at. It seems clear, though, that concern with fertility would have been one overriding aspect of ideological life, given the importance of agriculture to this adaptation type.

Sensitive Areas of High Site Probability

The San Juan Basin is the focus of the Chaco Phenomenon. Hundreds of sites related to this adaptation type have been recorded there. These cover a variety of landforms, so it is difficult to provide predictions of where the most preferred locales were. Sites in Chaco Canyon itself are situated near a major drainage, as are many outliers. Some, however, are located in quite unlikely settings. For example, the Bis sa 'ani outlier community, while near a major drainage (the Escavada) is situated in a foreboding badland setting.

Chacoan sites also occur outside the San Juan Basin. For example, at least one (Chimney Rock) is known from southwestern Colorado. As with other Formative sites, Chacoan sites occur over a remarkably wide variety of landforms. Given the relatively recent age of this adaptation type, most sites will not be deeply buried. However, along alluvial terraces where deposition has been rapid, a considerable degree of burial might be expected.

Data Gaps and Critical Research Questions

We know a fair amount about this adaptation type, but its very complexity has resulted in several research deficiencies. Some of the more important unresolved issues include the following.

1. Relatively little detailed information is available for the beginning of this adaptation type (ca A.D. 900s). Several questions relating to the origins of the Chaco Phenomenon have not been satisfactorily answered. These include questions such as "why did it develop in such an environment as marginal as the San Juan Basin?;" and "were the first manifestations of the Chaco Phenomenon in Chaco Canyon or in outlying areas?"

2. We also require far more information on the demise of the Chaco Phenomenon. Was it due to overexploitation of an already marginal environment? Was drought a major factor? Where did the Chaco populations go?

3. What was the nature of the relationship of Chacoan with other groups, such as populations from Mesa Verde, who are documented to have occupied several Chacoan sites? Was it a peaceful or a hostile takeover? Or, were the Chacoan sites already abandoned when the Mesa Verdean groups arrived?

4. Much more information on the nature of the trade and redistribution networks is needed. What was the precise nature and extent of the trade network? Was trade with Meso-America and other areas outside the Southwest a formalized arrangement?

5. More precise environmental data could help clarify several issues relating to the Chaco Phenomenon, especially relating to its collapse.

6. What is the extent of the Chacoan road system?

7. Were the Chacoans responsible for denuding the local environment? Did they obtain the majority of their building materials locally or were these imported?

8. What was the nature of the biological, ritual, and economic relationship of Chacoans to the outlier community residents?

9. Who built the huge Chacoan sites? What type of social organization was responsible for this?

10. Were elite or priestly classes present? If so, what was the extent of their power? What are the biological correlates of differential status?

11. Were food surpluses produced, and if so, how were food surpluses handled?

12. What was the extent of the sophistication of water control systems?

13. What were the functions of the great kivas?

14. How extensive and complex was ritual behavior associated with this adaptation type?

15. Can the claimed ceremonial and astronomical functions of some Chacoan sites be verified?

Semi-Sedentary, Specialized Hunter and Agriculturalist

Date Range

This adaptation type is relatively restricted in time. In the project area, it occurs roughly between A.D. 1300–1800.

Environmental Context

This adaptation type is best reflected in the eastern reaches of the project area and has close ties with developments on the Great Plains. Although the overall environmental configuration probably was quite similar to that of today, climatic changes have been documented for this period. A series of small scale and short term droughts may have characterized much of the project area.

One of the more significant environmental characteristics of this period was the presumed expansion of grasslands and the associated increase in bison populations. These were the focus of intensive hunting up to and past contact with European groups. Stuart and Gauthier (1984:274), citing Reher, feel that buffalo populations actually peaked not during but following episodic climatic optimums for grass production. They believe that such an optimum would be in the form of both increased and winter dominant rainfall. This would lead to colder, slightly wetter conditions, which would favor grassland production. In any event, Stuart and Gauthier believe that there is evidence that bison hunting was associated with two major climatic episodes, the first around A.D. 1250–1300 and the second around A.D. 1450 and later on to historic times. The second optimum in buffalo population would have coincided with the so-called Little Ice Age, a widely known climatic episode that lasted from ca A.D. 1500 to 1800.

Cultural Context

This adaptation corresponds to a very restricted adaptive strategy, although it is similar in many respects to both the Focal Hunter/Gatherer and the Semi-sedentary, Mixed Economies types. The analogy to the former is reflected in the emphasis on large game, while the similarity to the latter is seen by the semi-sedentary and partial agricultural nature of this type.

The primary characteristic of this adaptation type is in its emphasis on bison or buffalo hunting. This is not to say that participants did not engage in other subsistence strategies as well—man does not eat by buffalo alone. But, the focus on massive bison kills was an adaptation that sets this type apart from others. Our archeological knowledge of this type is relatively limited, thus we cannot conclusively identify many of its salient characteristics. Based on available data, however, it represents an economic strategy unique enough to qualify for a separate adaptation type.

The beginning date of the Semi-sedentary, Specialized Hunters and Agriculturalists adaptation type is not well established. It clearly had to coincide with the expansion of grasslands conducive for large buffalo herds. This adaptation type continued well into the Historic period, however, and once the horse was introduced by the Europeans, it became more efficient. The best reflection of this adaptation type is in the Great Plains—aspects of the ethnographically well documented horse nomads are pertinent. In the project area, we only see reflections of these groups in the eastern reaches, in those areas closest to the Great Plains.

Distribution of Subsistence Activities

As its name implies, a primary economic focus of this adaptation was in specialized hunting. This involved the systematic hunting of the large herds of buffalo that roamed the eastern part of the study area. Other economic pursuits also were practiced by some members of this adaptation type, however. This included generalized hunting and gathering, as well as agriculture. Agricultural activities were not as significant as they were with Puebloan groups farther to the west, but the archeological data do indicate that farming was practiced. Agriculture was undoubtedly a risky endeavor in the generally arid eastern parts of the project area, and during times of climatic stress this was even more true.

The actual specialized hunting was conducted by limited segments of the population. Other individuals tended fields and gathered wild resources. In this sense, this adaptation type is quite similar to the Semi-Sedentary, Mixed Economies type, except that the hunting component was much more focalized.

Settlement Pattern/Site Distribution/Site Types

We are hampered by a lack of well controlled archeological data for this adaptation type in the project area. Much better information regarding settlement patterns and site distribution is available from the adjacent Great Plains. The best information comes from Jelinek's (1967) classic study of the Lower Pecos valley, where he defined several phases, the latter of which are reflective of this adaptation type. By definition, members of this adaptation were mobile; this was necessary in order to follow the buffalo herds. On the other hand, it may be that only segments of the population (male hunters?) practiced mobility to any great degree, returning to semi-sedentary villages on a periodic basis.

Site distribution was tied to the migratory patterns of buffalo. This obviously affected sites related specifically to buffalo hunting, but also had implications for the semi-sedentary villages. A logical assumption is that the villages would have been located so as to take advantage of whatever arable land might be available as well as of proximity to herds. Once the horse was introduced, however, this changed the settlement pattern dramatically. With the increased mobility and "striking distance" provided by horses, a much more dispersed pattern was possible.

A variety of site types reflect this adaptation. Again, however, supporting archeological data are weak in the project area. One problem is in identifying whether or not the late prehistoric villages known in the area were related to the buffalo hunters. There is no consensus opinion on this. Some of the best recent data comes from Speth's research at the Garnsey site in southeastern New Mexico, where a late prehistoric kill locality has been well documented. Speth also has investigated a temporary camp site in the same area belonging to the same period.

In general, our information of this adaptation type in the project area is limited. Much better data exist to the east. A major research gap in the project area is in a better identification of this adaptation and its concomitant settlement and subsistence variables.

Bioarcheology (Ann Lucy Wiener Stodder)

Six bioarcheology sites were categorized in this adaptation type, but it might be argued that they belong in the Formative adaptation types as well. The best example is the small assemblage from the Post-McKenzie phase Henderson site, where there is evidence for an unexpectedly large degree of agricultural involvement in addition to substantial bison hunting. The inhabitants of this site seem to have been morphologically similar, but not identical to, both Pueblo and Trans–Pecos populations, while quite distinct from earlier Jornada people (Rocek and Speth 1986). Further study of this adaptation type (for which a larger sample is needed) could be used to refine the knowledge of biological affiliations of the specialized hunting groups, and to compare their health with other hunting and agricultural populations.

Social Organization

We have extremely limited information on the social organization practiced by members of this adaptation type. For the latter aspects of it, ethnohistoric documents exist and many similarities to the Great Plains can be seen. For systematic buffalo hunting to have been successful, it would have been necessary for a well controlled social structure to have existed.

Trade/Exchange

Trade with Puebloan groups to the west is relatively well documented for the earlier aspects of this adaptation type. This has been discussed in some detail in Chapter 8. A symbiotic relationship existed between these groups, and Stuart and Gauthier (1984) believe that it was strongly influenced by climatic conditions.

Trade items were primarily subsistence oriented. There is, however, evidence that some degree of slave trade also existed. This is particularly true into the early Historic period, when the Spaniards sought additional labor for their various facilities. Although trade with Europeans gradually increased, this was tempered by the generally hostile confrontations between the two groups.

Ideology

Once again, our knowledge of ideology for this adaptation type is very limited. The best analogies come from Great Plains groups, who had a complex set of ideological beliefs. Some information also comes from the early historic accounts of the project area. Although they were in contact with Puebloan groups, it is unlikely that members of this adaptation type participated to any great degree in Pueblo religious practices.

Sensitive Areas of High Site Probability

Thus far, this adaptation type is documented for the plains-like environments common to the eastern reaches of the project area. Given the relatively recent nature of this type, it is unlikely that sites are deeply buried. Favorable site locations include areas where buffalo could have been driven and killed. As such, bluffs or short cliffs are likely site locales. Village sites may occur along major drainages or near other sources of water.

Data Gaps and Critical Research Questions

As is obvious from the preceding discussion, there are several major data gaps and critical research questions for this adaptation type. Some of the more important are outlined below.

1. When did this adaptation start? Can paleoenvironmental conditions be sufficiently reconstructed to indicate when the grasslands expanded to provide favorable conditions for buffalo herds?

2. We need much more information on the range of site types, settlement patterns, and artifact inventories of this adaptation type.

3. Were these groups related to their more sedentary, or semi-sedentary, neighbors?

4. What was the precise nature of their relationship with other Native groups and with Europeans?

5. Are the patterns that Speth detected at the Garnsey Kill site repeated at other sites?

6. The various propositions put forth by Speth require additional testing.

7. How did the introduction of the horse affect this adaptation type?

8. What was the precise economic make-up of this adaptation type? Did buffalo comprise the bulk of the diet, to what extent was it traded—and for what? Was it only a seasonal resource or was it stored for lean times? How important was agriculture?

9. Are there differences between the health of these and other populations involved in buffalo-related subsistence and trade (e.g., Pecos) and that of populations outside the range of bison economy?

HISTORIC ADAPTATION TYPES

Since the focus of this document is on prehistoric archeology, the historic adaptation types will only be dealt with in an abbreviated fashion. With the advent of European society in the project area, the entire cultural situation assumes a new complexity, making it difficult to clearly differentiate specific adaptation type beyond the obvious (e.g., Anglos, Spanish, Puebloans, Nomadic Natives, etc.). We have, nonetheless, identified several adaptation types that adequately characterize the diffuse cultural mixtures prevailing in the project area during historic times (Table 50).

Unlike the previous discussion on prehistoric adaptation types, where several categories were individually discussed, we have provided a much more limited description here. Each historic adaptation type will be discussed in prose form, and only major points will be highlighted. Tainter and Gillio (1980: 117–144) provide an excellent discussion on many aspects of the historic adaptation types in the core of the project area (although they do not use that term), including their archeological reflections.

Exploration

This adaptation type starts in 1535 in Trans–Pecos, although a better date is de Niza's 1539 expedition to the Zuni area. The former was not a systematic expedition while the latter was. This type continued intermittently until 1590, thus the time span covered is relatively short. The principal players in this adaptation type were the early Spanish explorers of the

Table 50.
Historic Adaptation Types

Type	Cultural Group
Exploration	early historic European, transitory
Mission	early historic European, permanent
General Native Acculturation/ Contact	general early historic Native
Contact Horse Nomads	Apache, Commanche, Ute
Herder/Agriculturalists	Navajo
Assimilated Natives	Genizaros and other Native groups
Frontier	early Anglo/trappers, settlers
Ranching/Agriculture/Mining/ Railroading	Anglo/United States
Reservation Adaptation	historic to early modern Native
Modern	Multicultural

Southwest. We have referred to this type as a transitory one because the explorers did not, at this time, set up permanent facilities in the project area. Rather, their intention was exploratory.

This, as with all of the historic adaptation types, must be understood within the greater context of global events. The exploration of the Southwest was inextricably linked with the Spanish domination of Meso-America and the quest for enriching the Crown's treasury. Subsistence activities, trade, ideology and social organization were all tied within the European cultural milieu and Catholicism. At this point in time, the conversion of Natives to Christianity was not a major factor.

The archeological remains of this type are extremely poorly documented. Some claims have been made to have found early Spanish sites, but these are disputed. The settlement pattern and distribution of sites would have been limited since no permanent settlements were established. The archeological remains would be reflected in temporary sites related to individual expeditions and perhaps in artifactual remains left behind at native sites—armor, crosses, etc. No definite remains of early Europeans in the area are described in the bioarcheological literature.

Numerous research questions and data gaps exist. These include archeologically documenting individual expeditions, determining the initial impact on indigenous groups, and tracing expedition routes. Most of what we know about this adaptation type is through early historic documents, and another major research issue is in verifying the information in these records.

Mission

The Mission adaptation type dates from roughly 1590–1846, and coincides in the project area with the Spanish Colonization, Colonial, and Mexican periods. Unlike the former adaptation type, the Mission type involves the establishment of permanent Spanish facilities in the project area. This resulted in the domination of Native groups and the establishment of the encomienda and repartimiento systems. The Spaniards became a dominant force in the project area, and their impact is still felt today, both in terms of cultural identification and architecture. Their rule was briefly interrupted by the Pueblo Revolt (1680–1692), but was quickly reestablished.

Catholicism was a dominant ideological feature of this adaptation type. However, relatively little effort went into converting indigenous groups such as the Navajo, who were viewed as cheap labor sources (Tainter and Gillio 1980:125). Trade and exchange were common elements during this period, both with indigenous groups and with the Spanish in Mexico. The mechanism of exchange for the Europeans was the mission supply caravan, which made the round trip between Mexico and Santa Fe once every three years (Tainter and Gillio 1980: 127). The establishment of haciendas or ranchos was a dominant settlement trend.

The archeological manifestations of this adaptation are much better documented than are those from the Exploration period. Many of the missions and other facilities established by the Spaniards are still standing. Portable archeological materials include metal objects such as horseshoes, spurs, and bridles, and household goods such as needles, awls, and scissors. Liquids, including sacramental wine, also were imported into the project area, presumably in ceramic containers (Tainter and Gillio 1980:1927). Bioarcheological resources from this adaptation type are rare, but remains of a few Europeans—presumably clergy—have been recovered from early missions and chapels during excavation and restoration.

Major research questions still include documenting the precise nature of the relationship between Spanish and Native groups. Other issues involve archeological verification of historic records, and additional examination of prevailing trade mechanisms. Investigation of the Pueblo Revolt using archeological data also represents an important research issue.

General Native Acculturation/Contact

This is a somewhat generalized adaptation type that spans the period from the initial Native contacts with the Spaniards up to the Anglo and United States period. In a sense, much of this adaptation type is appropriately considered under the prehistoric type Semi-sedentary, Mixed Economies. Native groups involved included the Puebloans, the Athabaskans (Apaches and Navajos), and, to a lesser extent, some Plains groups. The main difference between this type and the Semi-sedentary, Mixed Economies type is the impact of European culture on Native life. While in most instances this was a generally adversarial and disruptive relationship, in some instances it resulted in symbiotic relationships. In other cases, the impact was only peripheral, at least initially.

The major research question regarding this adaptation type is in documenting the precise nature of the relationship between Native groups and the Europeans. The impact of European diseases on native populations also is an important issue. There are several complex issues involved with this, and the historic records, being written by the “victors” undoubtedly reflect a strong bias. Archeological and archival research could clarify several specific events and the processes of acculturation and population shifts that characterized the contact period.

Horse Nomads

This adaptation type is quite similar to the prehistoric Semi-sedentary, Specialized Hunters and Agriculturalists except that the horse nomads did not necessarily engage in specialized hunting as the primary economic focus. The beginning dates of this type are difficult to document—they could be as early as the first Spanish incursions into the project area. This type continued well into the United States–Anglo period in the 1800s.

The important element in this type is that once the horse was introduced, it allowed unprecedented mobility among Native groups. These groups had close ties with other Natives on the Great Plains. The most significant impact of the horse nomads was not directly economic, but was related to their raiding prowess. This had major effects on both other Native groups and on European colonists.

The latter aspects of this adaptation type are well documented historically. Ethnographically known groups include the Ute, Commanche, and Apaches.

A major research gap is in the archeological documentation of this adaptation type. By definition, these largely were mobile groups, and their archeological remains are ephemeral at best. Human remains of Ute and Apache affiliation have been recovered in the project area, but relatively little osteological data exist and reinterment is common. Another research issue, once again, involves the archeological verification of historic records.

Herder/Agriculturalist

This adaptation type is nearly synonymous with the Navajo. Several aspects of it already have been discussed in Chapter 8. Once the Navajo became an established cultural entity in the project area, they developed an adaptation unique to themselves. This began with the incorporation of European livestock (primarily sheep) into their economic system in the 1700s. By this time, the Navajos also had adopted agriculture from their Puebloan neighbors. Variants of this adaptation type still are in operation today, although the traditional economic focus of sheep herding and agriculture has been supplemented by a reliance on modern economy.

The Navajo have a rich cultural and religious life. This has been well documented ethnographically. Archeological research on the Navajo also has a long history, although it has concentrated on earlier aspects. There has, however, been an interest in more recent Navajo archeology, and several interesting studies have been undertaken (e.g., Kelley 1986). A small number of bioarcheological resources of Navajo affiliation have been recovered from the project area, but these have not been thoroughly studied, and relatively little is known about them. The potential for research in Navajo bioarcheology is limited by ethical concerns and objections to disinterment. The osteologist should conduct as thorough analysis as permitted prior to reinterment. Additional biological data can be obtained from ethnohistoric records such as census documents, and through archeology and research.

Several research gaps and questions relate to this adaptation type. One major one is in the documentation of when this unique adaptation initially occurred; we know that the Navajo were in the project area by 1700 if not earlier (see Chapter 7), but information relating to their subsistence practices is limited. Other research questions include better documentation of land-use patterns in relation to herding activities and examining relationships with other Native and with European groups.

Assimilated Natives

This adaptation type came into existence with the domination of local indigenous groups first by the Spaniards and then the Anglos. The best specific reflection of it is in the Genizaros. They were a social rather than a genetic group and were comprised of Natives captured from various tribes to serve as slaves of the Spanish. Separate Genizaro towns were established on the frontier, where they could serve as buffers against hostile nomadic groups. Culturally, the Genizaros became Spanish and lost their tribal identities (Tainter and Gillio 1980:123).

This clearly is a limited adaptation type, but it merits a separate type due to its unique nature. Extremely little is known about the Genizaros in an archeological sense, thus numerous research questions and data gaps exist. These include the archeological documentation of these groups, determining their relationships with the Spanish and with other Native groups, and documenting the degree that their Native ideological beliefs became subsumed under Catholicism.

While the Genizaros are the best reflection of this adaptation type, it is not exclusively restricted to this group. Any Native group that underwent assimilation could be appropriately considered within this adaptation type.

Frontier

The Frontier adaptation type corresponds with the American period that started in 1846. Early aspects of this type also are apparent in the initial Anglo explorations and settlement of much of the area, especially in the Colorado subregion. This is an immensely complex period and undoubtedly could be divided into several more specific adaptation types. With the incursion of the Anglos into the region, the framework of the project area was forever modified to reflect the present-day situation.

This adaptation is partially contemporary with the next type (Ranching/Agriculture/Mining/Railroading) and is popularly known as the “wild west” period. The establishment of military outposts was one characteristic of this type. The unique western style of life that characterizes the project area today had much of its genesis in this adaptation type.

Overall, relatively little archeological or bioarcheological research has been conducted into this adaptation type. Depending upon how specific one wanted to get, literally scores of research questions can be asked of this type. Once again, a prevailing question is how can archeology supplement the historic record, either verifying or refuting existing documentation?

Ranching/Agriculture/Mining and Railroading

This adaptation type is partially contemporary with the preceding one. It began in 1846 and expanded rapidly as the wealth of much of the project area became known. The primary economic foci of this type are, obviously, ranching, agriculture, mining, and the railroad. This type is as complex, if not more so, than the preceding one.

Each one of the components of this adaptation type could in a sense qualify as a separate adaptation type. Certainly the impact of the railroad on the west cannot be overestimated. We have combined these components, however, to reflect the interrelated nature of cultural activities in the project area once the Americans became the dominant political and economic force. To isolate them would be an inappropriate "splitting."

Much "historic archeology" has been conducted on this adaptation type. Once again, the research questions that can be asked are many and specialized, and we cannot detail them here. Multidisciplinary bioarcheological research combining osteological analysis, archeological data, and historic records would be very informative as to the health and lifestyles of the various ethnic and economic subcultures in the project area in the 1800s (e.g., Cobb 1986). As with the previous historic adaptation types, a major question is the archeological verification of historic records.

Reservation

This adaptation type corresponds to the establishment of the numerous Indian Reservations in the project area. A good starting date is 1863, with the "Long Walk" of the Navajo. This was the most traumatic event in their history. The imprisonment of the Navajo at Bosque Redondo had a lasting impact on their culture. In 1868, a treaty was signed that allowed the Navajos to return to a portion of their homeland, which is now the sprawling Navajo Nation in northwestern New Mexico and northeastern Arizona (Tainter and Gillio 1980:135).

Once Americans became the dominant force in the project area, several mechanisms were implemented to deal with the "Indian Problem." The establishment of reservations was the most enduring. The Navajo represent the largest reservation, but there also are numerous other reservations throughout the project area, including several inhabited by Puebloan natives.

"Reservation archeology" has not been common per se; however, as noted earlier, a considerable amount of Navajo archeology has been conducted. A principal research question is, once again, verifying and supplementing historic documentation through archeological investigation. Particularly pertinent here would be any archeology related to the Navajo incarceration at Bosque Redondo.

Modern

This last adaptation type is a catch-all category that has an undefined beginning date and extends to the present time. The present multicultural milieu of the project area is a remarkable blend of numerous heritages. Each of these has left its mark on the region, making much of the project area one of the most culturally diverse areas in the United States. This adaptation type is, obviously, composed of a complex interaction of events.

Archeology on the modern period has been limited. Its potential for contributing to better insights to modern problems should not be ignored. As with the other adaptation types, the modern period is part of our cultural heritage and deserves the protection mandated by federal law.

CONTEMPORARY ISSUES IN THE ARCHEOLOGY OF THE PROJECT AREA

Alan H. Simmons

The past chapters have summarized the current state of archeological knowledge for the Basin and Range region of the U.S. Army Corps of Engineers's Southwestern Division. This is an area that includes some of the richest archeological remains in North American, and literally thousands of sites have been recorded (Appendix D). While we have considerable knowledge about the major cultural events that occurred in this large region, several questions remain unanswered. We have attempted throughout this document to point out significant data gaps and contemporary research trends. Our success at this will have to be gauged by the readers of this volume.

In this final chapter we offer as concluding remarks a series of research and management issues facing those charged with the protection and proper investigation of our cultural resources. The following section deals with research issues pertinent to the project area. There subsequently is a discussion of major management issues. Although we have separated these two concerns to facilitate discussion, it is our firm belief that the schism between management and pure research represents one of the most detrimental aspects of contemporary archeology. There is no doubt that legitimate management issues stand apart from legitimate research issues. However, when management and research are played off one against the other, the resource base is bound to suffer. We also feel that the related rift between CRM practitioners and pure researchers (i.e., traditional academic archeologists) should likewise be an artificial dichotomy. If the profession is to proceed in an orderly fashion in the next few decades, these perceived, if not real, differences must be resolved.

ARCHEOLOGICAL ISSUES

There are literally scores of archeological questions that remain unanswered in the Southwest, and we cannot hope to summarize all of them here. Some of the more specific research issues already have been addressed in the preceding chapter, where a series of data gaps and critical research questions was identified for each prehistoric adaptation type. Many of these are quite specific. The following are phrased on a more general level.

Several works dealing with parts of the project area also have provided very specifc research questions and data gaps for the various subregions covered this volume. These will not be repeated here. The most relevant works are the following. For New Mexico, Stuart and Gauthier (1984) discuss significant research issues and data gaps for each subregion examined in this report. For Colorado, two works are especially pertinent. Eighmy (1984:47–49, 76–78, 140–143, 151–153) outlines several research problems and data gaps for the Front Range study unit, while Guthrie et al. (1984:53–58) provide similar information for the Mountain and San Luis Valley study units. Mallouf (1986) provides similar information for Trans–Pecos, Texas.

With the above understood, the following have been identified as major research issues. Some are more specific than others and they are not presented in any particular order of importance.

1. **Pre-Paleo-Indian.** This probably will remain a controversial issue for the next several years. Before accepting the presence of human groups preceding the well documented Paleo-Indian periods, several specific issues relating to chronology, artifact assemblages, economy, site typology, and relationship to the Paleo-Indians will have to be satisfactorily resolved.

2. **Economy.** Economic characterization has always been a major goal of archeology. While we understand the general framework of economic systems for most cultural periods in the project area, there remains a considerable amount to be learned. Especially pertinent are verifying the focalized economic nature of the late Paleo-Indians, better defining Archaic economy, and gaining more precision in interpreting Formative economy, especially in determining the relative significance of agriculture compared to hunting and gathering.

3. **The introduction of cultigens.** A related economic issue is the question of when cultigens were introduced into the project area. This remains a controversial topic but there presently is good evidence suggesting that this introduction occurred by ca 2000 B.C. As such, it represents the earliest evidence of cultigens in North America. It is important to determine when this occurred, but other issues are even more intriguing. These include identifying the source and route of cultigen introduction and determining its initial impact on indigenous economies. Available evidence suggests that this initial impact was relatively low and that cultigens represented a secondary resource for up to 2,000 years or more before radically influencing cultural behavior. All of these issues require additional refinement.

4. **The late bison hunters.** Yet another economic issue involves the late prehistoric and early historic bison hunters of the eastern part of the study area. Relatively little research

in the project area has been directed towards these groups and several questions are unanswered. These include the following: were the bison hunters related to more sedentary groups; how significant was bison to the entire economic spectrum; and to what degree was trade with other groups a significant variable?

5. **Late Archaic/Early Formative.** The transition to village life and its associated economic implications requires far more research.

6. **Archaic.** Despite the recent surge of interest in the Archaic, numerous data gaps still exist. The Archaic requires far more investigation using state-of-the-art data recovery and interpretive methods.

7. **Chronology.** Our knowledge of the chronology of some periods is quite refined, but several data gaps still exist and additional precision is required. This is particularly true for the Paleo-Indian and Archaic periods.

8. **Nontangible aspects of culture.** Our knowledge of social organization and ideology is limited, especially for the earlier cultural periods.

9. **Paleoenvironment.** Environmental reconstruction is a critical variable in interpreting the cultural changes that occurred throughout the duration of human occupation in the project area. We require far more in the way of paleoenvironmental refinement, especially as environmental conditions affected specific events, such as the introduction of cultigens.

10. **Interdisciplinary research.** It has become apparent over the past several years that the input of nonarcheological specialists is a powerful interpretative tool. Particularly beneficial has been the input of geomorphologists. True interdisciplinary research is to be strongly recommended. One must stress data integration, however; all too often the contributions of various specialists are put into appendices or are not well incorporated within a conceptual model that uses a variety of data sets to interpret cultural behavior.

11. **Small site archeology.** There has been a recent emphasis on small site archeology. A primary stimulus to this has been the expansion of CRM archeology and its associated requirements of investigating all aspects of past cultural systems. Small site archeology requires special techniques in order to obtain as much data as possible from often elusive contexts. Additional refinement in data recovery and analysis is required; it would be an unfortunate occurrence if small sites were excavated with a small site mentality. That is to say, there often is a substantial amount of information contained within small sites, but it frequently is not immediately apparent and can easily be overlooked. Thus data recovery requires special care.

12. **Refined techniques.** Recent years have seen a considerable refinement in archeological techniques. Many new methods are available for both data recovery, analysis, and interpretation. Several of these require interdisciplinary input. The continued use of sophisticated techniques is to be encouraged. Examples include remote sensing, digital imaging, accelerator dating, and packrat midden and pollen analysis.

13. **Sampling.** As data recovery and analysis become more refined, they also frequently require that more time be spent on sites and assemblages. Given limited funding as well as ethical concerns, it usually is not possible to completely excavate sites. It therefore becomes necessary that appropriate and adequate sampling techniques be used.

14. **Abandonment.** At the risk of beating a dead horse (or pueblo), there still are several questions that are unresolved regarding the population shifts that occurred throughout much of the project area during the Formative period.

15. **The Chaco Phenomenon.** This event represents the closest development to a state-society documented in the project area. Despite years of research, several questions remain unanswered. These relate to social organization (a relevant question for other Formative developments as well), the significance of trade, the stimuli for initial development, and the reasons for ultimate collapse.

16. **Amount and nature of trade.** Trade probably occurred during the Archaic if not earlier. It is well documented during the Formative and later periods. Numerous questions relating to trade have not been satisfactorily answered. The issue of Meso-American influence still generates a considerable amount of debate. The nature of trade relationships between nomadic and sedentary groups and with Europeans also is an intriguing research issue.

17. **Early Athabaskans.** The entry of Athabaskan peoples into the Southwest is not resolved. Additional investigation of presumed early sites is required. Questions relating to ethnic identity (e.g., Navajo, Apache) also are relevant here. The problems of identifying such sites must be addressed.

18. **Contact period.** The initial impact of Europeans on indigenous Native groups requires far more research attention. A large variety of complex questions can be generated from this period.

19. **Effects of introduced disease.** The impacts of European introduced disease on Native populations represents a fascinating research topic that could benefit from substantially more investigation.

20. **Pueblo Revolt and pueblitos.** Although a fair amount of historic documentation exists regarding the Pueblo Revolt, several issues have not been satisfactorily resolved. Archeological verification of historic records could contribute towards a more balanced perspective of this event. Additional research on pueblito sites and on the interactions of Navajos and Puebloans would be welcome.

21. **Historic document verification.** Archeology can contribute substantially towards the verification of historic documentation for the project area. This includes not only the early Spanish periods but much more recent activities as well.

MANAGEMENT ISSUES

Cultural resources, even those as substantial as Pueblo Bonito, are fragile remnants of our heritage. Their proper management and protection must be a top priority. The following management issues have been identified; again these are not listed in any particular priority, although the first three are critical. While these issues are not all restricted to the project area, several are Southwest specific.

1. **CRM, management, and research.** This is an immensely complex issue and we obviously will make no contribution to resolving its numerous difficulties. Several points, however, need to be made. The majority of archeological investigation in the United States today is CRM in orientation; that is, its funding is derived from federal sources stemming from protective legislation. This is good and well, and we have a right to be proud of the attention that our government has devoted to cultural resources. We have the best cultural resource protection mechanism in the world, and many countries are rightfully envious. Despite this, several difficulties have become apparent over the past several years, and these frequently have resulted in adversarial relationships between various groups.

The issue of pure research and management already has been briefly addressed. A schism has developed between many practioneers of archeology. Some regard themselves as researchers who would not touch anything tainted by CRM with a 10-foot trowel. This is a naive and parochial view, but it is one that is held by many academic researchers. Such a perspective is unfortunate and unnecessary. The bottom line boils down to a simple observation: it is not important who or what is paying for the archeology; what is much more important is who is doing the archeology. There are poor researchers in both private practice and in the universities. Some of the most significant recent advances in contemporary archeology have stemmed from CRM projects. This perceived dichotomy between CRM archeology and academic archeology has lessened dramatically in recent years, but make no mistake that it still exists. The profession must come to terms with this problem.

Management is another variable to consider. Some have stated that many of the problems of contemporary archeology stem from forcing management into research. Others believe that management is divorced from research, and that this has caused untold problems. Both perspectives have more than a grain of truth to them. Certainly the bureaucratic structure of modern CRM archeology is formidable and can often seem to be a stumbling block rather than a facilitating device. Some degree of balance must be achieved. The government archeologists have to realize that research flexibility is desirable and that cookbook approaches are inappropriate for modern archeology. These same people, however, have the very real and sensitive responsibility of ensuring quality control; one way to do this is through rote requirements. The actual people doing the archeology also have to realize the government's role in preserving and protecting cultural resources. No one likes undue bureaucratic red tape, but some amount is necessary to avoid maverick archeology. All of this is very complex, with outspoken advocates for any given perspective. The role and nature of cultural resource management will continue to be a focus of contemporary archeology in the United States.

2. **Vandalism.** Rampant vandalism and pothunting has reached epidemic proportions throughout much of the Southwest and elsewhere. Protective legislation is in effect, but in many cases it lacks conviction. This issue requires far more attention than it is presently receiving. It also is a complex issue, given Americans' independence and sense of autonomy from the government. Certainly the distinction between weekend arrowhead collecting and mass vandalism for profit has to be addressed, as does the problem of dealing with vandalism on private lands. Several countries have quite restrictive rules concerning their antiquities, regardless of land status. While it is unlikely that such legislation would ever be passed in the United States, public education is one format for archeologists to use in pressing a conservation ethic.

A related issue involves public access. Should sites be restricted from the general public, or should attempts be made to create public awareness by hands-on experiences? Does increased tourism and visibility lead to increased vandalism?

3. **Reburial.** This is an extremely significant issue that cannot be ignored (see Quick 1986 for additional detail). In recent years, several Native groups have come to the conclusion that the exhumation of Native human remains is a sacrilegious activity and should cease. There are various degrees of conviction to this feeling, and in some extreme cases it extends to any Native burial, regardless of age. The implications of this to archeology are tremendous, especially since a vocal component of this group also feels that related artifacts, in addition to burials, should not be disturbed. It requires only a small conceptual leap for such an attitude to extend to anything archeological.

Without taking a pro or con stand, it is clear that the profession is going to have to deal with this issue. Naively standing back and thinking that reburial is a passing activist idea could not be farther from the truth. As pointed out in this volume, the information that can be derived from human remains is substantial, and it seems unlikely that a majority of archeologists will easily give up one major component of their data base. On the other hand, many of the concerns expressed by Native groups certainly are legitimate and require careful consideration. It is clear that if the profession does not take a united stand on this issue, it may become legislated without archeological input. The political power of Native American groups should not be underestimated.

4. **Native American involvement.** Related to the above issue is Native American involvement in archeology. In many instances, Native groups are all but ignored by archeologists. This is an inappropriate attitude. Attention should be directed towards educational efforts about the significance of archeology to Native groups. More active involvement in archeology by Native groups also is desirable. The Navajo Nation Cultural Resource Management Program represents one model.

A related issue of Native involvement are the concepts that we use in determining site significance. These rarely take into account perceptions of ethnic significance (e.g., Doyel 1982), although the enactment of the American Indian Religious Freedom Act is one step to rectify this.

5. **Publication/dissemination of information.** This is a major problem. In the not too distant past, a complaint heard loudly and frequently was the lack of published results of research, especially of projects undertaken within a CRM context. If anything, that situation has changed dramatically. It is now not uncommon for multiple volumes of projects to be issued. While this is admirable, it also has resulted in information overload. Few researchers are going to take the time to sit down and read a 2,000 page volume. Synthetic treatments are abysmally rare. A significant example from the study area is the Navajo Indian Irrigation Project (NIIP). This massive project has resulted in literally thousands of pages being written about the archeology of northwestern New Mexico. Several volumes, many containing extremely significant information, have been produced. And yet, only one limited synthetic treatment in a major professional journal exists (Simmons 1983).

Many of the volumes that are produced also have limited distributions, and are not easily accessible to the profession as a whole. This so-called gray literature contains a wealth of information, but much of it is extremely difficult to access. The gray literature is composed not only of short letter reports and other results from small projects, but many large projects also are lost in this huge literature.

There have been steps taken to address this problem. The National Technical Information Series (NTIS) is one such remedy, but it has met with only limited success. Some agencies, including some districts of the U.S. Corps of Engineers, require the submittal of an article to a professional journal in addition to the detailed final report as part of a contract. This is an extremely positive development, and should be made into a requirement for most contracts. This would ensure that at least the basic outline of a project was available to a wide professional audience. Of course, there are problems with this. If a project has largely unimpressive results, should it take up some of the limited pages available in professional journals? This is not an easily resolved issue, but it requires serious attention.

6. **Public awareness/amateur involvement.** Public interest in archeology generally is quite high. The profession needs to make better efforts to reach this potentially captive audience. Some programs do this extremely well, but many archeologists have assumed an ivory tower perspective that effectively isolates them from community involvement in their research.

The role of amateur or avocational archeologists also is an important variable. The contribution that these individuals have made to archeology is substantial and needs to be recognized. Their involvement on projects in capacities beyond free labor is essential. The effective use of amateur archeological societies has not been fully exploited by the profession. Not only can amateurs participate in projects, but they can be useful guardians of cultural resources.

7. **Funding.** While funding levels for archeology were at an all time high in the recent past, this is no longer the situation. Levels have been cut drastically, both for CRM studies and for noncontract situations (such as funding from the National Science Foundation). For a short time, there was an almost embarrassing richness of resources for archeology. This scenario has passed and probably never will return. With limited funding, new priorities have to be set and projects must operate in a more efficient manner.

8. **Training.** The training of competent archeologists and managers is critical. Graduate programs in archeology have recently been suffering, and it is necessary to revitalize these. This represents a complex issue, since the present employment outlook for archeologists could be better. Nonetheless, the continued training of competent professionals is necessary. Many universities have instituted programs in CRM archeology; most of these are offered at the MA level. Whether or not this is a good trend is uncertain. On one hand, it tends to widen the perceived gap between CRM and researchers. On the other hand, modern archeology in the United States requires a familiarity with CRM legislation and other practical aspects of doing archeology that are all too rarely taught in our universities. For example, how many practicing archeologists today can remember having taken classes that actually required them to produce realistic budgets and schedules? Contemporary training in archeology demands that all aspects of the discipline be covered, not just the technical components of doing archeology.

It also is important that those responsible for managing the nation's resources be cognizant of the fragility and attendant problems associated with cultural resource management. Those nonarcheological professionals charged with this responsibility must be able to communicate with archeologists, and vice versa.

9. **National Register and significance.** The National Register of Historic Places remains the primary legal mechanism of site protection. Yet, it was not established to adequately deal with the most common site types encountered: artifact scatters. Thus it is an awkward mechanism for dealing with prehistoric resources. It works, but it could be streamlined. If the National Register is to be the legal device for site protection, it is perhaps necessary to reevaluate many of the procedures used to nominate properties to it. If one looks at the project area, it is clear that only a tiny portion of the recorded sites are listed on the National Register (Appendix D). Does this mean that these other sites are unimportant? Clearly not, but how to deal with this in a legal sense is a difficult issue.

Intricately linked with the National Register is the concept of significance. Significance determines eligibility to the Register, so it is easy to see why this concept is so important. It is clear that the criteria normally used to determine significance require refinement. We have already mentioned the concept of ethnic significance as it relates to Native Americans (cf. Doyel 1982); such concerns need to be addressed. Numerous articles have been written on this issue (e.g., Butler 1987; Fowler 1982, 1986; Lipe 1978a, 1984; Lipe and Lindsay 1974; Schiffer and House 1977) and the concept represents a critical pivot in CRM archeology.

10. **Research on National Register sites.** Coupled with the above discussion is the issue of conducting research on sites that are on the National Register. Should this be allowed or should these sites be preserved for the future, when presumably more refined data recovery and analytical techniques will enhance archeological research? Is the protective mechanism perhaps too restrictive; is research for research's sake an appropriate exploitation of nonrenewable resources? Who makes these decisions?

11. **Representative investigations.** One of the major accomplishments of CRM archeology has been the requirement that samples of all aspects of past human behavior be investigated in areas that will be impacted. This has resulted in a tremendous amount of data that previously would have been ignored. It is essential that this practice continue, but it has to be balanced with pragmatism.

The issue of data redundancy is pertinent here: how many more lithic scatters need to be excavated before we know all there is to know about them? Is not a point of redundancy reached where little new information is gained? This is a difficult issue, and those making the decisions need to be aware of the information potential of even apparently nondescript sites (see previous discussion on Small Site archeology).

12. **Predictive modeling.** A related issue is the recent interest in predictive modeling (e.g., Plog 1984a; Nelson 1984; King 1984; Brose 1984). This requires extremely careful deployment in archeological situations where such modeling may be used as an excuse not to do field work. Predictive modeling clearly can be a strong tool, but it also has the potential for severe abuse.

13. **Quality and ethnics.** This is an extremely sensitive issue (e.g., Green 1984). It must, however, be addressed. Since CRM archeology has come into force, there is concern about both the quality of research and the ethics of some practioners. Several variables are involved. These include problems of underbidding on projects, substandard work, conflict of interest, and exploitation of labor, to name but a few.

Groups such as the Society for Professional Archeologists (SOPA) have attempted to remedy many of the ethical problems that have arisen. In many cases, though, these remedies have treated only the symptom and not the disease. Present sanctions lack strength, and the profession needs to deal with this issue. If we do not take measures against unprofessional conduct within the discipline, forces outside of it will. This could have undesirable consequences.

14. **The Archeological Conservancy.** The Archeological Conservancy buys sites to protect them. This agency deserves support. It also, however, brings into question once again the issue of research for research's sake. Can sites owned by the Conservancy be investigated by qualified researchers? What conditions pertain?

15. **Conservation, stabilization and restoration.** Many of the major sites in the project area are in danger of advanced decay. Ruin stabilization, conservation, or restoration is a critical element in their preservation and requires numerous management decisions. For example, should ruins only be stabilized to prevent their collapse, or should they be restored? Should access be restricted or open to tourism? What are the effects of tourism and other developments on archeological sites?

16. **Historic archeology.** Several issues are relevant to historic archeology in the project area. There has been a recent surge of interest in the historic periods, and this is a positive step. However, it is necessary to ensure that historic resources receive the protection that the law provides without enacting requirements that are inappropriate to the point of absurdity (for example, the author knows of one instance where a used can of Spam was the cause of an alignment reroute.)

17. **The 50-Year rule.** Most protective legislation defines archeological resources as those cultural materials being older than 50 years. Some sort of cut-off is necessary and this seemed a reasonable period. Upon reflection, however, the profession is very soon going to be faced with a tremendous amount of new cultural resources. For example, the numerous facilities related to World War II are rapidly reaching an age when they qualify as archeological. How is the profession going to deal with this, especially in a time of dwindling funding availability? Is it time for a new definition of what is archeological, perhaps using criteria that are not chronological, such as adaptation types?

18. **Political impact and legislation.** The ultimate fate of archeology in the United States depends upon political action and legislation. There is a strong continuing need for the discipline to be involved in such activities as appropriate.

Furthermore, the mechanisms by which archeology is conducted on a statewide basis needs to be clarified. There is a tremendous gap of knowledge on the part of many archeologists regarding this issue. In most states, the State Historic Preservation Officer (SHPO), or his or her representative, wields a considerable amount of power regarding how archeology is conducted in that state. The procedures used by SHPOs in permit issuance and overview, project review, and standard setting should be clearly understood by researchers and the need for open communication is obvious.

CONCLUDING REMARKS

Human populations have continuously occupied the project area for 10,000 years if not longer. This occupation, coupled with the preservation qualities of the region's aridity, has resulted in an archeological record unparalleled in the United States. In this volume, we have attempted to chronicle this rich heritage, examining human developments from the initial

Paleo-Indian groups to the spectacular Pueblo builders to the ethnically diverse groups encountered by the Spaniards during the first European incursions into the area during the sixteenth century.

The Southwest has been a major proving ground for many of the archeologists who founded the discipline. It continues to be a principal focus of research, and many technical and interpretative innovations have derived from the region. It also has been the scene of some of the most devastating vandalism of cultural resources in North America. The protection of these resources must be a key priority of those agencies charged with management responsibility. These groups and the archeological profession must work together for the common good of the resource base, because once it is gone, it is irreplacable.

In attempting to document both the cultural history of the region and the critical issues facing researchers and managers, we know that we have omitted much. Our intention has been to summarize major cultural events and topical issues for the area. To do so has required that a tremendous number of discretionary decisions be made regarding what to include, what not to include, and how much detail to provide. It is our hope that this document has imparted some of the excitement of the archeology that dots the deceptively barren landscape of so much of the study area.

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Table A.1
Bioarchaeological Resources: Colorado Foothills

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Kelran Site	5DA227	Douglas	5,9	4135	4211	1			1	10	1,2
North of Colorado Springs		El Paso		4107	4211	1			1	11	
Lake George Burial	5PA44	Park	5	4154	4204	1			1	12	

Table A.2
Bioarchaeological Resources: Colorado Plains, Chaquaqua and Park Plateaus

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Draper Cave	5CRI	Custer	2	4150	4203	1			1	3	1-7,9,11
Red Creek Burial	5EP773	El Paso	6	4154	4204	1			1	3	1,2,3,4,5,7,8
Garden of the Gods Skeleton		El Paso	20	4135		1			1	7	1,2,3,4,5
Cucharas Cemetery		Huerfano	15	4120	4215	14		9	5	7	1,2,4,7
Turkey Creek Crevice Burial		Pueblo	6	4135		1			1	10	
Pueblo County Burial		Pueblo	7	4107	4211	1			1	3	1,2,3,4,7
	5PE285	Pueblo	6	4112	4211	1			1	12	
	5PE1	Pueblo	6	4107	4211	1			1	11,12	1,2
Dave Fountain Site	5PE79	Pueblo	20	4154	4204	1			1	10	1,2,3,4
Muldoon Hill Burial	5PE420	Pueblo	5,7	4025	4203	2			2	12	1,2,7
[Chaquaqua Plateau]											
	5LA20	Las Animas	20	4155, 4159	4205	1			1	5	
	5LA128	Las Animas	20	4155, 4159	4205	1			1	5	
	5LA175	Las Animas	20	4155, 4159	4205	1			1	5	
	5LA271	Las Animas	20	4155, 4159	4205	1			1	5	
	5LA919	Las Animas	20	4155, 4159	4205	1			1	5	
Trinchera Cave	5LA1057	Las Animas	3	4159	4205	1			1	5,13	1,2,9
	5LA1229	Las Animas	20	4135		1		1	0	11,12	1
Torres Cave	5LA1310	Las Animas	2	4155	4205	1			1	3,13	1
Hudsen Ranch	5LA1720	Las Animas	20	4135		1			1	11,12	1,2
	5LA2232	Las Animas	20	4171	4202	1			1	12	
[Park Plateau]											
Eastman Ranch	5LA1188	Las Animas	8	4114 ?	4211 ?	3			3	11,12	1,2
La Veta Site	5HF75	Huerfano	6	4107	4211	1			1	7	1,2,3,5,7
Leone Bluffs Site	5LA1211	Las Animas	13	4162	4205	9		5	4	7,7A,13	1-5,7,8,10
	5LA1413	Las Animas	12	4162	4205	2		1	1	7	1
	5LA1415	Las Animas	12	4162	4205	1			1	7	1
Sopris Site	5LA1416	Las Animas	13	4162	4205	19		6	13	3,7,7A,13	1-4,6-8,10
	5LA1418	Las Animas	12	4162	4205	3		2	1	7	1
	5LA1424	Las Animas	12	4162, 4165	4205, 10	1		1	0	7,7A	1,10
	5LA1426	Las Animas	7	4165	4207	1		1	0	7	1
	5LA1478	Las Animas	12	4162	4205	2			2	7,7A	1,2,3,4,5,10
	5LA1523	Las Animas	4	4161, 4165	4205, 10	1			1	7	1,2,4
Reilly Canyon Site		Las Animas		4162	4205	4			4	7,7A	1,2,3,4,5,7,10
Sherrif's Dig		Las Animas	1	4162	4205	1			1	7	1,2,3,4,8
Blasi Place		Las Animas	1	4162, 4165	4205, 10	1			1	7,7A	1,2,4,10

Table A.3
Bioarchaeological Resources: San Luis Valley, Colorado

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Flattened Skull Site	5SH350	Saguache	4	4025 ?	4203	1			1	12	
Upper Graeser Petroglyphs	5RN12	Rio Grande	4,6	4107	4211	1			1	11,12	
Rio Grande del Norte		Rio Grande		4107	4211	1			1	11	1,2
	5AL100	Alamosa	4	4132	4207	1			1	12	
Seven Dunes Complex	5AL8	Alamosa	4	4025 ?	4203	1			1	11,12	
	5AL7	Alamosa	4	4154	4204	1			1	12	
	5AL5	Alamosa	4	4154	4204	1			1	12	
Ojito Creek Burial Site	5CT121	Costilla	9	4132 ?	4211	1			1	10	
San Luis Skeleton		Saguache		4135		1			1	11	
	5CN26	Conejos	2	4081	4205	1			1	11,12	
King's Turquoise Mine	5CN31	Conejos	1	4081	4205	1			1	12	
	5CN6	Conejos	5	4135		1			1	12	

Table A.4
Bioarchaeological Resources: Colorado Mountains, South Park, and Pagosa-Piedra District

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
	5FN293	Fremont	6,3	4128	4207 ?	1			1	7	
	5SH137	Saguache	4	4135		1			1	12	
Cochetopa Dome	5SH99	Saguache	6	4107	4211	1			1	3	1,2,3,4,5,7
	5HF53	Huerfano	3	4128		1			1	12	
	5CR2	Custer	5	4135	4207 ?	1			1	11,12	1,2
Park County Burial	5PA33	Park	20	4107 ?	4211	1			1	12	
[South Park]											
	5PA125	Park	4	4128	4210 ?	1			1	10	
[Pagosa-Piedra District]											
Pagosa-Piedra Sites		Archuleta	12,13	4029-31	4205		18	3	15	10,11	1,2,3,5,7,8,9
Piedra District Sites		Archuleta	12,13	4029-31	4205	104	7	0	3	4,11	1,2
	5AA86	Archuleta	13	4029-30	4205	1			1	11	
	5AA131	Archuleta	13	4030	4205	1		1	0	11	1
Stollsteimer Mesa		Archuleta	12,13	4029-31	4205		4	0	4	10,11	1,2,3,8

Table A.5 References Index for Colorado Bioarchaeological Resources

Site Name	Site #	References
ALAMOSA COUNTY		
	5AL5	Site form
	5AL7	Site form
Seven Dunes Complex	5AL8	Site form
	5AL100	Site form
ARCHULETA COUNTY		
	5AA86	Site form
	5AA131	Site form
Pagosa-Peidra Sites		Hummert 1981, Wallin 1939
Piedra District Sites		Roberts 1930
Stollsteimer Mesa Sites		Hummert 1981, Wallin 1939
CONEJOS COUNTY		
	5CN6	Site form
	5CN26	Site form
King's Turquoise Mine	5CN31	Site form, NRHP form
COSTILLA COUNTY		
Ojito Creek Burial	5CT121	Button 1984
CUSTER COUNTY		
Draper Cave Site	5CRI	Hagar 1976, Finnegan 1976, 1981
	5CR2	Site form
DOUGLAS COUNTY		
Kelran Site	5DA227	Hand and Byers 1985
EL PASO COUNTY		
Red Creek Burial	5EP773	Butler et al. 1986
North of Colo. Spgs.		Museum records
Garden of the Gods Skeleton		Renaud 1941
FREMONT COUNTY		
	5FN293	Alexander et al. 1982
HUERFANO COUNTY		
	5HF53	Site form
La Veta Site	5HF75	Renaud 1933, Renaud 1941
Cucharas Cemetery		Eck 1983
LAS ANIMAS COUNTY		
	5LA20	Campbell 1969
	5LA128	Campbell 1969
	5LA175	Campbell 1969
	5LA271	Campbell 1969
	5LA919	Campbell 1969
Trinchera Cave	5LA1057	Simpson 1976, Cassells 1983
Eastman Ranch	5LA1188	Site form
Leone Bluffs Site	5LA1211	Ireland and Wood 1973, Ireland 1974, Turner 1980, Wood and Bair 1980
	5LA1229	Site form
Torres Cave	5LA1310	Cassells 1983, Hoyt 1979
	5LA1413	Ireland and Wood 1973, Ireland 1974
	5LA1415	Ireland 1974
Sopris Site	5LA1416	Bair 1975, Ireland 1974, Miller 1980, Turner 1980, Wood and Bair 1980
	5LA1418	Ireland 1974
	5LA1424	Ireland 1974, Miller 1980
	5LA1426	Ireland 1974
	5LA1478	Ireland 1974, Miller 1980, Turner 1980
	5LA1523	Ireland and Wood 1973, Wood 1974
Hudson Ranch	5LA1720	Site form
	5LA2232	Site form
Blasi Place		Ireland 1974, Miller 1980
Reilly Canyon Site		Ireland 1974, Miller 1980, Turner 1980
Sherrif's Dig		Ireland 1974
PARK COUNTY		
Park County Burial	5PA33	Site form
Lake George Burial	5PA44	Site form
	5PA125	Potts n.d.
PUEBLO COUNTY		
	5PE1	Site form
Dave Fountain Site	5PE79	Finnegan 1979
	5PE285	Site form
Muldoon Hill Burial	5PE420	Siteform
Pueblo County Burial		Bass and Kutsche 1963
Turkey Creek Crevice Burial		Unpublished records
RIO GRANDE COUNTY		
Upper Graeser Petroglyphs	5RN12	Site form
Rio Grande del Norte		Museum records
SAGUACHE COUNTY		
Cochetopa Dome	5SH99	Scott et al. 1984
	5SH137	Site form
Flattened Skull Site	5SH350	Site form
San Luis Skeleton		Museum records

Table B.1, page 1
Bioarchaeological Resources: Mimbres, Southwest New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Three Circle Ranch	LA 53	Grant	12,13	4036-38	4205		1		1	11,12	
Cameron Creek Village	LA 190	Grant	13	4038	4205	475	13		13	4,7	
Galaz Ruin	LA 635	Grant	13	4040	4205	995	63	29	34	2,2A,5	1,2,10
Mattocks Site	LA 676	Grant	13	4040	4205	210	132	66	66	4,7	1,2,3,4,5,9
Rockhouse Ruin	LA 1118	Grant	12	4040	4205	3	1		1	11	
	LA 2544	Sierra	12	4040	4205	3			3	12	
	LA 2877	Sierra	11	4043	4205	1			1	12	
	LA 2947	Catron	12	4038	4205	1			1	7	1,2,5
	LA 2948	Catron	12	4036	4205	2	1		1	7	1,2,4,9
Apache Creek Pueblo	LA 2949	Catron	13	4041	4205	29	25	8	17	3,7,7A	1,2,3,4,6,9
	LA 3253	Catron	12	4041	4205	2	1		1	7A,11	1,2,4,9
	LA 3278	Catron	12	4040	4205	3			3	7,7A	1,2
Switchback Site	LA 3280	Catron	12	4040-41	4205	1			1	12	
Pine Creek Site	LA 3639	Grant	13	4043	4205	3	1		1	11	
Baca Ruin	LA 4051	Grant	12	4040	4205	3			3	11,12	
Tularosa Cave	LA 4427	Catron	2	4036	4205		2		2	4	1
Bat Cave	LA 4939	Socorro	2	4043	4205	1			1	11	1,2
Clanton Draw	LA 4979	Hidalgo	13	4041	4205		6		6	4,11	
Box Canyon Site	LA 4980	Hidalgo	14	4041-42	4205		1		1	4,11	
Allen Site Cluster	LA 4986	Catron	13	4036-41	4205	57	13	5	8	10,11,12	1,2
Pueblo Rodriguez	LA 4987	Catron	13	4041	4205	4	25	4	21	11,12	1,2
Hidalgo Pueblo	LA 4988	Catron	12	4041	4205	1	8		8	11,12	
U-Bar Cave	LA 5689	Hidalgo	3,10	4041	4205	1			1	4,4A	1,2
Buffalo Cave	LA 5690	Hidalgo	2	4043	4205	5		3	2	4,4A	1
Lee Village	LA 5779	Grant	13	4038	4205	16	21	2	19	4,11,13	1,2
Ormand Site	LA 5793	Grant	12	4042	4205		55	?	55	10,11,13	
Armijo Springs	LA 5939	Catron	13	4041	4205	1	2		2	7,11	1,2
Gallita Springs	LA 6083	Catron	13	4040-41	4205	7	8	2	6	7,11,12	1,2
	LA 6537	Catron	12	4040	4205	2	4		4	7,11	
Diablo Village	LA 6538	Catron	13	4036	4205		7		7	7,11	
Diablo Village	LA 6538	Catron	13	4040	4205		4		4	7,11	
Dinwiddie Site	LA 6783	Grant	12	4038	4205		4		4	11,12	
West Fork Ruin	LA 8675	Catron	14	4040	4205	19	21	5	16	7,11	1,2
Oak Springs Pueblo	LA 9725	Catron	12	4040-41	4205	3		1	2	4	1,2,9
	LA 10014	Catron	12	4043	4205	1			1	7,12	
Mogollon Village	LA 11568	Catron	13	4036-38	4205	8			8	4	1,3,4
Treasure Hill	LA 11609	Grant	13	4040	4205	6		5	1	3,13	1
Joyce Well	LA 11823	Hidalgo	12,13	4041	4205		8		8	4,11	
Poe Ruin	LA 12076	Grant	13	4040	4205		20	9	11	7,11	1,2
	LA 15006	Grant	13	4040	4205		1		1	11,12	
	LA 12077	Grant	11	4042	4205		5	1	4	11,13	1
Walsh Site	LA 15044	Grant	14	4041	4205	23	38	?	38	5,11	
NAN Ranch	LA 15049	Grant	13	4036-40	4205	173		50+	123	3,6,7,11	1,2
Montoya Site	LA 15075	Grant	13	4041	4205	23	11	?	11	5,5A,11	
	LA 18365	Grant	5	4043	4205	1			1	12	

Table B.1, page 2
Bioarchaeological Resources: Mimbres, Southwest New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Florida Mountain Site	LA 18839	Luna	12	4036-38	4205	4	5		5	4,11	1,2
	LA 18890	Grant	12	4043	4205	1?			1?	12	
	LA 18940	Grant	5	4041	4205	1?			1?	12	
Bradsby Sites	Y:4:35	Grant	13	4040	4205		181	62	119	11	1,2
Disert Site	Z:5:10	Grant	13	4041	4205	1?			1?	13	
Cowboy Site	LA 12129	Hidalgo	12	4040	4205		1		1	4,11	
Aragon-Apache Creek 11,12		Catron	13	4041	4205	1		1		4	1
Aragon-Apache Creek 13		Catron	12	4041	4205	1			1	4	
Doolittle Cave		Grant	3,10	4043	4205	1		1		4	1
Gallo Pueblo	NM:F:14:1	Catron	13	4041?	4205	50+		?	50?	5	
Harris Site	Q:1:14	Grant	13	4036-38	4205	50		?	50?	4,4A,13	
Heron Ruin		Grant	13	4040-41	4205	4		2	2	7	1
Hermanas Ruin	MC-47	Luna	13	4040	4205	45+	5		5?	7	
Higgins Flat Pueblo		Catron	13	4041	4205	15		13	2	4	1
Montezuma Site	Z:1:30	Grant	13	4040	4205		39	?	39?	13	
Pendleton Ruin		Hidalgo	13	4041-4042	4205	7		3	4	4	1,2
Red Rock Site		Grant	13	4040	4205	5			5	4	
South Leggett		Catron	13	4040	4205		2		2	4	
Starkweather Ruin		Catron	13	4037-38	4205	172	26		26	4,4A	1-5,9
Swarts Ruin		Catron	13,14	4037-38	4205	1009	62	14	48	3,4,4A,13	1-5,7-9
Turkey Foot Ridge		Catron	13	4038	4205	1			1	4	
Wet Leggett		Catron	12,13	4040	4205	1			1	4,13	
Winn Canyon Site	G-40	Grant	12,13	4036-38	4205	8			8	4,4A,13	1,2
Gila Nat'l Monument Cave 2		Hidalgo	2,3	4042?	4205	1			1	4	1,2,9
Gila Nat'l Monument Cave 3		Grant	2	4042?	4205	1		1	0	4	1
Spur Ranch Site		Catron	13,14	4035-36	4205		6		6	3,4,11	1,2
Cave Near Ft. Tularosa		Catron?	2,3	4043	4205		2		2	4,11	1,2
Upper San Francisco River		Socorro?	12,13	4043	4205		29	2	27	3,11	1,2
Cave South of Grant		Grant	3	4043	4205		5	2	3	11	1,2
Oldtown Ruin		Luna	13	4043	4205		3		3	4,11	1,2
Byron Ranch Ruin		Luna	13	4043	4205		3	1	2	4,11	1,2
Tularosa Canyon (Hough)		Socorro?		4043	4205		4		4	4,11	1,2
Tularosa Canyon		Socorro?		4043	4205		13	3	10	4	1
Los Lentes Valley		Catron	12	4043	4205	7+		7+	0	3,4	1
S U Site		Catron	13,14	4035	4204	54	34	4	30	4,4A,13	1,2,3,9

Table B.2
Bioarchaeological Resources: Southwest New Mexico, non-Mimbres

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
	LA 5797	Grant		4134		1			1	12	
Fort Stanton	LA 8744	Lincoln	18	4120-21	4215		3		3	11,12	
	LA 10025	Catron	22	4120	4125	2			2	7,12	
	LA 10048	Catron	5	4111	4211	1			1	7,12	
	LA 19123	Grant	7	4132		1			1	12	

Table B.3
Bioarchaeological Resources: Southeast New Mexico, Jornada North

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Alamogordo Site	LA 456	Otero	12	4044	4205	1			1	3,12	
	LA 460	Otero	5	4044	4205		6		6	3,11	
Mayhill Administration Site	LA 505	Otero	20	4068	4205	4			4	4,7,11	1,2,3,7
Bonnell Site	LA 612	Lincoln	13	4069	4205	28		19	9	3,4	1,2,9
Henderson Site	LA 1549	Chaves	13	4047, 76	4207	11		3	8	1	1-5,7,8,9,11
Penasco Bend	LA 2000	Chaves	12	4068-69	4205	11		?	11	4,4A,7,7A	1,2,3,4,5,9
Smokey Bear Ruin	LA 2112	Lincoln	12,13	4070	4205	38		17	21	3,4,4A,7	1,2,3,4,5,7,9
Crockett Canyon Site	LA 2315	Lincoln	12	4068	4205		39	16	23	11,13	1,2
	LA 2335	Otero	12	4044	4205		2		2	11,12	
Bloom Mound	LA 2528	Chaves	12	4070	4205	25	5	?	5	4	
Corona HWS	LA 2945	Lincoln	12	4047	4205	4	1		1	4,7,10	1,2,5,8,9
	LA 3323	Otero	12	4045	4205	2			2	12	
Three Rivers Petroglyph Rec.	LA 4921	Otero	13	4046-47	4205	3		1	2	7,7A	1-9
Glencoe HWS	LA 5378	Lincoln	12	4044	4205	5	6	3	3	7,11	1
Hondo HWS	LA 5380	Lincoln	12	4046	4205	14	15	4	11	7,11	1
Bent HWS	LA 10832	Otero	12	4046	4205		1		1	7,11	
Bent Site	LA 10835	Otero	12	4045	4205	1	1		1	7,11	1,2
Angus Sites	LA 16297	Lincoln	12	4045	4205		8	2	6	11,12	1,2
Angus Sites	LA 16300	Lincoln	12	4044	4205		5	3	2	11,12	1
Surprise Site	LA 18436	Lincoln	12	4045-46	4205		2		2	11,12	
	LA 32227	Chaves	12	4044	4205	1 ?			1 ?	12	
	LA 32229	Eddy	12	4063-64	4205	1 ?			1 ?	12	
	LA 32259	Chaves	4	4063-64	4205	3			3	12	
Mayhill Site 2	LA 46310	Otero	12	4068	4205	2			2	4,12	
Blackwater Creek Site		Chaves	3	4044	4205	1			1	4	
Heiner Ranch Site		Lincoln		4070?	4205	1			1	4	
Site 24 (Jelinek)	P-24	De Baca	12	4045	4205	3		1	2	4	1,2
Pueblo at Three Rivers		Otero		4044	4205	2			2	4	1,2,7,9
Boot Hill (Red Tank) Site		Eddy	4	4065	4207	many		?	1+	13	

Table B.4
Bioachaeological Resources: Southeast New Mexico, Jornada South

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Last Chance Canyon Cave	LA 538	Otero	3	4051	4205	6	7		7	4,4A,11	1,2,3
Little Pine Canyon Cave 4	LA 1771	Eddy	2	4049	4205	1			1	4,4A,11	
Little Pine Canyon Cave 1	LA 1772	Eddy	3	4049	4205	2	1		2	4,4A,11	
Goat Cave	LA 1773	Eddy	3	4049	4205	1			1	4,4A,11	1,2,3,7,9
Condron Field	LA 8673	Dona Ana	12	4052	4205	1			1	11,12	
	LA 36970	Otero	4	4051	4205	2			2	7	1,2,4,7
	LA 43432	Eddy	2,3	4049	4205	1			1	12	
Dark Canyon Cave		Eddy	3	4049	4205		9		9	11	1,2
Mescal Pit		Eddy		4049	4205		10	3	7	11	1,2
Cremation Cave		Eddy	3,19	4049	4205		2	1	1	4,11	1,2
Camp Site (Mera)		Eddy	4	4049	4205	3			3	4	1,2,3
Midden-circle (Mera)		Eddy	5	4049	4205	3			3	4	1,2,3,9

Table B.5

Bioarchaeological Resources: Southeast New Mexico, non-Jornada

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Richard Brown Site	LA 43440	Eddy	3	4010, 05	4204,11	10			10 ?	12	
Boulder Canyon Cave	LA 43669	Eddy	3	4010	4204	1			1	12	
Earl Dowell Site	LA 43273	Eddy	5,23	4010	4204	1			1	12	
Pue Ranch Site	LA 43269	Eddy	23	4010	4204	1		1		12	
Burnet Cave		Eddy	3	4007	4203	2			2	3	
Fresnal Shelter	LA 10101	Otero	3	4010	4204	1		1		4	1,3,9
Garnsey Site	LA 18399	Chaves	5	4076	4207	1		1		4	1
	LA 43436	Eddy		4128		1			1	12	
	LA 55987	Eddy	7	4135		1			1	12	

Table B.6

Bioarchaeological Resources: South Central New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
San Antonio	LA 23	Bernalillo	13	4032	4205	28		8	20	13	1,2,3,4,7,8,11
San Antonio de Padua	LA 24	Hernalilio	13	4032	4205	8		3	5	7A	1,2,3,4,5,6,7,8,9
San Antonio de Padua	LA 24	Bernalillo	13	4033, 4098	4205,06	19		4	15	7A	1,2,3,4,5,6,7,8,9
San Antonio de Padua	LA 24	Bernalillo	13	4032-3, 98	4205,06	12		3	9	7A	1,2,3,4,5,6,7,8,9
Tabira	LA 51	Torrance	14	4031-33	4205,06		1	1		4,11	1,9
Pueblo Pardo	LA 83	Socorro	14	4032, 4109	4205,07	40	13	5	8	3,4,5,11,13	1-3,5-9,11
Quarai	LA 95	Torrance	13,16	4033, 4109	4205,07	41	47	15	32	3,5,11	1,2,10
Gran Quivira (Las Humanas)	LA 120	Torrance	14,16	4032, 4109	4205,06	510	?	212	298	2,3,5,6,11,13	1-11
Paa-ko	LA 162	Bernalillo	14	4031-32	4205		172	112	60	2,3,4,6,11,13	1-9,11
Teypama	LA 282	Socorro	13	4031-33	4205,07		6		6	11	
Pottery Mound	LA 416	Valencia	14	4032	4205	110	95	57	53	3,5,10	1-4,7-11
Tijeras Pueblo	LA 581	Bernalillo	14	4032	4205	92	64	22	42	2,5,7A,11,13	1-11
Vulture Gulch	LA 586	Bernalillo	12	4031	4205	1?			1 ?	12	
	LA 2567	Valencia	12	4031	4205-	1			1	7	1,2,3,5,6,7,8,9
Sedillo Site	LA 3122	Bernalillo	13	4029-30	4205	12	18	6	12	3,7,11	1,2,4,9
	LA 3124	Sandoval	12	4028-29	4205	1?			1 ?	12	
	LA 3289	Bernalillo	12	4028-29	4205	1			1	7	1,2,7,9
	LA 3290	Bernalillo	12	4029	4205	2	1		2	7,11	1,2,3,4,5,7,8,9
Olguin Pit House	LA 3306	Valencia	12 ?	4031	4205	1			1	3,12	
Abo Mission	LA 3933	Torrance	16	4109, 4118	4206,09	9	4	4	5	10,11,13	1,2
	LA 4062	Valencia	13	4030	4205	13	8	?	13 ?	7,11	
Tunnard Site	LA 6868	Bernalillo	5	4032	4205	7	10	1 ?	9 ?	7,7A,11	
Tijeras Canyon	LA 14857	Bernalillo	12	4031	4205	1			1	11,12	1,2
Big Head Mesa	LA 15231	Sandoval	6,22	4101	4212	2	1		2	4,11,13	1,2,3,4,9
Sevilleta Shelter	LA 20896	Socorro	3	4030	4205	1			1	7,7A	1,2,3,4,5,6,7
Chamisal Site	LA 22765	Bernalillo	13	4032	4205		57	29	28	5,11	1,2,10
	LA 49791	Bernalillo	15	4120	4215	10		?	10 ?	12	
	LA 57017	Sandoval	13	4028	4205	2			2 ?	12	
	LA 57025	Sandoval	13	4028	4205	3			3 ?	12	
	NAU NMH1078	Valencia	13 ?	4031	4205	17	5		12	10	1
Artificial Leg Site II		Bernalillo	12	4028-29	4205	3			3	5	1
Artificial Leg Site III		Bernalillo	13	4028-29	4205	3		2	1	5	1

Table B.7, page 1
Bioarchaeological Resources: North Central New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Pindi Pueblo	LA 1	Santa Fe	13	4030-32	4205	86	81	36	45	4.5,10,11	1,2,4,7,8,10,11
School House Site	LA 2	Santa Fe	13	4031	4205		10	?	10 ?	11,12	
Pueblo Wells	LA 4	Santa Fe	13	4031-32	4205		6	?	6	4,11,12	
Pueblo Alamo	LA 8	Santa Fe	13	4031	4205		26	4	22	4,7,11	1,2
Cieneguilla	LA 16	Santa Fe	14	4032, 4098	4205		4		4	3,4	
Nambe Pueblo	LA 17	Santa Fe	14	4032, 4098	4205		1		1	3,11	
Galisteo Pueblo (Las Madres)	LA 26	Santa Fe	14,16	4031-2, 98	4205,6		3		3	4	
Cundiyo	LA 31	Santa Fe	5	4031-32	4205		1		1	11,12	
Puye	LA 47	Rio Arriba	2,14	4030-32	4205,6		243	12	231	3,4,5,9,11,12	1,2,3,4,5,6,7
Pueblo Colorado	LA 62	Santa Fe	14	4032	4205.6	6	2		6 ?	4,13	
Jacona	LA 63	Santa Fe	13	4032, 4098	4205,6		1		1	11,12	
Pueblo Encierro (Cochiti)	LA 70	Sandoval	13	4032, 4098	4205.6	98	100	39	61	3,5,7,7A	1-5,7-9,11
Arroyo Hondo	LA 76	Santa Fe	13	4032	4205,6	120		68	52	1,3,4,5,11	1,2,3,4,7,8,11
San Cristobal	LA 80	Santa Fe	14,16	4031, 2, 98	4205,6		256	97	159	3,4,6,7,9	1,2,3,7,11
Tyuonyi	LA 82	Los Alamos	14	4032	4205,6	?	2		2	3,11	
San Lazaro	LA 91, 92	Santa Fe	14	4032	4205,6	8		?	8 ?	4,13	
San Marcos	LA 98	Santa Fe	14,16	4032, 3, 98	4205,6	5			5	3,4	1
Fort Marcy Hill	LA 111	Santa Fe	12,18	4031	4205		1		1	11	1
Arroyo Negro (Cieneguitas)	LA 114	Santa Fe	13	4030	4205		1		1	11	
Unshagi	LA 123	Sandoval	13	4032	4205	191	240	105	135	3,4,5,11	1,2,3,10,11
	LA 153	Santa Fe	12 ?	4030-31	4205		1		1	11,12	
Tsirege	LA 170	Los Alamos	2	4032	4205	100	64	?	64 ?	3,5,9,11	3
Pueblo Largo	LA 183	Santa Fe	14	4032-33	4205,6	15	4	?	4 ?	3,4	
Kuaua	LA 187	Sandoval	14	4032, 3, 98	4205.6	600	255	82	173	3,4,5,6,11	1,2,3,4
	LA 195	Rio Arriba	5	4031-32	4205		2		2	11	
Tsankawi		Santa Fe	13,14	4032	4205,6	32	25	1	24	3,7,9,11,13	1,2,3
Pueblo She	LA 239	Santa Fe	14	4032	4205,6	11	2		2	4	
Tonque Pueblo	LA 240	Sandoval	14	4032	4205,6	14	8	1	7	3,4	1,9
Te'ewi	LA 252	Rio Arriba	13	4031-32	4205	36	37	9	28	5,7,7A,11	1-5,7-11
Sapawe	LA 306	Rio Arriba	13	4032	4205		99	28	71	3,5,10,11	1,2,3,4,7,8,10,11
Puaray	LA 326	Sandoval	14	4032, 4098	4205,6	450	58	21	37	3,5,11	1,2,3,4,10,11
	LA 344	Los Alamos	12	4031	4205		2		2	11	
	LA 389	Santa Fe	5	4031	4205		1		1	3,11	1,7
Amoxiumqua	LA 481	Sandoval	13	3031-32	4205,6		3		3	3,4,11	3
Nanishagi	LA 541	Sandoval	13	4032	4205		41	11	30	3,11	3
Guisewa	LA 679	Sandoval	14-16	4033, 4098	4206,9		71	21	50	3,4,9,11	1,3
Hardy Project	LA 742	Santa Fe	13	4030-31	4205		1		1	11,12	
Cuyamunge	LA 833	Santa Fe	12	4030-32	4205		70	15	55	3,6,11	1
Yunque (San Gabriel, San Juan)	LA 874	Rio Arriba	14,16	4032, 98	4205,6	43	20	6	14	3,11	1
Greenlee Ruin	LA 908	Rio Arriba	12	4129	4205		13	?	13 ?	11,12	
Rio Puerco Site	LA 875	Sandoval	13,14	4129	4205		1		1	11,12	
	LA 1844	Sandoval	12	4030-31	4205		1		1	11	
	LA 3125	Sandoval	12	4029-31	4205	1+			1 +	12	
Tesuque By-Pass Site #1	LA 3294	Santa Fe	12	4030-31	4205	3		1	2	4,7A	1,2,4,6,9
Galisteo HWS	LA 3333	Santa Fe	13	4129	4205		7	?	7 ?	11	
Ephriam St. Burial	LA 4450	Santa Fe	20	4129	4205		13	?	13 ?	11,12	
Palace of the Governors	LA 4451	Santa Fe	18	4118	4209		3	1	2	11,12	1
	LA 4562	Santa Fe	5	4129	4205		1		1	11	
	LA 4608	Los Alamos	12	4032	4205	1		1		7	1

Table B.7, page 2

Bioarchaeological Resources: North Central New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
	LA 4664	Los Alamos	12	4031	4205	1			1	7	1
Montez Site	LA 4994	Santa Fe	18	4118	4209		3	?	3 ?	11,12	
Torreon Site	LA 6178	Sandoval	11	4129	4205	1		1		4	1
San Idelfonso	LA 6188	Santa Fe	13	4032, 4098	4205,6		2		2 ?	11,12	
Alfred Herrera Site	LA 6455	Sandoval	13	4032	4205,6	64	65	15	50	3,5,7,7A	1-5,7-9,11
Northbank Site	LA 6462	Sandoval	12	4032	4205	12		5	7	7,7A,5	1,2.3,4,5,7,8,9
Twin Hills Site	LA 8866	Santa Fe	3	4135		3	4	?	4 ?	7,11	
Torrito Site	LA 9193	Sandoval	12	4029-30	4205	2			2	11,12	
Prieta Vista	LA 9608	Sandoval	13	4031	4205	3		2	1	7	1,2,4,5,6,7,8,9
	LA 12119	Sandoval	13	4031	4205	2		1	1	7,7A	1,2,3,4,5,7,9
	LA 12121	Sandoval	12	4031	4205	1			1	7,7A	1,2,3,4,5,7,8,9
Pueblo Canyon Cliffs	LA 14815	Los Alamos	12	4030-31	4205	2		1	1	10	1,2,5,7,9
McKee Ranch	LA 14825	Santa Fe	12	4032	4205		1		1	11	
	LA 24783	Sandoval	20	4029	4205	1			1	12	
	LA 47695	Santa Fe	5	4031	4205	1			1	12	
Site Bj-74		Sandoval	3,10	4033, 98	4207	13		7	6	10,10A	1,2,4,5,6,9
Otowi		Santa Fe	13 ?	4032	4205,6		93	6	87	3,7,9,11,13	1,2,3
Rainbow House		Sandoval ?	2	4032	4205,6	3		?	3 ?	11	
Jemez Cave		Sandoval	2	4031-32	4205	1		1		3,4	1,9,10
Kwasteykwa		Sandoval	13	4033, 98	4205		155	38	117	3,5,9,11	1,2,3,7
Nambe Falls	X29SF17	Santa Fe	12	4129	4205	3		1	2	7,7A	1,2,4,7,9
Pajarito Park/Vigil Grant		Sandoval?	13 ?	4031-32	4205		9	?	9 ?	3,11,12	
Po-shu-ouinge		Rio Arriba	14	4032	4205,6	8		2	6	4	1
Riana Ruin		Rio Arriba	12	4031	4205	1			1	4	
San Ysidro Pueblo 2	FB142	Sandoval	12	4032, 98	4205	1		1		7	1
San Ysidro Pueblo 1	FB115	Sandoval	12	4032, 98	4205	4		1	3	7	1,2
Cave Near Snake Kiva		Los Alamos	2	4032	4205	1			1	3	

Table B.8

Bioarchaeological Resources: Taos / Cimarron District, North Central New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Howiri	LA 71	Taos	12	4032	4205		20	14	6	11,12	1,2
Pot Creek Pueblo	LA 260	Taos	13	4029-31	4205	10		3	7	3,4	1,2
	LA 587	Taos ?	12	4031	4205	1			1	7	1,2,4,7,9
Ranchos HWS	LA 3643	Taos	12	4031	4205	1			1	7	1,2,3,4,5,6,7,9
	LA 9200	Taos ?	12	4031	4205	1			1	7,10	1,2,4,9
	LA 9204	Taos	12	4031	4205	1			1	7,10	1,2,3,4,5,7,9
	LA 14868	Taos	12	4031	4205	5			5 ?	12	
North Ponil 1,7 (Philmont)	LA 27957	Taos	3,11	4028-29	4205	7		1	6	3,4	1,2,9
Lower Ponil 3	LA 28612	Colfax	12	4028-29	4205	1			1	4	
Middle Ponil 1A	LA 28282	Colfax	5	4135		1			1	3,4	
Middle Ponil 2,2A	LA 28283	Colfax	12	4030-31	4205	1			1	3,4	
Middle Ponil 14	LA 28294	Colfax	3	4128	4205	1			1	4	
	LA 32358	Colfax	20	4135		1			1	12	
	29TA10	Taos	12	4030	4205	3			3	4	1
	29TA18	Taos	12	4030	4205	8		2	6	4	1,2
	29TA20	Taos	12	4030	4205	1		1		4	1
	29TA47	Taos	13	4030	4205	9		2	7	4	1,2
Carson N. F. Site 587		Taos ?	12	4030	4205	1			1	7	1,2,4,7,9

Table B.9
Bioarchaeological Resources: North Central New Mexico Gallina Sites

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Capulin Station	LA 641	Rio Arriba	12	4030-31	4205		5		5 ?	3,5,11	3,7,10,11
Nogales Cliff House (Bg3)	LA 649	Rio Arriba	2	4030-31	4205	18		7	11	3,5,11	1-3,5-8,10,11
Kiva House	LA 653	Rio Arriba	12	4030-31	4205	1			1	3,7	1,3,11
Chupadero Ranger Station	LA 654	Rio Arriba	12	4030-31	4205	2	1		2	3,7,11	1,2,3,7,11
Oso Canyon	LA 1707	Rio Arriba	12	4030-31	4205		1		1	11,12	
	LA 5862	Rio Arriba	12	4030-31	4205	1 ?			1 ?	12	
	LA 6163	Rio Arriba	12	4030-31	4205	1	3		3 ?	3,11,12	1,2,3,4,8,9
Lagunitas Ruin	LA 6865	Sandoval	12	4030-31	4205	1	2		2	7,11	1
Bull Snake Hill	LA 6866	Sandoval	12	4030-31	4205	1			1	7,11	1
	LA 11841	Rio Arriba	12	4030-31	4205	1			1	5,7A	1-4,7,8,10,11
Kinslow Site	LA 11843	Rio Arriba	12	4030-31	4205	3		1	2	5,7,7A	1-4,7-11
	LA 11850	Rio Arriba	12	4030-31	4205	4			4	5,7A	1-4,7-11
Lg 84	LA 12059	Rio Arriba	12	4030-31	4205	1			1	11	
King Triple Burial	LA 12060	Rio Arriba	12	4030-31	4205		3		3 ?	11,12	
	LA 12063	Rio Arriba	12	4030-31	4205		2		2 ?	11	
	LA 12066	Rio Arrlba	12	4030-31	4205		1		1 ?	11	
	LA 12325	Rio Arriba	12	4030-31	4205		1	1		11	1
	LA 12340	Rio Arriba	12	4030-31	4205	3			3 ?	12	
	LA 12387	Rio Arriba	12	4030-31	4205	1			1 ?	12	
Hormigas Site	LA 35648	Rio Arriba	13	4030-31	4205		1		1 ?	4,11	
Simon Burial	LA 53788	Rio Arriba	20	4030-31	4205	1			1	7,7A	1-5,7-9
Cuchillo Site	Bg2	Rio Arriba	12	4030-31	4205	16	17		17	3,5,11	1,2,3,5,7,11
Evans Site	Bg7	Rio Arriba	12	4030-31	4205	1			1	3,5	1,2,4,5,7
Gavilan Site	Bg4	Rio Arriba		4030-31	4205	2			2	3,11	1,2,3,9
Rattlesnake Point Community	Bg20	Rio Arriba	12	4030-31	4205	11 R		6	5	3,4,5,6,7,10	1,2,3,7,8,10,11
Carricito Community	Bg22	Rio Arriba		4030-31	4205		1		1	5,11	1,2,7,11
	Bg51	Rio Arriba		4030-31	4205	5	13	1	12	3,11	1,2,3,11
Starve Out Ridge Group	Bg88-91A	Rio Arriba	13	4030-31	4205		18	3	15	5,11	1,2,7,10,11
Butts Ranch Site		Rio Arriba	12	4030-31	4205		2	2		11	1
Owl Point	29RA207	Rio Arriba	12	4030-31	4205	1			1	5	1,2
The T-Site		Rio Arriba	12	4030-31	4205	6		2	4	3	1,2,3,4,7
Nogales Canyon		Rio Arriba		4030-31	4205		2		2	11	1,2
Adams State College (ASC) G-8	AR03100208	Rio Arriba	12	4030-31	4205	1			1	7	1,2,7,8,9
ASC G-189	AR031002184	Rio Arriba	12	4030-31	4205	1			1	7	1,2,6,7,8,9
ASC G-4	AR03100204	Rio Arriba	12	4030-31	4205	1			1	7	1,2,7,9
ASC G-2	AR03100202	Rio Arriba	12	4030-31	4205	1			1	7	1,7
ASC G-3	AR03100203	Rio Arriba	12	4030-31	4205	2		2		7	1,5,7,8,9
East of Llaves		Rio Arriba	12	4030-31	4205	2		1	1	7	1,2,5,8,9
ASC G-31	AR03100231	Rio Arriba	12	4030-31	4205	1		1		7	1,9
ASC G-38	AR03100238	Rio Arriba	12	4030-31	4205	2		1	1	7	1,2,4,7
Capulin Creek		Rio Arriba	12	4030-31	4205	2		1	1	7	1,2,7

Table B.10
Bioarchaeological Resources: West Central New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Hawikku	LA 37	McKinley	14,16	4031-3, 99	05,6,12	996	262	67	195	3,4,5,6,10,13	1-11
Atsinna	LA 99	Cibola	14	4031	4205	9		?	9 ?	9,13	
Gallinas Springs Ruin	LA 1178,80	Socorro	13,14	4031-32	4205		30	6	24	11,12	1,2
Pueblo de los Muertos/El Morro	LA 1585	McKinley	14	4032	4205	26		11	15	2,3,13	1,2,7,9
Correo West	LA 3638	Cibola	12	4031	4205	2			2	10,11	1,2
Philadelphia Site	LA 5942	Cibola	12	4030	4205	3	1		2	7,11	1,2,9
Bug Creek Site	LA 5949	Cibola	12	4029	4205		1		1	7,11,12	
San Fidel HWS	LA 6167	Cibola	12	4030	4205	1			1	7	
	LA 6168	Cibola	12	4030	4205	1	3		3 ?	7,11	1,2,7
	LA 6995	Cibola	19	4030	4205	4			4 ?	12	
	LA 8704	McKinley	12	4030-31	4205	1		1		12	1
	LA 8116	Cibola	12	4031	4205		1		1	11,12	
Kechiba:wa	LA 8758	McKinley	14,16	4032, 3, 99	05,6,12	166	70	?	70 ?	13	
Sun House Hills	LA 8763	Cibola	12	4027	4205		5		5 ?	7,11,12	
	LA 9108	McKinley	12	4031	4205	1			1	11,12	
Blackrock Sites	LA 12848	McKinley	12	4030	4205	2+			2+	7	
	LA 26328	McKinley	12	4031	4205	1 R		1		7,7A	1
	LA 27211	Catron	12	4030-31	4205	2			2 ?	12	
	LA 27448	Socorro	12	4030-31	4205	1			1	12	
	LA 30560	McKinley	12	4031	4205	1 R			1	7,7A	
	LA 30564	McKinley	12	4030	4205	3 R			3	7,7A,10	1,2,3,4,5,7,8,9
	LA 30578A	McKinley	12	4030-31	4205	2 R		1	1	7A	1,2
	LA 34927	McKinley	12	4031	4205	2 R			2	7,7A	1,2,3,4,7
	LA 48390	McKinley	2,3	4099	4206,12	4			4 ?	4,12	
	LA 48417	McKinley	12	4030	4205	2 R			2	7	1,2,3,4,7,8
	LA 49221	McKinley	12	4129	4205	2			2 ?	12	
Kiva Compound Near Hawikku		McKinley	14	4030-31	4205,6	10			10 ?	4	
Heshotauthia	LA 15065	McKinley	14	4032	4205,6	200	30	7	23	4,9,11,13	1,2,3,4,5,9
Halonawan		McKinley	14	4031-32	4205,6		13	2	11	4,9,11,13	1,2,3,4,5
Acoma Pueblo		Cibola	14	4032	4205,6	1 R			1	5	1,2,9
LP 2:35 (Dittert)		Cibola	12	4030	4205	1			1	5	1,2,6,7,9
LP 2:13-A (Dittert)		Cibola	3,12	4028	4205	1			1	5	1,2
LP 4:3-A (Dittert)		Cibola	3	4016, 4028	4204	1		1		5	1
LP 4:3-A (Dittert)		Cibola	3	4101, 4099	4212	1			1	5	1,2
Village of the Great Kivas		McKinley	13	4031	4205	60		24	36	9	1,2,7,9
Sandstone Hill Pueblo	NA 11233	Catron	13	4030-31	4205	1			1	7	1,2,5,7
Mariana Mesa Site 481		Catron	12	4031	4205	3			3	4	1
Mariana Mesa Site 616		Catron	13	4031-32	4205	20		7	13	4	1,2,7,9
Mariana Mesa Site 494		Catron	12	4030-31	4205	5		2	3	4	1,2,7,9
Mariana Mesa Site 143		Catron	13	4031	4205	2			2	4	1
K3:4 ZAP		McKinley		4129	4205	4 R		2	2	10	1,2,6,7,9
HWS Near Gallup		McKinley	12	4030-31	4205	2		1	1	4	1
K3:101 ZAP		McKinley ?		4031	4205	3 R			3	10	1,2,4,5,7,8,9
K3:102 ZAP		McKinley		4031	4205	6 R		4	2	10	1,2,4,5,7,8,9
K3:103 ZAP		McKinley		4129	4205	1 R			1	10	1,2,3,4,5,7,8,9
K3:108 ZAP		McKinley		4129	4205	1 R		1		10	1,5
Nutria Road Site	NA 11530	McKinley	13	4031	4205	3			3	4,7,7A	1,2,4,7,9
Near Manuelito		McKinley		4129	4205	6			6	11	1,2

Table B.11
Bioarchaeological Resources: Northeast New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Rowe Pueblo	LA 108	San Miguel	13	4031	4205		4		4 ?	11,12	
Tecolote Ruin	LA 296	San Miguel	12	4029-31	4205	7	11		11 ?	11	
Pecos Pueblo	LA 625	San Miguel	14	4031-2, 98	4205,6	2000	1118	270+	848	1,3,5,6	1-11
Pecos Mission	LA 4444	San Miguel	15,16	4098, 4118	4206,09	1254	109	36	73	10,11	1,2,7
Bacas Ranch	LA 1246	Guadalupe	5	4030-31	4205		1		1	11	
Fuentes Ranch	LA 1499	Harding	5	4128			1		1	11	
	LA 14100	San Miguel	5	4030-31	4205		2		2	12	
La Cinta Canyon	LA 18798	Harding	5	4135			1		1	11,12	
Sininger Site		San Miguel	15	4120	4215		70	30	40	3,5,10	1,2
Fort Union Nat'l Monument		Mora	15	4120	4215	4			4	4	1,2,7

Table B.12, page 1
Bioarchaeological Resources: Northwest New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Aztec Ruin	LA 45	San Juan	13	4030-31	4205	186	65	?	65 ?	4,5	1,2,3,4,7,8,10,11
	LA 1912	San Juan	12	4029-31	4205	1			1	12	
Twin Lakes	LA 2507	McKinley	12	4028-29	4205	2			2	7	
Coyote Canyon A	LA 2547	McKinley		4135			2		2	11,12	
Coyote Canyon B	LA 2578	McKinley	12	4129	4205		1		1	11,12	
	LA 2585	San Juan	12	4030	4205		1		1	7,11	
	LA 2599	McKinley	12	4129	4205	3	2		2	7,10,12	
Chivos Site	LA 2672	McKinley	12	4030	4205		1		1	12	
San Jose Project	LA 2675	McKinley	12	4030	4205	18	10	11	7	7	1,2,5,7,9
	LA 2699	McKinley	12	4030	4205	2		1	1	7	1,9
	LA 2701	McKinley	12	4030	4205	1	2		2	7	1,2,7,9
	LA 2706	McKinley	9	4102	4212,16	1			1	7,7A	1,2,3,4,9
Fort Wingate HWS	LA 2714	McKinley	12	4029-30	4205	6	4	2	4	10,12	1,2,7,9
Crownpoint North HWS	LA 2985	McKinley	12	4030-31	4205	5	1	3	2	7,11	1,2
Palmer Ridge Ruin	LA 2987	McKinley	12	4030	4205	1			1	7	
	LA 2988	McKinley	12	4030-31	4205	1			1	7,11	1,2
La Plata HWS	LA 3292	San Juan	12	4031	4205	2		1	1	7,7A	1,2,3,4,5,6,7,9
Waterflow Site	LA 3335, 36	San Juan	12	4030-31	4205		1		1	11	
Ambrosia Lake HWS	LA 3559	McKinley	12	4129	4205		1		1	11,12	
	LA 3562	McKinley	12	4029	4205	2		1	1	7	1,2,5,7,9
San Mateo HWS #6	LA 3566	McKinley	12	4129	4205	1			1	12	
San Mateo HWS #7	LA 3567	McKinley	5	4129	4205		1		1	11,12	
San Mateo HWS #8	LA 3568	McKinley	12	4129	4205		1		1	11	
San Juan Coal Lease #143	LA 3686	San Juan	12	4031	4205	1			1	7,7A	1,2,7,9,9
	LA 4485	McKinley	12	4031	4205	0	2		2 ?	7,11	
	LA 4487	McKinley	13	4028-29	4205	32	16	2	14	7,11	1,2
	LA 4488	McKinley	12	4031	4205	1			1	12	
	LA 5007	San Juan	11	4030-31	4205	1			1	7	
Burned Canyon Site	LA 5057	McKinley	12	4028, 30-1	4205	0	11	?	11 ?	7,11	
Blue Dog Site	LA 5062	McKinley	12	3030-31	4205	1			1	7	1
McCabe Site	LA 5093	McKinley	12	4129	4205	1			1	7	
Tohalina Bikitsiel	LA 5596	San Juan	12	4129	4205	1			1	3,11,12	1,2,3,4,5,7,9
	LA 5858	San Juan	5	4129	4205	1			1	12	
	LA 6062	San Juan	11	4031	4205	1			1	7	
	LA 6186	McKinley	11	4129	4205	1			1	11,12	1,2,7,9
	LA 6187	McKinley		4030	4205	1			1	11,12	1,2,7
Thoreau Site	LA 6372	McKinley	12	4031	4205		1		1	12	
	LA 6373	San Juan	11	4030-31	4205	1		?	3 ?	7	
Horseshoes Site	LA 6380	McKinley	13	4031	4205	1			1	11,12	1,2
Prairie Dog Pueblo	LA 6383	McKinley	13	4030	4205		3	?	3 ?	11,12	
Chaves Site	LA 6384	McKinley	12	4031	4205	5		?	5 ?	7,11,12	
Arroyo Chico	LA 6387	McKinley	12	4030	4205		5	?	5 ?	12	
Blue Spruce Site	LA 6390	McKinley	12	4129	4205		2	?	2 ?	12	
	LA 6396	San Juan ?	11	4030	4205	3		?	3 ?	7	
Windmill Site	LA 6400	McKinley	12	4031	4205		1		1	11,12	
	LA 6481	McKinley	11	4129	4205	1			1 ?	11,12	

Table 8.12, page 2
Bioarchaeological Resources: Northwest New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
	LA 6384	San Juan	12	4030	4205		1		1	7	
Terrace Site	LA 6485	McKinley	12	4029-31	4205		1+	?	1 +	11,12	
Chuska School	LA 6988	McKinley	12	4028	4205		1		1	11,12	
Redrock HWS	LA 8243	San Juan	13	4029-31	4205		4	?	4 ?	11,12	
	LA 8662	San Juan	12	4028	4205		2	?	2 ?	11,12	
Casamero Site	LA 8779	McKinley	13	4031	4205		6	?	6 ?	7,11,12	
Salmon Ruin	LA 8846	San Juan	14	4030-31	4205	106	111	82	29	5,7,7A	1,2,4,5,7,8,10,11
	LA 10219	San Juan	11	4029	4205	1			1 ?	12	
	LA 10931	McKinley	13	4028	4205	1			1 ?	12	
Bina a 'bikee	LA 10973	McKinley	12	4029-31	4205		1		1 ?	11,12	
T. T. Site	LA 11827	McKinley	5	4030	4205	1			1 ?	12	
	LA 13624	McKinley	13	4030-31	4205	1			1 ?	12	
Antelope Mesa HWS	LA 14695	McKinley	12	4028	4205		2		2 ?	11,12	
Tsaya Project	LA 15645	San Juan	12	4028-29	4205	1			1	7,7A	1,2,3,4,7,8,9
Little Water	LA 16029	San Juan		4028-29	4205		8	?	8 ?	11,12,13	
Dead Dog Site	LA 16255	McKinley	12	4030	4205	3		?	3 ?	12	
	LA 16825	McKinley	19	4027-28	4205	25	34	?	34 ?	12	
	LA 18184	McKinley	12	4030-31	4205	1			1	12	
San Juan Coal Lease #134	LA 21148	San Juan	12	4031	4205	1		1		7,7A	1,4,7
	LA 26324	McKinley	12	4031	4205	1 R			1	7,7A	1,2,4,7
Pittsburgh-Midway (PMMC) #51	LA 31000	McKinley	12	4030	4205	1			1	7,7A	1
PMMC #203	LA 31247	McKinley	12	4031	4205	9		2	7	7	1,2,3,4,5,6,7
PMMC #205	LA 31249	McKinley	12	4030-31	4205	4		1	3	7	1,2,3,4,5,6,7,8
PMMC #218	LA 31262	McKinley	12	4031	4205	1		1		7	1
PMMC #222	LA 31266	McKinley	11	4031	4205	1			1	7	1
PMMC #224	LA 31268	McKinley	12	4031	4205	1			1	7	1,7
PMMC #240	LA 31284	McKinley	12	4030	4205	1			1	7	1
	LA 31796	San Juan		4122		1			1	7	1,2
Slender Warrior's Grave	LA 34135	McKinley	7	4102	4212	1 R			1	7,7A	1,2
	LA 36725	McKinley	5	4030	4205	1			1	7,12	1,2,9
	LA 38595	San Juan	5	4030-31	4205	2		?	2 ?	12	
Turpen Site	LA 47496	McKinley	12	4029-30	4205	1		1		12	1
	LA 53644	San Juan	5	4031	4205	1			1 ?	12	
Bennett Peak		San Juan	12 ?	4029-31	4205		13		13	4	1
Mitten Rock		San Juan	12 ?	4029-31	4205		104	31	73	4	1
Seven Lakes Site		McKinley	12 ?	4029-31	4205		2		2	11	1,2
Near Coolidge		McKinley		4129	4205		3		3	11	1,2
Manzanares Mesa	SJC 1322	San Juan		4100	4212	1			1	10	1,2,7,9,10
Pinedale 1		McKinley	14	4030	4205	2			2	7,7A	1,2,4,7
Pinedale 2		McKinley	12	4028-29	4205	1			1	7,7A	1,2,8
Pinedale 3		McKinley	12	4028-29	4205	5		2	3	7,7A	1,2,3,7,9
Pinedale 4		McKinley	12	4030	4205	1			1	7,7A	1,2,4,7
Bis sa'ani Pueblo	NM-G-63-23	San Juan	13	4031	4205	6 R		4	2	7A	1,2,3,4,7,9,10
Thoreau Pueblo		McKinley	12	4031	4205		57	4	53	5,11	1,2,7,8,11
Tocito Site	LA 7603 ?	San Juan	12	4030-31	4205	1 +		?	1 +	2	1,7
Jensen Site		San Juan	12,13	4031	4205	3		1	2	4	1,2
Hubbard Site		San Juan	13	4031	4205	12		7	5	4	1

Table B.13
Bioarchaeological Resources: Chaco Canyon, Northwest New Mexico

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
Bc 50		San Juan	13 ?	4029-31	4205,6	15	4		4 ?	1	1-9,11
Bc 51	29SJ395	San Juan	13 ?	4029-31	4205,6	54	19	6	13	1,11	1-9,11
Bc 52		San Juan	13 ?	4029-31	4205,6	1			1	1	1
Bc 53	29SJ396	San Juan	13 ?	4030-31	4205,6	18	24	9	15	1,5,11	1-9,11
Bc 54		San Juan	13 ?	4129	4205	1		1		1	1
Bc 55		San Juan	13 ?	4129	4205	1			1	1	1
Bc 56	29SJ753	San Juan	13 ?	4029-31	4205,6	2	1		1	1,11	1-9,11
Bc 57	29SJ397	San Juan	13 ?	4031	4205	14	16	12	4	1,11	1-9,11
Bc 58		San Juan	13 ?	4129	4205	1			1	1	
Bc 59	29SJ399	San Juan	13 ?	4029-31	4205,6	68	10	2	8	1,3,5,11	1-11
Bc 63	29SJ798	San Juan	13 ?	4129	4205	1	1		1 ?	1,11	
Bc 126	29SJ394	San Juan	13 ?	4129	4205	2		1	1	1,11	1-9,11
Bc 191		San Juan	13 ?	4129	4205	1			1	1	1-9,11
Bc 192		San Juan	13 ?	4030-31	4205,6	2	1		1	1	1-9,11
Bc 236		San Juan	13 ?	4031	4205	2		1	1	1,4	1-9.11
Bc 246 Chetro Ketl	LA 838	San Juan	13	4030-31	4205,6	5	2	1 ?	1 ?	1,11	1-9,11
Bc 248 Kin Kletso	LA 2464	San Juan	13	4030	4206	6	4	2	2	1,4,5,11	1-9,11
Bc 257 Talus Unit	LA 2469, 70	San Juan	13	4030-31	4205,6	7	7	5	2	1,11	1-11
Bc 262	29SJ2385	San Juan	13 ?	4129	4205	7	1		1	1,11	
Bc 362		San Juan	13 ?	4030-31	4205,6	2			2 ?	1	
Bc N		San Juan	13 ?	4129	4205	1			1	1	1-9,11
	29SJ299	San Juan	13 ?	4030	4206	4	4		4	1	1-11
Pueblo Bonito	29SJ387	San Juan	14	4030-31	4205,6	136	97	35	62	1,2,3,4,5	1,2,3,5,7,10,11
Pueblo Alto	29SJ389	San Juan	14	4030	4206	5-19	?	?	5	1	
	29SJ563	San Juan	13 ?	4030-31	4205,6	1			1	1	1-9,11
	29SJ597	San Juan	13 ?	4030-31	4205,6	2			2	1	1-9,11
	29SJ626	San Juan	13 ?	4030-31	4205,6	2			2	1	1
	29SJ627	San Juan	13 ?	4030-31	4205,6	4		2	2	1	1-9,11
	29SJ629	San Juan	13 ?	4030	4206	2			2	1	1-9,11
	29SJ633	San Juan	13 ?	4031	4205	4		4		1	1-9,11
	29SJ721	San Juan	13 ?	4031	4205	1			1	1	1-9,11
	29SJ798	San Juan	13 ?	4029-30	4205,6	1			1	1	1-9,11
	29SJ1360	San Juan	13 ?	4030-31	4205,6	6		4	2	1,4	1-9,11
	29SJ1396	San Juan	13 ?	4129	4205	1			1	1	1-9,11
	29SJ1629	San Juan	13 ?	4030-31	4205,6	1			1	1	1
Pueblo del Arroyo		San Juan	13 ?	4031	4205	15+		?	15 ?	1	
Penasco Blanco		San Juan	13 ?	4129	4205	2+		1	1	1	1
Three C Site		San Juan	13 ?	4029-31	4205,6	16		6	10	1	1
Kin Ya'a		San Juan	13 ?	4031	4205	1			1	1	1-11
Casa Rinconada		San Juan	13 ?	4030-31	4205,6	1			1	1	1-9,11
Near Penasco Blanco		San Juan	13 ?	4129	4205	5		1	4	1	1-9,11
Wijiji		San Juan	13 ?	4129	4205	5		3	2	1	1-11
Kin Neole		San Juan	13 ?	4030-31	4205,6	72	68	33	35	1,4	1
Shabik'eschee Village		San Juan	13 ?	4028	4205	14		?	14 ?	4	9

Table B.14
Bioarchaeological Resources: Northwest New Mexico, Upper San Juan Area

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
	LA 1870	Rio Arriba	12	4029	4205		1		1	11	
Governador Site 1 (Hall)	LA 2120	Rio Arriba	12	4029	4205	4			4	4,4A	1-6,8,9
Tapacitoes Ruin	LA 2298	Rio Arriba	12	4100	4207,12		2		2	3,13	1,2
	LA 2959	Rio Arriba	5	4029	4205	1			1	12	
Blanco HWS	LA 3572	Rio Arriba	20	4135			1		1	11	
	LA 3646	San Juan	7	4028	4205	1			1	4,5,10	1-4,8-11
	LA 4053	San Juan	9	4030	4205	1			1	4A,5	1,2,7,9,10,11
	LA 4072	San Juan	3	4100	4212	1			1	4A	1,2,9
	LA 4151	Rio Arriba	11	4029-30	4205	1			1	4A,5	1-3,7,9-11
Sambrito Village	LA 4195	Rio Arriba	14	4028-30	4205	30	33	16	17	3,4A,5,6	1-4,7,9-11
Mascarenas Site	LA 4198	Rio Arriba	13	4029	4205	4		2	2	4,4A,5	1-4,7,9-11
	LA 4242	Rio Arriba	12	4029	4205	5		1	4	3,4,4A,5	1-3,7,9-11
Power Pole Site	LA 4257	San Juan	12	4027	4204	2		2		4,4A,5	1,7,10,11
Valentine Village	LA 4289	San Juan	13	4027, 16	4204	3		1	2	4,4A,5	1,2,7,9,10,11
Todosio Rock Shelter	LA 4298	San Juan ?	2	4029	4205	5		3	2	4,4A,5	1,2,7,9,10,11
	LA 4341	Rio Arriba	12	4029	4205	2			2	4,12	
	LA 4346	Rio Arriba	12	4029	4205	1			1	4,12	
Uells Site	LA 4363	San Juan	11	4028	4205	4			4	4,4A,5	1,2,7,9,10,11
Bancos Village	LA 4380	San Juan ?	13	4029	4205	11		5	6	4	1,2,9
The Cemetery Site	LA 4384	San Juan	19	4029	4205	10		7	3	4,4A,5	1,2,7,9,10,11
The Cemetery Site	LA 4384	San Juan	7	4027	4204	1		1		10	1
Burnt Mesa	LA 4528	Rio Arriba	12	4029-30	4205	11		4	7	3,6	1,2,7,9
	LA 9090	Rio Arriba	12	4029	4205	1			1	12	
	LA 11099	Rio Arriba	5	4029	4205	1			1	12	
	LA 16429	Rio Arriba	4	4029	4205	1			1	7,7A	1,2,7
	LA 54175	San Juan	20	4100	4212	1			1	12	

Table B.15 References Index for New Mexico Bioarchaeological Resources

Site Name	Site #	References
BERNALILLO COUNTY		
San Antonio	LA 23	Ferguson 1980
San Antonio de Padua	LA 24	El-Najjar et al. 1980
Paa ko	LA 162	Alcauskas 1985, Ferguson 1980, Mackey 1977, Nelson 1916, Rogers 1954, Tyson and Toole 1986
Tijeras Pueblo	LA 581	Brock 1985, Ferguson 1974, 1977, 1980, Rhine 1974, Weaver 1977a
Vulture Gulch Site	LA 586	ARMS
	LA 3289	Peckham 1957, Reed 1957
	LA 3290	Peckham 1957, Reed 1957
Tunnard Site	LA 6868	Hammack 1966b, Reed 1966b
Tijeras Canyon	LA 14857	ARMS
Chamisal Site	LA 22765	Brock 1985, ARMS
	LA 49791	ARMS
Artificial Leg Site II		Frisbie 1967
Artificial Leg Site III		Frisbie 1967
CATRON COUNTY		
	LA 2947	Ferdon 1956, Reed 1957
	LA 2948	Reed 1957, Wendorf 1956a
Apache Creek Pueblo	LA 2949	Reed 1957, Peckham 1956
	LA 3253	Reed 1957, Schroeder and Wendorf 1954
	LA 3278	Reed 1957, Wendorf 1956b
	LA 3280	ARMS
Tularosa Cave	LA 4427	Martin et al. 1952, Turner 1960
Allen Site Cluster	LA 4986	Romriell 1980
Pueblo Rodriguez	LA 4987	ARMS
Hidalgo Pueblo	LA 4988	ARMS
Armijo Springs	LA 5939	Kayser 1972a
Gallita Springs	LA 6083	Kayser 1972b, Kayser et al. 1975
	LA 6537	Hammack 1966a
Diablo Village	LA 6538	Hammack 1966a
West Fork Ruin	LA 8675	Ice 1968
Oak Springs Pueblo	LA 9725	Martin et al. 1949, Turner 1960
	LA 10014	Anderson et al. 1986
	LA 10025	Anderson et al. 1986
	LA 10048	Anderson et al. 1986
Mogollon Village	LA 11568	Haury 1936, Neumann 1940
	LA 27211	ARMS
Aragon-Apache Creek 11 and 12		Wendorf 1954c
Aragon-Apache Creek 13		Schroeder 1954
Gallo Pueblo		Bullard 1950
Higgins Flat Pueblo		Martin et al. 1956, Turner 1960
Los Lentes Valley		Hough 1907, 1920, 1923
Mariana Mesa Site 143		McGimsey 1980
Mariana Mesa Site 481		McGimsey 1980
Mariana Mesa Site 494		McGimsey 1980
Mariana Mesa Site 616		McGimsey 1980
Sandstone Hill Pueblo		Barnett 1974
South Leggett		Turner 1960
Spur Ranch Site		Hough 1907, 1923
Starkweather Ruin		Nesbitt 1938, Neumann 1940
Swarts Ruin		Howells 1932, Kidder 1927, Neumann 1940, Spuhler 1954
Turkey Foot Ridge		Martin and Rinaldo 1947, 1950, Turner 1960
Wet Leggett		Martin et al. 1949, Turner 1960
SU Site		Kelly 1940, 1941, Martin 1940, 1941, Turner 1960
CHAVES COUNTY		
The Henderson Site	LA 1549	Rocek and Speth 1986
Penasco Bend	LA 2000	Jennings 1940, Kelley 1984, Neuman 1940
Bloom Mound	LA 2528	Kelley 1984, Turner 1960
Garnsey Site	LA 18399	Speth and Parry 1980
	LA 32259	ARMS
	LA 32227	ARMS
Blackwater Creek Site		Kelley 1984
CIBOLA COUNTY		
Atsinna	LA 99	Kintigh 1985, Woodbury 1956
Correo West	LA 3638	ARMS
Philadelphia Site	LA 5942	Peckham 1967
Bug Creek Site	LA 5949	Peckham 1967
San Fidel HWS	LA 6167	Peckham 1962
	LA 6168	Peckham 1962
	LA 6995	ARMS
	LA 8116	ARMS
Sun House Hills Site	LA 8763	Peckham 1967
Acoma Pueblo		Dittert 1959
LP 2:13-A		Dittert 1959
LP 2:35-D		Dittert 1959
LP 4:3-A		Dittert 1959
COLFAX COUNTY		
North Ponil 1,7/Philmont Scout Ranch Site	LA 27957	Lutes 1959, Glassow 1980
Lower Ponil 3	LA 28162	Glassow 1980
Middle Ponil A	LA 28282	Glassow 1980, Lutes 1959
Middle Ponil 2,2A	LA 28283	Glassow 1980, Lutes 1959
Middle Ponil 14	LA 28294	Glassow 1980
	LA 32358	ARMS
DE BACA COUNTY		
Site P-24		Jelinek 1967
DONA ANA COUNTY		
Condron Field	LA 8673	ARMS
EDDY COUNTY		
Little Pine Canyon Cave 4	LA 1771	Mera 1938
Little Pine Canyon Cave 1	LA 1772	Mera 1938
Goat Cave	LA 1773	Bartlett 1938, Mera 1938
	LA 32229	ARMS
Pue Ranch Site	LA 43269	ARMS
Earl Dowell Site	LA 43273	ARMS
	LA 43432	ARMS
	LA 43436	ARMS
Richard Brown Site	LA 43440	ARMS
Boulder Canyon Cave	LA 43669	ARMS
	LA 55987	ARMS
Burnet Cave		Howard 1932
Camp Site		Bartlett 1938, Mera 1938
Cremation Cave/Broken Pendrow		Mera 1938
Dark Canyon Cave		Museum records
Mescal Pit		Museum records
Midden Circle		Bartlett 1938, Mera 1938
Red Tank/Boot Hill Site		Corely and Leslie 1960*
GRANT COUNTY		
Three Circle Ranch	LA 53	ARMS
Cameron Creek Village	LA 190	Bradfield 1923, 1923, 1931
Galaz Ruin	LA 635	Anyon and LeBlanc 1984, Brock 1985, Provinzano 1968*
Mattocks Site	LA 676	LeBlanc 1975, Nesbitt 1931
Rockhouse Ruin	LA 1118	ARMS
Pine Creek Site	LA 3639	ARMS
Baca Ruin	LA 4051	ARMS
Lee Village	LA 5779	Bussey 1975, Turner 1960
Ormand Site	LA 5793	Hammack et al. 1966, Nelson and LeBlanc 1986
	LA 5797	ARMS
Dinwiddie Site	LA 6783	ARMS
Treasure Hill	LA 11609	Cosgrove 1923
Poe Ruin	LA 12076	LeBlanc 1975
Janss Site	LA 12077	Nelson and LeBlanc 1986
	LA 15006	ARMS
Walsh Site	LA 15044	Brock 1985, Ravelsoot 1979

NAN Ranch/Hinton Ruin	LA 15049	Shafer 1980, 1983, 1985, Shafer and Murry 1978, Shafer and Taylor 1986, Shafer et al. 1979, Weinstein 1986
Montoya Site	LA 15075	Ravesloot 1979
	LA 18365	ARMS
	LA 18890	ARMS
	LA 18940	ARMS
	LA 19123	ARMS
Bradsby Sites	Y:4:35	Museum records
Disert Site	Z:5:10	Nelson and LeBlanc 1986
Doolittle Cave		Cosgrove 1947
Harris Site	Q:1:14	Haury 1936, Neuman 1940
Heron Ruin		Burns 1972
Montezuma Site	Z:1:30	Nelson and LeBlanc 1986
Redrock Site		Brook 1977
Winn Canyon Site		Lekson 1973, Fitting 1973
Gila Cliff Ruin 3		Cosgrove 1947
Cave South of Grant		Museum records

GUADALUPE COUNTY

Bacas Ranch	LA 1246	ARMS

HARDING COUNTY

Ft. Union National Monument		Morrison 1975

HIDALGO COUNTY

Clanton Draw	LA 4979	McCluney 1962
Box Canyon Site	LA 4980	McCluney 1962
U-Bar Cave	LA 5689	Lambert and Ambler 1961, Reed 1961
Buffalo Cave	LA 5690	Lambert and Ambler 1961, Reed 1961
Joyce Well	LA 11823	McCluney 1962
The Cowboy Site	LA 12129	McCluney 1962
Pendleton Ruin		Kidder et al. 1949
Gila Nat'l Monument Cave 2		Cosgrove 1947

LINCOLN COUNTY

The Bonnell Site	LA 612	Holden 1952, Kelley 1984
Smokey Bear Ruin/ Block Lookout Site	LA 2112	El-Najjar and Bruder 1976, Reed 1971, 1984, Turner 1960, Wiseman et al. 1971
Crockett Canyon Site	LA 2315	ARMS
Corona HWS	LA 2945	Kelley 1984, Reed 1957, Wendorf 1956c
Glencoe HWS	LA 5378	Brolio 1973
Hondo HWS	LA 5380	Brolio 1973
Fort Stanton	LA 8744	ARMS
Angus Sites	LA 16300	ARMS
Angus Sites	LA 16297	ARMS
Surprise Site	LA 18436	ARMS
Heiner Ranch Site		Kelley 1984, Turner 1960

LOS ALAMOS COUNTY

Tyuoni	LA 82	Hewett 1909a
Tschirege	LA 170	Hewett 1904, Hrdlicka 1931, Mackey 1977, Maxon 1969
	LA 344	Steen 1977
	LA 4608	Steen 1982
	LA 4664	Steen 1982
Pueblo Canyon Cliffs	LA 14815	Sheldon 1977
Cave near Snake Kiva		Hewett 1909b

LUNA COUNTY

Florida Mountain Site	LA 18839	Minnis and Wormser 1984
Byron Ranch Ruin		Fewkes 1914, Hough 1907
Hermanas Ruin		Fitting 1971
Oldtown Ruin		Fewkes 1914, Hough 1907

MCKINLEY COUNTY

Hawikku Ruin	LA 37	Corruccini 1972, Fouste 1972, Hodge 1937, Hrdlicka 1931, Kintigh 1985, Mackey 1977, Matthews et al. 1893, McWilliams 1974, Seltzer 1944, Smith et al. 1966, Stodder 1986
El Morro Nat'l Monument/ Pueblo de los Muertos	LA 1585	Kintigh 1985, Watson et al. 1980*, Wheeler 1985
Twin Lakes	LA 2507	Bullard and Cassidy 1956
Coyote Canyon A	LA 2547	ARMS
Coyote Canyon B	LA 2548	ARMS
	LA 2599	Wendorf et al. 1956
Chivos Site	LA 2672	Wendorf et al. 1956
San Jose Project	LA 2675	Scheans 1956, Wendorf et al. 1956
	LA 2699	Scheans 1956, Wendorf et al. 1956
	LA 2701	Scheans 1956, Wendorf et al. 1956
	LA 2706	Reed 1956, Wendorf et al. 1956
Fort Wingate HWS	LA 2714	Reed n.d., ARMS
Crownpoint North HWS	LA 2985	Alexander 1963
Palmer Ridge Ruin	LA 2987	Hammack 1964
	LA 2988	Hammack 1964
Ambrosia Lake HWS	LA 3559	ARMS
	LA 3562	Peckham 1963
San Mateo HWS #6	LA 3566	ARMS
San Mateo HWS #7	LA 3567	ARMS
San Mateo HWS #8	LA 3568	ARMS
	LA 4485	Sciscenti 1962
	LA 4487	Sciscenti 1962
	LA 4488	ARMS
Burned Canyon Site	LA 5057	Allen and Kayser 1971
Blue Dog Site	LA 5062	Allen and Kayser 1971
McCabe Site	LA 5093	Allen and Kayser 1971
	LA 6186	ARMS
	LA 6187	ARMS
Thoreau Site	LA 6372	ARMS
Horseshoes Site	LA 6380	ARMS
Prairie Dog Pueblo	LA 6383	ARMS
Chaves Site	LA 6384	Maxwell and Koczan 1984, Smith n.d.
Arroyo Chico	LA 6387	ARMS
Blue Spruce Site	LA 6390	ARMS
Windmill Site	LA 6400	ARMS
	LA 6481	ARMS
Terrace Site	LA 6485	ARMS
Chuska School	LA 6988	ARMS
	LA 8074	ARMS
Kechiba:wa Ruin	LA 8758	Kintigh 1985
Casamero Site	LA 8779	Sigleo 1981
	LA 9108	ARMS
Bina a' bikee	LA 10973	ARMS
T. T. Site	LA 11827	ARMS
Blackrock Sites	LA 12842	Wiseman 1977
	LA 13624	ARMS
Antelope Mesa HWS	LA 14695	ARMS
Dead Dog Site	LA 16255	ARMS
	LA 16825	ARMS
	LA 18184	ARMS
	LA 26324	Anyon et al. 1983, Benshoof et al. 1983
	LA 26328	Anyon et al. 1983, Benshoof et al. 1983
	LA 30564	Anyon et al. 1983, Benshoof 1981, Benshoof et al. 1983
	LA 30569	Anyon et al. 1983, Benshoof et al. 1983
	LA 30578	Anyon et al. 1983, Benshoof et al. 1983
PMMC #51	LA 31000	Allen and Nelson 1982, Eck 1982
PMMC #203	LA 31247	Allen and Nelson 1982, Eck 1982
PMMC #205	LA 31249	Allen and Nelson 1982, Eck 1982
PMMC #218	LA 31262	Allen and Nelson 1982, Eck 1982
PMMC #222	LA 31266	Allen and Nelson 1982, Eck 1982
PMMC #224	LA 31266	Allen and Nelson 1982, Eck 1982
PMMC #240	LA 31284	Allen and Nelson 1982, Eck 1982
Slender Warrior's Grave	LA 34135	Moore 1981, Winter et al. 1982

K3:122 ZAP	LA 34927	El-Najjar 1979a, Schreiber 1979
	LA 36725	Stucky and Smith 1978
Turpen Site	LA 47496	ARMS
	LA 48390	Turner 1960
	LA 48417	Anyon 1981, Gleichman 1984
	LA 49221	ARMS
Near Coolidge		Museum records
Kiva Compound near Hawikuh		Hodge 1923
Halonawa		Kintigh 1985, Matthews et al. 1893, Stuart and Gauthier 1981
Heshot ula		Kintigh 1985, Matthews et al. 1893, Stuart and Gauthier 1981
HWS Near Gallup		Wendorf 1954b
K3:3 ZAP		London 1986
K3:101 ZAP		Miller and London 1986
K3:102 ZAP		Miller and London 1986
K3:103 ZAP		Miller and London 1986
K3:108 ZAP		Miller and London 1986
Nurtia Road Site	NA 11530	Hartman 1975, Zier 1976
Near Manuelito		Museum records
Pinedale 1		El-Najjar and Bussey 1980
Pinedale 2		El-Najjar and Bussey 1980
Pinedale 3		El-Najjar and Bussey 1980
Pinedale 4		El-Najjar and Hussey 1980
Thoreau Pueblo		Berry 1983
Village of the Great Kivas		Roberts 1932

MORA COUNTY

Fuentes Ranch	LA 1499	ARMS

OTERO COUNTY

Alamogordo Site	LA 456	Bradfield 1929
	LA 460	Stubbs 1930
Mayhill Administration Site	LA 505	Kelley 1984, Sheldon 1978, Tainter 1978
Last Chance Canyon Cave	LA 538	Bartlett 1938, Hera 1938
	LA 2335	ARMS
	LA 3323	ARMS
Three Rivers Petroglyph Recreation Area	LA 4921	Bussey et al. 1976, Hicks 1976
Fresnal Shelter	LA 10101	Hall 1973
Bent HWS	LA 10832	Wiseman 1973
Bent Site	LA 10835	Wiseman 1973
	LA 36970	Beckes 1977
Mayhill Site 2	LA 46310	Kelley 1984
Pueblo at Three Rivers		Cosgrove and Cosgrove 1965

RIO ARRIBA COUNTY

Puye	LA 47	Corruccini 1972, Fouste 1972, Giles and Bleibtreu 1961, Hrdlicka 1931, Mackey 1977, McWilliams 1974, Seltzer 1944
	LA 195	ARMS, Museum records
Te'ewl	LA 252	Brock 1985, Reed 1953, Wendorf 1953
Sapawe	LA 306	Brock 1985, Mackey 1977, Rhine n.d.
Capulin Station	LA 641	Brock 1985, Mackey 1977, Mercer 1985
Nogales Cliff House	LA 649	Brock 1985, Chase 1976, Lange 1940, Mackey 1977, Mercer 1985, Pattison 1968
Kiva House	LA 653	Chase 1976, Mackey 1977
Chupadero Ranger Station	LA 654	Chase 1976, Mackey 1977
Yunque/ San Gabriel	LA 874	Johnson 1961
Tsama	LA 908	ARMS
Oso Canyon	LA 1707	ARMS
	LA 1870	ARMS
Governador Site 1	LA 2120	Gabel 1944, Hall 1944
Tapacitoes Ruin	LA 2298	Lange 1940, Stuart and Gauthier 1981
	LA 2959	ARMS
Blanco HWS	LA 3572	ARMS
	LA 4141	Sennett 1966, Berry 1983
Sambrito Village	LA 4195	Bennett 1966, Berry 1983, Mackey 1977, Turner 1960
Mascarenas Site	LA 4198	Berry 1983, Mackey 1977, Reed 1966a
	LA 4242	Bennett 1966, Berry 1983, Dittert 1961 et al., Mackey 1977
	LA 4341	Dittert et al. 1961
	LA 4346	Dittert et al. 1961
Burnt Mesa	LA 4528	Flinn et al. 1976, Turner 1982
	LA 5862	ARMS
	LA 6163	Reed 1963c
	LA 9090	ARMS
	LA 11099	ARMS
	LA 11841	Brock 1985, Mercer 1985, Pattison 1968, Weaver 1976
	LA 11850	Brock 1985, Mercer 1985, Pattison 1968, Weaver 1976
	LA 12059	ARMS
King Triple Burial	LA 12060	ARMS
	LA 12063	ARMS
	LA 12066	ARMS
	LA 12325	ARMS
	LA 12340	ARMS
	LA 12387	ARMS
	LA 16429	Deal 1977, Terrel and Kleiner 1977
Hormigas Site	LA 35648	Bice 1980, Green 1962*
Simon Burial	LA 53788	Langenfeld 1985, Miller 1985b
Cuchillo Site	Bg 2	Lange 1940, Mackey 1977, Mackey and Green 1979, Mercer 1985
Evans Site	Bg 7	Lange 1940, 1956
Gavilan Site	Bg 4	Lange 1940
Rattlesnake Point Community	Bg 20	Bice 1980, Brock 1985, Hayden 1976, Mackey 1977, Mackey and Green 1979, Miller 1985a, Turner 1982
Carricito Community	Bg 22	Mercer 1985
	Bg 51	Mackey 1977, Mackey and Green 1979
Starve Out Ridge Group	Bg 88-91	Brock 1985, Mercer 1985
Butts Ranch Site		Museum records
Owl Point	29RA207	Snow 1978
The T Site		Sullivan and Katzenberg 1982
Nogales Canyon		Museum records
ASC G-8	AR03100208	Chase 1976
ASC G-189	AR031002189	Chase 1976
ASC G-4	AR03100204	Chase 1976
ASC G-2	AR03100202	Chase 1976
ASC G-2	AR03100203	Chase 1976
East of Llaves		Chase 1976
ASC G-31	AR03100231	Chase 1976
ASC G-38	AR03100238	Chase 1976
Capulin Creek		Chase 1976
Po-shu-ouinge		Jeancon 1923
Riana Ruin		Hibben 1937

SANDOVAL COUNTY

Pueblo Encierro/ Cochiti	LA 70	Heglar 1968, 1974, Lange 1968, Mackey 1977
Kuaua/ Coronado State Monument	LA 187	Luhrs and Ely 1939, Mackey 1977, Senter 1936, Vierra 1986
Unshagi	LA 123	Brock 1985, Mackey 1977, Reiter 1938
Tonque Pueblo	LA 240	Barnett 1969, Turner 1960
Puaray	LA 326	Brock 1985, Mackey 1977, Schaafsma 1968, Vivian 1934
Amoxiumqua	LA 481	Mackey 1977, Reiter 1938
Nanishagi	LA 541	Mackey 1977, Museum records
Guisewa	LA 679	Holmes 1905, Hrdlicka 1931, Reiter 1938
Hardy Project	LA 742	ARMS

Cuyamungue	LA 833	Tyson and Toole 1986, Wendorf 1952
Rio Puerco Site	LA 875	ARMS
	LA 1844	ARMS
	LA 3124	ARMS
	LA 3125	ARMS
Torreon Site	LA 6178	Snow and Warren 1973
Alfred Herrera Site	LA 6455	Heglar 1968, 1974, Lange 1968, Mackey 1977
Northbank Site	LA 6462	Heglar 1968, 1974, Lange 1968
Lagunitas Ruin	LA 6865	Hammack 1965
Bull Snake Hill	LA 6866	Hammack 1965
Torrito Site	LA 9193	ARMS
Prieta Vista	LA 9608	Bice and Sundt 1972
	LA 12119	Rayl 1982, Traylor and Hubbell 1982
	LA 12121	Rayl 1982, Traylor and Hubbell 1982
Big Bead Mesa	LA 15231	Keur 1941, Stuart and Gauthier 1981
	LA 24783	ARMS
	LA 57017	ARMS
	LA 57025	ARMS
Site Bj 74		Luebben 1970, Reed 1970
Jemez Cave		Alexander and Reiter 1935, Alexander 1935
Kwasteyukwa/ Kiatsukwa?		Fouste 1972, Hrdlicka 1931, Mackey 1977, Museum records
Pajarito Park/ Vigil Grant		Hewett 1904, Museum records
Rainbow House		Museum records
San Ysidro Pueblo 1		Barnett 1973
San Ysidro Pueblo 2		Barnett 1973

SAN JUAN COUNTY

Aztec Ruin	LA 45	Berry 1983, Lumpkin 1976, Morris 1924, McWilliams 1974, Turner 1960
	LA 1912	ARMS
	LA 2585	Wendorf et al. 1956
La Plata HWS	LA 3292	Reed 1957, Peckham 1957
Waterflow Site	LA 3335-6	ARMS, Museum records
	LA 3646	Bennett 1966, Berry 1983, Dittert and Turner n.d.
San Juan Coal Lease #143	LA 3686	Beal et al. 1984
	LA 4053	Bennett 1966, Berry 1983, Eddy 1966
	LA 4072	Bennett 1966, Eddy 1966
Power Pole Site	LA 4257	Bennett 1966, Berry 1983, Eddy 1966
Valentine Village	LA 4289	Bennett 1966, Berry 1983, Eddy 1966
Todosio Rock Shelter	LA 4298	Bennett 1966, Berry 1983, Eddy 1966, Hester and Shiner 1963
Uells Site	LA 4363	Bennett 1966, Berry 1983, Eddy 1966
Bancos Village	LA 4380	Bennett 1966, Eddy 1966
Cemetery Site	LA 4384	Bennett 1966, Berry 1983, Eddy 1966
	LA 5007	Allen and Nelson 1982
Tohalina Bikitsiel	LA 5596	Reed 1963b
	LA 5858	ARMS
	LA 6062	Allen and Nelson 1982
	LA 6373	Allen and Nelson 1982
	LA 6396	Allen and Nelson 1982
	LA 6483	Allen and Nelson 1982
Redrock HWS	LA 8243	ARMS, Museum data
	LA 8662	ARMS
Salmon Ruin	LA 8846	Berry 1983, Irwin-Williams and Shelley 1980, Shipman 1980
	LA 10931	ARMS
	LA 10219	ARMS
Tsaya Project	LA 15845	Ferguson 1982, Wiseman 1982
Little Water Site	LA 16029	Stuart and Gauthier 1981
San Juan Coal Lease #134	LA 21148	Beal et al. 1984, Rhine 1984
	LA 31796	Moorehead 1981
	LA 38595	ARMS
	LA 53644	ARMS
	LA 53645	ARMS
	LA 54175	ARMS
Bennett Peak		Turner 1960
Bis sa'ani Pueblo		Breternitz et al. 1982, Hanson 1982
Hubbard Site		Vivian 1959
Jensen Site		Kemp 1984
Manzanares Mesa		Huffner, pers. comm. 1986
Mitten Rock		Turner 1960
Tocito Site		Fink 1985

CHACO CANYON, SAN JUAN COUNTY

Bc 50		Akins 1986
Bc 51	29SJ395	Akins 1986
Bc 52		Akins 1986
Bc 53	29SJ396	Akins 1986, Berry 1983
Bc 54		Akins 1986
Bc 55		Akins 1986
Bc 56	29SJ753	Akins 1986
Bc 57	29SJ397	Akins 1986
Bc 58		Akins 1986
Bc 59	29SJ399	Akins 1986, El-Najjar et al. 1976, Berry 1983, Reed 1962
Bc 63	29SJ798	Akins 1986
Bc 126	29SJ394	Akins 1986
Bc 191		Akins 1986
Bc 192		Akins 1986
Bc 236		Akins 1986, Bradley 1971
Bc 246 Chetro Ketl	LA 838	Akins 1986
Bc 248 Kin Kletso	LA 2464	Akins 1986, Berry 1983, Reinhard and Clary 1986
Bc 257 Talus Unit	LA 2469,70	Akins 1986
Bc 262	29SJ2385	Akins 1986
Bc 362		Akins 1986
Bc N		Akins 1986
	29SJ299	Akins 1986
Pueblo Bonito	29SJ387	Akins 1986, Clary 1984, Corruccini 1972, El-Najjar 1979b, Fouste 1972, Hrdlicka 1931, Lumpkin 1976, McWilliams 1974, Ortner and Putschar 1981, Palkovich 1984a, 1984b, Reinhard and Clary 1984, von Endt and Ortner 1982
Pueblo Alto	29SJ389	Akins 1986
	29SJ563	Akins 1986
	29SJ597	Akins 1986
	29SJ626	Akins 1986
	29SJ627	Akins 1986
	29SJ629	Akins 1986
	29SJ633	Akins 1986
	29SJ721	Akins 1986
	29SJ798	Akins 1986
	29SJ1360	Akins 1986, McKenna 1984
	29SJ1396	Akins 1986
	29SJ1629	Akins 1986
Pueblo del Arroyo		Akins 1986
Penasco Blanco		Akins 1986
Three C Site		Akins 1986
Kin Ya'a		Akins 1986
Casa Rinconada		Akins 1986
Near Penasco Blanco		Akins 1986
Wijiji		Akins 1986
Kin Neole		Akins 1986, Palkovich 1984b
Shabik'eschee Village		Roberts 1929

SAN MIGUEL COUNTY

Rowe Pueblo	LA 108	ARMS
Tecolote Ruin	LA 296	ARMS
Pecos Pueblo	LA 625	El-Najjar 1979b, France 1983, Giles and Bleibtreu 1961, Hooton 1930, Jurmain 1980, Kidder 1958, Lumpkin 1976, Mobley 1980, Nelson 1938, Palkovich 1983, Ruff 1981, Ruff and Hayes 1983a, 1983b, Schoeninger and Spielmann 1986, and many others
Pecos Mission	LA 4444	Moore 1979
	LA 14100	ARMS
La Cinta Canyon	LA 18798	ARMS
Sininger Site		Cobb 1986, Mills 1978, Rhine 1978

SANTA FE COUNTY

Pindi Pueblo	LA 1	Brock 1985, London and Tobler 1979, Stubbs and Stallings 1953
School House Site	LA 2	ARMS
Pueblo Wells	LA 4	Dickson 1980
Pueblo Alamo	LA 8	Allen 1973, Nelson 1914
Cieneguilla	LA 16	Nelson 1916, Turner 1960, Stuart and Gauthier 1981
Nambe Pueblo	LA 17	Ellis 1964
Galisteo Pueblo/ Las Madres	LA 26	Nelson 1914
Cundiyo	LA 31	ARMS
Pueblo Colorado	LA 62	Nelson 1914, Stuart and Gauthier 1981, Turner 1960
Jacona	LA 63	ARMS
Arroyo Hondo	LA 76	Dickson 1980, Nelson 1916, Palkovich 1976, 1980, 1984a
San Cristobal	LA 80	Lang 1976, Mackey 1980, Nelson 1914, 1916, Stodder 1986
San Lazaro	LA 91, 92	Nelson 1914, Stuart and Gauthier 1981
San Marcos	LA 98	Nelson 1914, Turner 1960
Fort Marcy Hill	LA 111	ARMS
Arroyo Negro/ Cieneguitas	LA 114	ARMS
	LA 153	ARMS
Pueblo Largo	LA 183	Dutton 1953, Nelson 1914, Reed 1981, Turner 1960
Tsankawi	LA 211	Cordell 1979, Hewett 1904, Hrdlicka 1931, Mackey 1977
Pueblo She	LA 239	Nelson 1914, Turner 1960
	LA 389	Jarcho 1965
Tesuque By-Pass Site #1	LA 3294	McNutt 1969, Reed 1957
Galisteo HWS	LA 3333	ARMS
Ephriam Street Burial	LA 4450	ARMS
Palace of the Governors	LA 4451	ARMS
	LA 4562	ARMS
Montez Site	LA 4994	ARMS
San Ildefonso	LA 6188	ARMS
Twin Hills Site	LA 8866	Allen 1967
McKee Ranch	LA 14825	ARMS
	LA 47695	ARMS
Nambe Falls	29SF17	Means 1980, Skinner 1980
Otowi		Cordell 1979. Hewett 1904, Hrdlicka 1931, Mackey 1977, Wilson 1916

SIERRA COUNTY

	LA 2544	ARMS
	LA 2877	ARMS

SOCORRO COUNTY

Pueblo Pardo	LA 83	Brock 1985, Mackey 1977, Reed 1981, Toulouse and Stephenson 1960
Teypama	LA 282	ARMS
Gallinas Springs Ruin	LA 1178	Museum records
Bat Cave	LA 4939	Dick 1965
Sevilleta Shelter	LA 20896	Eck 1980, Winter 1980
	LA 27448	ARMS
Cave Near Fort Tularosa		Hough 1907, Museum records
Upper San Francisco River		Hough 1923, Museum records
Tularosa Canyon (Hough)		Hough 1907, Museum records
Tularosa Canyon		Turner 1960

TAOS COUNTY

Howiri	LA 76	ARMS, Museum records
Pot Creek Pueblo	LA 260	Blumenschein 1956, 1958, Green 1976, Wetherington 1968
	LA 508	Quinn 1978
Ranchos HWS	LA 3643	Peckham and Reed 1963
	LA 9200	Loose 1974, Reed 1966c
	LA 9204	More 1967, Loose 1974
	29TA10	Green 1976
	29TA18	Green 1976
	29TA20	Green 1976
	29TA47	Green 1976, Wetherington 1968
Carson Nat'l Forest Site 587		Quinn 1978

TORRANCE COUNTY

Tabira/Pueblo Blanco	LA 51	Reed 1981
Quarai	LA 95	Brock 1985, Ely 1935, Wilson 1973
Gran Quivira Nat'l Monument /Las Jumanas Pueblo	LA 120	Burns 1982, Coyne 1981, Harris 1972, Mackey 1977, Morris 1970, 1981, McWilliams 1974, Reed 1981, Scott 1981, Schmucker 1985, Swanson 1976, Turner 1981b, Tyson and Toole 1986, Walker 1985
Abo Mission	LA 97	Touluose 1939, Stuart and Gauthier 1981

VALENCIA COUNTY

Pottery Mound	LA 416	Brock 1985, Lautman and Dougherty n.d., Mackey 1977, Mercer 1985, O'Neill and van Sickle 1979, Rhine 1985, Schorsch 1962, Thompkins 1985
	LA 2567	Reed 1956, Wendorf et al. 1956
The Sedillo Site	LA 3122	Reed 1968, Skinner 1965, 1968
Olguin Pit House	LA 3306	Ferdon and Reed 1950
	LA 6402	Peckham 1962
NAU NM H-10-78		Ambler, pers. comm. 1987

NOTES: LA = Laboratory of Anthropology, Museum of New Mexico Site Number. ARMS = Archaeological Records Management System, Laboratory of Anthropology. *Denotes a reference which was not read, but which may provide additional bioarchaeological data. Site numbers beginning with Y:, Z:. or Q: are Mimbres Foundation site numbers. HWS = New Mexico State Highway Salvage project. PMMC = Pittsburgh and Midway Mining Company. ZAP = Zuni Archaeology Program. Bg = University of New Mexico Gallina site. ASC G = Adams State College Gallina site. AR = U.S. Forest Service site. Bc = Chaco Canyon site. NAU = Northern Arizona University.

Table C.1
Bioarchaeological Resources: Trans-Pecos and Big Bend Areas, Texas

Site Name	Site #	County	Site Type	Cultural Affiliation	Adaptation Type	N-F	N-L	N of Subadults	N of Adults	Citation Types	Data Categories
	LA 1870	Rio Arriba	12	4029	4205		1		1	11	
Bee Canyon Cave		Brewster	2	4023	4203	9		2	7	3,4,7	1,2,3,4,7
Meriwether Shelter A	VJS115-SULR	Brewster	2,3	4023-4, 54	4203	1 +		?	1 +	11	
Meriwether Shelter C	VJS207-SULR	Brewster	2,3	4023-4, 54	4203	1 +		?	1 +	11	
Cow Cave/ Comanche Cave	VJS71A-SULR	Brewster	2,3	4023-4, 54	4203	1 +		?	1 +	11	
Paradise Canyon Cave	VJS133-SULR	Brewster	2,3	4023-4, 54	4203	1 +		?	1 +	11	
Rock Pillar Cave	VJS718-SULR	Brewster	2,3	4023-4, 54	4203	1 +		?	1 +	11	
Marquillas Canyon Shelter		Brewster	3	4023-4, 54	4203	2		1	1	11	1,2
Hord Cave		Brewster	2,3	4023-4, 54	4203	1		1		4,11	1,3,7
Pictograph Cave		Brewster	2,3	4023-4, 54	4203	1		1		4,11	1
Rock Cave	ALP2:4-SULR	Brewster	2,3	4023-4, 54	4203	1+		?	1 +	4,11	
Cartledge Cave		Brewster	2,3	4023-4, 54	4203	1		1		4,11	1
V. J. Smith Locality 6	VJS6-SULR	Brewster	2,3	4023-4, 54	4203	2	1	1	1	11	1,2
Caldwell Cave #l	41CU 1	Culberson	2,3	4024,4054	4203	1 +		?	1 +	3,5	
Caldwell Cave #2	41CU 2	Culberson	2,3	4024	4203	2	3 +	2 +	1	3,11	1
McAlpin Cave #2	41CU 6	Culberson	2	4022-24	4203	2	1		1	3,11	1
Brooks Shelter		Culberson	2	4024, 4054	4203	7		1	6	3	1,2
Calling Indian Hill	37C716-SULR	Culberson	2	4023-4, 54	4203	1 +		?	1 +	11	
Hall Cave		Culberson	2	4023-4, 54	4203	1 +		?	1 +	11	
Pratt Cave	GUMO-1	Culberson	2	4024	4203	1	5 +	?	5 +	3,11	
Rustlers Hills Shelter		Culberson	2	4054	4203	1		1		4	1
ELCOR Burial Cave		Culberson	3	4054	4203	7			7	3	1,2,3,5,7
Fort Bliss		El Paso		4049 ?	4205 ?		1		1	11	1,2,7
Dog Canyon Site		El Paso		4134			1		1	11	1
	FB 6281	El Paso		4049	4205		2	?	2 ?	11	
	FB 9692	El Paso		4049	4205		1		1 ?	11	
	FB M170	El Paso		4049	4205		2	?	2 ?	11	
	FB M83-3	El Paso		4049	4205		5	?	5 ?	11	
Ceremonial Cave		El Paso	2	4024, 4054	4203	3		2	1	3	1,2
Cave 1 (Cosgrove)		El Paso	2,3	4024, 4054	4203	3		1	2	4	1,2
Burnet Cave (Cosgrove)		El Paso	2,3	4024, 4054	4203	5		?	5 ?	4	
Hueco Tanks		El Paso		4049 ?	4205 ?	2		?	2 ?	7	
Flat Top Mountain Site		Hudspeth		4128			1		1	11	1,2
Basket Cave		Hudspeth	2,3	4023-4, 54	4203	1 +		?	1 +	11	
Wiley Cave		Hudspeth	2,3	4023-4, 54	4203	1 +		?	1 +	11	
Rock Pile Ranch	41JD 8	Jeff Davis		4128		2 +		?	2 +	11	
Knight Ranch		Jeff Davis	2	4023-24	4203	1		1		4	1
Near Fort Stockton		Pecos		4134			1		1	11	1,2
Millington Site	41PS 14	Presidia	11	4059	4205 ?	1	8	4	4	3,11	1,2
Loma Alta/San Juan Evangelista	41PS 15	Presidia		4058-59	4205		1		1	7,11	1
Williams Site	41PS 53	Presidia		4054	4203		1		1	11	1
WROE #1	41TE 307	Terrell	2,3	4024	4203		1	1		3,11	1

Table C.2 References Index for Trans-Pecos Texas Bioarchaeological Resources

Site Name	Site#	References
BREWSTER COUNTY		
Bee Canyon Cave		Anonymous 1929, Coffin 1932, Harrington 1928, Oetteking 1930, Stewart 1935
Meriwether Shelter A	VJS115	Smith 1933*
Meriwether Shelter C	VJS207	Smith 1933*
Cow Cave/Comanche Cave	VJS71A	Museum records
Paradise Canyon	VJS133	Museum records
Rock Pillar Cave	VJS712B	Museum records
Maraquillas Canyon Shelter		Museum records
Hord Cave		Setzler 1933
Pictograph Cave		Setzler 1933
Rock Cave	ALP2:4	Setzler 1933
Cartledge Cave		Setzler 1933
V. J. Smith Locality 6	VJS6	Museum records
CULBERSON COUNTY		
Caldwell Cave #1	41CU1	Holloway 1985, Jackson 1937, Tanner 1949*
Caldwell Cave #2	41CU2	Jackson 1937
McAlpin Cave #2	41CU6	Jackson 1937
Brooks Shelter		Jackson 1937, Lehmer 1958
Calling Indian Hill	37C716	Museum records
Hall Cave		Museum records
Pratt Cave	GUMO-1	Schroeder 1983
Rustlers Hills Area Shelter		Sayles 1941
ELCOR Burial Cave		Skinner et al. 1980
EL PASO COUNTY		
Burnet Cave		Cosgrove 1947
Cave 1 (Cosgrove)		Cosgrove 1947
Ceremonial Cave		Alves 1930
Dog Canyon Site		Museum records
Fort Bliss		Museum records
	FB 6281	Museum records
	FH 9692	Museum records
	FB M170	Museum records
	FB M83-3	Museum records
Hueco Tanks		Martin and Sommer 1974
HUDSPETH COUNTY		
Flat Top Mountain Site		Museum records
Basket Cave		Museum records
Wiley Cave		Museum records
JEFF DAVIS COUNTY		
Rock Pile Ranch	41JD8	THC
Knight Ranch		Setzler 1932
PECOS COUNTY		
Near Fort Stockton		Museum records
PRESIDIO COUNTY		
Millington Site	41PS14	Kelley 1939, Lehmer 1958
Loma Alta/ San Juan Evangelista	41PS15	THC, Holliday and Ivey 1974*
Williams Site	41PS53	Museum records
TERREL COUNTY		
WROE #1	41TE307	Turpin et al. 1986

NOTES: VJS and ALP are Sul Ross State University site numbers. * denotes a reference which was not read, but which may provide additional bioarchaeologioal data. FB = Fort Bliss. THC = Texas Historical Commission.

APPENDIX D

NUMBER OF SITES AND NATIONAL REGISTER STATUS BY COUNTY

NOTES: Data for the following tables were abstracted from information provided by each state's computerized archaeological data repository. The information provided in each table differs slightly since each state has a different encoding system. The site information apparently does *not* take into account multiple component sites. The information also is changing rapidly; for example, the number of sites in the New Mexico file increased by about 10,000 from the start of this project until the final output we received in August of 1987. This frequently reflects the backlog with which most states must deal. The information for historic sites may be underrepresented, since these sometimes are not necessarily recorded as archeological occurrences. Likewise, care must be used in evaluating the National Register information; for example, in Colorado, almost all the National Register properties are historic architectural structures and are not archaeological, *sensu stricco*. All of the information in these tables, however, gives a good reflection of the archaeological structure of each county. Additional detail on sites by site type and cultural affiliation also are available from the respective state repositories, although these data often are variable in their consistency and are not provided here.

TRANS-PECOS TEXAS

County	Total Sites (1)	NR (2)	NR Elig (3)	SAL (4)
Brewster	743	5	2	10
Culberson	297	2	20	6
El Paso	2,610	64	133	62
Hudspeth	342	4	0	4
Jeff Davis	163	1	0	0
Pecos	443	289	0	10
Presidio	421	11	1	4
Reeves	16	0	0	1
Terrell	330	43	0	26
Totals	5,338	419	156	125

NOTES

1. Information for this table was abstracted from a listing sent to the Arkansas Archeological Survey by our colleagues at the University of Texas. These data are based on TARL records as of April, 1987. No information provided on breakdown between prehistoric and historic sites.
2. As of 1 July, 1987
3. As of 1 July, 1987
4. Properties with archaeological sites numbers only, as of 1 March, 1987

NEW MEXICO (1)

County	PH	H	0	NR	ELIG	SR	INF
Bernallio	803	243	0	9	4	83	35
Catron	2,177	181	0	5	5	5	157
Chaves	1,071	83	0	0	3	1	34
Cibola	1,870	568	0	71	3	5	116
Colfax	726	280	0	5	5	0	19
Curry	18	9	0	0	0	1	3
DeBaca	108	15	0	1	1	0	1
Dona Ana	1,636	173	0	3	2	1	12
Eddy	1,729	190	0	0	3	3	44
Grant	1,171	165	0	8	0	3	17
Guadalupe	397	195	1	0	1	2	0
Harding	28	11	0	0	1	0	4
Hidalgo	199	34	0	1	0	0	4
Lea	612	18	0	0	3	1	12
Lincoln	304	104	1	5	0	0	3
Los Alamos	909	286	67	49	0	0	7
Luna	364	61	1	1	1	0	4
McKinley	6,228	3,793	1	414	486	44	162
Mora	41	25	8	3	1	0	5
Otero	1,147	200	0	2	9	3	26
Quay	179	49	0	0	1	1	8
Rio Arriba	3,025	1,114	909	41	367	5	334
Roosevelt	63	4	0	1	1	0	3
Sandoval	5,079	1,145	767	110	421	3	257
San Juan	10,873	5,368	1	2,509	1,642	66	387
San Miguel	464	176	54	4	11	2	54
Santa Fe	1,428	384	32	26	76	5	15
Sierra	944	173	0	1	2	19	96
Socorro	1,001	243	1	9	1	2	60
Taos	269	106	0	6	7	0	26
Torrance	180	47	0	5	2	0	1
Union	127	78	0	0	0	0	93
Valencia	355	52	0	2	3	0	25
Totals	45,525	15,573	1,835	3,292	3,062	255	2,024

Total Sites on ARMS files: 62,933

KEY: PH-prehistoric sites; H-historic sites; 0-unknown affiliation sites; NR-sites on National Register; ELIG-sites eligible for National Register; SR-sites on State Register; INF-"informal opinion" sites (i.e., those visited or examined by archaeologists and felt to be possibly eligible)

NOTE

1. Based on information on the Archaeological Records Management System (ARMS). Site information current as of 17 August, 1987; National Register information current as of 14 August, 1987. This is not every recorded site in New Mexico; it includes only those in the State ARMS files. Many Forest Service sites are *not* yet recorded on this system.

SOUTH-CENTRAL COLORADO (1)

County	PH	H(2)	0(3)	National Register Status (4)				
				NR	NRD	NRDI	NRTR	NRA
Alamosa	326	6	1	0	0	0	0	0
Chaffee	199	5	0	10	2	0	3	0
Conejos	463	4	0	5	0	0	1	0
Costillo	123	1	0	2	1	0	1	0
Custer	3	0	0	1	0	0	0	0
El Paso	276	8	0	33	5	0	6	0
Fremont	539	14	1	5	2	0	7	0
Hinsdale	188	5	0	1	0	0	0	0
Huerfano	260	4	0	3	0	0	0	0
Lake	267	4	0	2	4	0	0	0
Las Animas	3,726	59	1	5	2	0	5	2
Mineral	118	3	0	1	0	0	1	0
Pueblo	431	12	2	44	2	2	4	1
Rio Grande	306	1	0	0	0	0	4	0
Saguache	810	17	1	5	0	0	0	0
Teller	40	0	0	4	2	0	0	0
Totals	8,075	139	6	121	20	2	32	3

KEY: NR-National Register; NRD-National Register District; NRDI-National Register District, Individual; NRTR-National Register Theme Resource; NRA-National Register archaeology

NOTES

1. Based on printout provided by the Office of Archaeology and Historic Preservation, Colorado Historic Society, as of 14 October, 1987.
2. Based on limited printout information; includes protohistoric and ethnic-identified sites. I do not believe this includes all recorded historic sites, since the printout is labeled *Listing of Cultural Affiliations and Site Types for Prehistoric Sites in Colorado*. Some historic sites may be registered separately.
3. Paleontological sites
4. Current as of September, 1987. Note that only three sites are listed as National Register archaeological properties. The others are historic resources. No information was provided as to National Register eligible sites.