Cultural Resources Overview

Central New Mexico

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CULTURAL RESOURCES OVERVIEW
CENTRAL NEW MEXICO

by

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and

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The Salinas Province is the Bermuda Triangle of archeological reports. The results of several of the most significant projects - such as those of Hurt at Quarai, Toulouse and Dutton at Abo, Toulouse and Stephenson at Pueblo Pardo, and Hayes at Gran Quivira - have disappeared for up to several decades before emerging in published or manuscript form. The present document was essentially completed in early 1981, and in the interim seemed doomed to the same fate. The one person who was most responsible for its rescue was Thomas Carroll, Superintendent until 1987 of Salinas National Monument. Tom's enthusiasm and unfailing support overcame bureaucratic inertia, and led to the present publication. We are grateful, and wish to dedicate this volume to him.

INTRODUCTION

INTRODUCTORY REMARKS

Federal land managers have in recent years assumed many new tasks. One of these is the protection and management of cultural resources. While cultural resources are not an entirely new Federal concern (the Antiquities Act became law in 1906), nevertheless land managers have only recently been given the expanded conservation mandate under which we now operate. For the land manager with no training in the fields of archeology or history, this may present not only a challenge but also a new source of uncertainty. What kinds of cultural resources are to be found in an area? What do these signify? What can they tell us about the past? Such questions inevitably confront the official with new responsibilities for conserving an unfamiliar resource.

At the same time, the archeological profession has been called upon to greatly expand its fieldwork and data collection in the interest of management and protection. So much information is now being recovered about past peoples that the need for synthesis has become urgent. Many archeologists voice this concern. Rarely does the opportunity arise to act upon it.

The joint Cultural Resources Overview program of the USDA Forest Service (Southwestern Region) and the USDI Bureau of Land Management (Arizona and New Mexico State Offices) is designed to meet these needs. By providing a compilation and synthesis of the prehistory and history of different areas, the program makes available the basic background information needed by the land manager. At the same time, these studies attempt to provide the kind of synthesis needed by cultural resources specialists, both to better manage cultural resources and to further our understanding of the human use of the Southwest.

To better handle the massive amounts of information often available for such a synthesis, the Southwest has been divided into subareas, each of which will be treated separately (see Map 1). The present overview deals with central New Mexico (Map 2). The area of the study may appear oddly shaped, but in fact much of it was characterized at the time of Spanish contact by a degree of ethnolinguistic unity. The region was occupied almost entirely by speakers of the Piro, and related Tompiro, languages.

This overview has been prepared for the Cibola National Forest, and for the Las Cruces and Albuquerque Districts of the Bureau of Land Management.

BACKGROUND INFORMATION

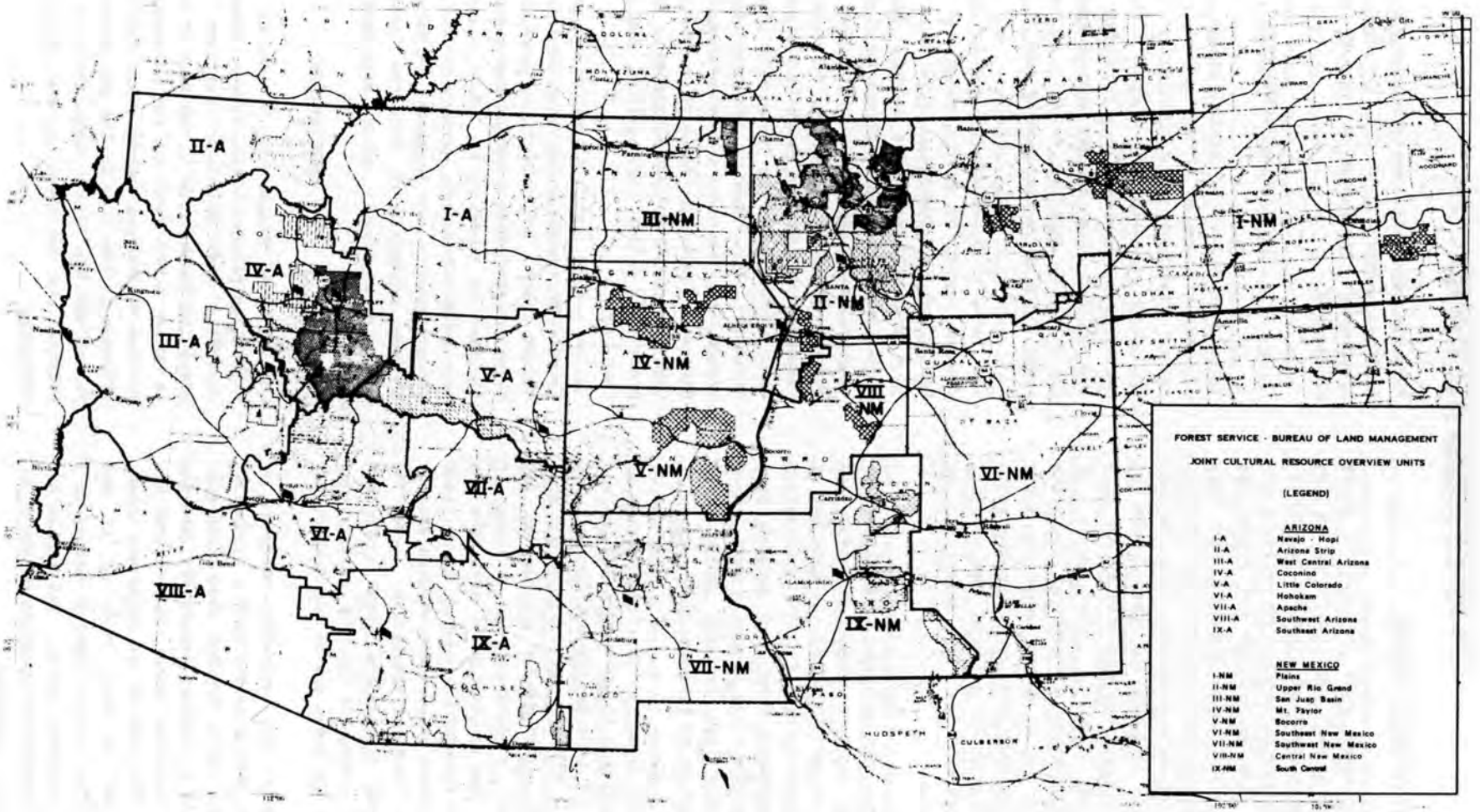
The preparation of this study involved a convenient division of the authors' labor. One of us (Levine) is a specialist in historic archeology, while the other (Tainter) is basically a prehistorian. The tasks of research and writing were divided accordingly. Part of the historic section, as well as bibliographic annotations, were prepared by John P. Wilson.

The task of synthesizing the information from even a region as poorly known as central New Mexico can be monumental. This could easily lead to a volume of excessive length. Any writer of such a study, whether explicit about this dilemma or not, must be selective in the information presented. This being so, it is the responsibility of an overview writer to make clear the emphasis that will be followed. Although the basic chronologies of the prehistoric periods are presented in as much detail as possible, we have both concentrated, wherever possible, on subsistence and economic practices, social organization, and patterns of land use.

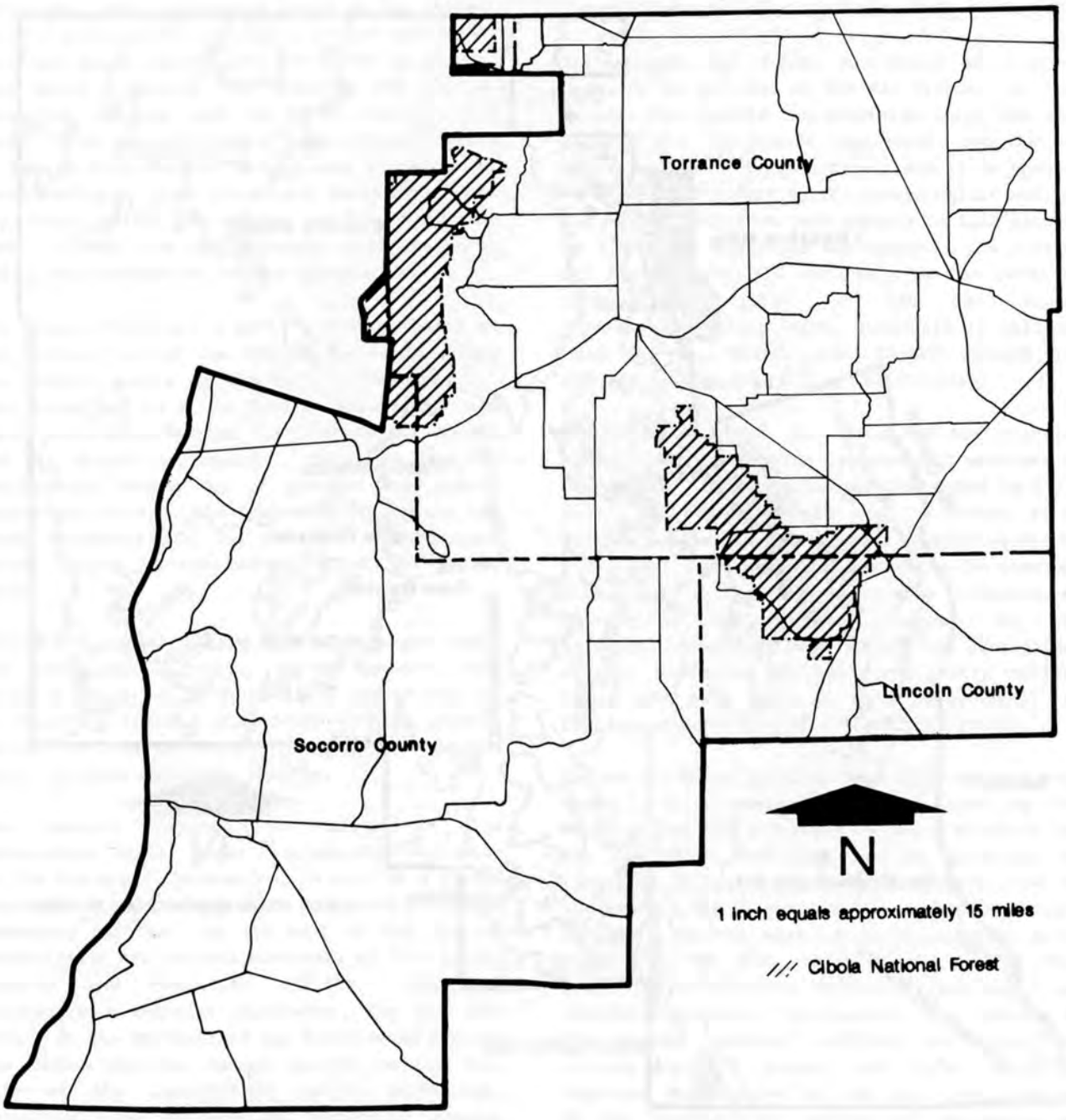
Background research for this overview began in August, 1980. Writing of the prehistory section began in November, 1980, and was essentially finished by February 1, 1981. Minor additions were made thereafter, ending in mid 1986. The history portion was completed in December, 1981. We have attempted to make the bibliography as complete as possible, as of these dates.

THE OVERVIEW AREA

Central New Mexico is a varied landscape, exhibiting plains, playa, canyon, riverine, mesa, foothill and mountain habitats (Map 3). Elevation ranges from 10,098 feet at Manzano Peak to about 4,500 feet in the southern, riverine portion of Socorro County. The only significant drainage in the area is the Rio Grande. The Rio Puerco and Rio Salado enter the main river just outside the northwest corner of the overview territory.



Map 1. Forest Service-Bureau of Land Management joint cultural resources overview units.

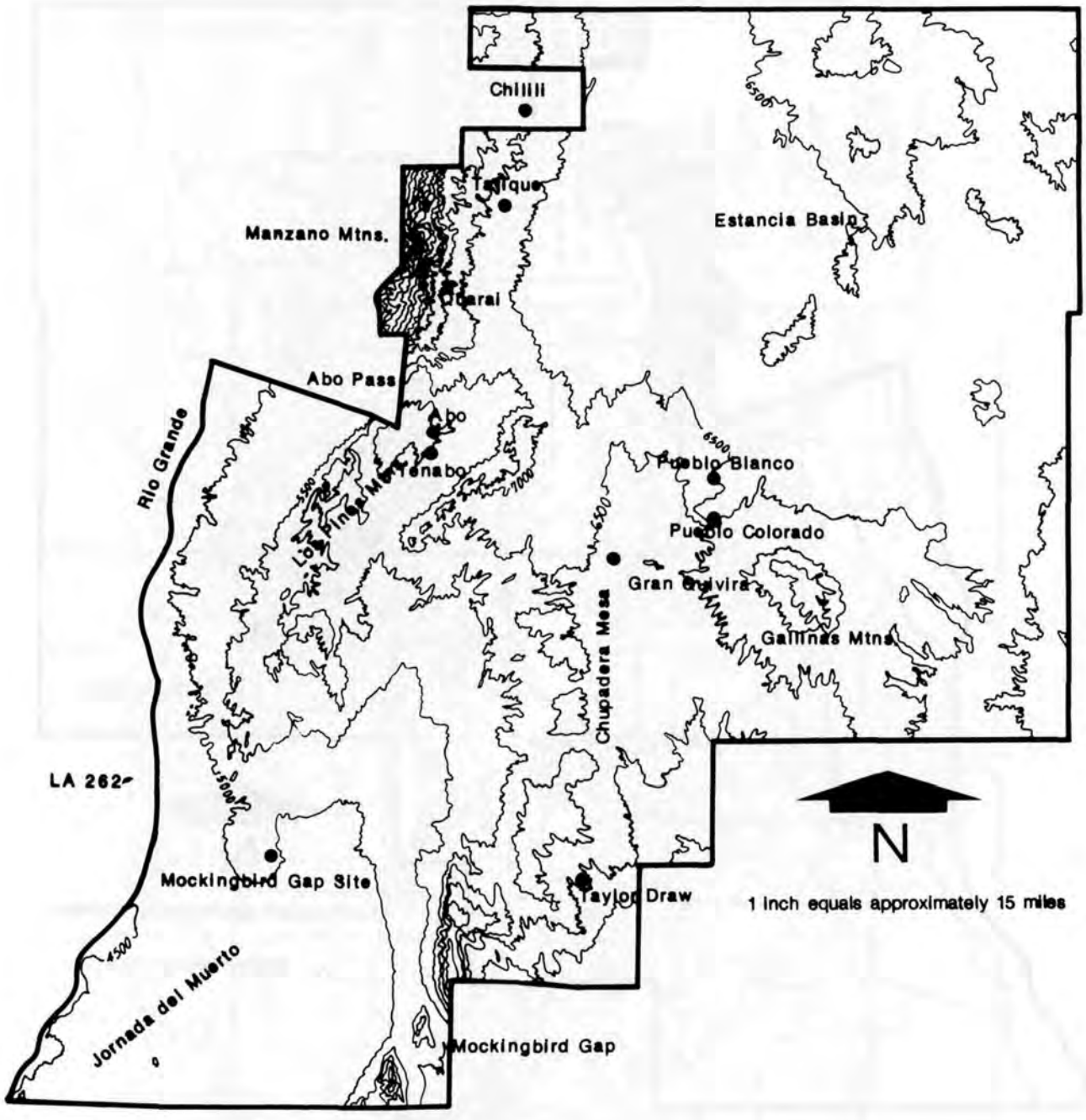


Map 2. Central New Mexico Overview Area, Showing Counties, Roads, and National Forest Lands.

Annual rainfall in the area averages 8.3 inches at San Marcial, 10.3 at Socorro, 13.2 at Estancia, 15.9 at Mountainair, 15.3 at Progresso, and 12.9 at Torrance. Spring (March - May) rainfall has averaged 1.58 inches at Socorro, 4.33 at Tajique, and 3.34 at Corona. Summer (June - August) moisture averages 3.46 inches at Socorro, 6.92 at Tajique, and 6.43 at Corona (Tuan et al. 1973:18, 31, 32).

The growing season in the upland portions of the area ranges between 120 days at the northern end of the Estancia Basin, and 180 days just south of the Gallinas Mountains and in the Jornada del Muerto. In the riverine area it ranges between 190 and 210 days (Cordell 1979: Map 3).

Geological Structure



Map 3. Topography, major topographic features, and selected cultural resources of the Central New Mexico overview area.

Kelley (1952:102) notes that the dominant structures of the Rio Grande Basin are of the basin and range type. They are, however, so far removed from the basin and range structures of the Great Basin, and are so different from Arizona basin and range structures, that Kelley feels it better to consider the Rio Grande structural belt a separate and distinct type within the Rocky Mountain structural belt. He terms this the Rio Grande Rift Belt of the Rocky Mountains.

Kelley's view of the major tectonic features of the Rio Grande depression, including the overview area, is shown in Map 4. The Rio Grande depression is a series of basins arranged in

sequence north-northeasterly along the course of the river. The Albuquerque basin is the largest of this series. The mountains to the east of it form one great uplift some 80 miles in length. From north to south this includes the Sandia, Manzanita, Manzano, and Los Pinos ranges. This uplift is an eastward tilted fault block, divided or broken into several mountainous divisions by cross faults or other structural deviations. The Los Pinos uplift terminates gradually to the south in lava dips which descend into the north end of the Jornada del Muerto depression.

The Joyita Hills are a north trending uplift at the southern end of the Albuquerque Basin, along the eastern margin of the Socorro Constriction. This structure is a low fold or anticlinal bend which intervenes between the Jornada del Muerto and Rio Grande depressions. This low fold is intricately broken by a network of small, high-angle faults. The thrust faults of the Los Pinos Mountains die out or pass into younger normal faults in the north end of the Joyita Hills.

Sediments exposed within the Albuquerque Basin are predominantly sands, silts, gravels, and clays of the Santa Fe formation. Toward the end of Santa Fe times a widespread erosion surface appears to have developed across the Albuquerque Basin and into adjoining uplifts.

The Socorro Constriction, south of the Albuquerque Basin, shows a pronounced narrowing of the Rio Grande Depression, as well as a marked change in the structural alignment of the bordering uplifts. To the west of the Socorro Constriction are curious reversals of tilt in the Socorro and Magdalena uplifts. This is apparently a regional phenomenon, for the same occurs at the Mockingbird Gap fault-wedge between the Oscura and San Andres uplifts on the east side of the Jornada del Muerto depression. Extensive late Tertiary to Quaternary erosion surfaces are developed on both sides of the Rio Grande in the area of the Socorro Constriction.

In the San Marcial basin, the Rio Grande depression again widens into an irregular basin. The main axis trends south-southwest, and coincides with the Rio Grande. The basin is bounded on the east by a low edge of the Jornada del Muerto, termed the San Pascual Platform.

There is an extensive, though much dissected, erosion surface which exists on both sides of the Rio Grande in the San Marcial basin. This is largely cut upon slightly deformed Santa Fe beds.

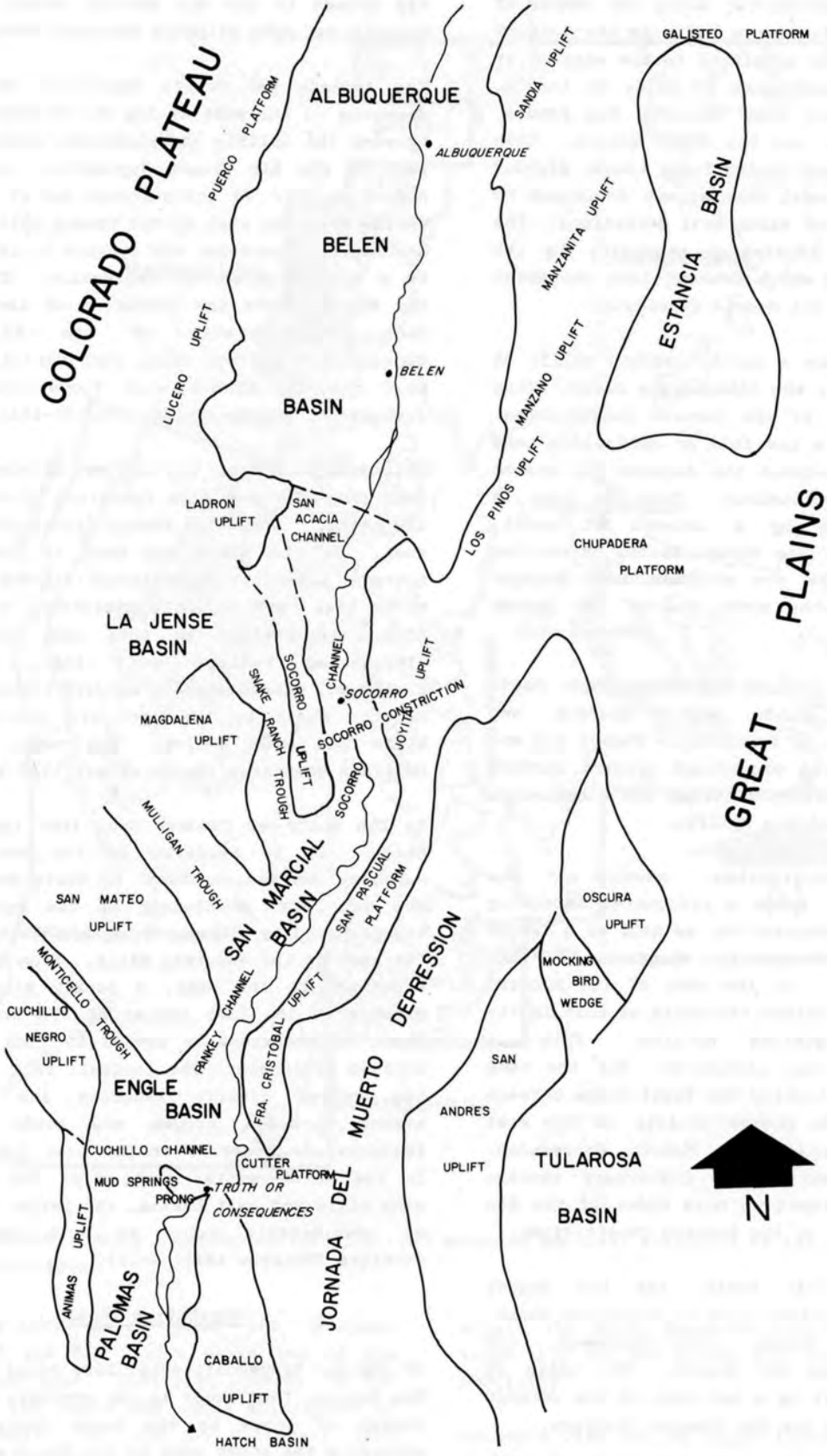
The Jornada del Muerto depression is a great downwarp to the east of the Rio Grande. It lies between the uplifts and platforms along the east edge of the Rio Grande depression, and the San Andres Uplift. At its northern end it is bounded on the east and west by the Oscura Uplift and the San Pascual Platform, and appears in this area to be a faulted synclinal depression. The Jornada del Muerto lacks the thickness of the Santa Fe beds characteristic of the Rio Grande depression. Kelley, thus, considers it unlikely that the Rio Grande ever flowed through the Jornada del Muerto (Kelley 1952:93-101).

Chupadera Mesa, in the center of the overview area (Map 3), is a wide tableland of moderate to low relief. Elevation ranges from 7,050 to 7,250 feet. To the north and west is lower, rough terrain, underlain by southeast-dipping strata of rocks that have variable resistance to erosion. Thus, the surface in this area consists of alternating valleys and ridges. On the southwest, Chupadera Mesa borders the Jornada del Muerto, while to the east are gently rolling hills and wide valleys that merge into the Gallinas Mountains (Bates et al. 1947:9-10).

To the north of Jumanes Mesa lies the Estancia Basin. It is bordered on the west by the Manzanos, on the northwest by South Mountain and the San Pedro Mountains, on the northeast by topographically dissected mesa country, and on the east by the Pedernal Hills. From the Manzano foothills on the west, a gently sloping plain extends to the flat center of the basin. This plain is occasionally broken by rock hills and incised drainages. The central, flat portion of the valley clearly exhibits its lake bed history. Beach ridges and other shoreline features are observed at the past lake margins. In the south-central portion of the basin are clay hills and salt basins, the latter a resource of considerable value to both natives and settlers (Meinzer 1911: 9-11).

Vegetation Zones

Of the six transcontinental life zones present in New Mexico, four occur in the overview area. The lowest of these is the Lower Sonoran, which occurs in the study area in the Rio Grande trough north to about Los Lunas. On the sides of the valley this zone tops out at about 5,000 feet,



Map 4. **Major tectonic features of the Rio Grande depression (after Kelley 1952:92).**

but on northeast slopes it will terminate about 500 feet lower, and on southwest slopes about 500 feet higher. It is characterized by such species as mesquite, screwbean, acacia, creosote bush, ocotillo, allthorn, small-leaved sumac, tree yucca and various cacti (Bailey 1913:14). Many of these were of economic importance to the native occupants.

The Upper Sonoran zone generally extends from about 5,000 to 7,000 feet. The climate of this zone is mild, without great extremes of heat or cold. The zone is mainly arid, with enough moisture to support grass, but without enough for reliable agriculture except in topographic situations that collect runoff. There is a dominant grassland character to this zone. Trees include pinyon and juniper in the upper reaches of the zone, with juniper often extending into lower elevations. Ponderosa pine occasionally edges downward, while along streams cottonwood is characteristic. Sagebrush is often present throughout the pinyon-juniper belt (Bailey 1913:25, 35; Elmore 1976:13). The Upper Sonoran zone occupies the eastern part of Socorro County and much of Torrance County.

The Transition zone lies between 7,000 and 8,500 feet on northeast slopes, and between 8,000 and 9,500 feet on drier southwest slopes. It covers most of the Manzano and some portions of the Gallinas and Oscura Mountains. Compared with the zones above and below, it is intermediate in temperature, moisture, and soil conditions. The soils are relatively dry and sandy, containing little or no humus. Ponderosa pine and Gambel's oak dominate the zone. On cool, north slopes, Douglas fir will intermingle with occasional aspens. On lower, drier slopes, pinyon will be found. Hence, the term Transition zone is appropriate (Bailey 1913:42; Elmore 1976:109).

The Canadian zone is found in the study area in only a limited portion of the Manzanos. On cold slopes it will extend down to 8,500 feet elevation and to 9,500 feet on warm slopes. It is a densely forested zone, characterized by spruce, fir, and aspen (Bailey 1913:46; Elmore 1976:157, 175).

Manthey (1977) has produced a detailed study of the flora of the Sevilleta Wildlife Refuge. The eastern segment of the refuge (the segment within our study area) exhibits a gently sloping bajada from the Los Pinos escarpment west to the Rio Grande. This feature becomes increasingly dissected near the river. It has been modified by ancient river terraces and by wind and water erosion to produce a complex terrain of hills, gravelly ridges, sandy washes, and rolling, sandy hummocks (Manthey 1977:4).

Manthey discerned 12 floristic communities in the Sevilleta Wildlife Refuge. The diversity represented by these floristic communities would have been a resource of considerable value to the native population. These are listed in Table 1.

Fauna

A variety of faunal resources occur within the overview area. Deer tend to concentrate in sagebrush, pinyon-juniper, Ponderosa, and fir vegetation, while elk have been recorded in the higher elevations of the Manzano and Gallinas Mountains. Antelope occur in conditions of open grassland, while bison were once available to the occupants of the Estancia Basin. A large variety of rodents are most abundant in the lower ranges. Birds are particularly diverse, with the greatest variety found in wooded habitats. The Rio Grande trough supports a diverse assemblage of migratory waterfowl during the winter months (Whitford 1978).

ARCHEOLOGICAL INVESTIGATIONS IN THE STUDY AREA

In synthesizing the history of American archeology, Willey and Sabloff (1974) classified archeological research in this hemisphere into five periods: (1) the Speculative Period (1492 - 1840), (2) the Classificatory-Descriptive Period (1840 - 1914), (3) the Classificatory-Historical Period: the Concern with Chronology (1914 - 1940), (4) the Classificatory-Historical Period: the Concern with Context and Function (1940 - 1960), and (5) the Explanatory Period (post - 1960). These periods are, of course, highly generalized, pertaining as they do to the whole of American archeology. In any locality, such as central New Mexico, individual studies may not fit precisely into this framework.

Speculative Period

Spanish records of the reconquest describe the burned and ruined Piro pueblos of the riverine area, and since these lay astride the major route to the south, they were probably observed for many years after their abandonment. In the Salinas Province, however, Spanish penetration following abandonment was limited, owing to fear of the Apache.

Table 1

Floristic Communities of The Sevilleta Wildlife Refuge*

	Community	Description	Elevation
1.	Rio Grande Floodplain	Narrow strip of land parallel to the river.	4400-4500
2.	Rio Salado Sand Dune	Fan-shaped area of active and stabilized dunes along the Rio Salado.	4500-5000
3.	Desert Grassland	Largest and most floristically diverse.	4700-6000
4.	Grassland Riparian	Isolated elements along small streams, springs, and tanks.	5250-6000
5.	Montane Riparian	Isolated areas centered around permanent springs and intermittent wet-weather seeps.	5600-7400
6.	Grassland Wash and Arroyo	Interspersed within the Desert Grassland	4700-6000
7.	Desert Shrubland	A narrow band west of the Rio Grande.	4800-6000
8.	Interior Chaparral	Occurring on drier slopes of the Ladron Mountains and a few spots on the west slopes of the Los Pinos Mountains.	5600-8000
9.	Montane Canyon	Occurs in narrow canyons with sandy or rocky bottoms and steep, rocky walls.	5700-7300
10.	Evergreen Woodland	Occupying a large part of the Los Pinos and Ladron Mountains.	5600-8600
11.	Forest	Restricted to only a few spots in the Ladron Mountains. Ponderosa and Gambel's oak are included in this relict from once extensive forests.	7000-8200
12.	Rock-Shield and Talus-Slope	Occurring in numerous locations in the upper Ladrons and in a few parts of the Los Pinos Mountains.	6200-9176

* After Manthey (1977).

Schroeder (1962) notes a few maps of the late 1600s and 1700s which show pueblos in the Gran Quivira region. He also notes an inscription with a date of 1753 on a wall of San Buenaventura Mission, and suggests that it may have been made by troops stationed at Quarai and Tajique to guard against Apache attacks. These early Spanish records, however, cannot really be considered archeological in the same sense that contemporary English colonists to the east were speculating about archeological remains that they could not relate to living Indian groups.

A later inscription at Gran Quivira, dated 1773, may be connected with a journey possibly made to the region by a Virginian, John R. Peyton. In 1773-74 he apparently came up the Rio Grande Valley and turned east in the vicinity of the Salinas Province. He noted that he had been told that the ruins were Indian in origin, but he thought they were Spanish. Possibly he was referring to San Buenaventura (Schroeder 1962).

In the winter of 1835-36, Benjamin D. Wilson left the Rio Grande south of Socorro and traveled east, arriving at Gran Quivira without food and water. Finding what he thought was a concrete aqueduct, he reported tracing it easterly to the Gallinas Mountains where he found water (Woodward 1934).

Classificatory-Descriptive Period

The Classificatory-Descriptive period witnessed the initial development of field archeology as we know it today. In this period persons with an avocational interest in America's earliest populations produced descriptions and rudimentary classifications of at least the more outstanding kinds of archeological remains, such as mounds and pueblo ruins.

The observation and study of archeological remains in the overview area evolved noticeably throughout this period. In 1844, Josiah Gregg recorded what he felt were stone cisterns and remains of stone aqueducts eight or ten miles in length at Gran Quivira. He echoed the belief that this was actually a wealthy Spanish mining town. This is similar to Peyton's belief, noted above, and may reflect a widespread notion of the day. Possibly this belief is related to the persistent tales of Spanish treasure buried at the site.

In 1848 a survey was conducted through the area by Lieutenant J. W. Abert. He examined the pueblo ruins near Tajique, and at Quarai and Abo. Abert also described the ruins of Gran Quivira, but apparently didn't visit the site. A few years later Carleton (1855) commanded a military reconnaissance through the region, initiated because of the Apache menace. He described the ruins of Abo, Quarai, and Gran Quivira, relating the story of buried treasure. During his trip Carleton visited an apple orchard on the east side of the Manzanos supposedly planted by Spanish priests before the abandonment of the province. Based upon the size of the trees, he estimated that the ruins must have been greater than 200 years old - a remarkably accurate appraisal, especially considering that he relied on no documents pertaining to the abandonment. Some years later, in 1872, Deputy Surveyor Willison described Gran Quivira while surveying the New Mexico base line (Bandelier 1881:30). This was followed in 1878 by a map of the ruins by Lieutenant Morrison (Bandelier 1890:282).

The major, early work in the overview area, and the first work of a truly scholarly nature, was conducted by Bandelier (1890, 1892). Bandelier carried on both historical research and archeological fieldwork in what are now Socorro and Torrance counties, tracing the distribution of the Tiwa and Piro languages, and describing the ruins of the area. He found a few traces of the chapel at Chilili. (N. C. Nelson traced the foundations of this church a few years later [Walter 1916:19].) Bandelier stated his belief that the church and convento at Gran Quivira had not been finished, and concluded that the linear features at the site were designed to carry water (1890:286). In 1898 John Virgin described a paved limestone floor in San Buenaventura.

Classificatory-Historical Period

Other than Nelson's test at Chilili, no further work was done in the Salinas area until the School of American Archaeology (now the School of American Research) and the Museum of New Mexico started excavation and stabilization projects at Quarai, Gran Quivira, and Abo. The first season, 1913, was spent at Quarai (Hewett 1917). With this, the Classificatory-Historical Period (Chronology) commenced in the overview area. Since these projects concentrated on late prehistoric/early historic period remains there was, in fact, little contribution to local chronology.

There was a substantial contribution toward rescuing the Spanish missions from further deterioration, and making them secure for public enjoyment. This work focused on Gran Quivira between 1923 and 1925 (Hewett 1923, 1924a, 1924b, 1925, 1926, 1927; Pinckley 1924; Halseth 1926; Bloom 1927), shifting in the 1930s to Abo (Toulouse 1949). Through the 1930s and 40s the focus was on Quarai (Senter 1934; Ely 1935; Baker n.d.; Hurt 1985; Hurt and Dick 1946). Ms. Carmie Lynn Toulouse of Albuquerque has in her possession diaries of her uncle's work in the area during this period (Toulouse 1980). It was during these years that Harrington (1928) discovered and described Sandal Cave in southern Socorro County, and that Frank Hibben (1941) excavated Manzano Cave.

During the latter years of this period, Yeo (n.d., 1948) and Mera (1931, 1935, 1940a, 1940b, 1943) conducted large regional surveys which included portions of the overview area. Mera's work, in particular, established basic knowledge of the relative placement of the ceramic complexes of the area.

In 1940, Joseph Toulouse was appointed custodian of Gran Quivira. He conducted stabilization work at the monument (Toulouse 1940, 1942a, 1942b), and initiated a study of the supposed water systems of the ruins (Toulouse 1945). In the spring of 1941, with the assistance of Robert Stephenson, he directed Washington and Jefferson College excavations at nearby Pueblo Pardo. World War II prevented any more fieldwork at the site, and the report prepared following the 1941 season was not published for several years. When it did appear (Toulouse and Stephenson 1960), it proposed a chronological sequence for late prehistoric manifestations in the area.

On a national level, the succeeding portion of the Classificatory-Historical Period (1940-1960) was characterized by growing concern with context and function, the behavioral significance of artifacts, patterns of settlement and community organization, and cultural ecology (Willey and Sabloff 1974:131-132). Some of the research in the overview area mirrored this pattern, as in the continuing debate over the water system at Gran Quivira (Toulouse 1945; Howard 1959a), and in the function of the adobe lined pits at the site (Howard n.d., 1981; Hayes 1981).

In 1951 Gordon Vivian excavated portions of House A, Kiva D, and San Isidro Mission at Gran Quivira. His report, published some years later (Vivian 1964), contained important observations and interpretations. The New Mexico Highway Salvage Program was in full swing in the 1950s, and several sites were excavated in the overview area (Fenenga 1956; Fenenga and Cummings 1956a, 1956b; Wendorf 1956; Alexander 1962, 1964). Green (1955) conducted excavations at the same pithouse site as Fenenga (1956). Shiner and Lark (1954) conducted survey and excavation in the riverine area, in anticipation of pipeline construction.

Independent research projects were also undertaken in this era, although these were fewer than Federal and salvage-inspired undertakings. In 1944, Bertha Dutton tested the non-Mission portion of Abo (Dutton 1981). John Campbell (1951) conducted a survey in the Estancia Basin for Florence Ellis, while Vance Haynes (1955) reported early manifestations in the same area. Frank Hibben, with assistance from Florence Ellis, excavated the Lucy site. This excavation has been reported by Roosa (1956a, 1956c, 1968). Stanley Stubbs (1959) excavated and reported on early Spanish churches at Tabira (Pueblo Blanco) and Quarai. In the riverine area, Weinrod (n.d.) began the initial exploration of Lemitar Shelter, north of Socorro, in 1953. This site had been discovered the previous year by Vance Haynes and G. Shelton.

Explanatory Period

The Explanatory Period (post-1960) has been characterized on a national level by the goal of using the archeological record as a data base for testing explanations of cultural behavior. The goal, thus, is no longer history per se, but rather the use of historical occurrences to understand processes that are not bound by time or space. Thus far, this emphasis has had little expression in the overview area. Instead, with the sparseness of our knowledge of the region, research continues to tackle the basic problems of description, chronology, and classification, although some inquiry into processual matters is also evident (e.g., Lyons 1969; Warren 1981).

The early years of this period saw a number of small Park Service projects at Gran Quivira (Voll and Richert 1962a, 1962b; Gordon 1962; Ice 1968; Sudderth and Kruse 1968). But the major work of the period, and indeed the major project

conducted in the study area, was Alden Hayes' (1981) excavation of Mound 7. After a delay of many years, this long-awaited report, with accompanying studies, was finally published in late 1981. (Included in this was a report by Caperton on archeological survey in the Gran Quivira area.) Subsequent excavations at Gran Quivira were conducted by Bruce Anderson in anticipation of construction for a new visitor center. Elsewhere in Torrance County during these years, Thomas Lyons conducted a survey for PaleoIndian and Archaic remains around Lake Estancia. The results were reported in his doctoral dissertation (1969).

In the northern Jornada del Muerto a major PaleoIndian site, Mockingbird Gap, was recorded by Hammack (1964) during a contracted survey. Excavations have been conducted at this site by Robert Weber and George Agogino (1966, 1967, 1968, 1970; Weber 1973b; Agogino and Weber 1970). These excavations had not been completed when the research for this overview was undertaken. Weber, who has been most active in the area, also excavated the Tajo 2 pithouse (1973a), Hackberry Shelter (Anzalone 1973), and prepared a synthesis of the prehistory of Socorro County (Weber 1963). In the early 1970s, Ronald Anzalone investigated late Archaic/early Basketmaker sites in San Lorenzo Canyon, north of Socorro, continuing Weinrod's excavations at Lemitar Shelter. The results formed his M.A. thesis (Anzalone 1973).

With the expansion in recent years of Federal support for the conservation of archeological and historical resources, most of New Mexico has seen an explosion of contracted archeological work. The overview area, however, has witnessed comparatively little of this, due primarily to the small amount of mineral development.

The Cibola National Forest, the Bureau of Land Management, the U.S. Fish and Wildlife Service, and the National Park Service all hold land in the area and maintain active programs of cultural resource management. The Cibola National Forest has conducted a sample archeological survey in the Gallinas Mountains under the supervision of Emily Garber, and a complete survey in the northeastern Manzanos (Garber 1982). The Socorro District of the Bureau of Land Management, as part of its Rio Grande Occupancy Resolution Program (RGORP), has conducted cultural resources evaluations of lands scheduled for disposition to private parties. These surveys have been directed by Mark Henderson and Pat Baratti-Sallani. The Bureau of Indian Affairs has recently reported the results of a sample survey of lands scheduled for timber harvesting in the Manzano portion of the Isleta Reservation (Ireland, Walt and Stein 1981).

Among contracted studies, the most notable are the Human Systems Research surveys of the lower Puerco and Salado rivers (which, although just outside the overview area, are pertinent) (Wimberly and Eidenbach 1980), the Office of Contract Archeology excavations at Sevilleta Shelter and in Los Alamos Canyon (Winter 1980; Hogan and Winter 1981), and the New Mexico State University Surveys in Socorro County (unreported) and at Gran Quivira (Beckett 1981b).

A major survey of historic architecture in Torrance County was undertaken by Edith Cherry for the New Mexico Historic Preservation Program. It focused on pre-1945 structures.

In 1981, several projects were underway that promise to provide substantial information about the region over the next few years. Michael Marshall began a survey of the Rio Grande and adjacent terraces, funded in part by the New Mexico Historic Preservation Bureau (Marshall, Gossett, et al. 1981; Marshall 1982; Marshall and Walt 1984). Linda Cordell directed the University of New Mexico archeological field school (cooperatively with the Bureau of Land Management) at the Piro site of LA 282, which is sometimes thought to be the Pueblo of Teypama (Earls 1981). Stuart Baldwin of the University of Calgary conducted excavations and survey in the Abo Pass area, most especially at the important site of Tenabo (Baldwin 1981).

Major inventory records for the area are held by the Laboratory of Anthropology, the New Mexico Historic Preservation Bureau, and the Socorro District of the Bureau of Land Management. The Cibola National Forest maintains records of cultural resources on lands under its jurisdiction.

THE EARLY NATIVE OCCUPATION

PALEOINDIAN

The overview area is a prime locality for study of the PaleoIndian period. Archeological remains dating to the era are abundant and diversified, and have been found in several sections of central New Mexico. This may be due, in part, to the eroded nature of much of this region. Cordell has pointed out that, in New Mexico, PaleoIndian sites have been found consistently in areas of moderate to severe erosion where older land forms have been exposed (1979:133-134). Cordell's map of eroded terrain (1979:134) shows that the Estancia Basin area and the northern Jornada del Muerto are both eroded localities. Not surprisingly, the most abundant PaleoIndian remains in the overview area have been found in precisely these places.

It is pertinent to the aims of this study to enter into a brief discussion of the general PaleoIndian phenomenon in western North America. A total synthesis of the PaleoIndian period in the Southwest will not be attempted, however, since two excellent reviews of this topic have recently been written (Irwin-Williams n.d.; Judge n.d.).

In recent interpretations of the PaleoIndian period, Cynthia Irwin-Williams (1977; Irwin-Williams and Haynes 1970) has proposed that there were close correspondences between climatic fluctuations and PaleoIndian occupation in western North America. Irwin-Williams concludes (1977, n.d.; Irwin-Williams and Haynes 1970) from paleoecological research that post-Pleistocene moisture levels in the area fluctuated as shown in Table 2.

Pre-Clovis

The overview area and adjacent localities figure prominently in the debate over pre-Clovis occupation in North America. Most of the sites for which pre-Clovis dating has been claimed have been the subject of academic disputes. Sandia Cave (Hibben 1937, 1941), located on the Cibola National Forest a few miles northwest of the study area, has been the subject of particularly virulent controversy. This controversy will be discussed in a subsequent section of the present chapter.

Judge (n.d.) has recently reviewed the evidence for pre-Clovis sites in the New World and has concluded that the sites which might be scientifically acceptable tend to be concentrated (although not located exclusively) in the western, high altitude areas of both North and South America. This pattern suggests to Judge an adaptation which tended away from grassland areas of low ecological diversity. In contrast, archeological remains from subsequent time periods tend to concentrate in low diversity habitats, leading many scholars to conclude that these populations practiced a focal economy concentrated on large game animals (Judge n.d.:57).

Clovis

The Clovis occupation of the Southwest corresponds with what Irwin-Williams (1977, n.d.; Irwin-Williams and Haynes 1970) believes was a period of increased effective moisture between 9500 and 9000 B.C. Irwin-Williams and Hayes (1970:61) suggest that during this period of increased moisture the western United States witnessed a dramatic increase in human population size, with consequent expansion into new regions. They propose that in the Southwest, during this interval, the faunal assemblage was basically an extension of that of the Plains.

It has generally been thought that Clovis exploitation of fauna was concentrated on extinct mammoth, although Judge's (n.d.:27-29) recent re-evaluation of Clovis artifact complexes suggests that Clovis populations may have scavenged mammoths, rather than systematically hunted them. Bison, horse, and smaller fauna have been recovered at Clovis sites in addition to mammoth. Irwin-Williams (n.d.:10) believes that these were not of major importance in the diet. Judge, however, suggests that the Clovis diet was in fact eclectic, being transitional between earlier, diffuse economies, and later, focal strategies (n.d.).

Clovis sites are more widely dispersed than those of subsequent time periods, and are less restricted in their distribution to specific microenvironmental situations. In general, though, sites are found near sources of water and/or in areas where game animals could be trapped or driven.

The Clovis lithic technology is distinctive. In

Table 2

Fluctuations In Post-Pleistocene Moisture

Date	Moisture
Pre-10,000 B.C.	Greater effective moisture than at present in the Southwest.
10,000-9500 B.C.	A period of decreased effective moisture.
9500-9000 B.C.	Return to increased moisture.
8600-5000 B.C.	A period of generally decreased moisture, with a minor reversion to increased moisture between 6700 and 6000 B.C., followed by a moisture decrease bringing conditions similar to the present.
5000-3000 B.C.	The Altithermal, a period of noticeably decreased moisture.
3000-2500 B.C.	The Medithermal, a time of greater moisture than the present.

addition to the diagnostic fluted points (see Fig. 1), common artifacts include side scrapers, raclettes, bifacial knives, perforators, utilized flakes and hammerstones. The raw material for implements was often carried as much as 200 miles to the place of final tool deposition. This suggests extensive trade networks and/or an economic cycle involving a broad territorial base (Irwin-Williams n.d.).

Clovis points have been found at and near the Lucy site (Roosa 1968:79), and at other localities in the Estancia Basin (Haynes 1955; Roosa 1968; Lyons 1969), but Lyons reports that they are rare in this area (1969:86). A small site with a Clovis point base was found in the summer of 1980 in the northeastern Manzano Mountains (Garber 1982). The Mockingbird Gap site in the northern Jornada del Muerto contains an extensive Clovis occupation (Hammack 1964). One other site with Clovis materials is located west of the town of Socorro (R. Weber, personal communication).

Folsom

The Folsom period is dated to between 8800 and 8300 B.C., during what Irwin-Williams (n.d.) believes was a period of decreased moisture relative to Clovis. Perhaps as a consequence, Folsom settlements are more concentrated on major water sources. Mammoth and other elements of the Clovis faunal assemblage had declined or become extinct: Folsom hunters concentrated instead on Bison antiquus, a now extinct species. Indeed, Irwin-Williams and Haynes (1970:63) have suggested that, from Folsom times onward, PaleoIndian adaptation relied on bison. Bison antiquus was rare or absent west of central Arizona, and Folsom remains are correspondingly sparse beyond that boundary. Overall, the Folsom occupation represents a shrinkage of PaleoIndian territory.

The vegetational pattern in the Southwest during Folsom times was a mosaic of interspersed grasslands and woodlands. Judge (n.d.:61) suggests that this vegetational pattern would have prevented formation of large bison herds. It is significant the Folsom kill sites display an average of only 15.25 bison, compared with 98.25 in later Plano sites (Judge n.d.:61). Apparently, more pronounced seasonality following Folsom times led to replacement of the pine-parkland mosaic by open, grassy plains which permitted aggregation of bison herds.

Distinctive indicators of the Folsom period are, of course, the Folsom points (Fig. 1). Other characteristics, listed by Irwin-Williams (n.d.), include well-made end scrapers, side scrapers (in reduced frequency from previous time periods), perforators, spurs, knives, denticulates and raclettes.

In the overview area, Folsom remains have been recovered from the Lucy site (Roosa 1968:75), and elsewhere in the Estancia Basin (Hurt 1942; Campbell 1951; Roosa 1968; Lyons 1969). To the south, Folsom remains have been reported from the

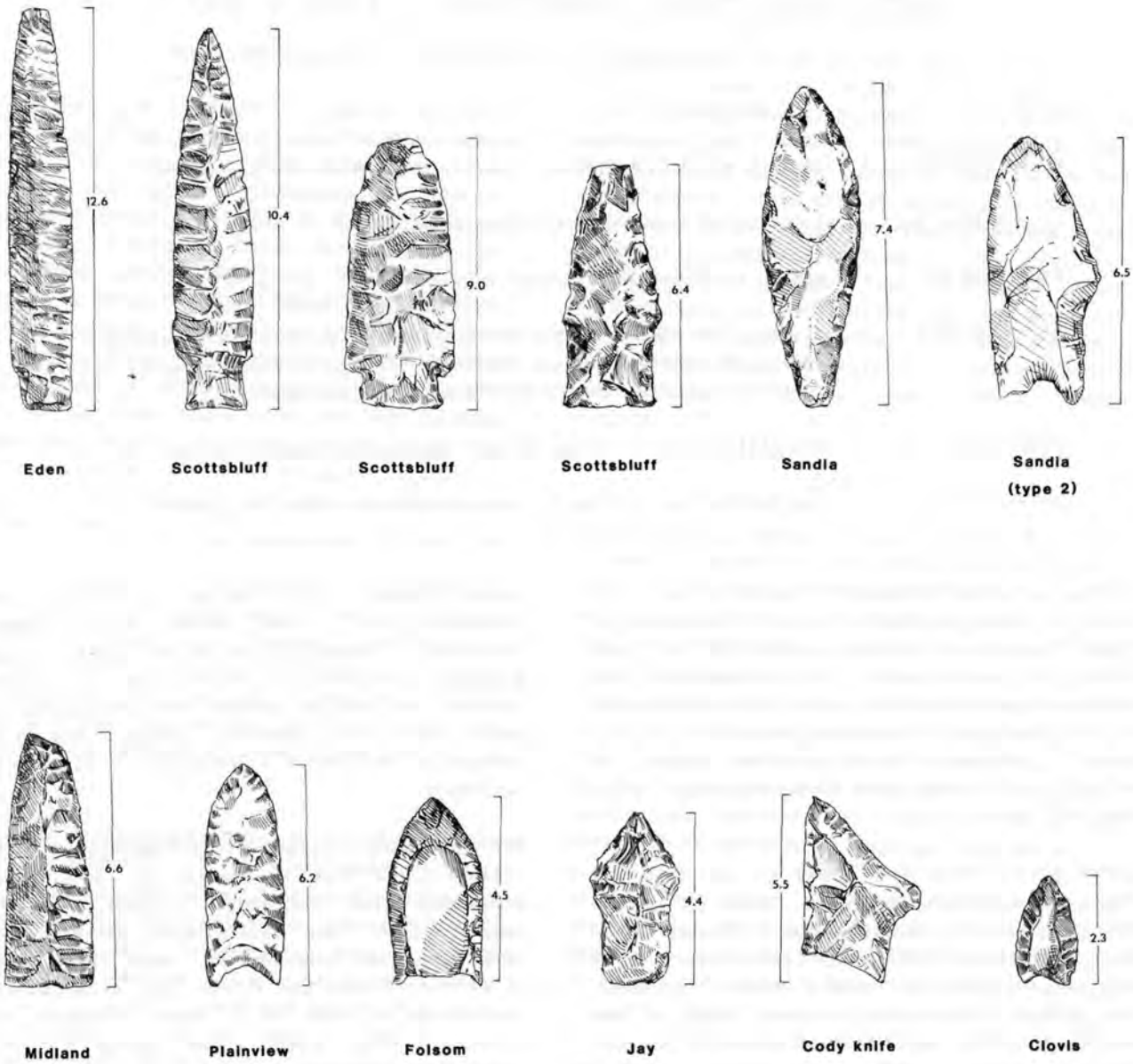


Figure 1. Early Projectile Points. All measurements are given in centimeters.

Mockingbird Gap site (Hammack 1964), near Polvadera (Anzalone 1973), and from the area of Socorro (R. Weber, personal communication).

Plano Complexes

PaleoIndian occupation in western New Mexico following the Folsom period is problematic. A temporal sequence for the High Plains has been postulated and has been summarized (as shown below) by Irwin-Williams (n.d.) . The position of the Alberta complex in this sequence is questionable, since it may be restricted to the northern Plains.

Date Span	Complex
8300-7500 B.C.	Agate Basin
7500-7000 B.C.	Hell Gap
7000-6500 B.C.	Alberta
6600-6000 B.C.	Cody

Irwin-Williams (n.d.; Irwin-Williams and Haynes 1970) postulates a continual pattern of decreased moisture following Folsom times (see Table 2). She interprets this as leading to reduced occupation in western New Mexico during Agate Basin times, and to sparse or intermittent occupation in the area between 7500 and 6600 B.C.

Table 3

Sequence of Pleistocene and Holocene Events in the Estancia Basin*

EPOCH	CLIMATIC SUBDIVISION	YEARS B.P.	EVENTS
HOLOCENE	Medithermal	0-4,000	Deflation of playas in bed of desiccated Lake Estancia. Dune formation and reworking in basin area.
HOLOCENE	Altithermal	4,000-7,500	Completion of desiccation of Lake Estancia.
HOLOCENE	Anathermal	7,500-10,000	Beginning of formation of prominent, extant, interior beach terraces and continuation of bar and spit formation. Beginning of perennial stream desiccation.
PLEISTOCENE	Cochrane Advance	10,150-10,300	Continuing desiccation of Pleistocene Lake Estancia. Continuing encroachment of Pinos Mountain dunes.
PLEISTOCENE	Valders Recession	9,000?-11,500	Encroachment of Pinos Mountain dunes.
PLEISTOCENE	Valders Advance	11,500-11,800	Oscillation in desiccation of Pleistocene Lake Estancia.
PLEISTOCENE	Two Creeks Interstadial	11,800-12,300	Continuing desiccation of Pleistocene Lake Estancia.
PLEISTOCENE	Mankato Substage	12,300-13,000?	Oscillation in desiccation of Pleistocene Lake Estancia.
PLEISTOCENE	Glacial Maximum	?-19,000	Deposition of the clay of the Big Sink. Deposition of marl of Cedarvale and beginning of desiccation of Lake Estancia: 16,000-19,000 years B.P. Deposition of Rattlesnake Hills clastics and formation of bars and spits: 19,000-? years B.P.

* After Lyons (1969: 44). Reproduced by permission of the author.

The extent to which west-central New Mexico experienced reduced occupation between Folsom and Cody times remains to be determined. Irwin-Williams and Haynes (1970) believe that there was an actual withdrawal of Plains-based hunting populations from the area. Even if reduced moisture in this period led to reduced opportunities for hunting megafauna, though, it is likely that other elements of a subsistence system would have remained intact. If so, then sizable populations may have existed in the area by following a subsistence strategy that did not concentrate on megafauna. Such populations might not produce the distinctive projectile points so consistently associated with megafaunal exploitation. They would be far more difficult to recognize archeologically than if they conveniently had dropped lanceolate points about the landscape.

The relative lack of commonly accepted indicators of occupation between Folsom and Cody times may, then, mean one of two things. Either there was a lack of human population in the area, or simply a lack of commonly recognized indicators.

In any case, Judge (1973:69-72) has documented the presence in the Middle Rio Grande Valley of a megafauna-exploiting population which he places temporally between Folsom and Cody. Termed the Belen occupation, it has been neither stratigraphically placed nor absolutely dated, but it does display technological similarities to the Plainview, Midland, and Milnesand complexes. Belen sites have been documented only from the area of Judge's survey. The fact that the Belen complex has not been documented outside of the Middle Rio Grande Valley argues against the interpretation of population movements between the Plains and this portion of west-central New Mexico.

A diversity of PaleoIndian complexes characterized the study area following Folsom. The Lucy site has yielded Midland, Cumro, Agate Basin, and Scottsbluff points (Roosa 1968). Elsewhere in the Estancia Basin researchers have found Agate Basin, Yuma, and possible Hell Gap-related points (Hurt 1942; Campbell 1951; Roosa 1968; Lyons 1969). In the northeastern Manzano Mountains, Plainview and Cody manifestations have been located (Garber 1982). The Yuma, Eden, and Cody complexes are represented at the Mockingbird Gap locality (Hammack 1964). Agate Basin, Plainview, and Cody materials have been found around Socorro (R. Weber, personal communication).

The projectile point terminology followed by some PaleoIndian specialists in the overview area merits clarification. The term "Cumro," applied by Roosa to one point from Lucy, designates a kind of point also called "oblique Yuma" (1968:84). These have been found in association with extinct bison near Cumro, Nebraska. "Yuma" is a generic term applied to a variety of point forms. Wormington (1957:103-107) considers the term, and associated point descriptions, to be so generalized as to be meaningless. She suggests that some Yuma points can be assigned to the Eden and Scottsbluff categories, and others to Plainview, all three of which have been found in the overview area. There is considerable temporal variation between the earlier Plainview on the one hand, and the later Eden and Scottsbluff, on the other. Hence, the term "Yuma," when applied to finds in central New Mexico, indicates little other than a Plano occupation.

A projectile point frequently found in the Estancia Basin has been referred to as "J" (see Fig. 1). Roosa (1968:69) discerns two types of J points at the Lucy site: wide and narrow blades. He suggests that the wide blade variety shows close similarities to Agate Basin and Hell Gap, and may indeed actually be Hell Gap points. The narrow blade, in contrast, shows similarities to the succeeding Archaic period Pinto Basin points (Roosa 1968:71). Lyons also classifies J point as PaleoIndian (1969:68).

More recently, Cynthia Irwin-Williams (1973:4-5), on the basis of work in the Arroyo Cuervo region, has assigned J points to the initial Archaic period, renaming the complex "Jay." She dates this complex in the interval from 5500-4800 B.C. In the Arroyo Cuervo region Jay populations appear to have followed a distinctively Archaic adaptation emphasizing a mixed spectrum resource base. In the Estancia Basin, however, Jay populations may have continued to exploit megafauna since, as Lyons and Switzer (1975) have shown, Pleistocene fauna may have survived in this area to as recently as 2000 B.C.

Thus, the classification of Jay points in the Estancia Basin as PaleoIndian may be disputable on technological and temporal grounds. The possibility exists, nevertheless, that early Archaic populations in this area may have retained some elements of the earlier subsistence base.

The Estancia Basin

The sequence of Pleistocene and Holocene climatic changes in the Estancia Basin (Table 3) exerted a substantial influence on human occupation of the area. The most significant influence came from the series of late Pleistocene and early Holocene lakes which formed in the basin. Antevs (1935) estimated that an annual precipitation of 20 inches, with a year-round mean temperature of 47 degrees Fahrenheit, would sustain the lake at a level of 6,210 feet elevation. He suggests that such conditions occurred between 12,000 and 10,000 B.P.

Antevs later suggested that if the June to September temperature was 10 degrees Fahrenheit lower than at present, and if annual evaporation from the lake was about 33 inches, then precipitation would have to have been about 23 inches to maintain the lake level (1954). Leopold (1951) proposed that 21 inches of precipitation would have maintained the lake at its high stage, but that with no decrease in

temperature 30 inches would have been needed. This possibility would have brought the pine/spruce border down to the lake margins. Harbour estimated that 31 inches of moisture would have been required to maintain the level at 6,210 feet (1958:26).

Bachhuber (1971) has conducted an extensive study of the pluvial history of the Estancia Basin. He sees three major episodes of lake formation in the basin during periods when human populations are likely to have been present (Fig. 2). The first of these, Late Lake Estancia, was the most extensive (Map 5). It is estimated to have existed between 12,000 and 10,500 B.P. This last figure is based on soil deposition rates (Bachhuber 1971:211). A period of drying and salinity ensued which is termed the Estancia Playa Complex. This was followed by Lake Willard, which reached its maximum stage around 7500 B.P. The final major stand was Lake Meinzer which, Bachhuber estimates, reached its maximum extent around 3000 B.P. Lyons, though, believes that this last lake reached complete desiccation by 4000 B.P. (1969:63).

Bachhuber and McLellan (1977) have noted the presence of fossil marine Foraminifera in the early stages of both the Late Lake Estancia and the Lake Willard pluvial maxima. The particular species present, which were probably introduced by shore birds, are Protelphidium orbiculare and Cribroelphidium selseyense. These occur today in restricted ecological contexts. The context of Protelphidium orbiculare is more limited. Its southernmost distribution, in the Arctic, coincides closely with the 10 degree centigrade mean August surface-water isotherm. In recent times the mean August air temperature in the Estancia Valley has been 19.7 degrees Centigrade. With no thermal stratification, maximum lake temperature would closely approximate the warmest mean monthly temperature. This suggests that August air temperatures in the Estancia Valley early in the Late Lake Estancia and Lake Willard maxima were depressed 9.7 degrees centigrade. Bachhuber and McLellan (1977:262) note that this figure compares favorably with the results of simulation studies of ice age climates using a global atmospheric model.

Roosa (1968:144-145) notes that Lake Estancia contained no permanent inflow. He believes that the lake would have been saline or brackish, with no resources usable by human populations. There

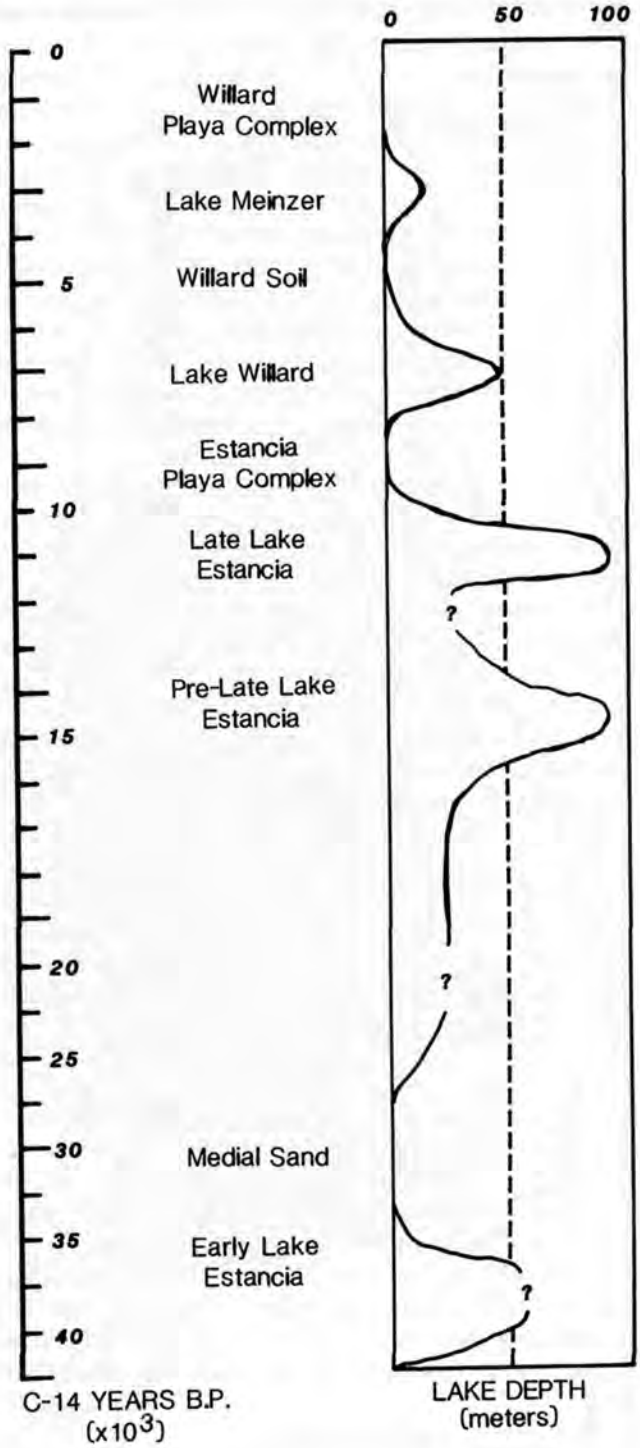
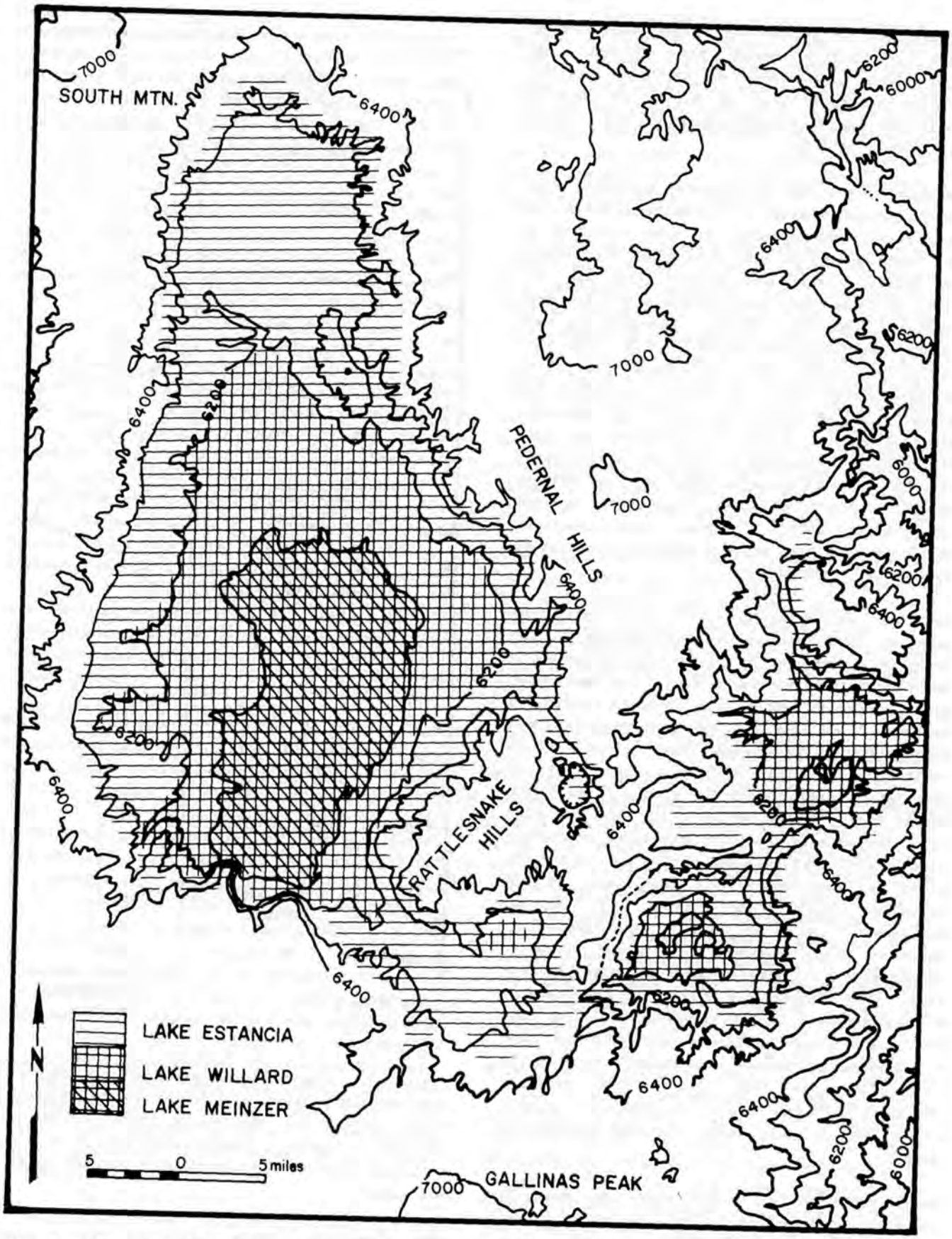


Figure 2. A generalized stratigraphic section also showing pluvial lake depths in the Estancia Valley During the Quaternary (after Bachhuber 1971:198). [Note: compare with Map 5 on the following page.] Reproduced with permission of the author.

was, therefore, little reason to camp on its shores. As a consequence, virtually all of the



Map 5. Areal extent of Estancia Basin pluvial systems (after Bachuber 1971:206).

PaleoIndian sites, and especially the larger ones, were located on a stream, a pond, or a small playa lake.

Although the Estancia Basin lakes were probably not potable during most of their existence, there were episodes when lake levels rose to overflowing. Then the water was at least relatively fresh. During these periods of high water, lacustrine resources usable by human populations were present, including Salmo clarki, cutthroat trout (Bachhuber and McLellan 1977:254-255).

Roosa (1968:175) suggests that vegetation zones at the end of the Pleistocene would have been depressed about 1,000 feet. An open parkland prevailed in the Estancia Basin at that time, dominated by pinyon/juniper or possibly Ponderosa.

PaleoIndian sites in the Estancia Basin tend to cluster at the northern and southern ends. Lyons (1969:73) suggests that the reason for this concentration was access to and from the High Plains to the east. Access west to the Rio Grande Valley would have been easiest through Abo Pass at the southern end of the basin. This suggests to Lyons (1969:82) that Abo Pass may have been one of the most heavily traveled PaleoIndian routes. PaleoIndian remains have recently been found near this pass (K. P. Medlin, personal communication).

The Lucy Site

The Lucy site, located in the southeastern portion of the Estancia Basin, was excavated under the overall direction of Frank Hibben during the summers of 1954 through 1957, except for 1956 when Florence Ellis was in charge. In the summer of 1959 William B. Roosa spent three weeks on the site under the auspices of the University of Michigan (Roosa 1956a, 1956c, 1968).

The Lucy site at present consists of a series of blow-outs. A diversity of archeological remains ranging from PaleoIndian to recent Apache or Comanche artifacts occurred on the surface, along with mammoth and bison remains. While exposing a portion of a long bone, Hibben found a Sandia Point. The Lucy site thus held the potential for answering some of the questions concerning pre-Clovis occupation of this hemisphere.

The most complete stratigraphic section, and the most abundant in situ finds, were made in Roosa's Trench I. Roosa characterized the strata in this trench as consisting of ". . . a series of waterlaid deposits and pond bottoms, which were cut into by an old erosion surface and covered in places by old stabilized dunes and modern dunes" (1968:30). The Sandia points, some of which were found in situ, were probably associated with proboscidean remains. In one place Roosa characterizes these remains as probably mammoth (1968:34), but elsewhere describes them as mastodon (1968:189). He suggests that the Sandia finds represent a mammoth kill made on the edge of a pond (1968:35).

The Lucy site yielded two varieties of Sandia points. Following the typology established by Hibben (1941:24-25), Type 1 Sandia points (Fig. 1) have an elongated elliptical shape with a step or shoulder in one edge near the base. The rounded base is more blunt and thicker than the tip. They are bi-convex in cross-section, and range from lenticular to diamond shaped. Type 2 Sandia points are more nearly parallel-sided with concave bases and attempts at basal thinning on some specimens. Type 2 Sandia points are occasionally fluted (Roosa 1956b:41-42).

Seven Type 1 points and six Type 2 were recovered at the Lucy site. Four of the latter were fluted. Roosa believes that one of the unfluted Type 2 points is similar to Agate Basin points, and proposes a close linkage between the two (1968:40).

Type 1 Sandia points at the Lucy site tend to be longer than Type 2. The length range for Type 1 is 59.5-109.5 mm. The range of Type 2 is 59-66 mm. Roosa suggests that the Type 1 points, especially the long ones, were actually knives, while the Type 2 forms were projectile points. The notion that at least some Sandia "points" may actually have been knives is an idea with which many scholars would be in agreement (e.g., Judge n.d.:13).

Roosa suggests that morphological variation in Sandia points may reflect the idiosyncrasies of individual makers. Based upon this, he suggests that the points recovered from Lucy were made by three or four men, and so extrapolates a total of nine to twenty persons occupying the site (1968:47-51).

The dating of the Sandia remains at the Lucy site, like the dating of the original finds in

Sandia Cave, is controversial. Roosa believes that the Sandia complex as a whole is late Pleistocene and may be roughly contemporary with, or older than, Clovis (1968:187). However, the stratigraphy of the Lucy site could not confirm the postulated pre-Clovis age for Sandia. The geology of the Lucy site has been investigated by Harbour (1956), who confirms the late Pleistocene estimate for the Sandia materials. Roosa (1968:62) figures the Sandia complex at Lucy to be early Valders maximum, probably ca. 11,500 B.P. However, he acknowledges that a radiocarbon determination on caliche of 14,300 years B.P. may be a correct age assessment (Roosa 1968:65). Lyons, in a later estimate, concluded that the Sandia complex dates to about 20,000 B.P. (1969:27). He based this assessment on the geomorphology of the Lucy site (personal communication).

In addition to the Sandia remains, Roosa mentions four small bifaces recovered at the Lucy site from possibly earlier deposits. He describes what he terms a "retouched Levallois" point from the floor of Trench I, and suggests that it may be pre-Sandia (1968:43, 45). Other PaleoIndian remains from the site included Clovis, Folsom, Midland, Cumro, Agate Basin, and Scottsbluff points. These remains span essentially the entire PaleoIndian sequence. The Clovis point was found with scattered mammoth remains, and may represent a kill. Two Folsom areas were located on the site. Both Folsom and Midland remains were found in each. A variety of Archaic and later materials was also recovered.

Noting the association of excavated Sandia remains with high diversity terrain, Roosa proposes that the subsistence base of these early populations involved more than just megafaunal exploitation, and may have included a diversity of smaller game and plant foods (1968:195-196). This interpretation is echoed by Judge's (n.d.) suggestion that pre-Clovis adaptations were more highly diversified than later strategies. However, Roosa suggests that both the Clovis and Folsom subsistence strategies in the area were also diversified (1968:223, 261-262). This contrasts with the standard interpretation that Clovis and later populations concentrated on megafaunal exploitation.

The Sandia Controversy

The possible pre-Clovis occupation of central New Mexico that is represented by Sandia complex was first uncovered at Sandia Cave in the northern Sandia Mountains. This cave, one of several in the vicinity, was first excavated by Frank Hibben of the University of New Mexico (1937, 1941).

The stratigraphy of Sandia cave is crucial to the chronological interpretation of the complex. Most important is the relationship between the Folsom layer, which overlay a sterile, yellow ochre stratum, and the underlying Sandia deposits. The Folsom layer was highly consolidated, and contained Folsom points and other artifacts. These tended to concentrate near the mouth of the cave. Underlying the Folsom level was the yellow ochre layer, a finely laminated, water-laid deposit. The Sandia layer, under this, was similar in composition to the Folsom level but was less highly consolidated. Other materials in this layer included a variety of non-diagnostic tools and two charcoal-filled hearths. One of these was surrounded by a ring of limestone boulders. Various attempts at geologically cross-dating the cave deposits, and at radiocarbon dating, have produced age estimates for the Sandia materials ranging up to, and exceeding, 20,000 years.

No sooner had the first report on the site appeared (Hibben 1937) than controversy began. This controversy has been summarized by Stevens and Agogino (1975). Discrepancies appeared as to how the site and its contents were discovered, and as to who was in charge of the 1936-37 excavations. Contradictions surfaced between Hibben's 1937 report and later reports about the Pleistocene fauna found on the surface inside the cave. The descriptions of the stratigraphy published by Hibben in 1937 and 1941 have contradictions in details of the important yellow ochre layer separating the Folsom and Sandia layers. The possibility exists that rodents may have disturbed the deposits.

The list of problem areas is lengthy. The radiocarbon determinations obtained from the cave are so controversial and confused as to be unreliable. Published photographs showing artifacts in situ were actually taken of chunks of the consolidated deposits that had been removed to the laboratory. The published reports contain discrepancies in the locations of materials found in the cave, and there are inconsistencies in descriptions of the hearths. There are contradictions between faunal lists published at different dates and, even though the faunal remains were fragmentary, species

identifications were given.

Based upon the suggestion that at least some of the Sandia points may have been knives, Stevens and Agogino (1975:46) have proposed that the use of the cave was for mining ochre, and that the points were employed for this purpose. The identification of some points as knives suggests that, as a multi-purpose tool, their spatial and chronological distribution might not have been as restricted as that of the more common PaleoIndian point forms.

Sandia points are indeed widely distributed (e.g., Hibben 1946), but neither Sandia Cave nor the Lucy site have yielded data which resolve the chronological controversy. The association of Sandia materials with mammoth remains at the Lucy site is not useful for dating because mammoth in the Estancia Basin may have persisted to as late as 2000 B.C. (Lyons and Switzer 1975). Nevertheless, Harbour's (1956) assessment of the geomorphology of the Lucy site did place the Sandia remains at the terminal Pleistocene, but this in itself is not a sufficient basis for assigning a pre-Clovis age to Sandia.

Indeed, continuing the search for or against chronological priority for Sandia may be a fruitless endeavor. The assumption behind this search is that the diagnostic Sandia artifacts functioned in the same ways as the supposedly diagnostic artifacts of later PaleoIndian complexes. That is, it is assumed that PaleoIndian point forms represent stylistic sharing within limited temporal and spatial distributions. This assumption is implicit in the search for a date for Sandia points.

Judge, however, has argued that PaleoIndian points can be separated into generalized forms (combined cutting/piercing functions) and specialized forms (piercing) (n.d.). This would suggest that the factor of style sharing may not be the exclusive element in understanding their temporal and spatial distributions. A similar consideration would apply to the Sandia points. It is possible that Sandia sites may simply have been functionally specialized types of activity centers, used during many time periods and in many areas, rather than the settlements of a temporally restricted technological complex.

PaleoIndian in the Estancia Basin

Beginning in June, 1964, Thomas Lyons began an archeological reconnaissance of the Estancia Basin (1969). A total of 48 sites were found by consultation with the literature on the area, or in field survey. Five of the sites represented late prehistoric Anasazi or Plains occupation, four were non-diagnostic, while all others contained PaleoIndian and/or Archaic remains. Eight sites contained J materials, which Lyons classifies as PaleoIndian (1969:68).

Lyons suggests a relationship between J and Hell Gap and, combining this with the topographic placement of J sites in relation to lake stands, proposes that the J sites may date between 10,000 and 7,500 B.P. in the area. Lyons believes that J may be contemporary with Folsom, or may slightly pre-date it (1969:169). This temporal placement is, of course, at odds with the 5500-4800 B.C. dating which Irwin-Williams has assigned to the Jay complex (1973). More will be said of this topic in the Archaic section of this chapter.

Of the PaleoIndian sites that Lyons encountered, three had Sandia materials (including Lucy). Six Clovis manifestations were recorded, 10 Folsom, and 15 Plano. The Plano sites were distributed all around the lake shore but, like the Folsom manifestations, concentrated at the northern and southern ends. As noted above, such locations provided the best access to adjacent regions.

Lyons records two localities which he believes are not only pre-Clovis in age, but indeed pre-Sandia. He terms the archeological remains at these sites the "Estancia Complex," and suggests that they date prior to 19,000 B.P. (1969:87-104).

The two sites in question, West Otto and East Keen, are both found on low hills capped by outcrops of Glorieta sandstone. This has partially metamorphosed into quartzite, and a large number of quartzite implements was found on each site. The dating of these sites is based on geomorphological considerations. On both hills, the lower distribution of artifacts terminated at the shore line of Lake Estancia. This suggests that the hills were occupied before the desiccation of the lake began, that is, before 19,000 B.P. (Fig. 2). At West Otto, quartzite outcrops occurred at the base of the hill as well as at higher elevations. The higher outcrops were used for tool production, while the lower ones were not, suggesting that Lake Estancia prevented access to these.

Lyons characterizes the manufacturing technique of the Estancia Complex implements as Mousterian rather than Levalloisian. He lists the characteristics of this complex as follows (1969:90):

1. Comparatively unskilled lithic manufacturing techniques.
2. Percussion flaking.
3. Predominance of plano-convex forms.
4. Mix of prepared and unprepared striking platforms.
5. General massiveness of size.
6. Presence of flake and core tools.
7. Lack of projectile points.
8. Basal thinning and shouldering of cutting implements.
9. High frequencies of:
   A. Pointed instruments that might be described as picks, gravers, or perforators.
   B. Chopping and scraping tools.
   C. Hammerstones and anvils.
10. Preferential use of Glorieta quartzite.

Lyons infers that the following tool types are present in the assemblages:

1. Flake knives shouldered for hafting.
2. A few blade knives.
3. Lunate knives.
4. Flake scrapers.
5. Sawtooth cutting implements or denticulated scrapers.
6. Nipple gravers.
7. Perforators or drills.
8. Sharply keeled or ridged pointed implement or "picks."
9. Fist axes or choppers.
10. Spokeshaves.
11. Cores.
12. Utilized flakes.
13. Hammerstones.
14. Anvils.

This is clearly a diversified tool kit, representing a variety of activities. Lyons suggests the following uses for these tools:

1. Large game processing.
2. Breaking bones for marrow.
3. Bone cutting or graving.
4. Fish scaling with lunate knives and blades.
5. Shredding coarse vegetal material.
6. Cutting wood.
7. Graving or grooving wood.
8. Boring or perforating wood.
9. Fashioning wood with gouges or hafted adzes.
10. Fashioning wood with spokeshaves.
11. Preparing wood for shelter.
12. Preparing rafts or other similar water transport.
13. Manufacture of preforms for finishing elsewhere.

Measuring the edge angles of these tools, Lyons notes that the Estancia Complex knives fall into the 26-35 degree interval, while the plano-convex tools are in the 65-75 degree range. Following Wilmsen (1968, see 1970), Lyons suggests that this last class of implement may have been used in woodworking, bone-working, skin softening, or heavy shredding.

If Lyons's functional inferences are correct, this diversified tool kit would indicate a multi-activity locality. Such multiple activities suggest the possibility of a base camp. Lyons reports no other characteristics that would indicate a base camp, however, such as structures or midden development. More likely, these were quarry locations which were repeatedly utilized for whatever activities groups in the area were pursuing at any time. These activities included, at various times, butchering and associated activities, plant food processing, and woodworking.

Given the possibility that these sites functioned as special activity loci, Lyons' characterization of the Estancia Complex should be regarded cautiously. It is most likely a characterization of only a limited subset of the technological repertoire of whatever populations used the locality.

Proceeding to an analysis of later occupations, Lyons attempts to estimate the number of PaleoIndian occupants in the basin at various times. He bases these estimates on average band size and site loss rates. Lyons estimates a total Clovis population of 550, Folsom 721, and Plano 361 (1969:153-156).

In summary, Lyons sees the PaleoIndian sequence in the Estancia Basin as beginning with the Estancia Complex, dated at sometime more than 19,000 years ago, followed by the Sandia occupation, at about 20,000 B.P. A hiatus in occupation separated Sandia from Clovis. Clovis

in turn was succeeded by Folsom and the various Plano complexes, with PaleoIndian occupation of the basin ending about 6000 B.P.

Mockingbird Gap

The Mockingbird Gap site is an extensive PaleoIndian site, one of several located in the northern Jornada del Muerto. It was first recorded by Hammack (1964), and was later discussed by Marshall (1976). The major work on the site has been carried out by George Agogino of the PaleoIndian Institute, Eastern New Mexico University, and Robert Weber of the New Mexico Institute of Mining and Technology. Their work has been reported in a number of papers (Weber 1973b; Weber and Agogino 1966, 1967, 1968, 1970; Agogino and Weber 1970). Weber's work at the site continues, and a final report has not yet been prepared.

The site itself is situated on a low, arcuate, sandy ridge and adjacent terrace that border a shallow arroyo. Clovis material on the site occurs in eight clusters. There are some later PaleoIndian materials, including a possible PaleoIndian structure (a posthole pattern suggesting a lean-to) near a Cody concentration, as well as Archaic and Puebloan material. The site overlooks Mockinbird Gap, a principle access route between the Jornada del Muerto and the Tularosa Basin to the east.

The Mockingbird Gap site contains a diversified tool kit, more varied than that customarily found on Llano kill sites. There is also a high frequency of basal point sections. These two characteristics suggest that the site was a camp rather than a special activity locale.

During excavations, a number of Clovis points were found which had been broken during manufacture. These allowed Agogino and Weber to piece together, for the first time, the sequence of Clovis point production. Bi-faced blanks were initially shaped to resemble the finished point in profile. Striking platforms for fluting were prepared by the removal of small lateral flakes from either side of a central platform, which was also ground prior to fluting. Damaged tips suggest the use of an anvil to support the point during fluting. Once the initial flute was removed the entire procedure was repeated on the opposite face. Final retouching and shaping usually took place after fluting although, in one case, this process was reversed.

The small size of these Clovis points (less than 50 mm.), and the occasional presence of edge retouch, are reminiscent of Folsom, as are many point profiles. Clovis points usually lack the carefully prepared striking platform characteristic of Folsom, but the Mockingbird Gap Clovis points have these. To Agogino and Weber, these characteristics suggest that Mockingbird Gap is a transitional Clovis/Folsom site. They do not define what they mean by "transitional." Their findings are significant nevertheless, for they suggest that the shift from Clovis to Folsom involved gradual technological adjustments rather than abrupt replacement.

It is noteworthy that most PaleoIndian sites in the Mockingbird Gap locality are Folsom, and that the Mockingbird Gap style of Clovis point was found associated with bison at a site four miles away. Clovis populations are usually thought to be associated with mammoth remains, so the use of bison reinforces the late Clovis interpretation.

The raw materials used to fashion the implements found at Mockingbird Gap include jasper, chert, chalcedony, flint, quartzite, and obsidian. Most of these came from quarries and gathering areas within a 35 mile radius of the sites. A considerable amount of the lithic raw material was derived from pebbles in local gravels. A small amount, however, came from such distant sources as the Alibates flint quarries in the Texas Panhandle, and the Chuskas of the western San Juan Basin.

PaleoIndian in Surrounding Areas

The central New Mexico overview area is surrounded by regions displaying the remains of substantial PaleoIndian occupation. To the west, the Plains of San Augustine (Berman 1979), the west side of the northern Ladron mountains (G. Agogino, personal communication), and the central Rio Grande Valley (Judge 1973) display abundant PaleoIndian remains. In this last area, Judge (1973) found evidence of Clovis, Folsom, and Cody occupations, as well as a complex termed Belen which he placed chronologically between Folsom and Cody. Three types of settlements were discerned: base camps, producing large numbers of implements; armament sites, characterized by projectile point production and scrapers displaying hard wear; and processing sites, with point bases and scrapers displaying soft wear. Judge suggests that, through time, conditions in his study area became drier, causing shifts in

the movement of game, and corresponding shifts in the settlement patterns of PaleoIndian hunters. To the east of the overview area, on the plains of eastern New Mexico, PaleoIndian occupation was extensive.

If Irwin-Williams (n.d.; Irwin-Williams and Haynes 1970) is correct in her suggestion that decreased moisture forced depopulation of west-central New Mexico between 7500 and 6600 B.C., this phenomenon should be evident in the Estancia Basin and in the northern Jornada del Muerto. If there was indeed a Cody reoccupation of western New Mexico by plains-based hunters, then the earliest Cody sites in the overview area should pre-date those farther west. Similarly, during the proposed abandonment of western New Mexico during the Agate Basin period, the latest Agate Basin sites in the western part of the state should be found in the overview area.

PaleoIndian Research Problems

In her overview of the middle Rio Grande Valley, Linda Cordell (1979:17) listed problems involved in the study of the PaleoIndian phenomenon. These include (1) geological processes which have covered earlier remains, (2) the ephemeral nature of archeological remains left by mobile, low density hunters and gatherers, (3) relative scarcity of diagnostic indicators of PaleoIndian occupation, and (4) lack of detail in paleoenvironmental reconstruction. Cordell makes the telling point that Middle and Upper Paleolithic archeology in Europe, despite facing these same problems in magnified form, has nevertheless produced considerable knowledge. Perhaps even more limiting than the technical problems Cordell listed is the relative lack of explicit, problem-oriented research designs focused on PaleoIndian phenomena. Most PaleoIndian studies have tackled research problems on an opportunistic basis, surveys and excavations being conducted as attractive possibilities have appeared. Such a hit-or-miss approach will not quickly resolve the outstanding research problems in the overview area.

The Sandia Problem

No discussion of the PaleoIndian prehistory of central New Mexico can omit the Sandia phenomenon, although it is distinctly possible that this will someday come to be less of a problem than it has been for the past fifty years. To a certain extent, the degree to which Sandia, or other potentially early complexes, present a problem is determined by the research goals of the profession. So long as the archeological profession, or segments of it, focus on historical questions, Sandia will remain a puzzle.

To the degree that the focus of interest shifts toward more anthropological concerns such as the subsistence bases, settlement patterns, social organization, and population dynamics of the PaleoIndians, the question of finding the earliest New World archeological complex becomes less important. Nevertheless, the profession continues to find early complexes a significant research area, and so the controversy over Sandia Cave will continue.

No matter how well a research program focused on the Sandia question is designed, the possibility of finding properly stratified deposits will always be uncertain. Hence, focusing research on Sandia chronology may be unprofitable. Insight into this phenomenon can probably be gained, though, from a functional analysis of Sandia tools. Lyons reports wear, polish, and striations on Sandia points that indicate use as knives as well as projectile points (1969:118). Stevens and Agogino (1975:46) propose that the points found in Sandia Cave were used for mining ochre. These observations and interpretations may have important implications.

If Sandia points represent a style, of presumably short duration, then they may well be found to hold a distinctive position in PaleoIndian chronology. But if they were a generalized, multi-purpose implement, designed for function rather than style, then the likelihood is reduced that they might serve as temporal indicators. The possibility then arises that Sandia points may have been used in specialized contexts over a long temporal range, and throughout a broad geographical area. If so, then the resolution of the Sandia chronological controversy would no longer seem to be crucial. It is significant in this regard that, when Hibben published his account of the first 38 Sandia points (1946), this was only a fraction of the number of Sandia-like items reported to him; the remainder did not fit securely into Hibben's conception of the Sandia complex.

Subsistence-Settlement Systems

One of the most significant problems in

PaleoIndian research is the extent to which the early subsistence base was a focal one, concentrated on the hunting of megafauna. Both Judge (n.d.) and Irwin-Williams (n.d.) believe that this is so, although admitting minor additions to the diet from other sources. Archeologists who have worked in the overview area, in contrast, believe that PaleoIndian subsistence in this region was more diversified (Roosa 1968:195-196, 233, 261-262; Lyons 1969:172).

On an a priori basis, the idea that PaleoIndians specialized in megafaunal exploitation is difficult to accept. A diversified subsistence base is the common pattern among ethnographically recorded hunters and gatherers (Lee 1968) and, except in the Arctic, it is unheard of for an entire subsistence base to be concentrated on a single faunal resource. It is not likely that the PaleoIndians would have been so anomalous.

In an earlier discussion of this topic (Tainter and Gillio 1980:39-41) data from Judge's (1973) survey of the central Rio Grande Valley were used to roughly compute megafaunal kill rates in the area, and to estimate, in the most preliminary way, the portion of the subsistence base accounted for by megafauna. Even using the most generous estimates, the conclusion was inescapable that megafauna could account for only a small fraction of the total diet.

Viewed from another perspective, extreme dependence on megafauna would have been a very risky strategy. In a subsistence economy, major reliance on a single resource is always risky, since depletion of that resource is a constant threat. There is no reason to suspect that the PaleoIndian subsistence strategy was so irrational.

That megafauna would have been attractive to early hunters is indisputable. The large size of these animals would have provided substantial amounts of food with comparatively little effort. To achieve a "harvest" of smaller animals or vegetal foods of equal caloric yield would have required far greater effort. Yet this fact alone does not lend credibility to the notion of a focal economy.

As Judge (1973) has pointed out, depletion of game herds in this region would have been a recurrent problem. This depletion could result from either hunting pressure or from climatic stress. Irwin-Williams (1977, n.d. and; Irwin-Williams and Haynes 1970) sees the response to such depletion as the actual withdrawal of hunting populations to the Plains, with return to the western area during more favorable periods. Yet there are problems with this interpretation.

During periods of climatic stress, movement of western New Mexico PaleoIndian hunters to the Plains might have resulted in encroachment on resident populations facing their own resource shortages. It is to be expected that these encroachments would have been resisted. If such encroachment did not precipitate or aggravate a local food crisis, then the megafaunal resources of the Plains must have been of such magnitude that expansion to the west, during periods of climatic amelioration, would have been unnecessary. Thus, fluctuations in the supply of megafauna in western New Mexico logically cannot explain the occupation and abandonment sequence that Irwin-Williams postulates.

It is more likely that PaleoIndian populations in western New Mexico were permanently resident, and pursued a mixed subsistence strategy which included both smaller fauna and vegetal foods. During periods of megafaunal depletion, and indeed at all times, such resources formed the major portion of the subsistence base. Depletion of megafauna would thus have amounted to little more than the loss of an occasional, minor resource.

We are led to ask, then, why hasn't evidence of a more diversified subsistence base been found? Actually, it is possible that evidence for this has been found, but not recognized. Not all PaleoIndian subsistence activities need have resulted in the deposition of diagnostic implements. If PaleoIndian projectile points were specialized tools, linked to exploitation of large game, then those points may not have been used in other portions of the subsistence round. Indeed, other subsistence activities may have required no tools which survive the passage of time.

Two impressions would result from this in the archeological record: first, that PaleoIndians did not practice a diversified economy, and second, that the area was uninhabited during periods of megafaunal depletion. We must constantly keep in mind the limitations imposed on PaleoIndian research by currently recognized diagnostic tools. It is no more than an accident

of history that the only PaleoIndian activities we can consistently recognize in the archeological record are those related to hunting.

Clearly, one of the most pressing needs in PaleoIndian research is a means to identify sites which were not used for megafaunal exploitation. Cordell has suggested the use of obsidian hydration dating, and identification of diagnostic reduction processes, for dating PaleoIndian remains (1979:21).

Judge (1973) has convincingly demonstrated that the PaleoIndian sites in his survey area were related to megafaunal exploitation. It is likely that many of the PaleoIndian sites in other large, plains-like areas, such as the Estancia Basin and the Jornada del Muerto, served similar functions, for these are the kinds of areas likely to have sustained herds of grazing herbivores. Thus, as I proposed in an earlier discussion of this topic (Tainter and Gillio 1980:40), the areas to look for other kinds of PaleoIndian settlements would be the higher terrain surrounding such plains-like areas. Sandia Cave is, of course, located in such terrain.

In the summer of 1980 the Cibola National Forest conducted an archeological survey in the northeastern Manzano Mountains, on the western edge of the Estancia Basin, and found evidence which fits this prediction. PaleoIndian remains reflecting Clovis, Plainview, and Cody occupations were found at an elevation of around 7,400 feet (Garber 1982). The vegetation in the area today is mixed conifer. At the end of the Pleistocene it is likely that the Canadian life zone would have been at this elevation, comprising a forest of spruce, fir, and aspen. With the pattern of desiccation after the Pleistocene, vegetation zones would have gradually migrated upslope. Whatever the precise vegetative characteristics may have been in Sandia times, these remains suggest some diversity in PaleoIndian subsistence.

ARCHAIC

Transition to Archaic

The nature of the transition from PaleoIndian to Archaic remains uncertain. It has been commonly suggested that the Archaic period represents a readaptation to drier climatic conditions, with the kinds of megafauna utilized by PaleoIndians no longer available. The Archaic economy is thought, then, to have been more diversified and generalized than the PaleoIndian one. But, as pointed out earlier, the degree of diversity in PaleoIndian economies remains to be determined.

Cynthia Irwin-Williams (n.d.) has suggested that after the disappearance of the Cody complex, there was no further occupation of the Southwest by Plains-based hunting-oriented groups. She sees no evidence for any direct connection between terminal PaleoIndian and early Archaic populations, nor for the derivation of the later from the former.

In the Arroyo Cuervo region, Irwin-Williams notes that the early Archaic Jay phase (5500-4800 B.C.) differs so greatly in tool kit, settlement patterns, and other elements from the preceding Cody complex that there appears to be no connection between them. Instead, she sees similarities with the contemporary or immediately antecedent San Dieguito/Lake Mojave remains in California and western Arizona. This leads Irwin-Williams to postulate slow demographic movements from the west into New Mexico. In this manner, new populations occupied the territory left empty by the withdrawal of the PaleoIndian groups.

In making her argument, Irwin-Williams assumes, among other things, that western New Mexico was indeed occupied by Plains-based PaleoIndian hunting groups, that lithic tools may serve as indicators of socio-ethnic differentiation, that abrupt changes in lithic assemblages, settlement patterns and the like reflect population replacement, and that hunting and gathering populations do not make rapid, pronounced changes. Although each of these assumptions could easily command a thesis-length discussion, we have already seen that there are substantial reasons for doubting the extent to which PaleoIndian groups were focused on big game. We can also question whether the postulated population movements between the plains and western New Mexico did, in fact, occur.

The subject of PaleoIndian subsistence is crucial to Irwin-Williams' opinions about population replacement at the PaleoIndian/Archaic interface. If PaleoIndian subsistence activities, other than the hunting of big game, did not result in the deposition of diagnostic PaleoIndian points, then the area might give the archeological appearance of desertion during

periods of megafaunal depletion. Furthermore, the dating of J points, whether they were strictly Archaic or were used during the PaleoIndian period as well, is obviously pertinent to this problem.

Lyons has suggested that the PaleoIndian diet was diversified, so that with the depletion of megafauna no major subsistence change was called for, only a minor adjustment in proportions of diet items (1969:172). This is an interpretation with which I am in complete agreement. I find this a more plausible view of PaleoIndian subsistence than the notion that early populations wandered back and forth, between western and eastern New Mexico, on a chimerical quest for disappearing herds of big game, while ignoring the elk, deer, antelope, rabbits, birds, fish, roots, tubers, seeds, and pinyon nuts that virtually fell at their feet.

The Estancia Basin

Sites of the western Archaic, often referred to as the Desert Culture, are well represented in the Estancia Basin (Lyons 1969:62-68). They are found throughout the entire basin, occurring on all sides of the former lake and on the lake floor itself. Lyons identifies Desert Culture sites on the basis of one-hand manos, thin grinding stones, and Archaic points.

Dating of the Desert Culture complexes in the Estancia Basin has suggested intriguing possibilities. Archeological debris from the floor of Lake Estancia establishes use of the area at least around 4000 B.P. But more interestingly, Lyons notes Desert Culture lithic artifacts from the Pinos Mountain dunes and correlative dunes in the southern part of the Basin which might date geomorphologically to around 10,000 B.P. (1969:172). This would place the early Desert Culture complexes in the area coeval with the PaleoIndian occupation. At Tom Pound Ranch No. 1, Archaic artifacts were found made of the types of lithic raw materials most often used by PaleoIndians (Lyons 1969:66-67).

Of course, it is entirely possible that this geomorphological dating is spurious. However, the co-occurrence in other parts of the Southwest of PaleoIndian and Archaic remains has been known for some time (Martin and Plog 1973:65), and so the possibility that this occurred in the Estancia Basin is not to be dismissed lightly.

The question of the dating of J points is obviously pertinent, and deserves reiteration here. While Irwin-Williams (1973) dates them exclusively to the early Archaic, others believe that they originated in the PaleoIndian era (Lyons 1969:68). Honea (1969) has pointed out the morphological similarities between Jay and several PaleoIndian point types, most especially Agate Basin, Hell Gap, and Angostura. Similar observations are expressed by William Roosa (1968:69-71). We must keep in mind, though, that similarity of Archaic Jay points to established PaleoIndian forms does not necessarily indicate technological continuity, since this is a simple point form (Fig. 1) which would require no genius to have been developed independently several times.

Lyons notes little variation in the assemblages of artifacts found in most Desert Culture sites in his area, and infers that the complex underwent little or no significant change over time. He concludes that the Desert Culture represents the most successful adaptation, in terms of longevity, of any of the Estancia Basin complexes (Lyons 1969:172-173).

Lyons addresses the pertinent question: if Desert Culture and PaleoIndian complexes coexisted in the area, what was the relationship between them? The Desert Culture, with its emphasis on plant food processing, could be a seasonal manifestation of PaleoIndian occupation, or a distinct adaptation of a separate population, or a combination of both (1969:174).

Noting the technological uniformity in Desert Culture materials through time, and the comparative diversity in PaleoIndian assemblages, Lyons concludes that this represents evidence of two distinct cultural adaptations, not of activity diversity within a cultural group (1969:174). He reinforces this conclusion by the observation that no sites have been found where there was a direct association between Desert Culture and PaleoIndian artifacts (1969:175). He thus concludes that the Desert Culture and PaleoIndian complexes in the Estancia Basin represent separate cultural groups. Lyons does not acknowledge the alternative possibility, though it should be mentioned, that lack of association between Desert Culture and PaleoIndian complexes may erode confidence in his interpretation that the two were contemporaneous.

The evidence on which Lyons bases his conclusion

of cultural diversity may not, in fact, be quite so supportive. Lyons does admit that his inferences rest on tenuous ground (1969:175). From the contrast between stability in Desert Culture complexes and change in PaleoIndian remains, it does not necessarily follow that two cultural traditions are represented. It is equally plausible to suggest that, if these complexes represent seasonal activity variations, the activities carried out with Desert Culture tools, plant food processing, remained steady, while the hunting activities requiring PaleoIndian tools changed.

I argued previously that PaleoIndian points may have been specialized tools, used for exploiting megafauna, and that this was a rare activity, contributing little to the overall subsistence base. In a portion of the technological repertoire used infrequently, maintenance of stylistic continuity might have been difficult and temporal change hence more frequent. In contrast, in the portion of the technology used for the everyday tasks of gathering and processing vegetal foods, and hunting and butchering small game, stylistic patterns would have been more consistent. It is in this sphere of everyday activities that Desert Culture tools might have functioned. Available evidence does not allow us to discriminate between these alternatives, but the fact that plausible alternatives to Lyons' conclusions can be formulated indicates that it is premature to accept a conclusion of cultural diversity based on the contrast between stable and variable assemblages.

The lack of association between Desert Culture and PaleoIndian assemblages is also a questionable basis for concluding that diverse cultural groups were present. For one thing, this lack of association would seem to suggest precisely the opposite: that distinct populations did not coexist in the area. If such populations did coexist, at least some minimal degree of trade and sharing would be expected, not to mention occasional or sustained imitations of behavior. Indeed, it is inconceivable that two populations could have coexisted in the area for 4000 years without displaying some tendency toward convergent behavior.

Furthermore, if these two complexes do represent different procurement systems of the same population, then lack of association between them is not surprising. To use an analogy from the Puebloan period, one does not expect to find spindle whorls in a pinyon gathering camp, nor milling stones in a butchering locality.

Of course, the relevance of the preceding discussion depends entirely upon the interpretation of contemporaneity between Desert Culture and PaleoIndian complexes in the area. Should the Desert Culture prove to post-date the PaleoIndian occupation, as is commonly assumed in the Southwest, then these questions vanish. Thus, dating of Desert Culture complexes in the Estancia Basin should be a research goal.

Voicing some of the same observations made by Irwin-Williams (1973, n.d.), that there seems to be no similarity between terminal PaleoIndian and early Archaic complexes, Lyons (1969:218-219) proposes that the Desert Culture derived ultimately from the Lower Lithic, which is represented in his study area by the Estancia Complex. He thus characterizes the PaleoIndian tradition as an ". . . evolutionary tangent culminating in a dead end" (Lyons 1969:219). Lyons here makes the crucial assumption that the PaleoIndian phenomenon represents a distinct tradition of socio-ethnic (i.e., cultural) continuity. If, instead, PaleoIndian and Desert Culture complexes represent specialized adaptive poses, then questions of cultural continuity become less meaningful.

Roosa (1968) encountered Archaic occupations at the Lucy site. A number of J points were found, some in association with hearths. Several of these were of the narrow blade variety which he associated with the Archaic Pinto Basin points (1968:69; cf. Wormington 1957:168-169), while others were the broad blade form that resembles Agate Basin and Hell Gap points (1968:71). Complexes which he terms Pinto are found elsewhere in the Estancia Basin (1968:19), and he suggests that the manos and metates found with these are similar to the Chiricahua Cochise and Chiricahua Amargosa II layers from Ventana Cave.

In 1975, Lyons and Switzer reported on the interesting site of Tillery Springs, located about one mile south of the town of Estancia. Remains at the site included San Jose (ca. 3200-1800 B.C.) as well as late Archaic/early Basketmaker and later Puebloan materials. Most significant was a radiocarbon date obtained on mammoth bone of 2050 B.C. $\pm$ 330. Augmenting this date are radiocarbon assessments of 4050 B.C. $\pm$ 200 and 6000 B.C. $\pm$ 300 taken on two samples of

mammoth tusk at the Tom Pond No. 1 site (Lyons and Switzer 1975:318). These dates correlate well with the known recession of Lake Estancia, but do not correlate with the presumed extinction of these megafauna. Thus, Lyons and Switzer suggest that the periphery of the shrinking lake was an area where Pleistocene megafauna survived well into Holocene times (1975:318, 328). It should be kept in mind though, as Martin (1967:98) suggests, that such recent dates may be due to inorganic carbonate replacement, or humic acid contamination.

If these dates are valid, they have potentially significant implications for both PaleoIndian and Archaic subsistence. The implications for Archaic subsistence are evident: with the availability of megafauna well into the Archaic, and with the possibility that Desert Culture complexes extend as far back as 10,000 B.P., then in the Estancia Basin there may have been little difference between PaleoIndian and Archaic subsistence. It should be mentioned that megafauna would have been rare toward the end of their existence in the area, but I have argued that even in the PaleoIndian period they did not constitute a major portion of the subsistence base. The implications for PaleoIndian subsistence are more subtle: if megafauna continued to be available in this area, then it becomes less convincing to argue that the PaleoIndians withdrew from the area around 6000 B.C. for lack of big game.

The Riverine Area

The Archaic occupation of the riverine portion of the overview area has, until recently, been almost totally undocumented. Weber notes remains (1963:228-229) in Socorro County that he assigns to the Chiricahua and San Pedro Cochise. He observes that Archaic populations ranged over river terraces, open plains, mountain foothills, canyons, and high ridges and saddles.

Anzalone (1973) has described remains from rockshelters in San Lorenzo Arroyo, north of Socorro, that seem to date to the late Archaic/early Basketmaker periods. Since the major occupation at these sites appears to have been during the Basketmaker era, they will be discussed in more detail in a subsequent section.

Significant evidence of Archaic occupation has emerged from Marshall's (1982; see also C. Gossett 1984) extensive survey of the riverine area. Very little evidence of Archaic use of the immediate riverine area was found. A major exception, though, occurred along the northern end of the Fra Cristobal range in southern Socorro County. Here a cluster of probable Archaic sites (they exhibited no diagnostic points, but rather slab-basin metates, one-hand manos, and hearths) was found along the river margin in dunes and sandy areas. Marshall (1982) relates this concentration to the presence of Chihuahuan Desert flora and the resource diversity of the adjacent Fra Cristobal range. Other Archaic manifestations were found near Fort Craig, Elmendorf, and San Acacia. Sites of possible antiquity have been located east of the river on the Los Pinos slopes.

Adjacent Areas

To the west of the riverine portion of the study area, in the San Augustine Basin, lies Bat Cave (Dick 1965). This well known Archaic site has yielded the earliest maize in the Southwest, dating to between 4000 and 2000 B.C. In this area, there may have been a pattern of seasonal transhumance between the San Augustine Basin and upland localities in the surrounding mountain ranges (Berman 1979:19, 21-22).

The major research in the Archaic phenomenon in northern New Mexico has been conducted by Cynthia Irwin-Williams in the Arroyo Cuervo region. The Arroyo Cuervo is a tributary of the upper Rio Puerco, located to the northwest of the overview area across the Rio Grande. Irwin-Williams (1973) has sketched a cultural/temporal sequence, termed the Oshara Tradition, for this area that may be of relevance to at least parts of the central New Mexico overview area.

Irwin-Williams (1973) notes a continual pattern of population growth throughout the Archaic in the Arroyo Cuervo region. This spurred repeated cultural changes which may be outlined as follows:

Jay Phase (5500-4800 B.C.). Most sites of this phase are located in sheet sand deposits on cliff tops in canyon heads. These sites are located in proximity to several resource zones, and contain evidence of the full range of seasonal activities. Specialized sites have been found at other locations. The Jay phase was characterized by a mixed-spectrum subsistence pattern which featured year-round exploitation of resources accessible from permanent water sources

(Irwin-Williams 1973:4-5).

Bajada Phase (4800-3200 B.C.). The settlement pattern of the Bajada phase was similar to that of Jay. Despite decreased moisture conditions, there appears to have been a slight increase in population, and archeological sites are more numerous (Irwin-Williams 1973:6-7).

San Jose Phase (3200-1800 B.C.). The San Jose phase witnessed considerably increased effective moisture. The number and reliability of springs increased, and the floral and faunal resource base improved. There is a noticeable increase in the number and size of sites, particularly in the canyon head area. Specialized sites were maintained. Base camp debris becomes more concentrated and extensive. Post hole patterns suggest temporary structures.

Important additions to the tool kit in this phase were shallow-basin grinding slabs, and simple cobble manos (Irwin-Williams 1973:7-9). These imply expansion of the subsistence system to include increased emphasis on seeds and nuts. I have suggested elsewhere (Tainter and Gillio 1980:44) that this shift was probably the outcome of the pattern of continual population growth in the Archaic of this area.

It is during the third millennium B.C. that the Southwest first becomes recognizable as a cultural entity. This entity has been termed the Picosa complex (Irwin-Williams 1967), from the major archeological units which comprise it: Pinto Basin, Cochise, and San Jose. Irwin-Williams (n.d.) suggests that this phenomenon reflects the development of a large-scale, low-level communication network.

Armijo Phase (1800-800 B.C.). The Armijo phase witnessed significant changes in patterns of land use, technology, and seasonal structure. Moisture fluctuated throughout the period, but was generally lower than before. For the first time, limited quantities of maize were grown in the narrow flood plains near canyon head springs. This at first provided only a small increment to the diet.

In most cases the Armijo phase settlement pattern was a continuation of that of previous phases. There was, however, a new settlement type, the first example of seasonal population aggregation. It is best represented at Armijo Shelter, a rockshelter located at a canyon head near the best spring. Paleobotanical and hydrological studies indicate a fall or fall/winter occupation. Items reflecting ritual activities were included in the tool kit. Such items are found only at Armijo Shelter.

Groups of 30-50 individuals, from several social groups, would probably gather at this location in the autumn to participate in their larger-scale social and ceremonial activities. When these were concluded, the populations would disperse to the smaller cliff-top sites (Irwin-Williams 1973:9-11). It has been suggested that the increased social and ritual complexity displayed at Armijo Shelter reflects population aggregation and resource distribution, the purpose of which was to even out variations in harvests enjoyed by individual groups (Tainter and Gillio 1980:45).

En Medio Phase (800 B.C.-400 A.D.)/Trujillo Phase (400-600 A.D.). The En Medio phase represents the first archeological materials in the Arroyo Cuervo region that are recognizable as Anasazi-Pueblo. It is essentially equivalent to developments termed Basketmaker II elsewhere in the Anasazi area. The Trujillo phase is the equivalent of early Basketmaker III.

A regional population increase is evident during these phases, reaching a peak in the first few centuries A.D. A strong pattern of seasonal transhumance developed, with populations traveling farther from base camps to obtain resources. In addition, there was some degree of resettlement on the Albuquerque West Mesa (Reinhart 1967), a locality that is now bleak, waterless, and decidedly marginal. Later, populations on the West Mesa shifted toward the Corrales Valley and practiced an agricultural subsistence base (Frisbie 1967), while corresponding populations in the Arroyo Cuervo region shifted toward wider valley bottoms that were suitable for agriculture. Two major developments during the Trujillo phase were pottery and the bow and arrow (Irwin-Williams 1973:11-16).

The consequences of population growth throughout the Archaic can be clearly seen in this sequence. By the Armijo phase population had grown to the point where maize had become important as a stored winter food. At this point the importance of evening out variations in harvest experienced by individual groups led to fall/winter population aggregations, ritual resource distributions, and increased social

complexity. Yet maize remained only a fraction of the diet. When continued population increases required yet further readaptation, the preferred options were expansion of the settlement system and use of marginal environments. Major reliance on agriculture came only when population had grown to the point that even these strategies were insufficient. The resulting agricultural strategies left the archeological record recognizable as the Basketmaker III period (Tainter and Gillio 1980:48, 99).

The Archaic sequence Irwin-Williams has delineated in the Arroyo Cuervo region may be found to apply (in whole or in part) to the Estancia Basin. Jay points are, as noted, regularly reported from this area. Lyons (1969:222) illustrates a point that appears to fall into the Bajada category. A similar point has been found in the adjacent Manzano Mountains (Garber 1982). San Jose remains were found at Tillery Springs (Lyons and Switzer 1975). Laumbach (n.d.) notes that Oshara Tradition point types have been found in the Cimarron area and near Wagon Mound, in northeastern New Mexico, and may indeed have extended all along the eastern border of the mountains in the northern half of the state. He suggests that Plains Archaic populations occupied the area to the east of the front range zone.

Oshara Tradition points are not the only variety found in the area, however. Points similar to southern forms, known as Cochise, have also been documented in the Estancia Basin (Lyons 1969). Immediately to the north, in the Galisteo Basin, Lang (1977) found that Oshara points had been used during the early Archaic, until perhaps 1500-1000 B.C., at which time Cochise points came to be used. He suggests actual population replacement, with a northward movement of Chochise populations into the area (Lang 1977:17).

Lang's discussion poses intriguing questions, but he has only touched upon an enormously complex problem. Lang assumes that projectile point forms served to symbolically designate socio-ethnic groups, a point worthy of more extended discussion. This issue will be addressed in more detail in the following chapter.

EARLY AGRICULTURAL POPULATIONS

The central New Mexico overview area is one of the least studied parts of the state in terms of early agricultural and pithouse-building populations. Those few investigations which do pertain to this era have been largely fortuitous, concentrating on pithouse sites because they were endangered by one cause or another. Actual problem-oriented research in this period has been minimal. Anzalone's (1973) study in San Lorenzo Canyon is a notable exception.

The Riverine Area

San Lorenzo Arroyo is located on the west bank of the Rio Grande about ten miles north of Socorro. A major archeological site in this drainage is Lemitar Shelter, a rockshelter discovered and tested by C. Vance Haynes and G. C. Shelton in 1952, and more completely excavated by William Weinrod in 1953. Investigation of the site was started again by Ronald Anzalone, whose objective was to study the late Archaic occupation of this region (Anzalone 1973). Lemitar Shelter, and associated nearby sites, are particularly important since they seem to date to the period when middle Rio Grande Valley populations were experiencing a shift of subsistence in the direction of major reliance on agriculture (Irwin-Williams 1973:15-16; Tainter and Gillio 1980:99).

In conducting a survey of the canyon under the sponsorship of Cynthia Irwin-Williams, Anzalone recorded four major occupation sites. These included Lemitar Shelter (ENM 3501), Polvadera Shelter (ENM 3502), Hacienda Terrace (ENM 3503), and Hackberry Shelter (ENM 3504). This last site was excavated by Robert Weber, but no report of his investigations is yet available. Indeed, Anzalone's (1973) M.A. thesis is the only documentation available for the locality, and serves as the basis for the synopsis to follow.

Archeological features in Lemitar Shelter included hearths and cooking pits, storage pits, matting, and bedding (concentrations of shredded and matted juniper bark and grass). Ceramics found in the deposit included 1 sherd of San Marcial B/w, 3 of Casa Colorada B/w, 3 of San Lorenzo R/b, 8 of an unnamed gray neck-corrugated ware, 28 of Lino Gray, 14 of plain brown ware, and 8 of an unnamed plain gray ware. A diversity of time periods are represented here, ranging from Basketmaker III to Pueblo III (Anzalone 1973:102).

The site contained a variety of artifact forms,

seeming to indicate a habitation locus. Anzalone sees the ground stone as being of Archaic types, including irregular, slightly modified hand-stones, and both shallow basin and slab varieties of milling stones. Different portions of projectile points, including tips, bases, and complete specimens, were "equally prevalent" throughout the shelter, and in all excavation levels. Anzalone analyzed stone tools in terms of Wilsen's (1970) three edge angle categories: 26-35 degree (cutting); 46-55 degree (skinning, hide scraping, sinew and plant fiber shredding, heavy cutting of wood, bone or horn, and tool-back blunting); 66-75 degrees (wood working, bone working, heavy shredding, skin softening). He found approximately equal numbers in each category, and concluded that the shelter was a multi-purpose site (Anzalone 1973:101).

A surface collection was made at Polvadera Shelter. The materials present were similar to those found at Lemitar Shelter, including the same variety of lithic materials and artifacts. An analysis of edge angles revealed a preponderance of low edge angle tools (Anzalone 1973:109).

The Hacienda Terrace is an open air site. In surface collections it yielded a single projectile point which Anzalone notes is similar to those from Woodchuck Cave, a Basketmaker II site in northeast Arizona. The remainder of the archeological materials were similar to those already noted at Lemitar and Polvadera Shelter, with a predominance of low edge angles on stone tools (Anzalone 1973:113).

Hackberry Shelter was excavated by Robert Weber, but results of this work are included in Anzalone's (1973:124) thesis. The ceramics from the site, as identified by Weber, include 33 pieces of plain brown ware (said to be of a generalized El Paso Brown character), 15 of Lino Gray, 7 of an unnamed gray ware, 2 of an unidentified carbon paint B/g, 2 of an unidentified non-local glaze B/g, 1 of Elmendorf B/w, 1 of an unidentified B/w, and 1 Rio Grande glaze B/r.

Projectile points recovered at the Hackberry site date relatively late compared to Cochise forms, but some types are large and reminiscent of San Pedro Cochise points. Other points were generally similar to early Mogollon and Basketmaker forms.

A variety of non-domesticated floral resources were recovered at Lemitar and Hackberry Shelters. These are shown below in Table 4. Domesticates included maize and squash (or gourd) in both sites. David Brugge tentatively classified the latter as Cucurbita pepo, Cucurbita moschata, and Lagenaria sp. In analyzing the maize remains, Brugge found an increase in both cob and kernal size from middle to late times. He postulated the arrival of Guatemalan Big Grain maize at Lemitar Shelter by 700 A.D., and grouped the maize within Basketmaker-like types. At Lemitar Shelter a cache of 65 kidney beans (Phaseolus vulgaris) was found in a leather bag in an upper level. No formal analysis of faunal remains was undertaken, but several rodent and deer parts were noted (Anzalone 1973:126-127).

Anzalone compares the projectile points recovered from San Lorenzo Arroyo to equivalent forms elsewhere in the Southwest. Among the comparable point forms Anzalone notes are those of the:

- Pine Line phase (150 B.C.-500 A.D.), western New Mexico;
- Hilltop and Cottonwood phases (A.D. 200-600), Forestdale Valley, Arizona;
- Pre-pottery through San Francisco phase levels at Tularosa Cave (300 B.C.-900 A.D.);
- Proto-Basketmaker from En Medio Rockshelter in the Rio Puerco area;
- Penasco phase (250 B.C.-100 A.D.) in San Simon Valley, Arizona;
- San Pedro Cochise pre-pottery to Mogollon 2 (or later) layers at Bat Cave and Forestdale Valley sites (?-600 A.D.).

Anzalone concludes that the sites would date in the interval between late Archaic and Basketmaker III, about 500 B.C. to 700 A.D., and would correspond to San Pedro Cochise in southwestern New Mexico (1973:130-131). The few later ceramics presumably indicate brief Puebloan use of the locality.

Anzalone characterizes the subsistence adaptation of the San Lorenzo Canyon inhabitants as a mixed hunting-gathering/ agricultural strategy. The presence of cultigens and pottery at the sites indicate an important period of cultural change, a period of perennial concern to Southwestern archeologists. During this crucial episode, San Lorenzo Arroyo inhabitants occupied these rockshelters as year-round base camps from which foraging and crop tending activities took place.

Rope snares found in the cave deposits indicate trapping of small game. Dart and arrow-sized projectile points were present, as were "bunt" points for stunning or killing game without tearing the flesh. Reed and wood fragments of composite arrows were found, some perhaps large enough to have served as spear shafts. Metates were all of the slab or shallow basin types.

A large number of hearths and cooking pits were found at Lemitar Shelter. Two pits lined with slabs, bark, and grass were also uncovered, one of which was filled with Yucca seeds. Anzalone (1973:136) notes that these pits appeared similar to Basketmaker II storage cists, and to features found in Cosgrove's (1947) Hueco Basketmaker caves to the south and southwest. The basketry recovered was also similar to these southern caves (1973:137).

Anzalone discusses factors involved in the selection of settlement locations. He suggests that both water and lithic raw materials would have taken more procurement time than floral and faunal resources. There are nine known springs within two miles of these sites. The chipped stone artifacts were all made of local materials, except for some items made of obsidian, but even this material could be obtained as cobbles from the Rio Grande, about six miles away. The placement of sites, however, may not have been freely chosen, but instead dictated by the availability of rockshelters. Anzalone concludes that the availability of shelter and plant resources were the main reasons for choosing site locations. The Hacienda Terrace site, though, was an exception. This was an open air site, and Anzalone suggests that water and lithic resources may have been among the most important factors in choosing this spot for occupation (1973:20, 139-140).

The botanical data from these sites indicate that mesquite was the most important plant resource,

Table 4

Non-domesticated Floral Materials in Lemitar and Hackberry Shelters[1]

Species	Part Recovered
Lemitar Shelter	
Celtis reticulata (hackberry)	seeds
Pinus edulis (pinyon)	wood(*), nuts
Yucca sp. (yucca)	pods(*), seeds, leaves
Opuntia sp. (pickly pear)	pods(*), leaves
Prosopis juliflora (mesquite)	wood, seeds, pods
Helianthus sp. (sunflower)	seed heads
Phragmites communis (reed)	stalk
Quercus sp. (oak)	leaves, acorns
Juniperus sp. (juniper)	seeds(*), wood, bark
Nolina sp. (beargrass)	leaves
Apocynum sp. (hemp)(*)	fibers
Asclepias sp. (milkweed)(*)	fibers
Dasylirion sp. (sotol)(*)	
Hackberry Shelter	
Yucca sp. (yucca)	seeds, leaves
Quercus sp. (oak)	acorns
Prosopis juliflora (mesquite)	seeds, pods
Celtis reticulata (hackberry)	seeds
Unidentified grass grain	
Horsetail or scouring rush (no species identification given)	

[1] after Anzalone (1973:126).

(*) identification only by Weinrod (1953)

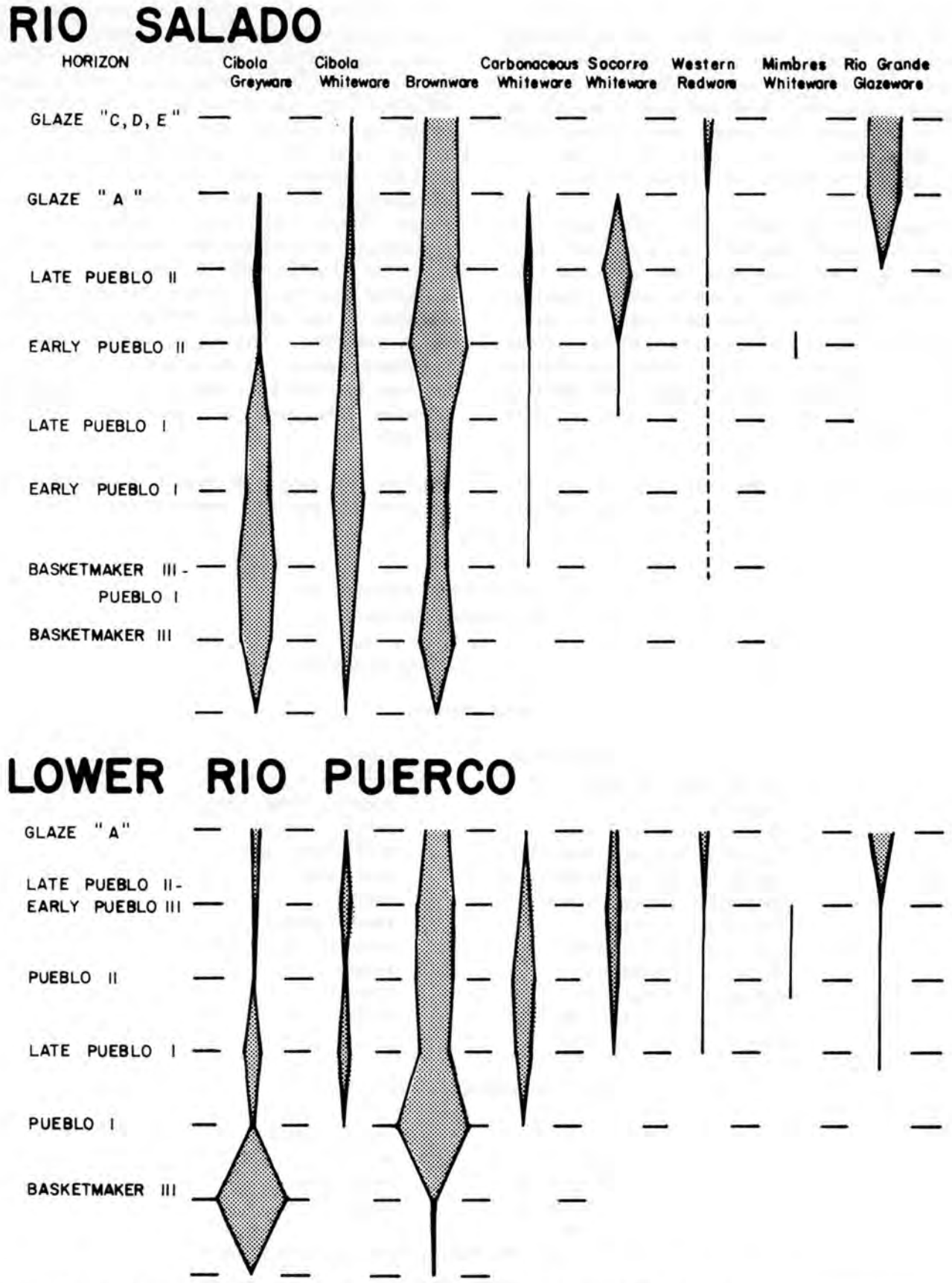


Figure 3. Ceramic ware frequencies of the Rio Salado and Lower Rio Puerco Areas (after Marshall 1980:187). Reproduced by permission of Human Systems Research.

followed by yucca, possibly hackberry, prickly pear, oak, and pinyon. Mesquite is available for human consumption from late June to late August/early September. Hackberry ripens during the same interval. Acorns and pinyon nuts would have been available in the fall, while cactus fruits and seeds could have been collected in the spring. No evidence for these last was found, however. Coupling the availability of plant foods with the diversity of artifacts and features, Anzalone suggests the possibility that these sites were occupied as permanent, year-round base camps. He believes these populations were organized as bands, that is, small, independent, egalitarian groups (Anzalone 1973:140-141).

A rockshelter which may contain deposits dating to the same period as the San Lorenzo sites is Sandal Cave, first recorded by M. R. Harrington (1928). It is located in a canyon 22 miles south of San Marcial. The cave contained pictographs, perishables (including sandals), and both black-on-white and red-on-black pottery. A preceramic stratum lay underneath the levels bearing pottery. Cosgrove (1947) included the area of Sandal Cave in his "Hueco Basketmaker" formulation, a term which he applies to archeological remains showing a variety of common characteristics in the upper Gila and Hueco areas of southwestern New Mexico and adjacent parts of Texas and Mexico.

In a recent archeological survey of the lower Rio Puerco and Rio Salado drainages, just outside the northwest corner of the overview area, some Basketmaker sites were found displaying pithouses, jacal structures, pueblitos, possible tipi rings, and debris scatters (Wimberly and Eidenbach 1980:89). These finds suggest a greater range of architectural variation than previously had been thought to characterize the period. Marshall (1980) has classified the ceramics found during the course of the survey. The results of his analysis are shown in Fig. 3. Most interesting in the Basketmaker III period is the clear dominance of gray wares over brown wares in the lower Rio Puerco sites, contrasted against their more balanced representation along the Rio Salado.

East of the riverine area, in the northern Jornada del Muerto, a set of five pithouses was located by Agogino and Weber (1970) at the Mockingbird Gap site. One of these was excavated, but no report on it has been issued.

Marshall has developed a cultural/temporal synthesis for the Socorro area which attempts to correlate known Socorro area remains with the Jornada Mogollon sequence established by Lehmer (1948). Marshall 1973:50) proposes the correlation shown below.

Table 5

Marshall's Correlation of Archeological Phases in Socorro and Jornada Mogollon Areas

Socorro	Temporal Range	Jornada Mogollon
San Marcial	800-1100 A.D.	Mesilla
Early Socorro	1100-1200 A.D.	Dona Ana
Late Socorro	1200-1400 A.D.	El Paso

Only the San Marcial phase is of interest at this point. (And in any event Marshall has since modified this scheme, as will be discussed below.) The San Marcial phase is characterized by pithouse villages with an indigenous brown ware which is probably similar to Jornada Brown. San Marcial B/w is a local version of White Mound B/w, and reflects the Anasazi ceramic tradition. Intrusive ceramics include Mogollon R/b, Alma Plain, and San Francisco Red. Marshall (1973:52) suggest that these indicate considerable contact with the western Mogollon.

The San Marcial phase is the earliest sedentary riverine occupation in the overview area. As part of his recent survey, Marshall (1982: Marshall and Walt 1984) delineated a concentration of Basketmaker III sites (San Marcial phase) in the Fra Cristobal area where a cluster of Archaic sites had also been found, and postulated in situ evolution from this Archaic base. These settlements tended to be small, averaging 4.1 non-contiguous house units per site, with a range from one to eight. Marshall and Walt (1984:35) suggest that the San Marcial sites were each occupied by a single lineage. The architecture of these sites patterns distinctively. Pit structures have been found only west of the river, masonry-based jacals east. Marshall and Walt note that this pattern could reflect either temporal, functional, or cultural differentiation. They date the San Marcial phase at ca. 300 - 800 A.D.

There is no evidence on these sites of public architecture or intercommunity organization. Populations, which may have been smaller than the

Archaic occupation of the area, were probably seasonally mobile, using the upland resources. Marshall and Walt feel that this was especially the case early in the phase.

Plain brown wares dominate these sites, while the east bank settlements rarely produce San Marcial B/w. San Marcial is the only Basketmaker III white ware in apparent indigenous association with a Mogollon brown ware complex, and it seems to occur only in the Fra Cristobal-Black Mesa area. Early agricultural populations seem to have otherwise avoided the riverine area, settling instead in upland, lateral drainages such as San Lorenzo Arroyo (Anzalone 1973) and the Salado and Puerco drainages (Wimberly and Eidenbach 1980). In the Salado drainage, no sites that would be assigned to the San Marcial phase were found in a substantial sample of Basketmaker III sites (Marshall 1980, 1982; Marshall and Walt 1984:34-35).

The Upland Area

As part of the Gran Quivira Mound 7 excavation project, Thomas Caperton (1981) conducted an extensive archeological reconnaissance of the Gran Quivira area. The area of this survey included all of Chupadera Mesa from 35 degrees 15 minutes north latitude to U.S. 60 at Abo Pass, east across Jumanes Mesa, and south to the foothills of the Gallinas Mountains. The method of survey was to interview local ranchers concerning the location of sites. Since this is a highly biased method of data recovery, it is no surprise that only ceramic sites were recorded.

A very general cultural/temporal sequence was developed by Caperton for the area based on architectural manifestations. Three cultural periods for Chupadera Mesa area were delineated as shown below:

Pithouse Period	800-1200 A.D.
Jacal Period	1175-1350 A.D.
Masonry Period	1300-1675 A.D.

The Pithouse Period in the Gran Quivira area, the only period I will discuss here, is characterized by a predominance of brown wares. Much of the pottery (65%) is Jornada Brown, with smaller percentages of various black-on-white varieties.

In the southern part of the survey area, black-on-white types included Puerco, Socorro, Chupadero, Casa Colorado, and one sherd of Mimbres Bold Face. San Andres Red-on-terracotta is also found in the south.

Around Jumanes Mesa in the north a variety of black-on-white types common to the southern area were found. These included Puerco, Socorro, Chupadero, and Casa Colorado. Other types of black-on-white found only in the north were Red Mesa, San Marcial, and Kiatuthlanna. The absence of San Marcial B/w from the south is surprising, and may reflect only sampling error. Other ceramics present in the north were Wingate B/r and one sherd of Lino Gray.

Caperton suggests that the trade wares found on these pithouse sites range between 800 and 1200 A.D. He notes a greater degree of outside contact on Jumanes Mesa than in the southern part of his survey area, although the possibility of sampling error should be kept in mind. The southern pithouse sites may have lacked access to reliable water sources.

Two excavated pithouse sites have been reported from the area. The earlier of these was discovered during pipeline construction, and excavated by Franklin Fenenga (1956) and Earl Green (1955). The latter worked under the auspices of the Museum of Texas Technological College. This site was located a few miles northwest of Gran Quivira National Monument. Pithouses and storage pits were found at the site.

Fenenga (1956:232) found the following ceramic assemblage in his excavations: 63.6% Jornada Brown, 6.0% Alma Plain, 0.9% mud paste ware, 0.2% Three Rivers Terracotta, 0.6% Glaze A red, 0.2% Glaze F red, 15.6% Lino Gray, 8.4% "Pink" Lino, 1.5% Lino Fugitive Red, 1.0% San Marcial B/w, and 2.3% Tabira B/w. Based upon the dominant occurrence of Jornada Brown and Alma Plain, Fenenga characterizes the occupation as Mogollon, although the Lino types indicate close contact with Anasazi populations. The Three Rivers Terracotta, the glazes, and the Tabira B/w indicate later camps at the site. The San Marcial B/w suggests contemporaneity with Basketmaker III populations in the Rio Grande Valley.

Green's (1955) analysis of the ceramics recovered from his excavations at this site indicated 127 pieces of Jornada Brown, 11 of Lino Gray or Kana-a Gray, 12 other brown wares, and 10 unidentified. He places the occupation around

600 or 700 A.D., with 900 as the latest possible date. Vivian (1964:143) prefers this later date.

A much later pithouse manifestation located at Gran Quivira was reported by Ice (1968). The ceramics associated with it suggest that, chronologically, it would fall into Caperton's Jacal period, and so it is discussed in the next section.

A recent survey of the Gran Quivira unit (Beckett 1981) revealed a substantial pithouse occupation. Gran Quivira apparently sustained a large population even before the pueblo was built.

One other site in this area displaying possibly contemporaneous pithouse and surface architecture is Taylor Draw (Peckham 1976). Since the majority of the architecture at this site seems to fall more appropriately into Caperton's (1981) Jacal Period, it will be described in the next section.

EARLY PUEBLOAN POPULATIONS

The Riverine Area

In 1973, Marshall termed the early puebloan period in the Socorro area the Early Socorro phase, and proposed that it was temporally equivalent to the enigmatic Dona Ana phase of the Jornada Mogollon area (ca 1100-1200 A.D.). As of the time of Marshall's synthesis no sites of this period had been excavated in the overview area, and to my knowledge, none have been as of this writing.

During this period, the use of indigenous brown wares continued, but not San Marcial white wares. The ceramic assemblage indicates continued association with Anasazi and western Mogollon populations. Oval to rectangular surface rooms, probably in association with pit rooms, have been noted. Later in the period Socorro white wares appear. Like the preceding San Marcial white wares, these represent a southeastern variety of Chaco white wares.

Mera (1935, 1943) sees no connection between San Marcial B/w and Socorro B/w. He suggests that the latter is most closely linked to his Chaco 2 variety (Mera 1935:27). Socorro B/w forms a complex with Pitoche Rubbed-ribbed and Los Lunas Smudged (Mera 1943:11). Mera views this last as a version of the southern brown wares (1935:28).

Based upon the results of his recent survey, Marshall (1982; Marshall and Walt 1984) has revised his earlier chronology, terming the Pueblo I period the Tajo phase. He dates its inception to around 800 A.D., and its termination to around 950 to 1000. At the beginning of this period there was considerable colonization of the riverine area. Marshall notes that this colonization corresponds with a more general trend toward the population of lowland areas, and with Stuart and Gauthier's (1981:411) "Basin Classic Era." He suggests that it may have resulted from population pressure and/or habitat deterioration in the uplands, or from development of water control technology (Marshall 1982).

In the riverine area, the first substantial Pueblo I occupation appears in the north, near the Rio Salado confluence, while use of the San Marcial area was limited. Tajo phase settlements tend to cluster on the eastern benches in the La Joya and San Acacia areas, but are occasionally found south to Carthage Arroyo. The concentration near the Salado confluence is of interest since it is related at least geographically to the earlier and contemporary populations farther up the drainage.

Tajo phase sites are small hamlets of one to ten surface rooms, with occasional pit structures. Most are single tier, linear rows of cobble-based jacal, but some masonry-based jacal and full height masonry structures are also present. There is an average of about five rooms per site, and two rooms per room block. Sites are located consistently on gravel bench margins in the riverine area. No Great Kivas have been observed, but there is one elevated enclosure that is possibly defensive or ceremonial in nature. Population of the riverine area is estimated by Marshall and Walt at 500 to 1000 persons.

Marshall concludes that there was no native white ware industry at this time. Tajo ceramics are mainly Mogollon-affiliated Pitoche brown wares with intrusive Cibola white wares. Red Mesa B/w is common. Occurring in lesser quantities are Cibola gray ware, Mimbres white ware, and Elmendorf white ware.

The Cibolan wares present are of the classic Plateau variety. Early Tajo sites display only the Red Mesa styles. Later, the Gallup and Puerco-Escavada styles are also present. Lino

Gray and Kana'a Neckbanded represent the Cibolan gray wares. Early in the phase there is more of this gray ware up the Rio Salado compared with the Rio Grande, but less difference between these areas in the later Tajo phase. Marshall infers from this trend the early co-residence of Anasazi and Mogollon populations in the area, with later Anasazi withdrawal (Marshall and Walt 1984:47-49).

Marshall terms the local Pueblo II period the Early Elmendorf phase. He places its inception around 950 - 1000 A.D., and its end about 1100 (1982; Marshall and Walt 1984). During this period, Marshall notes, the differentiation of the Socorro (western plateau margin), Elmendorf (riverine, evolving from the Tajo phase), and Cedarvale (eastern margin) ceramic traditions apparently took place.

As with all prehistoric occupations of the area, there was a decided preference for the east river margin. Early Elmendorf sites are distributed from the lower Rio Puerco south to Bosque del Apache. Settlement extended into areas that were relatively unused in Tajo times. Structural sites tend to be found on riverine gravel benches, non-structural ones on sandy benches or riverbank locations. Pueblos are similar in construction to those of the Tajo phase, but evidence increased aggregation. There are several village concentrations. Marshall and Walt discern two size ranges: small sites with one to nine rooms and a mean of 4.5, and large sites with 31 to 67 rooms and a mean of 54. Only 9 of 70 room blocks have 10 or more rooms. Small room blocks range from one to six rooms, with a mean of 2.2. Large room blocks range from 1 to 20 rooms with a mean of 4.5. Linear room blocks, like those of the Tajo phase, are still present, but L-, U-, and F-shaped structures also occur. Pit structures are common.

The formation of larger, aggregated villages of 50 to 100 persons suggests to Marshall and Walt a major change in social organization. They postulate increased social, economic, and ritual organization among the Early Elmendorf population.

The Early Elmendorf phase is characterized by a local white ware industry including Casa Colorado, carbonaceous white ware, and Southern Kwahe'e. Although traditionally linked to Chupadero white ware, this is more likely, Marshall and Walt argue, a local development.

The Pitoche brown ware of this phase is similar to Tajo. Intrusives include Chupadero B/w, Cibola white ware, traces of Mimbres, and some Cibola gray wares (Marshall and Walt 1984:75-78).

In Los Alamos and Palo Duro Canyons, between the Rio Grande and the Los Pinos Mountains, a number of Pueblo I and II farming sites have been located. Those in Los Alamos Canyon were discovered by Shiner and Lark (1954) during a pipeline survey. They suggested that several of these sites, which yielded Red Mesa B/w, date in the interval 950-1050 A.D. (Shiner and Lark 1954:14). One of these, when excavated, was found to contain rectangular rooms outlined by upright stone slabs, indicating jacal construction. Shiner and Lark (1954:15) propose that the sites were seasonal farmhouses. In a recent visit, Laumbach (1980) generally concurred with the dating and seasonal interpretation.

In 1981, Joseph Winter of the Office of Contract Archeology conducted test excavations at these sites (Hogan and Winter 1981). Again, the dating and seasonal use were confirmed. Both corn remains (Toll 1981) and corn pollen (Clary 1981) were found. Ceramics at these sites were predominantly brown wares, supplemented by Cibola white wares that were probably imported (Marshall 1981).

Sevilleta Shelter, in Palo Duro Canyon, was another Pueblo II farming site, reused in the 17th century (Winter 1980). Both it and the Los Alamos Canyon sites may also have been used for hunting, wild plant gathering, and stone tool manufacturing. The ceramics, analyzed by Michael Marshall (1980c), include a mixture of Mogollon brown wares and a southern version of the Anasazi Kwahe'e white wares. These sites east of the Rio Grande thus join sites west of the river in displaying mixed Anasazi and Mogollon ceramic assemblages (Wimberly and Eidenbach 1980).

Sevilleta Shelter and the Los Alamos Canyon sites, taken together, suggest summer farming of the canyons west of the Los Pinos range during the Early Elmendorf phase. Early pueblo sites have also been found against the base of the Los Pinos Mountains (M. Marshall, personal communication). It appears at present, though, that Pueblo III populations did not maintain such farming sites in this area (Hogan and Winter 1981).

The Late Elmendorf phase is roughly coeval with

Pueblo III, ca. 1100 - 1300 A.D. The nucleated villages of Early Elmendorf coalesced into large, fortified sites. Cobble-based jacals and pit structures continued in use, but masonry construction became increasingly frequent. At one site masonry was used for outside defensive walls, jacal for interior plaza-facing partitions. There is little midden at most of these sites, suggesting brief occupations. Most masonry buildings display from 22 to 54 rooms, but one contains about 150. Marshall and Walt (1984) estimate the regional population at 1000 to 1500 individuals.

There was increased variety in site form, with most sites showing some tendency toward plaza formation. No upland components are known. While isolated small hamlets and nucleated villages continued on exposed, open benches, there is a decided trend toward settlement of elevated, defensible buttes, knolls, and benches along the river. There is a 76% increase in the total number of rooms from Early to Late Elmendorf, and a 98% increase in total roofed area. Much of this no doubt reflects population increase, but there may also be some covering of Early Elmendorf sites. Marshall and Walt relate the defensive settlement pattern and apparent increased social integration of the Late Elmendorf phase to the regional unrest of the times. This was the period of the Chacoan collapse, and of migration and regional depopulation in a vast area from the northwest to the west to the southwest of the Rio Abajo.

Ceramically, the Late Elmendorf period is characterized by a continuation of the Pitoche brown wares and Elmendorf white wares. Intrusives include Chupadero white wares, Cibola white wares, and Socorro white wares. Cibola gray wares constitute less than 2% of the sample. White Mountain red wares are present, especially St. Johns Polychrome (Marshall and Walt 1984:95-98).

At the Tajo 2 pithouse site, located on a river terrace a short distance southeast of Socorro, Weber (1973a) found close architectural parallels with late pithouse sites in the Rio Grande Valley to the north. At Tajo 2, however, Weber found a greater number of textured culinary brown wares in the Mogollon tradition, while the Albuquerque area pithouses displayed more Anasazi characteristics. In what he terms a "small selected collection" taken from the surface of the site, Weber (1973a:19) found 14 sherds of Elmendorf B/w, 5 of Chupadero B/w, 3 of St. Johns Polychrome, 2 of McElmo B/w (Chaco variety), 1 of a Tularosa B/w variety, and 1 possible piece of Cebolleta B/w. These ceramics were identified with the assistance of Stewart Peckham. An occupation extending possibly into the late 1200s is seemingly indicated (Weber 1973a:19). Such a late date for pithouse use would duplicate the pattern in the Albuquerque area (Cordell 1979:43-44), and in the Gran Quivira region.

Another relatively late pithouse site, located just north of the overview boundary near Belen, was reported by Ferdon and Reed (1950). Surface sherds included one smudged interior brown ware, one light gray corrugated, one Wingate B/r, two Chupadero B/w, one Tularosa B/w variety, and four indeterminate B/w (but resembling Socorro and Chupadero B/w). In the fill of one pithouse were found five B/w sherds comparable to Santa Fe B/w, one Los Lunas Smudged, and three brown corrugated (Pitoche Rubbed-ribbed variety). Ferdon and Reed (1950:41) place the site in the Pueblo III period, around 1200 A.D.

In the lower Rio Puerco and Rio Salado areas, Wimberly and Eidenbach (1980:89) record debris scatters and pueblos of varying sizes during the Pueblo II period. Many of these pueblos display masonry construction, but one possible jacal was recorded.

Marshall's (1980) analysis of the ceramic assemblages (Fig. 3) reveals a dominant percentage of brown ware along the lower Rio Puerco, with carbonaceous white wares reaching a peak. Cibola gray wares and white wares were minor components, while Socorro white wares were increasing in frequency. Along the Rio Salado Marshall found the same dominance of brown wares, decreasing proportions of Cibola white wares, and minor amounts of other varieties. These projected trends must be viewed as tentative since, although Marshall (1980:165-166) attempted to minimize bias in his collection procedure, his sample sizes were often small.

Stewart Peckham (1976:56-57) has pointed out that the area from Socorro to Truth or Consequences shows consistent ties to the Mimbres region in the form of a fine paste, polished brown ware that carries on into the Alma Plain tradition. He suggests that the occupants of the Socorro-San Marcial district were the donor population for the settlement of the northern Jornada del Muerto and Chupadera Mesa.

The Upland Area

The early pueblo period in the Salinas Province and adjacent areas is characterized by jacal construction (Caperton 1981), although late pithouses are known (Ice 1968). This period is here called the Jacal Period for the sake of convenience and may roughly date between 1175 and 1350 A.D. There is some evidence at the Taylor Draw site that jacal construction in southeastern Socorro County may date somewhat earlier. Jacal construction, furthermore, continued in use at later, masonry sites in the area.

In his survey, Caperton (1981) found that villages of this period contained from 1 to 10 rooms per house unit, and from 1 to 50 house units per village. House units occurred in I, L, F, and E shapes, but most often in the first two. Village axis generally ran north-south, with extensions toward the east. No standard village plan is evident.

Ten single component jacal sites were recorded. Three of these were clustered in the northwest part of Chupadera Mesa, leading to Abo Pass. The remainder were located in the southern portion of Caperton's survey area. Caperton found no jacal sites in the area of Jumanes Mesa, but a more recent survey has located a village of this kind on the Cibola National Forest.

In the northwest section one site yielded 17 sherds, of which 13 were Jornada Brown, 2 Chupadero B/w, 1 Lino Gray, and 1 unidentified. The remaining two sites contained lower percentages of brown wares. Corona culinary ware was present at both. One piece of Santa Fe B/w was the only trade specimen.

The southern villages tend to be larger. Trade wares at these were more diversified, including Wingate B/r, Socorro B/w, Red Mesa B/w, Klagetoh B/y, San Marcial B/w, Mancos B/w, San Andres Red-on-terracotta, Pilares Banded, Los Lunas Smudged, Cebolleta B/w, St. Johns Polychrome, Heshotauthla Polychrome, Santa Fe B/w, Galisteo B/w, and Poge B/w. The trade wares indicate a temporal range of 1175-1350 A.D., and suggest social and economic interaction with populations to the north and west, rather than to the south.

Corona Corrugated first appears in the Jacal Period, averaging 7% of all sherds. Corona Plain averages 2%. Jornada Brown decreased from 66% in the Pithouse Period to 17%, while Chupadero B/w increased during the same time period from 6% to 30%.

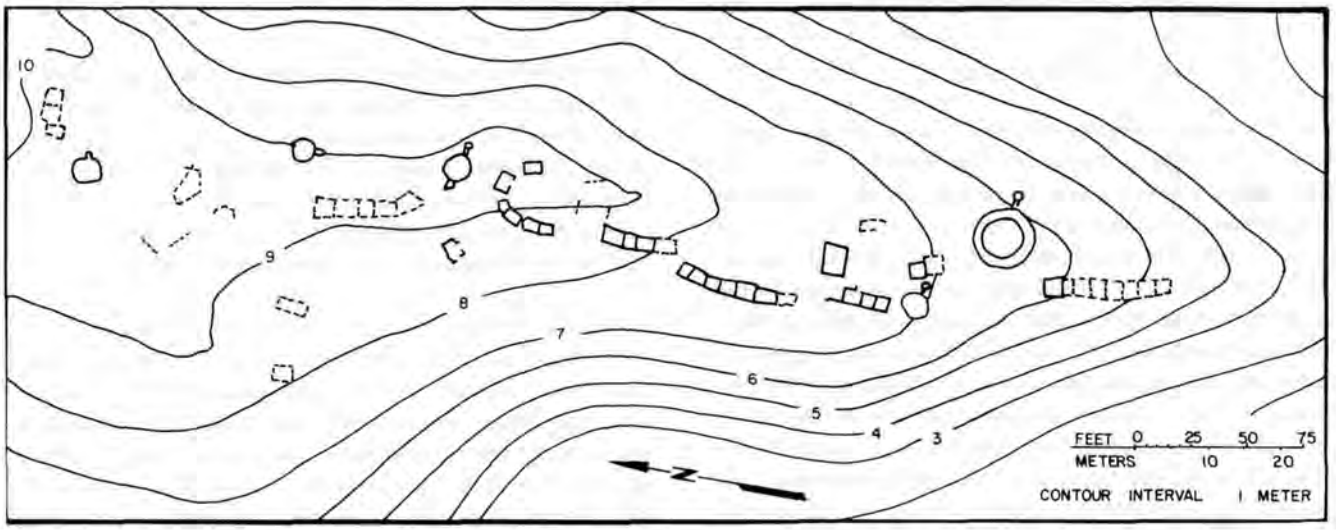
Defense seems to have become more important during the Jacal Period. Four of ten single component Jacal sites were on ridges; others were placed in the same locations as later masonry sites. Caperton believes that these latter sites were in defensive locations.

Late in the Jacal Period an intermediate type of construction came to be used. Crude masonry footings were employed, or stones were added to adobe to form conglomerate walls.

In 1953 and 1954 Stewart Peckham conducted a limited survey and excavation project at the southern end of Chupadera Mesa in order to gain chronological information for the northern Jornada area. As part of this project he excavated the Taylor Draw site (Peckham 1976), located in the southeastern section of the central New Mexico overview area. Portions of the site may fall into Caperton's Jacal period, at least architecturally, although the dating leaves open the possibility of assigning part of the occupation to the Pithouse Period.

Taylor Draw was one of several sites found during Peckham's survey which displays the same surface characteristics: arcs or straight alignments of contiguous surface rooms outlined with upright sandstone slabs, polished or well-smoothed brown wares, occasional sherds of Red Mesa B/w, and chipped limestone debris. Taylor Draw (LA 6565) was the largest of these sites. It was chosen for excavation because of the association of brown wares with Anasazi ceramics and architecture (Peckham 1976:37).

The site contained seven clusters of slab-lined surface rooms arranged in arcs or straight, single tiers. Four pithouses, a kiva, and 22 surface rooms were excavated (Map 6). Interior features of the pithouses consisted of stone clusters and alignments around the perimeter of the structure, hearths, ventilators, and ladder holes. The surface rooms had inside and outside hearths, as well as outside post holes. Some of these latter features may have been ramadas. Maize was found in association with rooms, as were manos, choppers, hammerstones, scrapers, polishing stones, bone awls, a pottery pipe, a pottery scoop, and several projectile points. The kiva was the only structure of this kind found along Taylor Draw.



Map 6. Taylor Draw site, LA 6565 (after Peckham 1976:40).

A number of tree-ring dates were obtained. None of these were cutting dates, but the readings were so consistent as to indicate that the site was occupied for about 50 years in the late 900s/early 1000s A.D. This is within the time range of the intrusive Red Mesa B/w, and is not substantially at variance with intrusive Mimbres pottery. The available dates, however, came from the pithouses. No suitable specimens were found in the surface structures. Thus, contemporaneity between the two types of structures cannot be absolutely demonstrated (Peckham 1976:50).

Plain brown wares constituted 90 to 100% of the sherd samples from Taylor Draw. Most of these sherds do not resemble either El Paso Brown or Jornada Brown, but instead are similar to Mera's Coarsened Alma. Some might be classified as San Andres Red-on-terracotta. Intrusive brown wares included a few sherds of El Paso Brown, an unnamed plain corrugated ware, and Three Circle R/w. Somewhat more common, but still rare, was Mimbres B/w. This, coupled with the absence of Mangus B/w, may reflect reoccupation after abandonment of the settlement (Peckham 1976:51).

One of the pithouses at Taylor Draw, Feature 17, displayed Rio Grande characteristics, and was similar to Green and Fenenga's pithouses near Gran Quivira. The other pithouses at the site were not Mogollon in character. The kiva, Feature 22, has no known architectural counterpart in the Rio Grande Valley (Peckham 1976:58-60).

Peckham concludes that comparative data are too scanty to reach a definitive cultural/temporal synthesis of the site. The title of his report, however, which suggests that Taylor Draw might be characterized as "A Mogollon-Anasazi Hybrid," may convey some notion of his interpretive leaning (1976:37, 62).

At the late pithouse manifestation at Gran Quivira reported by Ice (1968), two pithouses and four surface rooms were excavated. The walls of the surface structures were made of puddled adobe with some stone, in contrast to the later occupation at Gran Quivira which used limestone masonry. The pithouses and surface rooms were essentially contemporaneous. No Glaze A ceramics were found in either. The presence of Wiyo B/y and Heshotauthla Polychrome in the pithouses dates their use to the late 1200s.

One small pithouse, rounded in outline with square corners, measured 7.25 x 8.25 ft., and included a hearth, an ash pit, and four postholes. A second, rectangular pithouse measured 7.0 x 9.3 ft. These differed substantially from the earlier pithouses reported by Green (1955) and Fenenga (1956), which were large and circular.

The results of Beckett's (1981) survey of Gran Quivira, and Ice's (1968) excavation of these late pithouses, indicate that Gran Quivira sustained a large number of people, and may have been a population center, before the masonry pueblo was built. The late date for Ice's pithouses suggests that the transition to masonry architecture occurred rapidly at this site.

The Riverine Area

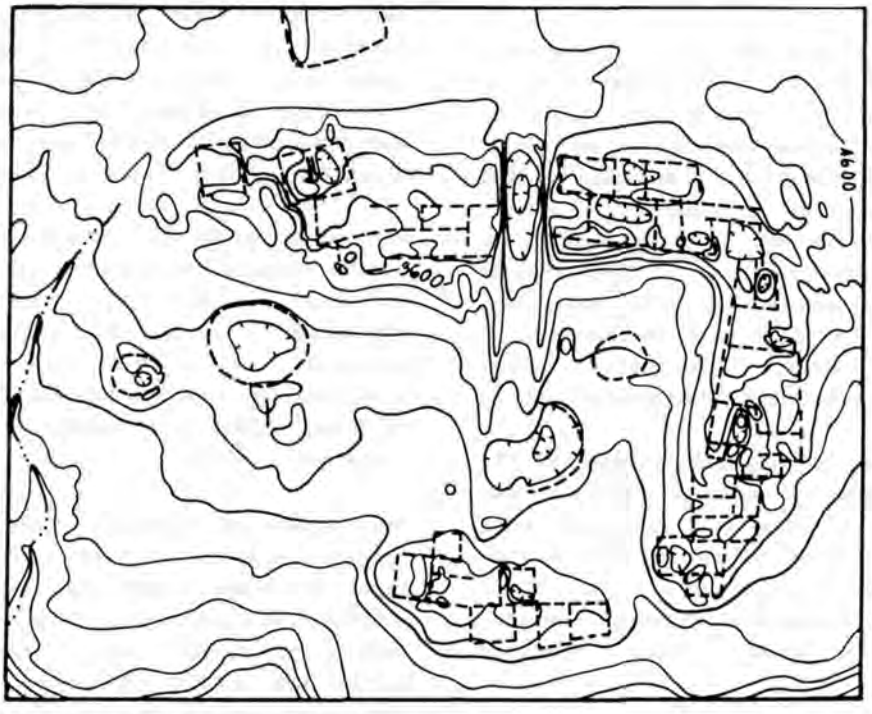
As with earlier time periods, little is known about the late Puebloan occupation of the riverine area. This situation may be resolved somewhat within the next few years. Dr. Linda Cordell of the University of New Mexico, in a joint UNM-Bureau of Land Management project, has recently conducted excavations at a badly vandalized ruin (LA 282), that has been suggested to be the historic Piro site of Teypama (Map 7) (Earls 1981). Stuart Baldwin of the University of Calgary has conducted documentary studies of Piro sites as part of his doctoral dissertation research. Marshall's (1982) survey in the area provides us, again, with a major source of knowledge.

Early surveys in the Socorro riverine area were conducted by Mera (1935, 1940a, 1943) and Yeo (n.d., 1948). Mera (1935) suggests that west of the Rio Grande Valley there are no pottery types derived from Socorro B/w. Within the overview area, though, he suggests two: Casa Colorado B/w in the valley and Chupadero B/w east of the valley. Mera describes Casa Colorado as being characterized by smoothing of undecorated surfaces, while Chupadero undecorated surfaces were roughened. Otherwise, he finds the two indistinguishable.

In a general survey of the Socorro riverine area, Yeo (n.d.) found numerous small house sites, camps, village sites, and rock art panels. He notes trade wares originating in central Chihuahua, the upper Gila Valley, the Little Colorado area of Arizona, the Galisteo Basin, and the Three Rivers area of the Tularosa Basin.

Marshall (1973:50, 52) initially termed the interval from 1200-1400 A.D. in the riverine area the Late Socorro phase, and correlated it with the El Paso phase of the Jornada Mogollon sequence. One excavated site pertaining to this period, LA 2569, lies on the lower Rio Puerco a few miles northwest of the overview boundary (Fenenga and Cummings 1956b). This site consisted of jacal rooms in both oval and irregular shapes, and rectangular rooms with coursed adobe or, rarely, masonry. A definite plaza was present. Indigenous ceramics included Pitoche Brown ware (Plain, Rubbed, Ribbed, and Smudged) and Socorro white ware. Intrusive ceramics were Lino Gray, Escavada B/w, Wingate B/r, and St. Johns Polychrome. There were minor quantities of Chupadero B/w.

Based on the results of his more recent survey Marshall identified a phase that he terms the Ancestral Piro. He places it between 1300 and



Map 7. LA 282, a Late Piro Pueblo.

1540 A.D., the latter date marking the Spanish entrada. It reflects, he suggests, both indigenous descendants of Elmendorf populations and recent immigrants. Characteristics of the Ancestral Piro phase include: (1) dramatic population increase, perhaps 7 times the Late Elmendorf level, (2) aggregation into large, plaza-type villages, (3) expansion into riverside areas that were previously unoccupied, and (4) prevalence of puddled adobe architecture.

Local population growth and immigration precipitated the establishment of fortified 14th century settlements. These are located on butte-top pinnacles, elevated benches, low benches, riverbank locations, and within lateral drainages. The Ancestral Piro phase witnessed the first substantial settlement of the southern riverine area since the San Marcial phase, and the first major expansion to the west bank. Settlements existed on the Rio Salado. Sites tend to be regularly distributed, in contrast to the Tajo/Elmendorf concentrations, and are often paired on the east and west river banks.

Site structure became standardized, with room blocks arranged around a plaza. Fourteenth century sites average around 100 ground floor rooms (range 60 to 122). Fifteenth century sites are fewer but larger, with from 200 to 600 ground floor rooms. At the extremes, there are small hamlets with 10 to 12 rooms, and one site with 1500 rooms and an estimated 2000 people. Often a kiva-like pit structure is found in the plaza.

The 14th century dislocation was at some point apparently resolved, for 14th century defensive settlements give way to larger, lower elevation 15th century pueblos. There is a population shift during this latter century to the southern riverine area, a fact that Marshall relates to the development of water control. Population of the Rio Abajo peaked in the years just before Spanish diseases and policies decimated the native settlements. Marshall estimates a 15th century population of 7500, a figure not reached again until the mining boom of the 1880s.

The ceramics of the period saw revolutionary developments. The local Pitoche brown wares and Elmendorf white wares were succeeded by the Rio Grande glaze ware and gray ware traditions (Marshall 1982; Marshall and Walt 1984:135-137).

The succeeding Colonial Piro phase, from 1541 to the abandonment during the 1680 Pueblo Revolt, marks the period of Spanish entrance and domination. There was a substantial population decline, and a drop in the total number of pueblo rooms. Ten Ancestral Piro villages continued to be occupied, nine were abandoned, and nine new ones were established. There was a slight increase in the west bank population, a reduction in the Rio Salado population, and the establishment of two upland pueblos near Magdalena. Marshall feels that these last may have housed from 1/4 to 1/3 of the Colonial Piro population. Since they are not mentioned in the pre-Revolt Spanish literature, Marshall suggests that Spanish domination might have been restricted to the river valley (1984b:256). As will be seen shortly, a similar pattern is also evident east of the riverine area.

Marshall notes two settlement types in the Colonial Piro phase. These are (1) large plaza communities of Ancestral Piro form, with large, square rooms built of adobe bricks laid out in grid-like fashion on masonry footings, and with a chapel/church and associated compounds, and (2) smaller, 8 to 36 room pueblos of variable form called the "Colonial" style.

Ceramics of the period include Glaze E and F variants, plain Rio Grande gray wares, and some Tabira, Jemez, and Tewa white wares. Imports include majolica, Mexican earthen wares, and china (Marshall 1982; Marshall and Walt 1984:138-141).

Northwest of the overview area, Gossett (1980) recently conducted a study of lithic assemblages along the Rio Salado and lower Rio Puerco, in which four distinct patterns were found.

Pattern 1 consisted of sites with high percentages of unutilized flakes, and low percentages of unutilized angular fragments, cores, hammerstones, and utilized flakes. These appear to have been places where primary reduction was a major activity.

Pattern 2 sites displayed equally high amounts of unutilized flakes and rejuvenation flakes. A moderate percentage of unutilized angular fragments were present. There were low percentages of utilized tools, cores, and hammerstones. These appear to have been locations where such factors as the distance to raw material sources, quality or rarity of raw materials, or intensity of activity created the need for frequent tool rejuvenation.

In Pattern 3 sites there was a relatively high percentage of unutilized angular fragments and unutilized flakes. There were correspondingly low percentages of utilized tools, cores, and hammerstones. These sites, then, display a strong element of primary reduction activity, as well as evidence of tool use. Gossett (1980:200) suggests that these patterns may relate to long-term occupation.

Pattern 4 consists of high percentages of unutilized flakes, angular fragments, and cores. There were low percentages of utilized cores and hammerstones but utilized flakes were absent. Primary reduction appears to have been a major activity at these sites.

Gossett (1980:200) notes no association between these patterns and either time period or spatial distribution. There does seem to be some correspondence between Pattern 3 and the presence of structures, supporting the idea that this pattern results from long-term occupation. Patterns 1 and 2 appear to be associated with open-air scatters that lack structures.

Patterns of ceramic change in this area after 1300 can be seen in Fig. 3. Along both drainages brown wares remained abundant, but declined somewhat, while the Rio Grande glaze wares rapidly gained in importance. Western red wares became increasingly prominent in both localities (Marshall 1980:187).

David Snow (1969), Jack Wilson, Michael Marshall (1976) and Stuart Baldwin (1980b) have independently attempted to locate the historic Piro villages based upon historic records and modern archeological reports. As of this writing, the only professional excavation at a late Piro riverine site is Linda Cordell's work at LA 282 (Earls 1981).

The Northern Jornada del Muerto

East of the riverine area, in the northern Jornada del Muerto, Mera (1940a) has documented the existence of a major puebloan occupation during the glaze era. Mera (1940a:5) divides this era into five periods, as follows:

Period 1: This period begins with the regional adoption of Glaze A, with Glaze B restricted to the northeast. Mera would date this period at 1350 to 1450 A.D. Warren (1980:159) has more recently provided updated estimates for Rio Grande glaze ceramics (Table 8).

Period 2: Glaze C. Mera's dates are 1450 to 1490.

Period 3: Glaze D. Mera places this period between 1490 and 1515.

Period 4: Glaze E. Mera's dates are 1515 to 1650.

Period 5: Glaze F. Mera dates this period at 1650 to 1700.

Mera's maps show continual occupation of the northern Jornada del Muerto throughout these five periods. The major occupation occurred in Period 1. During Period 2 there was a major decrease in the number of sites, possibly resulting from aggregation of populations into fewer but larger settlements. During Periods 3 and 4 there was a reversal of this pattern, a trend toward dispersal of population among smaller settlements. During Period 4 Spanish intrusions among populations to the north and west would have been known to the residents of the northern Jornada del Muerto. (Indeed, it is interesting that there are no known Spanish settlements in this area, or even records of these native villages.) In Period 5 the same number of settlements was maintained (22), but there was continuity of occupation in only half of them. All new settlements were comparatively small. Taking into account the location of these new settlements, Mera (1940a:6) postulates a strategy of population dispersal, which might attract less attention from the Spanish.

Elsewhere in the southeastern quadrant of the overview area only sporadic investigations have been undertaken. Weber and Agogino (1968; Agogino and Weber 1970) report a late glaze occupation at the Mockingbird Gap site, and suggest that it represents a farm site used by populations trying to avoid the Spanish. In a contracted survey in this area, Beckett and Shelly (1977:8) found that most sites were located on or near a playa edge, and at playa-arroyo confluences. They found an association between tool manufacturing and areas of localized desert pavement. In a more recent survey in this area, Frizell (1980) found only an isolated mano.

The Upland Area

The late prehistoric and early historic occupation of the upland area is better documented than any other aspect of the archeological record of central New Mexico. The confrontation between Spanish and natives, the spectacular mission architecture of the period, and the dramatic collapse of the Salinas pueblos in the 1670s have combined as a magnet attracting seemingly endless archeological interest. This interest has generated much literature on the late period of the Salinas area, but at the same time it has been biased in its approach, focusing on Spanish architecture rather than Spanish-native interaction, large pueblos rather than smaller settlements and non-architectural sites, and description and classification to the exclusion of cultural process.

Caperton's (1981) Masonry Period can be subdivided into two distinct units. The earlier of these, the Early Masonry period, appears late in the pre-glaze era. There are village plans of rectangular units arranged around a plaza. A kiva was usually placed in the plaza. All but two such sites were oriented to the east, with the long axis north-south.

In the southern part of Caperton's survey area trade wares on Early Masonry sites included Red Mesa B/w, Kana-a Gray, Chaco B/w, San Andres Red-on-terracotta, Wingate B/r, Tularosa B/w, El Paso Polychrome, Los Lunas Smudged, Lincoln B/r, Heshotauthla Polychrome, St. Johns Polychrome, Santa Fe B/w, Agua Fria G/r, and San Clemente G-P. Some of these wares reflect contamination from earlier occupations at these southern sites.

On single component northern sites were found St. Johns Polychrome, Poge B/w, and an unidentified ware in the Mesa Verde tradition. No Jornada Brown was found on the northern sites, a fact which may reflect the abandonment of the Jornada area. But in the south Jornada Brown amounts to 8% of the ceramic assemblages. Corona Corrugated averages 16% in the south, 27% in the north. Chupadero B/w reached its peak during this period, averaging 42% of southern ceramics and 50% of northern ones. Glaze wares made a significant appearance.

This period may reveal the greatest concern with defense. Only one site was not located on a promontory. Baldwin (1983) suggests that during this period (ca. 1275-1300 A.D.) Cebolleta Mesa Kowina phase populations migrated to Abo Pass. He bases this inference on ceramic similarities between sites in Cebolleta Mesa and Abo Pass.

One site dating to this time period, LA 2945, located near Corona, was excavated by Wendorf (1956) as part of the highway salvage program. It was once a sizable site, but only a segment in the road, consisting of 12 adobe-walled rooms, was preserved. Wendorf (1956:88) notes the following sites in the area:

1. LA 2945, the primary site excavated.

2. A fragmentary, adobe-walled pueblo with two room blocks and a possible pithouse.

3. A large masonry pueblo, originally at least two stories high.

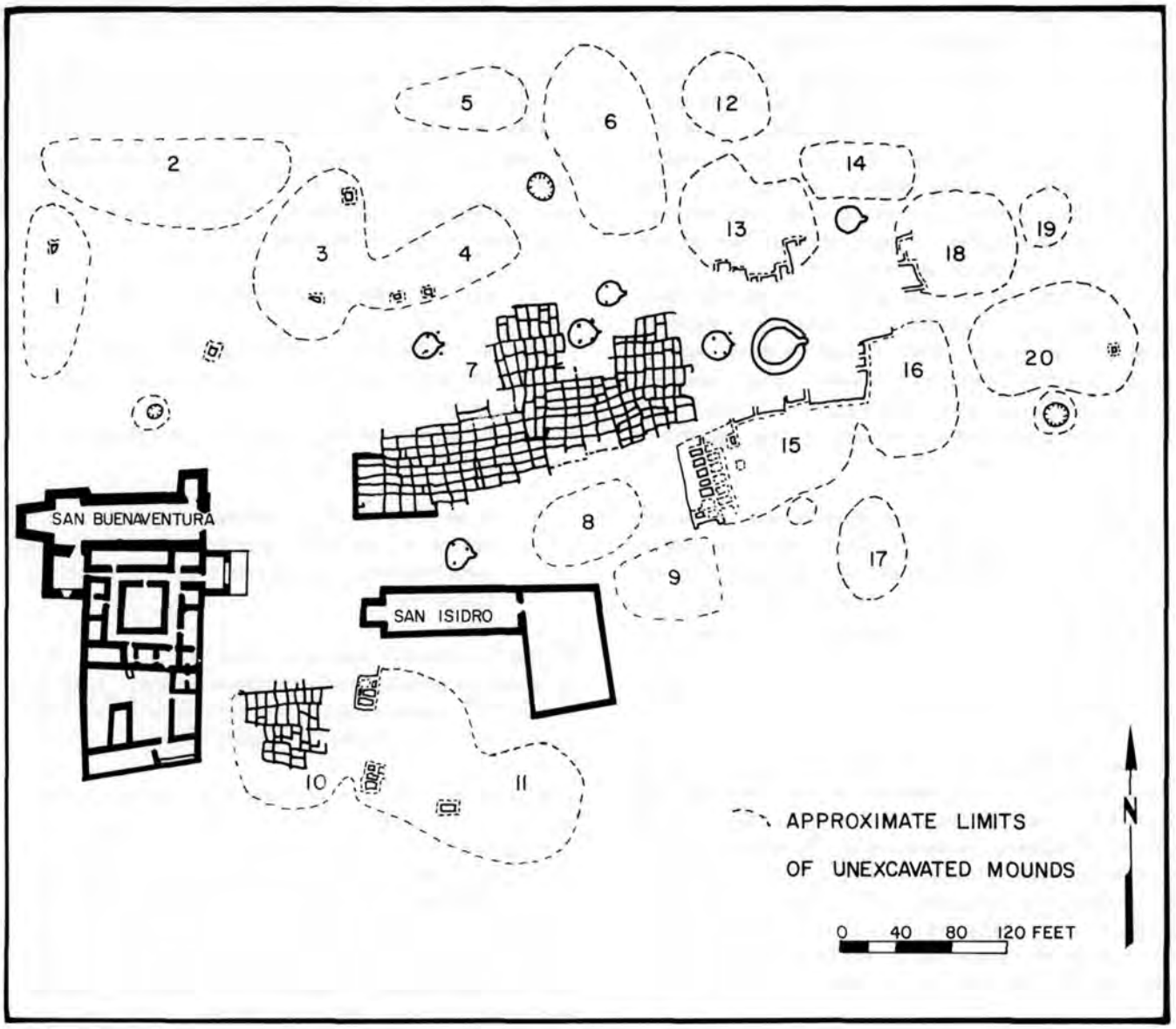
4. A masonry pueblo, somewhat smaller than number 3, but with similar ground plan and construction. No Glaze A was observed on the surface.

Wendorf (1956:88) concludes that sites 1, 2, and 4 were approximately contemporaneous, despite different construction techniques and village plan. Site 3 is placed slightly later.

The dominant painted pottery was Chupadero B/w, which comprised 33% of the assemblage. Corrugated brown ware totaled 36%, and plain brown ware 9%. Playas Red and Playas Incised, imported from Chihuahua, totaled 19%, but all except three sherds came from two vessels. The remaining sherds were of rare types: St. Johns and Heshotauthla Polychromes, Three Rivers Red-on-terracotta, Lincoln Black-on-red, and Los Lunas Smudged. Wendorf (1956:104) finds difficulty assigning the site to any period in the Jornada Mogollon sequence, although he does see close similarities in architecture and pottery.

During the Late Masonry period larger villages formed, and less consideration was given to defense. Since this is the period on which most archeological work in the area has concentrated, it will be described in some detail in the pages to follow.

Mera (1940a) has described some aspects of settlement trends among the villages on the east flank of the Manzanos. All of the well-established settlements, except for a few



Map 8. Gran Quivira (Pueblo de las Humanas) [after Hayes 1981:13].

small black-on-white sites, were confined to the piedmont region. Four out of six glaze sites were located on streams, two near springs. The area was sparsely populated at all times. Black-on-white sherd scatters in the Estancia Basin reflect short-term occupation. Special-use sites have been identified in the northeastern Manzano Mountains (Garber 1982) and near Mountainair (Tainter 1979).

Three sites were occupied during Mera's (1940a) Period 1. Two were occupied in Period 2, but these were larger and reflect aggregation. There were two in Period 3; then, in the latter part of Period 4, the area experienced an increase to five settlements. Six were noted for Period 5, the largest number of any time interval.

Site LA 383, near the town of Manzano, was first occupied during Period 5. Mera (1940a:23) suggests that it may have been settled by a remnant population occupying the locale after the abandonment of the Salinas Province.

Gran Quivira Excavations

Excavations at Gran Quivira (Map 8), both illicit and professional, for treasure and for information, have been conducted for many years. The first major, sustained research project at the site was by the School of American Archaeology (later to be named the School of American Research), between 1923 and 1925, directed by Edgar L. Hewett (1923a, 1923b, 1924a, 1924b, 1925, 1926, 1927a, 1927b; Halseth 1926; Bloom 1927). This project cleared the mission of San Buenaventura, and excavated a large plaza with two kivas, plus some nearby rooms in Mound 15. Of the two kivas, the larger one is the largest in the pueblo. Hewett (1923a) suggests that it served integrative functions extending to a large social segment.

Just west of the larger kiva was a large mound that Hewett (1923a) describes as standing seven feet above the plaza level. The fill of this mound was a black dirt that Hewett felt was foreign to that part of the settlement. This feature contained numerous burials, and Hewett accordingly called it a burial mound. After completing the excavation of this feature in 1965, however, Hayes noted that the 20 burials recovered were not an unusual concentration.

In 1951, the National Park Service Ruins Stabilization Unit, directed by Gordon Vivian, excavated 37 rooms of House A (Mound 10), San Isidro Church, and Kiva D near the southwest corner of Mound 7. Following Mera, Vivian (1964:103) notes that the local brown wares in this area resembled the Anasazi gray-paste utility wares in corrugated, clapboard, and other surface treatments, but retained their brown ware character in brown, sandy, friable paste. By the Pueblo III period the utility wares known as Corona Rubbed-Indented and Corona Rubbed-Ribbed were being produced. Vivian believes that the culinary pottery of Gran Quivira continues the Corona Rubbed-Indented pattern.

Carbon paint wares were not adopted on the east side of the Manzanos, including Gran Quivira. Furthermore, the influence of the Mesa Verde decorative style did not emerge in this area (Vivian 1964:146). Glaze wares, which totaled about 20% of all pottery, were at first not made at Gran Quivira. Vivian traces their local production to Glaze D and later periods, from about 1550 on, but Warren found minor amounts of local glaze production prior to that time (Warren 1981).

Vivian (1964:147-154) points out interesting technological discontinuities between the Gran Quivira area and the rest of the northern Southwest. Gran Quivira populations persisted in the use of mineral paint after carbon paint had been adopted elsewhere, and in the use of brown wares after other regions had more completely adopted the Anasazi ceramic pattern. There was persistence of Chupadero designs rather than adoption of Mesa Verde patterns. Manufacture of painted ceramics continued to focus on the black-on-white wares after glazes had been adopted elsewhere.

Vivian also notes a spatial/temporal discontinuity in kiva architecture beginning about 1400 A.D. After this date, Gran Quivire populations did not maintain the same kiva architecture as the Rio Grande Valley. By the time Gran Quivira was abandoned, around 1672, kivas had come to resemble those kivas used in the Rio Grande area 300 years earlier (Vivian 1964:148-149).

Vivian (1964:152-154) attributes these technological discontinuities, what he terms the "retarded period after 1300," to the "Mogollon strain" (1964:152), the populations which may have moved into the area after the abandonment of the northern Tularosa Basin. Vivian ascribes to this population influx the late adoption of Anasazi characteristics in Gran Quivira ceramics and religious architecture. He believes that these immigrants introduced a lack of social cohesiveness to the community. Vivian does not attempt to explain the assumptions or conceptual basis of his interpretations, nor detail how these might be tested, but these points will be discussed in the next chapter.

By far the most extensive excavation undertaken at Gran Quivira was the uncovering of Mound 7 in the mid 1960s, directed by Alden C. Hayes (Map 8). The reports resulting from this work have only recently seen the light of publication (Hayes 1981).

Hayes was able to discern three phases of occupation at Mound 7. Some of the characteristics of these are shown in Table 6. The early pueblo was mainly round, and was centered on a small plaza and kiva. It held

perhaps 209 rooms, or maybe somewhat less.

In a sample of 324 demonstrably Early phase sherds, Hayes characterized the ceramic assemblage of this period. The breakdown of this sample is shown in Table 7. The single sherd of Tabira B/w in this sample is probably intrusive. All of the others, except perhaps the Largo G/y sherd, were common 14th century wares. The relative lack of glazes in this sample indicates construction around 1300, or perhaps a few years earlier.

During the Middle phase the planned symmetry of the early occupation was distorted by room additions. Some of the early rooms and kiva continued in use. Nothing was found in situ on the floor of these rooms, so Hayes was forced to

Table 6

Phase Characteristics of Mound 7, Gran Quivira

Early Phase 1300 - 1400	Middle Phase 1400 - 1550	Late Phase 1550 - 1672
Circular, clay firepits?	Rectangular, clay firepits	Rectangular slab-lined firepits
Trough metates	?	Slab metates
Full grooved axes	Spiral grooved axe introduced	Spiral gooved axes
Informal shaft tools	?	Stylized, formal shaft tools
Corona Corrugated	Corona Plain introduced	Corona Plain
Chupadero B/w	Chupadero B/w	Tabira B/w, Plain, and Polychrome
Inhumation	Inhumation	Inhumation and cremation

Table 7

Ceramic Characteristics of Gran Quivira Early Phase

Jornada Brown - 1	Socorro B/w - 1	Agua Fria G/r - 8
Corona Corrugated - 46	Galisteo B/w - 1	Kwakina Polychrome - 1
Corona Plain - 12	Tabira B/w - 1*	San Clemente G-P - 1
El Paso Polychrome - 1	? white ware - 57	Largo G/y - 1
Los Lunas Smudged - 2	Heshota Polychrome - 1	Conetas Polychrome - 1
Chupadero B/w - 161	Los Padillas B/w - 3	? glaze - 12
		Plain - 13

* probably intrusive

estimate the temporal span of this phase.

The Late phase, like the Middle, witnessed construction by stages. Haynes notes a hiatus in tree ring cutting dates between 1515 and 1540. Within this interval there are only three dates, and only one cutting date. Prior to this, between 1433 and 1515, there was a total of five cutting dates plus four others that are probably close. For the following years, from 1540 to 1545, there are ten tree ring readings, of which five are definitely cutting dates. Thus, Hayes infers that sometime between 1515 and 1540 there may have been a period of 15 to 20 years when Gran Quivira's Mound 7 was not occupied.

The Late phase construction contains long stretches of common wall that were laid without breaks in the masonry. This would seem to indicate planned, coordinated construction. For this period Hayes estimates that about 45 to 50 families may have occupied the house.

There were six rooms near the outer walls of the Late phase house that Hayes characterizes as ceremonial rooms. Each of these had one or more decorated layers of plaster. The style of decoration in these was the same as in one painted kiva. All but one of these rooms was close to a kiva used in the Late phase. All of the kivas had been abandoned and destroyed 12-13 years before the abandonment of Mound 7 itself, probably as a result of Spanish conversion efforts.

The painted murals of Mound 7 have been analyzed by Barbara Peckham (1981). She dates these features from the 1400s to the abandonment of the site in 1672. The Mound 7 murals were simpler in design than those of Kuaua, Jeddito, and Pottery Mound, and lacked the formalized, Sikyatki-style designs found at the last two. Some Tabira B/w and Polychrome vessels from Mound 7, though, did have decorations that she characterizes as being like Sikyatki.

Among Late phase pottery vessels which were recovered intact, Hayes notes the following breakdown: 45 Corona Plain, 1 Chupadero B/w, 1 Tabira Plain, 32 Tabira B/w, 8 Tabira Polychrome, 3 Puaray G-P, 2 Glaze E or F, 24 Kotyiti G/r and G-P, 16 Salinas Red, and 1 Kapo Black. Other types that did not occur in earlier levels were Sankawi Black-on-cream, Tewa Polychrome, Majolica, and Chinese porcelain.

The culinary pottery from Mound 7 is a brown ware. Hayes notes that this pottery shows greater similarity to Mogollon plain red and brown wares than to the gray utility wares of the northwest.

Gran Quivira is near the center of distribution of Corona Corrugated, but the precise borders of its range are unknown. It was introduced during the first two decades of the 13th century. Hayes dates it to between about 1225 and 1460. Corona Plain is a later version, dating from the mid 1400s to 1672.

At Mound 7 Chupadero B/w and Casa Colorado B/w appeared to be nearly identical, except for some slight differences in color and slip weight that Hayes attributes to clay sources. Hayes suggests that this ceramic variety was made around Chupadera Mesa in the area adjacent to the northern Tularosa Basin, in the northern Jornada del Muerto, and probably on the Rio Grande between Belen and Socorro. It was widely traded.

In a test trench at Quarai 11% of the pottery was Chupadero B/w. At Gran Quivira the numbers ranged between 64 and 75%. This suggests to Hayes that the northern limit of manufacture was on Chupadera Mesa. No Chupadero B/w is found in the Biscuit ware area north of Tesuque or from the Pajarito Plateau, even though Biscuit ware was the most popular white pottery imported at Gran Quivira. Chupadero B/w is, however, found all the way to northwest Texas.

The production of Chupadero B/w may have begun around 1175. Its manufacture ceased at Gran Quivira with the introduction of Tabira B/w and Polychrome around 1545. Chupadero B/w represents a local manifestation of the ubiquitous Chaco II style that covered the Anasazi area during the Pueblo II period. Hayes suggests, though, that both Chupadero and Socorro B/w, which display some temporal overlap, are more similar to the Cibola white wares Reserve and Tularosa B/w, then to Puerco B/w or Chaco II.

At the time of the rebuilding of the west end of Mound 7, which Hayes dates to 1545, Tabira B/w was introduced. It was apparently made only at

Gran Quivira, Pueblo Pardo, and Tabira. From the mid 16th century onward it was the only indigenous ware at Gran Quivira, except for culinary brown wares. The inception date of 1545 is later than Toulouse and Stephenson (1960) proposed in their Pueblo Pardo report, but Hayes feels that they may have misclassified some Chupadero sherds as Tabira.

Hayes gives the following inception dates for Tabira wares:

Early Tabira B/w	1545
Classic Tabira B/w	1600
Tabira Plain	1625
Tabira Polychrome	1650

There was an increased use of symbolic designs on Tabira wares. Representational figures were widely employed, an unusual pattern for eastern pueblo pottery.

About one-third of the pottery at Mound 7 was made elsewhere. These imports were mostly glaze wares. The most important trade direction for pottery was to the west: the middle Rio Grande Valley, the lower Rio Puerco, Acoma, and over to the Cibola area and the White Mountains. Heshotauthla Polychrome was the most numerous western type. Next in importance was the area to the north, the Galisteo Basin, the northern Tewas, and the Pajarito Plateau. Few sherds were found with a southern origin. Of these, El Paso Brown and Lincoln B/r were most frequent. The abandonment of the Tularosa Basin probably accounts for this. Some Ramos Polychrome, from Chihuahua, was recovered, as well as Mesa Verde B/w and Jeddito B/w.

Hayes discusses at some length mortuary practices at Mound 7. A total of 512 graves was excavated, yielding 516 individuals. An additional minimum of 42 individuals was recovered as scattered bone. Hayes was able to assign all but 8% of the graves to one of the three phases. Forty-four of the graves were assigned to the Early phase, 170 to the Middle, and 314 to the Late. The majority of the remainder were placed in Early/Middle or Middle/Late categories.

During the early 14th to the mid 16th centuries the dead were usually buried flexed, probably wrapped in blankets and bound, in simple, shallow graves below room floors, or in trash just outside the walls. Ninety-seven percent of the burials were flexed (including Hayes' semi-flexed category, which distinguished individuals with one arm extended), 4% were interred sitting, 11% face down. Two-thirds were placed with the head toward the east. Three individuals were reburied as bundles after being disturbed by later interments. Two individuals were not buried, merely disposed of casually. One of these was an individual displaying severe physical abnormalities.

Most inhumations were in simple, unadorned graves. But in about 12% of the graves some extra degree of effort was made, such as slab lining (3), flagstone pavement set in clay (2), lining of walls and bottoms with sandy clay (12), covering with sandy clay (18), covering with flat limestone blocks (3), placing heads on unshaped limestone blocks (6), and placing large sherds over subadults, or placement of the head in a sherd (3).

Only 63 graves (17% of interments) had accompaniments. These were most often a piece of apparel. Infants of four years or less were twice as likely to be accompanied by some ornament. Thirty-seven percent of all burials were infants, but they were accompanied by 65% of all ornaments. None of the grave associations could be characterized as lavish. Functionally useful tools were found with 19 individuals, mostly adults.

A total of 149 cremated individuals was identified in the field, while an additional five were found when processing faunal remains in the laboratory. Cremation appears to have been restricted to the late period at this site. Only six cremated individuals were associated with the early to middle glazes or with Chupadero B/w. Of the 149 excavated cremations, only 24 were in burial pits that were something other than rudimentary. Two were lined with clay, one was lined with stone slabs, the bottom of one was lined with clean sand. Thirteen were covered with clay or sand, four were covered by flat pieces of limestone, one was overlain by two inverted Kotyiti G/r bowls. One cremation was placed in an unusual fire pit.

Grave associations were found with 81% of the cremations, as opposed to 7% of the inhumations. Hayes believes that much of this difference may be due to better preservation of carbonized organic matter. One of the commonest associations, found with 7% of the cremations, was shelled corn. Not all of this difference in

grave associations, however, can be attributed to preservation. Pottery occurs with 11% of the cremations as opposed to 2% of the inhumations.

Cremation cross-cuts age and sex distinctions at Gran Quivira. There is a low number of cremated individuals in the 10-17 year age category, but there were few deaths in this age grade anyway. Hayes suggests that cremation was introduced to Gran Quivira by a migration from the Zuni area.

The mortuary data from Gran Quivira provide a unique opportunity to study the social characteristics of a late prehistoric pueblo. The good chronological control, the large sample size, and the associated osteological studies combine to make this data set an unparalleled resource for Southwestern archeology. Although a complete analysis of these burials is beyond the scope of this study, and would be impossible anyhow with the reported information, some observations can still be made.

A crucial characteristic of mortuary ritual, and one that is essential to understanding archeological burial patterns, is the amount of energy expended in mortuary treatment. As one ascends a scale of social ranking, the number of persons recognizing status obligations to an individual increases. With increased duty-status relationships, the level of social involvement (and the disruption of normal community activities) in mortuary ritual increases (Binford 1971:17, 21). With greater amounts of social involvement in the mortuary act, the amount of energy expended in mortuary treatment increases (Tainter 1973). Energy expenditure in turn is reflected in such features as size and elaborateness of the interment facility, method of handling and disposal of the corpse, and the nature of grave associations.

There appear to be three major dimensions of energy expenditure in the reported data on the Gran Quivira burials. These three dimensions are cremation/inhumation, simple/complex grave construction, and the absence or presence and nature/quantity of associations.

Although Hayes treats cremation as a "custom," and suggests seeking its source in the Zuni area, it may be more profitable to view it as the single greatest energy expenditure contrast in the Gran Quivira burials. Based upon the far greater level of effort, custodial care, and social involvement called for in cremation, it can be proposed that this practice indicates a dimension of social ranking in Gran Quivira society.

Given Hayes' observation that cremation seems to cross-cut age and sex distinctions, it would appear that this higher status was not based upon personal qualifications. The expenditure of identical amounts of effort in the interment of infants and adults, females and males, suggests that this social status may have been hereditary. Viewed in this light, the tendency for cremated individuals to be more frequently associated with some kinds of grave accompaniment, such as pottery vessels, is not surprising, for such associations merely reaffirmed the symbolic message of cremation, that these were persons of high status.

The appearance of cremation during the Late phase, around 1550 A.D., may thus indicate an important episode of social change. It would appear that the native social hierarchy at Gran Quivira underwent expansion at this time, with the addition of a new superordinate status level. This new status level continued in existence throughout the period of Spanish occupation.

Contrasts in the amount of energy expended in grave preparation are also noticeable. The most common method of disposal was in a simple grave. A minority of both inhumations (12%) and cremations (16%), however, were accorded some distinctive form of treatment. This included such things as lining the grave with limestone slabs or with special soil. The allocation of extraordinary amounts of effort to the preparation of these graves identifies these interments as persons of elevated social significance. What is most interesting is that this status, whatever its nature may have been, apparently cross-cut the cremation/inhumation distinction.

In short, available information on the Gran Quivira burials reveals a society characterized after 1550 A.D. by hereditary status distinctions, but perhaps less noticeably ranked prior to that time. Cross-cutting the observable status dichotomy was a second position of elevated social importance. Persons from both the high (cremation) and low (inhumation) status segments were able to hold this latter position (or positions). More intensive analysis of the primary burial data would no doubt reveal

considerably more about Gran Quivira society.

Ceramic Distributions:

An excellent, detailed study of production and trade patterns of pottery recovered from Gran Quivira was conducted by Helene Warren (1970a, 1981). In the early glaze ware periods (see Table 8), up until around 1450, practically all glaze pottery was imported from the Rio Grande area, with lesser amounts coming from the north. Galisteo Basin wares were imported to the site between about 1350 and 1450, Tonque wares between 1425 and 1525. The Gran Quivira excavations, though, uncovered none of the popular mid 16th century Puaray Glaze-Polychrome from Tonque. Warren suggests that this may indicate either a period of abandonment of Mound 7 or a cessation of trade. The former idea might dovetail with Hayes' conclusion that Mound 7 was abandoned for 15 to 20 years prior to 1540.

During the Glaze C period at Abo, and possibly at one or two neighboring Tompiro villages, a ceramic industry developed that supplied most of the glaze wares to nearby villages and to the northern Jornada del Muerto. This industry persisted until after 1600. Shortly after 1600, another glaze ware source developed at Quarai.

Warren believes that Chupadero B/w and Tabira B/w, the major white wares at Mound 7, were made at Gran Quivira. Differences in temper suggest to Warren that these two wares were made by two different groups, and that an outside group migrated to Gran Quivira at the time Tabira B/w appeared. Temper differences indicate a similar division between early corrugated and later plain utility wares. Chupadero and Tabira were traded in limited amounts to neighboring villages, but most trade involved the importation of glaze wares from the Los Lunas, Abo, and Quarai areas. Reflecting this pattern, the glaze wares at Gran

Table 8

Dating of Rio Grande Glaze Ceramics*

Group	Pottery Types	Time Range
pre-A	Los Padillas Glaze-Polychrome	?1300 - 1325?
A	Arenal Glaze-Polychrome	?1315 - 1350?
	Agua Fria Glaze-on-red	1315 - 1425
	San Clemente Glaze-Polychrome	1325 - 1425
	Cieneguilla Glaze-on-yellow and Glaze-Polychrome	1325 - 1425
B	Largo Glaze-on-yellow and Glaze-Polychrome	1400 - 1450
C	Espinoso Glaze-Polychrome	1425 - 1500
	Pottery Mound Glaze-Polychrome	1400 - 1490
D	San Lazaro Glaze-Polychrome	1490 - 1515
E	Puaray Glaze-Polychrome (early)	1515 - 1600
E-F	Puaray Glaze-Polychrome (late)	1600 - 1650
E & F	Pecos Glaze-Polychrome	1600 - 1700
F	Kotyiti Glaze-on-yellow, Glaze-on-red, and Glaze-Polychrome	1650 - 1700 or 1750?

* after Warren (1980:159).

Quivira show diversity in physical properties through time, while the white wares show marked consistency in temper and clay. Less than 5% of glaze wares used at Gran Quivira were made there.

Glaze A Agua Fria G/r at Gran Quivira is characterized by a wide range of tempers and clays. This is typical of the entire Rio Grande glaze ware area during this period. Vesicular basalt tempered sherds (33%) resemble Agua Fria G/r at Pottery Mound, and may have come from there. Four percent contained the syenite temper of Abo, while 3% were locally made.

Minor amounts of Agua Fria G/r came from San Felipe, Tonque, and the Galisteo area; and particularly the last. But most ceramic importation was from villages south of Albuquerque.

San Clemente Glaze-Polychrome has similar distribution and temper types, but occurs at only about 14% of the frequency of Agua Fria G/r. Cieneguilla Glaze-on-yellow and Glaze-Polychrome were found in small quantities at Gran Quivira. These were traded mainly from the Galisteo area, although as much as 30% may have been made between Albuquerque and Socorro. No early glaze-on-yellow was made at Gran Quivira.

In the Glaze B period, Largo G/y, G/r, and G-P totaled less than 1% of the ceramic assemblage. Temper indicates that the G/r variety was spatially distinct from the G/y type. The G/r sherds seem to have originated in the southern glaze ware producing villages, while white or yellow slipped Glaze B sherds have temper used in the Galisteo and Tonque areas. One Largo G/r sherd contained local Gran Quivira temper.

During the Glaze C period several changes in trade patterns are reflected in ceramic temper. Up to 15% of glaze imports came from the Galisteo Basin. Imports from the Los Lunas area, or Pottery Mound, dropped off to less than 4%, contrasting with 15 to 60% earlier. Pottery Mound, however, was abandoned late in the Glaze C period.

Two Glaze rim sherds with Pecos sandstone are of interest because little is known of trade with that area prior to 1600.

In the Glaze D period the percentage of pottery from Tonque dropped to 25%, while that from Abo increased to 45%. A few sherds with a crystal vitrophyre temper may have come from the Kuaua-Puaray area near Bernalillo. A small percentage of the Glaze D vessels was made at Gran Quivira.

There is an absence of trade wares dating to the middle decades of the 16th century. Except for a few Puaray Glaze-Polychrome sherds of the "late" Tonque wares, no Glaze E sherds from that area are present at Gran Quivira, even though the trade industry at Tonque was at its height during the 16th century. Warren believes that this indicates either a cessation of trade with the northern Rio Grande, or an abandonment of Mound 7. Warren observes that all Glaze E pottery at Gran Quivira has a "late" appearance, perhaps from 1580 on, and transitional to Glaze F. (Note that this date is about 40 years later than the occupational hiatus postulated by Hayes.) But since most of the pottery at this time came from the Abo area, and since little is known of the chronology of Abo, Warren concludes that it is not possible to reach definitive answers based on pottery alone.

Trade wares from the Quarai area first appeared late in the Glaze E period, totaling about 10%. This is consistent with the proportion of late Glaze E to Glaze F sherds at Quarai itself. Quarai pottery has a distinctive hornblende gneiss or schist temper that seems to have first come into use post - 1600.

A number of trade wares from the upper portion of the Middle Rio Grande Valley, including some from the Galisteo Basin, appeared in late Glaze E. A few rhyolite tuff tempered sherds were recovered, perhaps having come from the Bernalillo or Pajarito Plateau areas. There was only one late Glaze E sherd from Tonque. Other sherds with the Tonque latite temper may post-date Tonque itself, and be from the San Felipe area. Locally made Glaze E totaled less than 5%.

Differences in temper show that shouldered bowls of the 17th century found at Mound 7 came from Abo, Quarai, Pecos and possibly Paako.

Over 50% of Glaze F pottery was from Quarai or its neighboring villages. About 30% of Glaze F appears to have come from the Abo area. Warren suggests, however, that this may reflect only the ceramic typing methods rather than an actual decrease in trade, since only sherds positively classified as Kotyiti G-P, G/r, or G/y were included. Glaze E rim forms may have persisted

longer at Abo before replacement by Glaze F forms. About 2% of Glaze F pottery was made at Gran Quivira.

Warren has also analyzed temper inclusions in the Gran Quivira plain wares and white wares. Salinas Red ware, a plain red ware found in Mound 7, was sometimes locally made, with the balance being obtained from Abo or Quarai. Red wares produced at Gran Quivira totaled 34% of all red ware sherds, while less than 5% of glaze wares were locally made. Salinas Red ware made up less than 1% of the Mound 7 sherds, but was very popular at Abo and at the Quarai convento.

The Chupadero B/w made at Gran Quivira had a fairly consistent temper, with varying amounts of calcite, shale or clay pellets, and quartz sand. On occasion, small amounts of crushed sherd, igneous rock, or iron oxide grains were used. Fine grained quartz mica schist was used in less than 10%; these vessels may have been trade wares, but their origin is unknown. The temper in Chupadero B/w resembles much of the corrugated ware from Mound 7.

The Chupadero B/w pottery from Pueblo Colorado, located on the Cibola National Forest east of Gran Quivira, contained a crushed vitrified sherd temper that was also found in a number of Chupadero B/w sherds from Gran Quivira.

Tabira ware sherds contained a biotite felsite temper that occurs locally. The clay seems identical to Chupadero B/w. Tabira sherds from Pueblo Blanco, also located on the Cibola National Forest to the north of Pueblo Colorado, had similar temper, but seemed to have more calcite and clay pellets.

Early culinary wares at Gran Quivira had corrugated or ribbed exterior surfaces. They were tempered mainly with quartz mica schist, which contained coarse angular grains of quartz as well as fragments of silvery or brownish black mica in a fine-grained quartz matrix. The source for this is unknown, but may be near the site.

Among the later culinary wares, 74% were tempered with biotite felsite, 20% with coarse quartz and white feldspar grains. The latter may be intrusive, but the source is unknown.

Special Features:

At the west end of Mound 7 was a suite of rooms which did not match the architecture of the rest of the room block. These rooms were larger and more formalized, and had interconnecting doorways. Hayes (1968) concluded that this was the convento of San Isidro Mission.

Between April and July of 1962, excavations were conducted by the National Park Service in the interior of San Buenaventura Church. Some intriguing anomalies were revealed. Although four surfaces were found in the sacristy, there was no evidence of a final, finished 17th century floor, nor any other indications that the church had been completed. The authors conclude (Voll and Richert 1962a) that church construction ceased shortly before work was to begin on the interior features of the church. There was no evidence of an altar. John Virgin in 1898, however, mentioned noting a paved limestone floor in the church (Virgin 1898).

The possibility of water control features at Gran Quivira has prompted speculation for decades. As early as 1835-36, David Wilson found what he reported as a concrete aqueduct which he traced eastward toward the Gallinas Mountains, and located water (Woodward 1934). In 1844, Josiah Gregg reported finding stone cisterns and the remains of aqueducts 8 or 10 miles in length, leading to the mountains. In addition, Gregg (1844) echoed the opinion that Gran Quivira was actually a wealthy Spanish mining town.

Subsequent investigations have, of course, failed to substantiate the presence of aqueducts and concrete canals. There are, however, features like ditches, bowl-shaped depressions, and pits lined with adobe around the site, and archeologists have debated the possibility that these had water control functions. Bandelier, in 1890, was of the opinion that these were indeed water control features. In 1945 Joseph Toulouse published a major paper on the Gran Quivira water system. In it he noted that historical sources indicate wells near the village as the main water source. Ranchers in the valley to the north of the site have indeed found pottery at depths of 20 to 40 feet while excavating wells themselves (Toulouse 1945:363). These sherds most likely were deposited during native well construction and use.

Richard Howard (1981) excavated an adobe-lined pit at the site which had been in use around 1300 A.D. He placed chunks of adobe from the pit in water, and noted that they dissolved in ten

minutes. Hayes (1981), in contrast, showed that with proper preparation some of these pits could have held water.

In 1959 Howard reported the results of a test trench cut across one of the supposed ditches at the site. There were no indications that it was intended for water flow. Instead a normal soil profile was observed, loose soil underlain within a few inches by bedrock. These "ditches" were too broad and shallow for water. In addition to their obvious porosity, they would have allowed wasteful evaporation.

Howard (1959) believes that the situation is much the same with the so-called "reservoirs." Many are on or near the tops of ridges, with little or no drainage into them. After a good rain they will hold only a few inches of standing water. Patrick Beckett has recently argued, quite convincingly, that many of these were limestone quarries, subsequently filled with soil and farmed (1981b:33-36).

Faunal Remains:

The faunal remains recovered from Gran Quivira have been analyzed by Charmion McKusick (1981). Among native fauna, bison, although numbering few individuals, yielded the greatest amount of usable meat in every period. Pronghorn antelope were second in each phase, followed by deer. In the Late phase, domesticated fauna provided more meat than native animals.

The grasslands were utilized most heavily to hunt fauna. They yielded bison, antelope, jackrabbit, kangaroo rat, pocket gopher, kit fox, and badger. The pinyon-juniper zone was used less intensively. Fauna originating here were mule deer, mountain lion, bobcat, porcupine, gray fox, rock squirrel, and wood rat.

McKusick notes that 66.1% of the turkeys had lived to an age of two years. This suggests use for feathers, rather than for meat.

In an interesting observation, McKusick notes that the prehistoric fauna from Mound 7 tended to be larger than the animals in the Southwest Archeological Center comparative collection. This may possibly have been due to calcium in their feed from the limestone formations of the area.

In an analysis of the domestic fauna of Gran Quivira, Olsen (1976a, 1976b) recorded turkey, chicken, dog, horse, pig, cattle, sheep, and goats. The butchering techniques employed on the animals betray a lack of familiarity with them. The bones reveal many multiple hacks at joints where one skillful cut would have done the job. There were also heavy marks on small bones where a lighter cutting procedure would have sufficed.

Human Biology:

The human skeletal material recovered during the various excavations at Gran Quivira is one of the most intensively studied sets of osteological data in the Southwest. The major work on the series has been conducted by Erik Reed (1981) and by Christy Turner (1981) and his students at Arizona State University.

Reed (1981) reports what he considers to be an exceptional number of tall males in the series. Thirteen of forty adult males were taller than 169 cm (ca. 5'7"). He notes that this is characteristic of much of the eastern Pueblo margin. Female stature also favored the tall side. Some exceptionally short females, however, were included in the sample, so the mean is not different from other Puebloan populations. Reed feels that tall stature is a reflection of genetic influences from Plains populations.

Reed reports an infant mortality rate near 50% through age 4. Comparatively few deaths occurred between 5/6 years and age 18-20. Mortality continued to be low under 25 years, rising thereafter. Very few individuals lived beyond age 50: the majority of adult deaths occurred in the fourth decade. Reed placed only three or four individuals beyond age 50, although Turner's analysis disclosed eight persons in the 56-75 year age bracket found in the first two season's work at Mound 7.

Reed's belief that Plains genetic influence could be traced in the Gran Quivira skeletons has been disputed by El-Najjar (1981). He notes that, although the means of metrical observations of the Gran Quivira crania differ from the Southwest as a whole, the ranges are almost identical. With some individual exceptions, the Gran Quivira crania are essentially of the Southwest Plateau variety (El-Najjar 1981).

El-Najjar compared the Gran Quivira crania to other populations from the Southwest, and also tested for differences between the Middle and

Late phase populations of the site itself. The Early phase sample was too small for this study. He found the least difference between Gran Quivira and Pecos, and the greatest difference between Gran Quivira and Paako. This is somewhat surprising since Paako is the closer site. El-Najjar also found that both males and females of the Middle phase tended to have broader faces than did Late phase individuals. Other facial dimensions of both males and females also changed in the Late phase. El-Najjar attributes these changes to stress and malnutrition induced by Spanish occupation.

El-Najjar's findings of stress in the historic era are mirrored by Turner's (1981) analysis of life expectancy. Turner finds lowered life expectancy in the historic period. This is borne out by the figures in Table 9. Historic period populations apparently experienced a greater proportion of infant and childhood deaths, and had a lower proportion of older persons. These are the segments of a population most susceptible to death in stress episodes.

Table 9

Life Expectancy Indicators in Gran Quivira Population

	Prehistoric	Historic
Proportion dying at age 6 or less	27.8%	35.6%
Proportion of old adults	17.8%	14.0%

In a significant observation, Turner (1981) and McWilliams (1981) note that there are no differences in the frequency of oral non-metric characteristics between the cremations and the inhumations. There is no reason to believe that these were not members of the same biological population. This discovery casts doubt on the notion of a migration from Zuni to the Salinas area (Hayes 1982:15). McWilliams (1981) also found that there was no statistical evidence for biological change through time in the population. This casts some doubt on the idea advanced by Mera (1940b) and Vivian (1964:152-154), that elements of the Jornada Mogollon population, from the south, joined Gran Quivira and other villages in the area after abandonment of their homeland in the Tularosa Basin. Any such movement, around 1350-1400, should be reflected in genetic change in Middle phase skeletons.

Scott (1981) has analyzed the stature of the Gran Quivira people. He found an increase in stature among males from Early to Middle, then a decrease in the Late phase. Among females there was a marked increase in stature in Early to Middle, with no change in the Late phase.

Cheryl Swanson (1976) has studied dental pathologies in this population, and found that the frequency of individuals affected by such things as caries, alveolar abscesses, and tooth loss decreased from the Early to the Middle phase, and then increased in the Late period. The frequency of periodontal disease also increased from the Early to the Late periods.

Swanson has postulated a sequence of events to account for these observations. She suggests that during the Early period populations migrated into the area and attempted to establish a new agricultural base. The resulting stress led to a high rate of dental pathologies. By the Middle phase trade networks to the Plains were established, bringing greater access to faunal resources, and enhancing nutritional intake and general health. In the Late phase the combined stresses of Spanish occupation, drought, cessation of trade, and Apache raids combined to bring about nutritional impairment, lowered resistance to disease, and ultimately increased dental pathologies. Swanson's interpretations in this regard follow those of Harris (1972:281-282).

Although this reconstruction is intriguing, it is not entirely plausible and does not correspond with known facts. To begin with, there is no evidence that Gran Quivira was settled by a newly immigrant population. To the contrary, the area was occupied prior to 1300 A.D. by pithouse and jacal dwelling populations who most likely aggregated to form the Gran Quivira community. The notion that the potential for trade with Plains populations was suddenly "discovered" in the Middle phase, and that this led to enhanced nutritional intake, is difficult to accept. This idea ignores the likelihood that local populations had been interacting with Plains dwellers for some time, and completely disregards the potential of local faunal resources in the diet.

One of the most significant studies of the Gran Quivira skeletal material is Harris' (1972)

analysis of growth arrest lines in femora. Growth arrest lines (Harris lines, transverse lines) occur in growing children as a result of episodes of illness or malnutrition of more than a few weeks duration (Harris 1972:2). They are observable in long bones when these bones are x-rayed. Harris standardized his results by restricting the analysis to the femur (upper leg bone).

The number of femora suitable for analysis was 28 from the Early phase, 74 from the Middle, and 100 from the Late. All of his comparative analyses were standardized by using only the left femur. Of the femora x-rayed (n=203), 33% were female and 22.2% male, while the remaining 44.8% could not be sexed, primarily due to immaturity.

Pooling ages and sexes, it appears that the Early phase population experienced relatively harsh health conditions (mean of 1.41 Harris lines per femur), the Middle phase population was healthier (0.90), while there was slight additional improvement in the Late phase (0.80).

Different segments of the population display varying frequencies of transverse lines. Infants less than three years display an apparent decrease through time in the number of Harris lines. This, however, may not indicate improvement in health, but exactly the opposite. Infants apparently came to experience a higher death rate, so that they were removed from the population before many growth arrest lines could form.

Members of the 21-35 year age grade experienced a decrease in the number of lines Early to Middle, then an increase in the Late phase. The Early sample size here, though, was only three, so this result is not to be relied upon.

In the 36-55 year age grade a different pattern can be seen. Lines decrease Early to Late, but line remnants increase Early to Middle, then decrease Late. Harris (1972:227) infers from this a decrease in relative morbidity during the Late phase.

Turning to male-female comparisons, with ages pooled, Harris notes that the relative morbidity of males was higher in the Early phase, but that this situation was reversed in the Middle and Late periods. When the sexes are considered individually with ages pooled, there was a general increase in morbidity through time. Harris (1972:233) attributes this to such factors as disease and Spanish domination.

Pooling all ages and both sexes, and counting both transverse lines and line remnants, Harris (1972:239) infers that the population as a whole experienced a decrease in morbidity from the Early to the Middle phases, with little change (a slight decrease) in the Late phase.

In comparing the Gran Quivira data to other similar studies some surprising results emerged. The Gran Quivira femora contain a mean of 0.82 Harris lines per bone. This is close to the lowest recorded archeological population, which showed 0.80. In addition, the degree of change between the Early and Late phases is much lower than temporal change in some other skeletal series. These observations combine to reinforce an observation made by Christy Turner (personal communication): that the Gran Quivira population was a rather healthy one, at least when compared against some other areas of the Southwest (cf. El-Najjar et al. 1976).

Gran Quivira Survey:

In a survey of the Gran Quivira unit, Patrick Beckett recorded numerous pithouses, as well as prehistoric dams, terraces, a small mound, rock art, roads, artifact scatters, and historic materials (1981b). He puts forward a sound argument that the many stone discs found at the site were used to cover the mouths of Chupadero B/w jars, possibly to prevent evaporation of water stored therein. The mean diameter of these discs corresponds quite closely to the mean diameter of the necks of recorded Chupadero B/w jars from the site (Beckett 1981a, 1981b:84-89).

Pueblo Pardo

Pueblo Pardo is a moderate-sized masonry site on Chupadera Mesa, located a few miles south of Gran Quivira. It was noted by Bandelier (1892).

In the spring of 1941, Washington and Jefferson College undertook excavations at the site. Joseph Toulouse, custodian at Gran Quivira, directed the work, assisted by Robert Stephenson. Their report on the excavations was prepared shortly thereafter, updated slightly in the intervening years, and published in 1960 (Toulouse and Stephenson 1960).

The occupation in the excavated portion of Pueblo

Pardo overlaps with that of Gran Quivira. Ceramics indicate occupation into the historic period. Several ceramic types were found which were also recovered from the mission of San Gregorio de Abo, including Red "Brick" ware, Salinas Red ware (both of which date post-1630), Kotyiti Glaze-Polychrome, and Tabira B/w. These indicate an occupation in the first third of the 17th century. But late Abo ceramics were not found at Pueblo Pardo, nor were European items. This may be due to the small area examined, but it may also mean that the site was in the final stages of abandonment in the first third of the 17th century. There are no known Spanish records of the site, probably because it was too small and was considered part of Gran Quivira (Toulouse and Stephenson 1960:3).

Fourteen rooms and one kiva were excavated. The recovered ceramic inventory included Chupadero B/w, Casa Colorado B/w, Tabira B/w and Plain, glaze wares, and both brown and gray utility wares. Nearly all glazes were present, but only A and F were found in any significant frequency. Toulouse and Stephenson (1960:3) estimate a 400 year span of occupation for the site.

Based on their excavations at Pueblo Pardo, and a surface reconnaissance of the area, Toulouse and Stephenson (1960:40) proposed a cultural/temporal sequence for the area. Starting from the most recent manifestations, it includes the following periods: Historic Puebloan (Salinas Focus), Proto-Historic Puebloan (Pueblo Pardo Focus), Late Prehistoric Puebloan (Pueblo Colorado Focus [actually named not after Pueblo Colorado, but after nearby LA 2091]), Middle Prehistoric Puebloan (Gran Quivira Focus), Early-Middle Prehistoric Puebloan (Arroyo Seco Focus), and Early-Middle Prehistoric Brown ware (Claunch Focus). The ceramic characteristics of these periods are shown in Table 10. Toulouse and Stephenson (1960:41) believe that the Claunch and Arroyo Seco foci were contemporaneous.

The single season of work at Pueblo Pardo resulted in discovery of 36 burials (Toulouse and Stephenson 1960:34-35). Of these 7 were cremations, 17 were flexed inhumations, 8 were extended inhumations, and 4 were inhumations that were too fragmentary to ascertain burial position. Cremations were all buried in simple pits, although in four cases these were cut down into bedrock. Some of both the extended and the flexed inhumations were placed in stone-lined pits.

The mortuary system from Pueblo Pardo is generally similar to that of Mound 7 at Gran Quivira, but some differences are apparent. The more elaborate, stone-lined graves were not used for cremations. This would suggest that, unlike Gran Quivira, whatever status is represented by these graves did not cross-cut the major cremation/inhumation dichotomy. Furthermore, there appears to have been a higher proportion of extended inhumations at Pueblo Pardo than at Gran Quivira, and as noted, some of these were placed in stone-lined graves. Provided that these differences are not merely errors induced by a small sample, it would appear that there may have been structural differences between Gran Quivira and Pueblo Pardo societies. Toulouse and Stephenson (1960:34) note that these types of burial do not vary between the earlier and the later aspects of their excavated material.

The Salinas Province

Elsewhere in the Salinas Province archeological work in the late prehistoric period has been much less intense. Only the sites of Abo and Quarai have received much attention. They will be discussed shortly.

East of Gran Quivira, on the Cibola National Forest, there are a number of late prehistoric sites recorded in the files of the Laboratory of Anthropology. LA 2091, located on top of a mesa southeast of Pueblo Colorado, has yielded Glazes A and B, and may date in the early 15th century. Pueblo Colorado itself was initially settled around 1200, but the major occupation was between 1325 and 1625. The site contains over 20 room blocks, but these were probably not all contemporaneous (Map 12).

Pueblo Blanco, known to the Spanish as Tabira, is located a few miles north of Pueblo Colorado (Map 10). It was initially settled around 1200, was at least intermittently occupied during the 13th and 14th centuries, and increased in size and population in the 15th through 17th centuries.

The existence of a Spanish mission at Pueblo Blanco was recognized by Richard Howard (1959b). This church was subsequently excavated by Stanley Stubbs (1959). Prior to Stubbs' work, illicit excavations had been conducted in a historic era midden at the site (Cress 1957). Some pothunting had also occurred in the church, but the main features had been missed. Several burials in the Campo Santo had, however, been disturbed.

Table 10

Ceramic Characteristics of Temporal Periods in The Pueblo Pardo Area*

Period	Ceramics
Historic Puebloan	Tabira B/w
Salinas Focus	Tabira Polychrome
	Kotyiti Glaze-Polychrome
	Salinas Red ware
	Mexican Majolica
	Plain Smoothed Utility Ware
Proto-Historic Puebloan	Tabira B/w
Pueblo Pardo Focus	Tabira Plain
	Chupadero B/w
	Kotyiti Glaze-Polychrome
	San Lazaro Glaze-Polychrome
	Jornada Brown
	Plain Smoothed Utility Ware
Late Prehistoric Puebloan	Chupadero B/w
	Tabira B/w
Pueblo Colorado Focus	Agua Fria G/r
	Cieneguilla G/y
	Largo Glaze Polychrome
	Little Colorado Polychrome
	Jornada Brown
	Indented Blind Corrugated
Middle Prehistoric Puebloan	Chupadero B/w
	Agua Fria G/r
Gran Quivira Focus	San Clemente Glaze-Polychrome
	Cieneguilla G/y
	Jornada Brown
	Indented Blind Corrugated
Early-Middle Prehistoric Puebloan	Chupadero B/w
	St. Johns Polychrome (?)
Arroyo Seco Focus	Corrugated Utility Ware
Early-Middle Prehistoric Brownware	Jornada Brown
	Los Lunas Smudged
Claunch Focus	San Francisco Red
	Chupadero B/w
	Indented Corrugated Utility

* after Toulouse and Stephenson (1960:40).

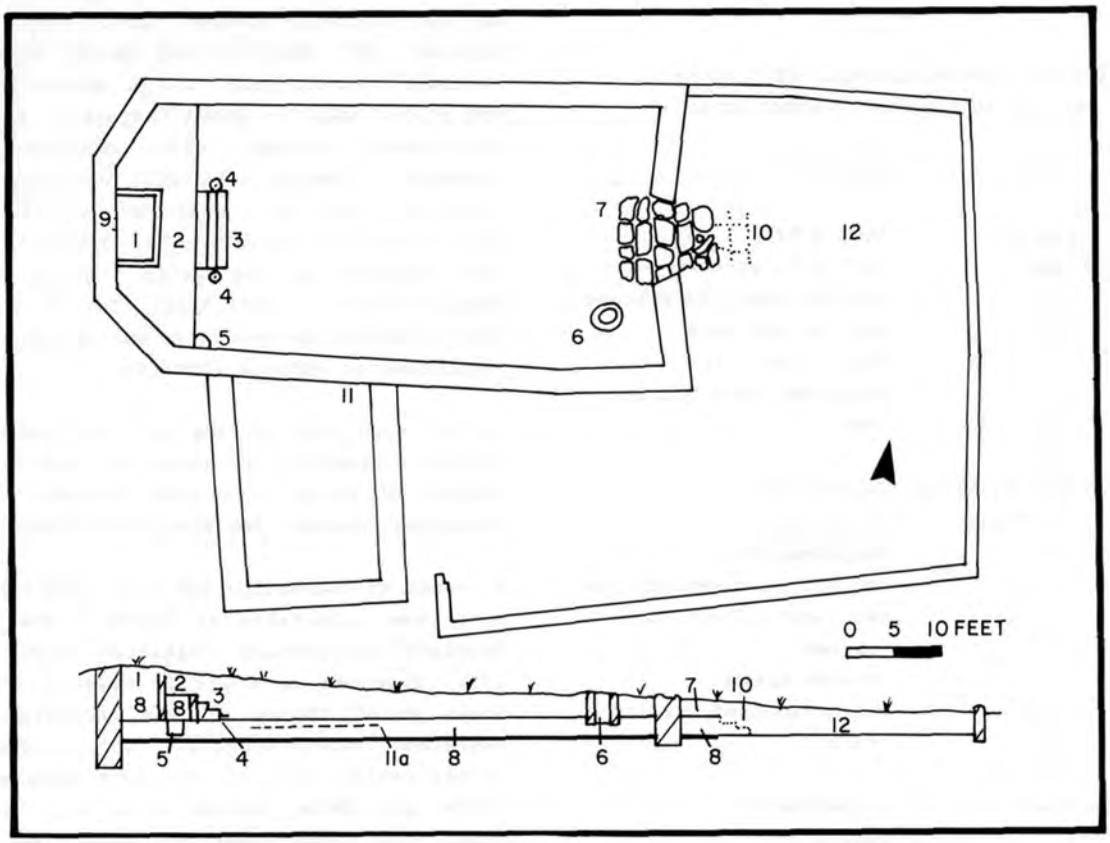
The floor plan of the mission church was typical of the earliest mission period (Map 9). Two periods of construction were noted. The earliest, around 1629, had a simple floor plan and walls, with no added features. A period of abandonment ensued, with considerable wall breakdown. Around 1659 fill was laid over the original floor to a depth of two feet and the walls rebuilt. Five or six layers of plaster were evident on the walls. There were some indications of a choir loft. The church may have been deliberately abandoned and wrecked, with the vigas removed (Stubbs 1959:168).

On the east side of the Estancia Basin, in the Pintada locality, a number of Pueblo III and Pueblo IV sites have been recorded. None of these has received any systematic investigation.

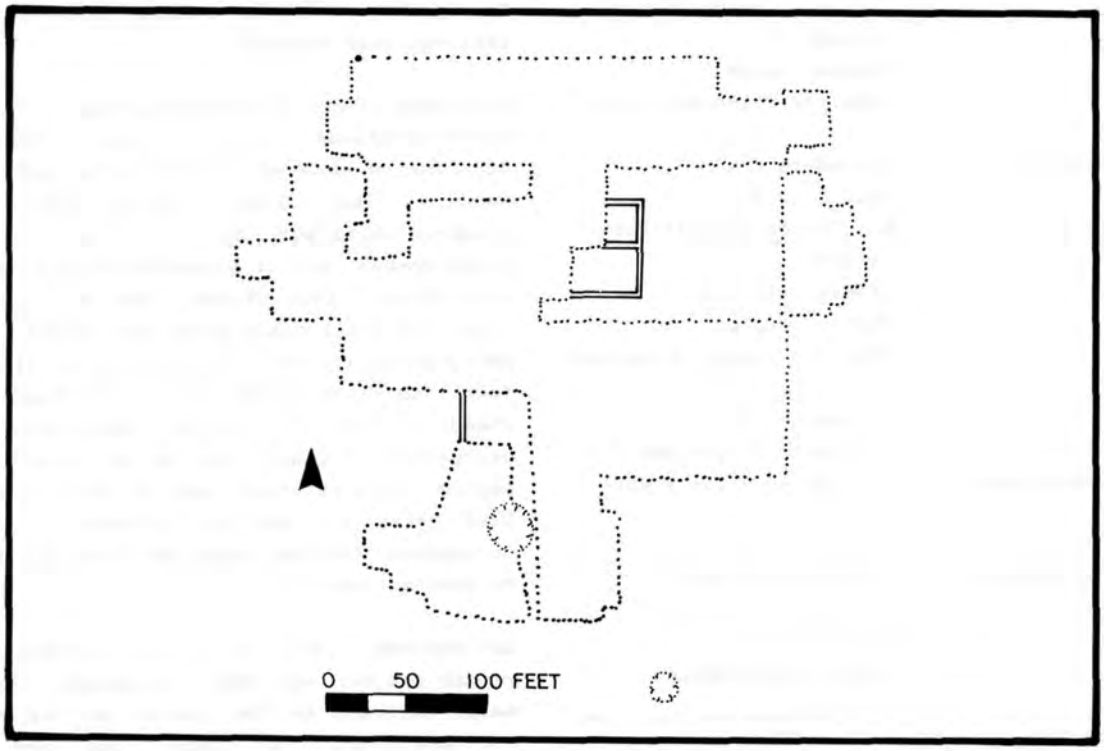
A number of excavation and stabilization projects have been undertaken at Quarai. The School of American Archaeology initiated work there in 1913, directed by Edgar L. Hewett (1917). The South Mound (House A) was excavated, and 22 skeletons removed (Hurt n.d.:45). Excavation and stabilization work at the site resumed in the 1930s and 1940s (Senter 1934; Ely 1935; Baker 1936; Hurt 1985; Hurt and Dick 1946). While doing repair work in 1959, Stanley Stubbs (1959) discovered a possibly older church similar to the one at Tabira. Stabilization of La Purisima Concepcion church was underway when research for this overview started.

Ele Baker (1936) conducted stratigraphic tests at three locations around the site: the monastery and mission, the West Mound plaza, and the South Mound. The South Mound test yielded black-on-white wares, a fair amount of Glaze A, glaze-on-red, Arenal Glaze-Polychrome, and a few Glaze B and Zuni glazes. The West Mound test contained later glaze wares with E and F dominant among painted wares. Five sherds of Glaze C were found, no Glaze D, and only a few black-on-white sherds. Baker concludes that the earliest occupation of Quarai was in the late Pueblo III period. The relative lack of Glaze C and D has been taken by some to indicate a hiatus in occupation, but the number of tests was too small to substantiate this.

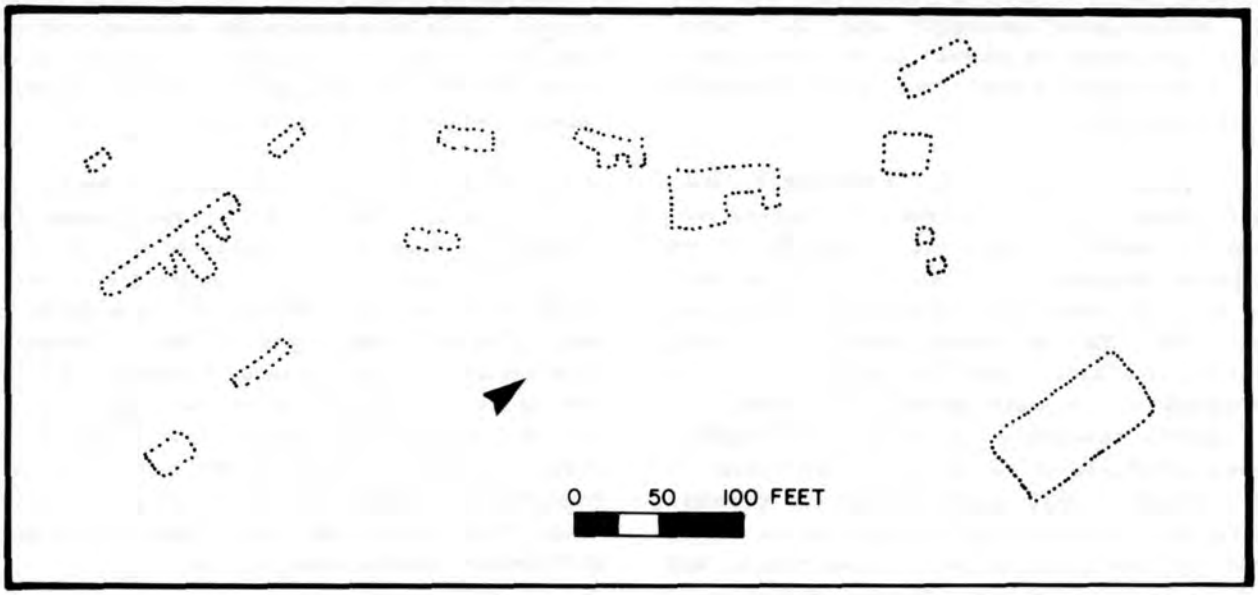
In January, 1939, a general landscaping and repair project was begun at Quarai. The Pueblo walls adjacent to the mission on the west were outlined (Hurt n.d., 1985). Two, and possibly three, stages of construction were discovered in the southeast section of the monastery. Stone



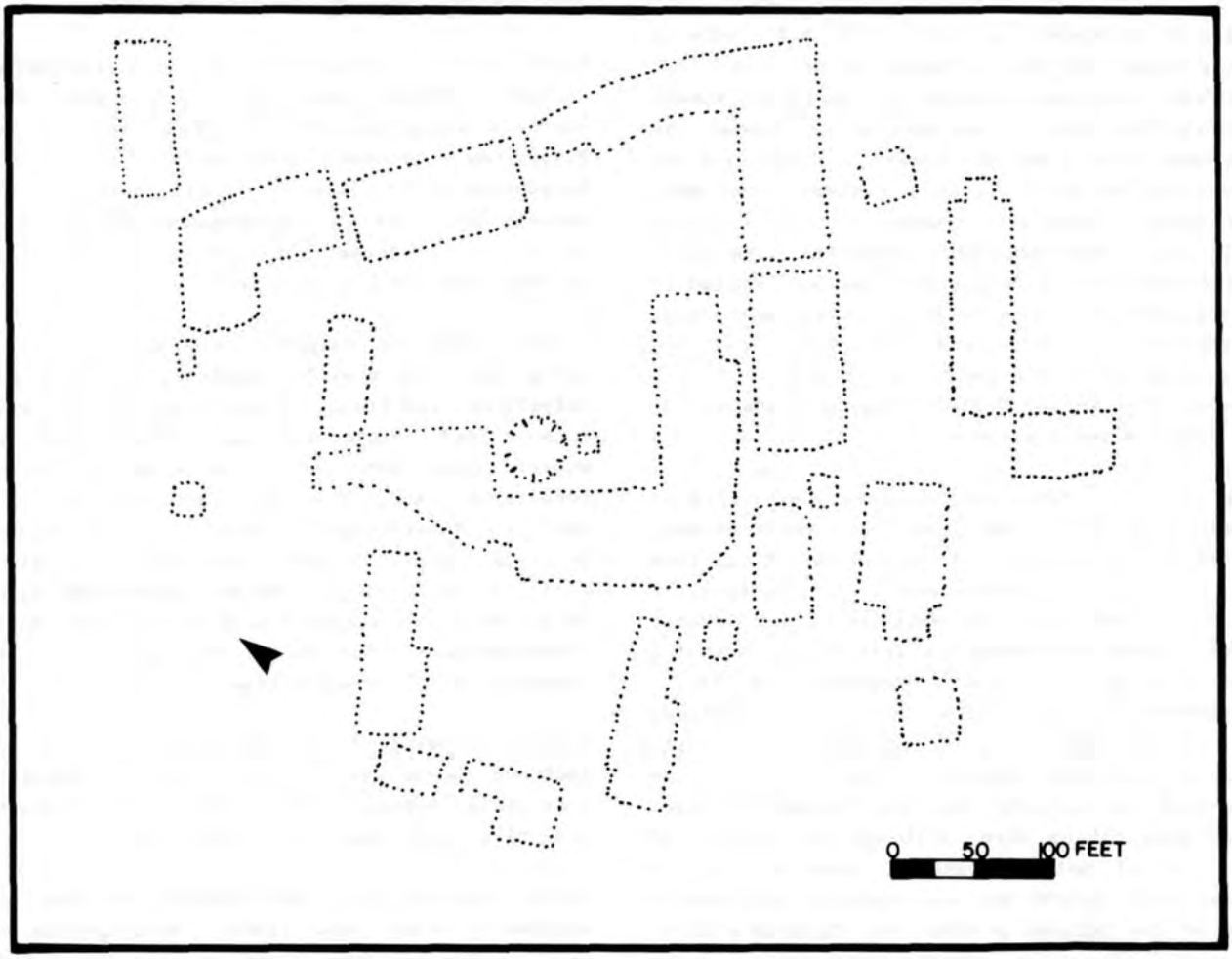
Map 9. Tabira Mission (after Stubbs 1959:166).



Map 10. Pueblo Blanco (LA 51) [after Mera 1940b:298].



Map 11. Late Thirteenth Century Village (LA 789) [after Mera 1940b:293].



Map 12. Pueblo Colorado (LA 476) [after Mera 1940b: 295].

projectile points, grinding implements, and iron arrow points were recovered from this area. Majolica and porcelain sherds, in association with Glaze F, were also found. One piece of Chinese porcelain was noted.

In the parts of Quarai he investigated, Hurt (1985) discerned three phases of occupation. Period I ceramic types were primarily Corona Corrugated, Chupadero and Casa Colorado B/w, Agua Fria G/r, Galisteo B/w, Cieneguilla G/y, and Arenal G-P. The estimated duration for this period is from 1350 - 1425 (or 1450) A.D. It is represented in the south mound, labeled Mound A, and perhaps elsewhere in fill and midden. Mortuary practices in Period I included burial in flexed to semi-flexed positions with no standard orientation. The deceased were placed in refuse mounds, in house fill or below house floors, and had few grave associations. The presence of small amounts of the twelfth century pottery types Tularosa B/w and St. Johns Polychrome raises the possibility of earlier occupation.

Period II at Quarai, ca. 1450 - 1545 A.D., is very poorly known. No residential areas dating to this time have been investigated, and one could almost conclude that Quarai was unoccupied between the time when Mound A was abandoned (ca. 1425) and the time when the Glaze E and F pottery types were introduced. There are, however, sherds of Glazes B, C, and D scattered throughout the site which indicate occupation during this period. Period II is characterized by a decrease in Chupadero/Casa Colorado B/w, Glaze A, and Corona Corrugated, and by an increase in Corona Plain. Glazes B, C, and D, and Santa Fe and Galisteo B/w as trade wares, are found in small numbers.

Hurt dates the structural remains he excavated in Mounds F, G, H, I, and J to the Glaze F ceramic period, and accordingly places his Period III from ca. 1615/1625 to abandonment (ca. 1676). In Period III samples that Hurt excavated several ceramic types decreased in frequency, including Agua Fria G/r, Corona Corrugated and Plain, Chupadero/Casa Colorado B/w, and Glaze E. Salinas Red, on the other hand, increased slightly, while Glaze F increased markedly. Kapo Gray, a trade ware from the Santa Fe area, was introduced. Hurt feels that Tabira ware, although not defined at the time of his excavations, occurred in low frequency at Quarai and was imported from one or more of the Salinas pueblos near Chupadera Mesa. Several construction episodes were evident among structures occupied during Period III.

Dendrochronological assays indicated that the main church, La Purisima Concepcion, was built prior to 1630 A.D. Hurt is unable to confirm Stubbs' (1959) belief that the smaller, nearby chapel was constructed prior to this time.

Mounds F, G, H, I, and J at Quarai revealed three types of masonry (Hurt n.d.). Type A masonry was confined to Mound J. It consisted of rubble core faced with linear slabs of sandstone. Some of these walls resembled masonry at the mission, and were no doubt contemporaneous. Type B masonry was fine sandstone slabs, without a rubble core, on a foundation of upright sandstone slabs. It was dominant in the 1939 project area. Type C consisted of fine linear slabs not laid on a foundation of upright slabs. Hurt (n.d.) acknowledges that there may have been no temporal differences between these styles.

The mission of San Gregorio de Abo was excavated and stabilized under the direction of Joseph Toulouse in 1938 and 1939. The report on this work was published by Toulouse in 1949.

Trade wares recovered from the excavations included pottery from Hopi, Zuni, and Acoma. Northern varieties also occurred, such as Tewa Polychrome, Posuge Red ware, and Puname Polychrome. Toulouse (1949:14) believes that vessels from late in the Chupadero series reveal imitation of these northern wares, as in a conventionalized feather design.

A few sherds of Chupadero B/w were recovered, along with the possibly derivative Tabira B/w, Polychrome, and Plain. A Tabira B/w chalice was a notable find. Plates and cups of the Tabira Plain variety were fashioned in imitation of Chinese porcelains and Mexican majolica (Toulouse 1957:5). Non-aboriginal ceramics included Mexican Majolica and Chinese porcelain. Toulouse (1949:17) believes that the Abo glaze wares cannot be accommodated within either Kidder's or Mera's classifications, but Reed (1940) reports all six conventional glaze wares from the site.

Fauna recovered from the excavations at Abo included wood rat, lynx, ground squirrel, cottontail rabbit, mule dear, bison, western red-tailed hawk, pig, sheep, and goat.

Floral remains from San Gregorio de Abo were studied by Volney Jones (1949). Four samples were sent to him for identification, two from turkey pens and two from adobe bricks. The bricks

contained almost nothing. The pen material was turkey dung, and it was very productive of floral remains. A peach pit was found, as were remains of watermelon and muskmelon, coriander, grape, chili pepper, plum, pumpkin, corn, pinyon nuts, yucca, prickly pear, cholla, amaranth, and juniper seeds. Considering the floral and faunal remains from Abo and Gran Quivira, a picture emerges of a historic era diet which included primarily domesticated fauna, supplemented by native species, and primarily native flora, supplemented by introduced species. Since the data which underlay this observation come from both native (Mound 7) and Spanish (San Gregorio de Abo) occupation areas, such a diet may well have characterized both groups.

Toulouse's (1949) work at Abo had indicated that an earlier structure lies beneath the convento standing today. This was confirmed in 1984 when National Park Service archeologists James Trott and Susan Kreger excavated a drainage pipe trench for the convento. They found several fragmentary walls under the present floor.

Based on these finds, Park Service historian James Ivey developed a plan for limited excavations to test for the existence of an earlier church (Ivey n.d.a). When these excavations were conducted in March 1987, wall remnants of an earlier church were indeed found (Kailer 1987). Ivey believes that this church was begun by Fray Francisco Fonte in 1623, and completed about 1627. When Fray Acevedo became guardian of Abo about 1640 he began planning the larger church that is seen today. This was built economically, by using much of the older church, and enlarging it where necessary (Ivey n.d.b).

In 1944, Bertha Dutton tested the native portion of Abo. Some of this work has been recently reported (Dutton 1981), while some is still forthcoming. Excavating in both rooms and refuse, she found the full range of glaze wares from A through F, Chupadero and Tabira wares, and various plain wares. The last included Manzano Brick ware (historic Casitas wares?) (cf. Dutton 1981:180; Dick 1968), Salinas Red, Corona Plain, Corona Corrugated, and Los Lunas Smudged. Dutton also notes twenty corrugated culinary sherds which she places between 1100 and 1300 (1981:189). She suggests occupation at Abo as early as 1150 A.D. (Dutton 1981:193).

The Abo area displays some of the most ornate and well executed rock art of the late period Rio Grande style, including masks and anthropomorphic representations (Schaafsma 1972:131-135). The masks in particular are similar to the Jornada rock art style. The Rio Grande style appears in the Rio Grande Valley from San Marcial to the Pajarito Plateau (Schaafsma 1972:141-144). Major representations in and near the overview area occur at the Bureau of Land Management's Arroyo del Tajo pictograph site (BLM 1981; Schaafsma 1980) (Fig. 4) and near Los Lunas (Durham 1955; Schaafsma 1968).

Schaafsma and Schaafsma (1974) believe that the Rio Grande rock art style was iconographic, and its spread after 1300 marks the adoption of a new ceremonial pattern, specifically the katchina cult. They suggest that population aggregation after 1150 in the Anasazi area, with the formation of larger villages of several descent groups, required the development of new means of village integration. The katchina cult, along with village sodalities, met this need. The spread of Jornada style rock art into the Anasazi area after 1300 documents the adoption of these new integrative institutions.

The Schaafsmas' inferences about the spread of the Jornada style, and the cultural processes they associate with it, are plausible. They do not, though, consider the question of whether this style of rock art served a function in the Jornada area similar to that which they postulate for the Anasazi. If so, this might imply that complex villages existed earlier in the Jornada area, an improbable point.

Notes on Salinas Province Ceramics

In a pioneering study which preceded Warren's (1981) research, Shepard (1942) analyzed temper inclusions in glaze ceramics of the Salinas Province, the northern Jornada del Muerto, and the Middle Rio Grande Valley. She found that among the Salinas pueblos the east-central and northernmost sites show strong ties with the Galisteo Basin. There is a sharp contrast between the Jornada del Muerto on the one hand, and the Salinas, Los Lunas, and lower Rio Grande areas on the other, in terms of the percentage of sherd tempered Glaze A red wares. The latter areas consistently display 33-35% sherd temper, contrasting with about 60% in the former.

The non-aboriginal ceramics of the Salinas Province have been described by Hurt and Dick (1946), Caywood (1950), Plowden (1958), Dick

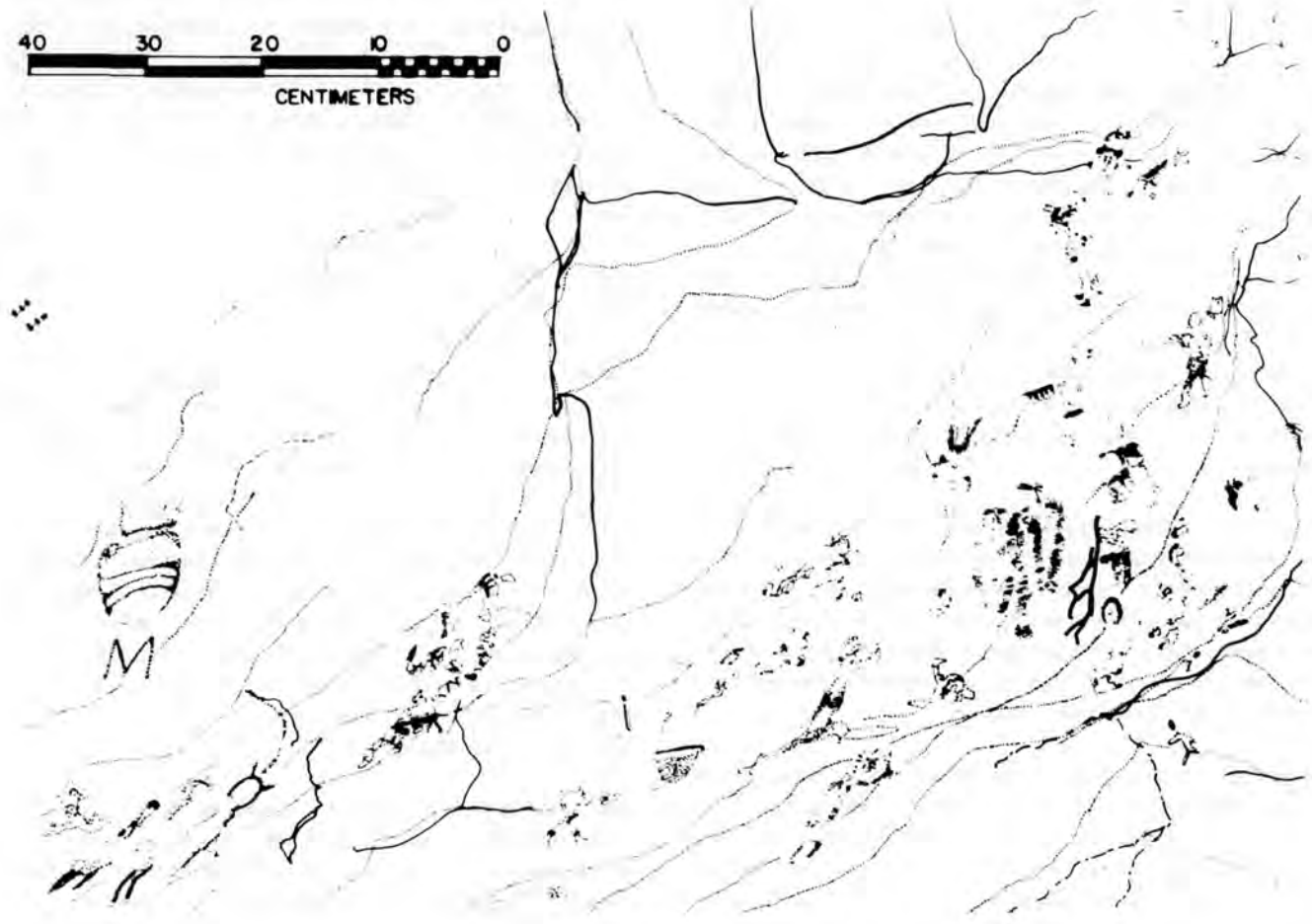


Figure 4. Terrestrial photogrammetry of a portion of the Arroyo del Tajo pictograph site.

(1968), and Goggin (1968). Among the ceramics recovered from Quarai, Plowden (1959:213, 217) lists Fig Springs Polychrome (1615-1650), Abo Polychrome (1650-1700), San Luis Blue-on-white, (1635-1700), Tallahassee Blue-on-white, Puebla Blue-on-white (1700- ?), and unclassified polychromes, blue-on-white wares, and green wares. Goggin (1968:171) notes that Abo Polychrome was probably made in Puebla, Mexico. Ceramics found at Abo include Abo Polychrome and San Luis Blue-on-white (Plowden 1958:217).

Plain wares found at Quarai include Manzano Coarse ware, Manzano Thin Red-on-buff, Manzano Burnished Black ware, and Manzano Micaceous (Hurt and Dick 1946:281-283). Dick renamed Manzano Coarse as "Carnue Plain" in his later paper (1968:80-84), and assigned a date of 1700-1895. Manzano Thin Red-on-buff became Casitas Red-on-brown (pre-1672 to 1890), and Manzano Burnished Black became Kapo Black (1700 to present). These ceramics clearly post-date the native occupation of the site. They were all stratigraphically late in the deposits, and were apparently intrusive from the Spanish resettlement of the locale.

Village Organization

In the southeastern portion of the Salinas Province, Mera (1940b) has documented a contrast in late prehistoric village organization. On the one hand are compact and tightly organized structures, seemingly built with some level of integration and planning. Pueblo Blanco (Map 10) and Pueblo Pardo illustrate such settlements. At the opposite extreme are sites such as Pueblo Colorado (Map 12), Gran Quivira, and LA 572 which lack this compact village form, and which consist of groups of room blocks clustered in an area with varying degrees of formal arrangement.

Mera draws some provocative inferences from this dichotomy. For example, he notes the similarity in village plan between the later group of pueblos, those lacking compact organization, and earlier, late 13th century brown ware villages

such as LA 789 (Map 11). Mera proposes that, with the abandonment of the Jornada Mogollon area around 1350 - 1400 A.D., populations from that region established residence in the southeastern Salinas Province. There they built large settlements of dispersed, non-contiguous room blocks in the manner of their former villages. They impinged upon resident populations who were building more compact structures. Mera believes that these newcomers were the Jumanos referred to by the Spanish, while the resident population should be classified as Tompiros.

Similar interpretations, based upon Mera's ideas, were advanced by Vivian (1964) to account for the late adoption of some Anasazi technological features in the Gran Quivira area. Vivian believed that the "Mogollon" Jumanos constituted a distinct faction in the Gran Quivira community, contributing to a lack of social cohesion, as well as to the delayed technological imitation of the Anasazi.

While it is evident that there were probably organizational differences between such sites as Pueblo Blanco and Pueblo Colorado, this is neither a sufficient nor a logical basis for reaching the conclusion that ethnically and linguistically different populations occupied these two types of village. Indeed, as noted, the lack of biological indicators of a populations intrusion in the Gran Quivira skeletons (McWilliam 1981) argues against the idea that Jornada Mogollon populations moved into this area following abandonment of the Tularosa Basin. This topic will be discussed in more detail in the next chapter.

As discussed in the History chapter of this overview, the pueblos of the Salinas Province were abandoned during the decade of the 1670s. The abandonment brought a major hiatus in 11,000 years of native occupation, although Apache use of the area probably continued.

SYNTHESIS OF THE EARLY NATIVE OCCUPATION

Hunters and Gatherers

Although substantial PaleoIndian and Archaic occupations of the riverine and Jornada del Muerto portions of the overview area have been documented, it is possible to synthesize these occupations in any detail only for the Estancia Basin.

The overview area figures prominently in the question of early occupation of North America. The well known, and controversial, Sandia remains have been found in the Estancia Basin at the Lucy site, and at other locations. The finds at the Lucy site were probably associated with mammoth remains, and Roosa (1968:35) believes that a Sandia mammoth kill occurred at the edge of a pond. Both Roosa (1968) and Harbour (1956) assign a late Pleistocene age to the Sandia remains at Lucy. Roosa suggests that Sandia may have been the same age as, or older than, Clovis, while Lyons (1969:27) believes that the Sandia complex dates to around 20,000 B.P. The stratigraphy of the Lucy site was not suitable for evaluating the temporal position of Sandia. The original discoveries at Sandia Cave, reported by Frank Hibben (1937, 1941) have become so controversial that serious doubts exist about the reported finds (Stevens and Agogino 1975). More recent excavations in the cave by C. Vance Haynes and George Agogino have not yet been reported.

In his survey of the Estancia Basin, Lyons (1969:87-104) recorded two sites that he feels may have pre-dated not only Clovis, but even Sandia. These sites were both found on low hills capped by outcrops of Glorieta sandstone. A large number of quartzite implements was found on each site. These tools extended down the two hills to the level where the shoreline of Lake Estancia existed prior to 19,000 years ago. And although at one locality quartzite outcrops occurred farther down the hill, only outcrops higher than the shoreline were used for making tools, suggesting that Lake Estancia prevented access to the lower ones. Lyons accordingly postulates a pre-19,000 B.P. age for these remains, and terms the manifestation the "Estancia Complex."

A diversity of tool forms were found on the two "Estancia Complex" sites, perhaps representing butchering and associated activities, plant food processing, and wood working. It is likely that these hills served as quarry sources which were repeatedly utilized for whatever activities groups happened to pursue in the area at any time. If these sites served as special activity loci, the remains found at them can serve to characterize only a portion of the technological repertoire of these possibly early populations.

The question of early, pre-Clovis occupation in the Estancia Basin can only be resolved by obtaining firm radiometric dates, or finding appropriate stratigraphic sequences. Since it is

difficult to predict from surface observations whether an archeological site might contain these kinds of data, designing a research program to test the chronological position of the Sandia and Estancia complexes is essentially impossible. It may be, then, in terms of empirical verification, that arguments over the temporal positions of these complexes are futile. It is, in part, for this reason that I have argued in the preceding chapter that research should concentrate instead on the possible functions of the Sandia "points." Lyons reports wear, polish, and striations on Sandia points that indicate their use as knives as well as projectiles (1969:118). Roosa (1968) suggests that Type 1 Sandia points were knives, while Type 2 were projectile tips. Stevens and Agogino (1975:46) have proposed that the points found in Sandia Cave were used for mining ochre.

If the Sandia points represent a style, presumably employed for a short duration, then it may be worthwhile to pursue the possibility that they held a distinctive position in PaleoIndian chronology. But if they were a generalized, multi-purpose implement, designed for function rather than style, then the likelihood is reduced that they might serve as temporal indicators. If so, the question of the Sandia chronology and controversy would become both less crucial and less solvable.

In his survey of the Estancia Basin, Lyons (1969) found 6 Clovis sites, 10 Folsom, and 15 Plano. These sites concentrated at the northern and southern ends of the basin, where access to adjacent regions was easiest. Lyons (1969: 153-156) estimates that the Folsom occupation was largest, followed by Clovis and Plano.

Cynthia Irwin-Williams (n.d.) has suggested that a pattern of continual moisture decrease following Folsom times led to decreased availability of megafauna, and to changes in the human occupancy of western New Mexico. She postulates reduced occupation during Agate Basin, sparse or intermittent occupation between the period 7500 and 6600 B.C., and reoccupation during Cody times (6600 - 6000 B.C.).

There are, however, consistent indications of human occupation in and near the overview area between Folsom and Cody times. Judge places the Belen complex of the Middle Rio Grande Valley in this era (1973:69-72). In the study area itself Plainview, Agate Basin, and Hell Gap points have been found. While it is possible that these do occur in lower frequency than fluted points, the conclusion that this reflects depopulation of the area may not be warranted.

Irwin-Williams bases her interpretation on the notion that PaleoIndian subsistence strategies were focal ones, concentrated on big game (mammoth during Clovis times, Bison antiquus thereafter). It is doubtful, though, if such a focal economy was indeed practiced. A diversified subsistence is the common pattern among ethnographic hunters and gatherers, except in the Arctic where food alternatives are few. A focal economy is always risky, since depletion of the major resource is a constant threat. It is not likely that PaleoIndians followed a subsistence strategy so anomalous, and so contrary to their own self-interest.

In an earlier discussion of this problem (Tainter and Gillio 1980:39-41), Judge's (1973) survey data from the Middle Rio Grande Valley were used to roughly estimate the portion of the subsistence base that could have come from megafauna. Even using the most generous estimates, it was apparent that megafauna could have accounted for only a small fraction of the total diet.

It seems more likely that PaleoIndians in western New Mexico pursued a mixed subsistence pattern, relying primarily on plant foods and smaller game, and supplementing their diet with megafauna only on rare occasions. This is a view with which both Roosa (1968:195-196, 233, 261-262) and Lyons (1969:172) are in agreement. If so, then during times when megafauna were not available, this would have amounted to the loss of only a minor resource, one easily adjusted for. If PaleoIndian projectile points were more frequently used in hunting megafauna, then during periods of megafaunal depletion, when such points were not being employed so regularly, the archeological record might give the appearance of depopulation. Scholars who study PaleoIndian occupation and subsistence in the overview area, and elsewhere, should bear in mind this potential bias in the archeological record.

Similar considerations apply to the transition between PaleoIndian and Archaic times. It is believed by Irwin-Williams (n.d.) that with the disappearance of the Cody complex (ca. 6000 B.C.) there was an occupational hiatus in west-central New Mexico prior to the appearance of the Jay populations (ca. 5500 B.C.). She bases this interpretation on two factors: (1) the presumed withdrawal of Cody populations to the Plains following the disappearance of megafauna, and (2)

the lack of any technological continuity between Cody and Jay. Irwin-Williams sees technological similarities between Jay and the remains of San Dieguito/Lake Mojave in California and western Arizona, and postulates population movements from the west into New Mexico.

As with the question of depopulation between Folsom and Cody, the appearance of population withdrawal between Cody and Jay may only be a skewed reflection of the fact that diagnostic PaleoIndian points were used only in a minor portion of the subsistence round. The apparent lack of technological continuity between Cody and Jay may also stem from this bias, and in any event is not a reliable indicator of population replacement. The assumption that hunters and gatherers do not make rapid, pronounced cultural changes is a shaky basis for such an important conclusion.

The overview area has produced Archaic remains that pertain to the nature of the transition from PaleoIndian to Archaic culture, and that raise additional questions. The dating of J points is obviously pertinent. Lyons (1969:68) classifies J as PaleoIndian, while Roosa (1968:69) discerns two varieties of J points at the Lucy site: wide and narrow. He finds the former to be similar to Agate Basin and Hell Gap, and the latter to Pinto Basin points. Irwin-Williams (1973), in contrast, has assigned J points exclusively to the initial Archaic period, renaming the complex "Jay," and dating it in the interval from 5500 to 4800 B.C.

It is possible that applying the term Jay, or J, to specimens that resemble undisputed PaleoIndian points on the one hand, and to examples that resemble Archaic forms on the other, has led to the confusion regarding chronological placement for these remains. Jay points are rather simple in form (see Fig. 1), and probably were developed independently many times. Arguments over whether they were restricted to the early Archaic may be focusing on the wrong question.

Irwin-Williams (1973) argues for the Archaic placement of Jay, not only as a point form, but also as an associated technological complex and settlement system. Those who argue for the PaleoIndian assignment of Jay may be discussing a morphologically different form (Roosa's wide variety). They are certainly not suggesting PaleoIndian assignment for the technological complex and settlement pattern delineated by Irwin-Williams in the Arroyo Cuervo region.

The possibility that certain PaleoIndians made points that somewhat resemble early Archaic forms may be only coincidental, does not require an interpretation of technological continuity, and need not contradict Irwin-Williams' (1973) Archaic sequence. In the event that points of the Jay form are found to date both in the PaleoIndian and the Archaic periods, much future confusion could be avoided if a different name were assigned to one of the manifestations.

In his survey of the Estancia Basin, Lyons (1969:172) found geomorphological evidence suggesting that Archaic Desert Culture remains may date as early as 10,000 B.P. in the area, coeval with the PaleoIndian occupation. Lyons suggests that the Desert Culture and PaleoIndian remains reflect concurrent occupation of the area by two separate socio-ethnic populations. The evidence he offers in support of this, however, is not convincing. I consider it more likely that the Desert Culture and PaleoIndian remains, if they were indeed contemporaneous, represent different aspects of a single food procurement system. Within this interpretation, the sites with PaleoIndian points would have been used for hunting activities, while many of the Desert Culture sites may have been related to plant foods.

At the site of Tillery Springs, located near the town of Estancia, Lyons and Switzer (1975) reported finding mammoth remains which were radiocarbon dated at around 2,000 B.C. Other samples of mammoth in the Estancia Basin have yielded dates of ca. 4,000 and 6,000 B.C. Lyons and Switzer proposed from these dates that the shrinking Lake Estancia was a region where Pleistocene megafauna survived long into the Holocene.

If these dates are valid, and if Desert Culture complexes in the area can indeed be dated to as early as 10,000 B.P., some significant implications are evident. It is possible that there was little difference, in general, between PaleoIndian and Archaic subsistence. With the northward migration of vegetation zones following the Pleistocene, there would, of course, have been some differences in the kinds of plant and smaller animal foods available to PaleoIndian and Archaic populations in the area. However, the general focus of the subsistence systems - plant and animal foods, supplemented by occasional

megafauna - would have been congruent. Thus, in at least the Estancia Basin, the possibility exists that the traditional view of the PaleoIndian/Archaic transition as involving a shift from a focal to a diffuse economy may be incorrect. Of course, this notion rests upon compound inferences, each of which is empirically tenuous, but it does suggest a fascinating research topic for the area.

The kinds of Archaic projectile points found in the overview area reflect both the northern Oshara forms and the southern Cochise varieties. These are often said to represent distinct cultural traditions (Berman 1979:27). Cultural traditions in archeology are normative constructs, referring to what are thought to have been identifiable population units sharing a generationally transmitted heritage.

The notion that Oshara and Cochise represent cultural traditions is clearly explicit in Lang's (1977) study of Archaic occupation in the Galisteo Basin, just to the north of the Estancia Valley. Lang found Oshara points in use during the early Archaic, until perhaps 1,500 - 1,000 B.C., at which time Cochise points came to be used. He suggests that Cochise populations moved into the area from the south, replacing the resident Oshara groups.

There are some elements of plausibility in Lang's reconstruction, but these are more than offset by questionable assumptions. It is conceivable, for example, that distinct groups of hunters and gatherers might have emphasized different forms of projectile points in order to symbolize social affiliation. Polly Wiessner (personal communication) has recently observed a similar phenomenon among the !Kung Bushmen of the Kalahari. If projectile point form was indeed manipulated for this purpose in the Archaic of the Southwest, the level on which it would have been done would have been small, localized groups. However, when archeologists write of Oshara and Cochise as cultural traditions they are referring, not to local groups, but to large, regional populations occupying thousands of square miles. To argue that such regional populations could have maintained generationally transmitted traditions of socio-ethnic unity seems scarcely credible.

What, then, is the significance of the distribution of Oshara and Cochise points? I have argued previously (Tainter and Gillio 1980:115) that what is reflected in such spatial distributions is degrees of interaction among localized populations (cf. Caldwell 1964). Interaction is manifest in such things as trade, intermarriage, and the adoption of symbols to reinforce relationships. It thus leads to the development of an archeological record showing broad similarities over large areas. No degree of cultural unity is implied, nor is any needed to account for the archeological distributions that are observed.

The western New Mexico zone of intermixing of northern Oshara and southern Cochise point forms anticipates a similar zone between the later Anasazi and Mogollon manifestations. Quite possibly, from the early Archaic until the depopulation of the Mogollon area, western New Mexico was characterized by two major interaction spheres, one centered in the north (Oshara, later Anasazi), the other in the south (Cochise, later Mogollon). Populations at the edge between these two interaction spheres variously participated in one or the other, as local conditions made advantageous.

Marshall's (1982) discovery that Archaic populations in the riverine area settled near high diversity locations along the Fra Cristobal range is potentially of great significance. In other parts of New Mexico, such as the Arroyo Cuervo region, similar settlement in high diversity locations led to reduced mobility and consequent population growth. Whether similar processes occurred in the riverine area of southern Socorro County is a question meriting investigation.

Early Agriculturalists

The early agricultural period in the overview area is poorly known. The most extensive research at sites dating to the late Archaic/Basketmaker period has been conducted by Anzalone (1973) at Lemitar Shelter and other sites in San Lorenzo Canyon north of Socorro.

Anzalone demonstrated that the four sites he analyzed were probably habitation loci. Based upon analysis of floral remains, he posits a mixed foraging/agricultural strategy for the time period. The presence of cultigens and pottery record significant cultural change from previous time periods.

To the north, in the Central Rio Grande Valley-Rio Puerco area, and indeed throughout much of the northern Southwest (Glassow 1980),

the Basketmaker II/Basketmaker III transition culminated a long series of adjustments to the pressures of population expansion. This is clearly evident in the Archaic sequence of the Arroyo Cuervo/Albuquerque West Mesa region (Irwin-Williams 1973; Tainter and Gillio 1980:47-48, 97-99). Growth of population is evident throughout the Archaic in this area (Irwin-Williams 1973).

By the Armijo phase (1800 - 800 B.C.) population had grown to the level where maize became important as a stored winter food, although still remaining only a small part of the overall yearly diet. At this point the importance of evening out the harvest of individual groups led to fall/winter population aggregations, ritual resource distributions, and increased social complexity. When continued population growth required further adaptive changes, the preferred options were expansion of the settlement system and use of marginal environments. Some degree of resettlement to the Albuquerque West Mesa occurred after 1000 B.C.

By this point the Archaic population of the area had apparently exhausted its options for intensification of a hunting and gathering economy. With further population growth the stage was set for a truly significant subsistence change: the shift to major reliance on agriculture. This is evident after the Basketmaker II period in the Albuquerque area with a settlement shift from the West Mesa to the Corrales Valley, and with a corresponding shift from high diversity locations in the Arroyo Cuervo to low diversity floodplains in the Rio Puerco.

There are thus indications that the late Archaic period in the Central Rio Grande Valley was a time of population pressure, subsistence stress, expansion of the settlement system, and resettlement in less desirable localities. Some of this resettlement may have involved expansion of Rio Grande populations out of the valley and into upland regions to the east.

Such a pattern of expansion seems to be indicated in the historic distribution of linguistic groups in the Salinas area. Tiwa speakers at contact were found distributed down the east side of the Manzanos from Chilili to Quarai; Piro (Tompiro) speakers were situated to the south and southeast (Bandelier 1892:265) (Map 13). This distribution may have developed by a process such as the following: (1) expansion of riverine Tiwa speakers through Tijeras Canyon, (2) thence out into the Estancia Valley, (3) similar expansion of the riverine Piros through Abo Pass, and (4) thence east and south. (It should be noted that Schroeder has developed a different interpretation of native Salinas language distributions [1964]. It is discussed in the history section of this study.)

Given the pattern of stress documented for the late Archaic, it is possible that the Tiwa-Piro expansion into the upland area occurred during the last few centuries B.C. or the first few centuries A.D., and resulted from population pressure. Data to test this reconstruction are not currently available, although Oakes (1979) has documented a ca. 700 A.D. pithouse in Tijeras Canyon, while Caperton (1981) notes pithouse sites around Jumanes Mesa.

Of course, it is entirely possible that this postulated Tiwa-Piro expansion occurred at some other time in the prehistoric sequence. Blevins and Joiner (1977) document major settlement in

Map 13. Distribution of Historic Linguistic Groups In The Study Area (adapted from Schroeder [1968: Figure 2], with modifications).

Tijeras Canyon after 900, while Mera (1940a:23) notes an increase in the number of settlements along the east slope of the Manzanos during Glaze E. Furthermore, Marshall's (1982) survey did not reveal substantial Archaic settlement along the Rio Grande near the Salado and Puerco confluences, although such settlements are found farther up these drainages. It should be remembered, though, that the Tiwa-Piro expansion into the Salinas area apparently involved complete linguistic replacement, at least along the east side of the mountains. It is easier to envision such linguistic replacement when high density horticulturalists impinge on low density hunter-gathers (late Archaic/early Basketmaker period) than when one group of high density agriculturalists impinges on another.

The occurrence of Basketmaker (San Marcial phase) settlements along the Fra Cristobal range (Marshall 1982; C. Gossett 1984), in the same area as the earlier Archaic population concentration, acquires considerable significance when viewed within this regional context. Is it possible that concentration of Archaic population in a desirable locale, with subsequent demographic growth, led to the development of sedentary horticultural communities? Additional fieldwork in this area to delineate the nature and extent of Archaic occupation would seem to be called for. Let us hope that the answer does not lie at the bottom of Elephant Butte Reservoir.

There is a decided trend toward riverine settlement in the early Puebloan era (Tajo phase), a trend that Marshall (1982; Marshall and Walt 1984) ascribes to overpopulation or habitat deterioration in upland areas, and/or to the development of irrigation. Since it is not likely that the development of labor intensive irrigation techniques was an independent variable, the former possibilities merit consideration. The first such riverine settlements are located along the Salado and Puerco confluences, downstream from earlier and contemporaneous settlements along these tributaries. Often, several room blocks are found together, suggesting an organized community. By the 11th/12th centuries A.D. (Early Elmendorf phase), both the number and size of sites expanded considerably (Marshall 1982; Marshall and Walt 1984).

Ford, Schroeder, and Peckham (1972) have attempted to reconstruct the past distribution of linguistic groups in the area based upon ceramic distributions. They identify the Tiwa, around 900 A.D., by Red Mesa B/w. The Tompiro around Gran Quivira are identified by San Marcial B/w. By 1150 the Tiwa, which they recognize at this time by Socorro B/w, are thought to have extended down river to Socorro. The Tompiro of this era are equated with Chupadero B/w.

Ford, Schroeder, and Peckham show the Tiwa (Socorro B/w) of 1200 as barely encompassing the Rio Salado; the Piro are identified by Casa Colorado B/w. The Tompiro, identified by Chupadero B/w, are shown over essentially their historic range. For the 1300 era, these populations are still equated with the ca. 1200 ceramic types.

Around 1400 A.D., the Tiwa, identified by Los Padillas Glaze-Polychrome, are shown in an abbreviated range, their southern border a few miles north of where it had been earlier. The Piros (Rio Grande Glaze A) are interpreted as having extended their territory north to the Rio Salado. The Tompiro are still characterized by Chupadero B/w.

Ford, Schroeder, and Peckham admit that their basic assumption, that major pottery styles can be correlated with particular linguistic groups, has not been validated (1972:37). Indeed, their reliance on ceramics for this purpose has essentially no theoretical basis. Why, for example, should we assume that populations which are linguistically unified will be culturally unified? For every ethnographic case that can be documented where language and culture converge, one can find others where they do not. In the archeological record, an assumption of linguistic/cultural convergence requires a leap of faith at which we should hesitate. Even if this assumption is warranted, and if these prehistoric language groups were also culturally unified, we need to ask, which cultural features were employed to symbolize this unity? Ford, Schroeder, and Peckham assume that ceramics served this purpose. They do not make this assumption, though, on either theoretical or empirical grounds, but rather employ ceramics only because they make a convenient, easily observable type of datum. It seems obvious, though, that the convenience of observing a datum bears no intrinsic relationship to its relevance for solving research problems. Thus, there is no inherent reason to believe that ceramics may identify linguistic groups, in this or any other case.

In conducting their survey of the lower Puerco and Salado drainages, Wimberly and Eidenbach (1980) set out to test Ford, Schroeder, and Peckham's interpretations. They noted that early Puerco sites are dominated by Cibola Gray ware and Salado sites by a mix of brown and gray wares. The brown wares are consistently present throughout the ceramic era. The mix of wares on Salado sites suggests to Wimberly and Eidenbach that these wares do not represent distinct sociocultural groups, while the early and continued presence of brown wares argues against population incursions from the south. Wimberly and Eidenbach conclude that the historic Piro populations were the descendants of earlier residents, and were not recent immigrants from the south (1980:228-230).

Late Agriculturalists

In the riverine area, there was a decided trend toward population aggregation, beginning in the late 13th century. Large, plaza-containing buildings came to replace scattered room blocks. For a time such large pueblos were consistently built in elevated, defensible locations (Marshall, Kight et al. 1981). Marshall suggests that these occurrences were prompted by the dislocations attendant upon regional depopulations (1982; Marshall and Walt 1984). Caperton (1981) also suggests a concern with defense, on the part of Salinas populations, at this same time.

Far more is known about the late prehistory of the Salinas Province than about any other spatial or temporal component of the overview area.

The excavation of Gran Quivira Mound 7 yielded data which Hayes (1981) divided into three phases of occupancy. The Early phase structure was round, and centered on a small plaza and kiva. It contained perhaps in excess of 200 rooms. This symmetrical structure was distorted during the Middle phase by the addition of rooms. The mound may have been abandoned for about 15 or 20 years sometime between 1515 and 1540. The succeeding Late phase construction displays long stretches of common wall that were laid without breaks in the masonry, seeming to indicate planned construction. Hayes estimates that 45-50 families may have occupied Mound 7 during the Late phase.

The Late phase may mark a significant episode of social change at Gran Quivira, characterized by expansion of the social hierarchy. The addition of cremation to the previously exclusive practice of inhumation signals a new, superordinate status level in the society. This status dichotomy was also observed at nearby Pueblo Pardo.

The study of ceramic manufacturing and trade patterns by Helene Warren (1970a, 1981b) has yielded provocative results. The population of Gran Quivira apparently produced little of its own glaze pottery, preferring to import most. In the early glaze periods, until around 1450, practically all glaze pottery came from the north. During the Glaze C period a ceramic industry developed at Abo and possibly some neighboring villages. This locality for a time supplied most of the glazes to nearby villages and to the northern Jornada del Muerto. This industry persisted until after 1600, at which time another glaze source developed at Quarai.

The rise and fall of ceramic industries that Warren has traced at such places as Tonque, Abo, and Quarai opens new areas for research into prehistoric Southwestern economies. This research area has been virtually untapped. The factors influencing the formation of trading ties, the reasons why certain localities developed primacy in manufacturing, and the economic effects on local populations when these industries collapsed, are among the topics that future scholars in the area may wish to address.

The human skeletal remains from Gran Quivira reveal much about the population. Reed (1981) notes the presence of exceptionally tall individuals in the series, and postulates Plains genetic influence. This has been disputed by El-Najjar (1981) on the basis of cranial morphology.

Reed reports a mortality profile for the Gran Quivira series which is not exceptional for a non-industrial population. Infant mortality was high, but deaths thereafter declined until about age 25. The majority of adult deaths occurred in the fourth decade, with only a few living beyond 50 years.

Harris' (1972) study of transverse lines has interesting implications. Among his findings was the observation that different segments of the populations were differentially affected by health-disturbing influences. As a whole, though, the people of Mound 7 seem to have experienced a major decrease in morbidity between

the Early and Middle phases, and a slight further decrease in the Late period.

It is interesting that Gran Quivira, when compared against other archeological populations, shows a very low overall incidence of transverse lines. Christy Turner (personal communication) believes that, in comparison with other Southwestern populations, the Gran Quivira people were quite healthy (cf. El-Najjar et al. 1976).

Many archeologists (myself included) might find this a startling observation (e.g., Steen 1977). Such things as the deficiency of surface moisture in the Salinas Province, the susceptibility of the area to drought, and the dramatic collapse of the province in the 1670s combine to give a picture of a territory which was rather marginal for a Puebloan adaptation. Yet in this territory we find a Late Puebloan population, not only quite healthy, but perhaps even healthier than the people of supposedly more favored portions of the Southwest.

The existence during the late period in the Salinas Province of large, complex, nucleated communities, which around 1550 experienced expansion of their social hierarchy, appears at odds with the healthy status of the population. Since more complex social and ritual systems carry greater per capita costs than less complex ones, the development of social complexity must arise because of some need, some stress which can be alleviated through organizational change. In the late Archaic of the Arroyo Cuervo area the stress of population pressure on food supply led to increased social and ritual complexity, then to settlement and foraging changes, and finally to agriculture. Yet at Gran Quivira the healthy status of the population argues against food stress. What, then, led to the complex societies of the late period?

There are some factors that are pertinent to this dilemma. In the first place, the fact of good health in the late period does not preclude poorer health earlier. It is possible that food stress did exist in earlier periods, but that it was alleviated by the organizational changes of the late period. It is worth recalling in this regard that stature, dental pathologies, and transverse lines all indicate improvements in health between the Gran Quivira Early and Middle phases (Scott 1981; Swanson 1976; Harris 1972). Thus, emphasis should be placed on collecting still earlier samples of skeletal material from the area, and on analyzing these in a comparable manner.

Secondly, it is possible that the factor(s) precipitating social complexity in the late period may not have been food stress, but requirements of aggregation for defensive purposes. Caperton (1981) has noted many pueblo sites in the area that he believes were defensively situated. If there was little or no stress on local food supplies in most years, then such defensive preparations may have been in anticipation of external populations. The vulnerability of Salinas Province towns to Plains dwellers was graphically illustrated by the attacks of the historic period.

In any event, the appearance of stress-induced behavior (social complexity), in the face of apparent nutritional adequacy, is yet another research problem in the overview area that could benefit from scholarly attention.

Despite the healthy status of the Gran Quivira population, the imposition of Spanish control over the region affected native health adversely. El-Najjar (1981) notes facial changes in the Late phase that he attributes to stress and malnutrition. Turner (1981) found lowered life expectancy in the historic period. Male stature decreased in the Late period (Scott 1981), while dental pathologies increased (Swanson 1976). Portions of the population experienced increases in morbidity, mirrored in transverse lines, which Harris (1972:233) attributes to disease and Spanish domination.

As noted in the previous chapter, Mera (1940b) has documented a contrast in late prehistoric pueblos between compact, organized structures, such as Pueblo Blanco (Map 10), and more dispersed settlements such as Pueblo Colorado (Map 12). Noting the similarity in village plan between the later form of settlement, and the earlier, late 13th century brown ware villages (e.g., Map 11), Mera suggests that with the abandonment of the Jornada Mogollon region around 1350-1400 A.D., groups from that area established residence in the Salinas Province. Here they supposedly built large settlements of scattered room blocks, in the manner of their former villages. These settlements existed coterminously with the more compact pueblos of the area's initial occupants. Mera identifies the Jornada population as the Jumanos referred to by the Spanish, while classifying the resident

population as Tompiros.

Vivian (1964) details discontinuities in the adoption of architectural and technological features between Gran Quivira and the Rio Grande. These discontinuities are evident in ceramic manufacturing patterns, such as the lack of carbon paint and Mesa Verde designs, persistence in use of brown wares, and minimal manufacture of glazes at Gran Quivira. There was also temporal discontinuity in kiva architecture, with the kivas in use at Gran Quivira in the 1600s resembling those used in the Rio Grande area 300 years earlier.

Vivian develops an interpretation for these events which follows Mera's ideas. He sees two distinct groups at Gran Quivira, the local population and immigrants from the Jornada Mogollon area. He identifies the latter as a distinct faction in the community, being the portion of the population that the Spanish mentioned as practicing tattooing. Vivian believes that these newcomers were responsible for the technological lag between the Rio Grande and Gran Quivira, and contributed to a lack of social cohesiveness in the community.

Such an interpretation seems in many ways unusual. There is not one whit of concrete evidence that such a migration to the Gran Quivira area even occurred, let alone that it had the supposed effect on technology and architecture. Indeed, in one sense Vivian's interpretation is rather puzzling. In the normative framework, when archeologists are confronted with some otherwise inexplicable episode of cultural change, migration is often postulated as the responsible factor. Yet Vivian cites migration to account for the lack of cultural change.

Mera makes the crucial assumption that socio-ethnic groups may be identified by individual archeological characteristics, such as degree of architectural compactness. Mera thus proceeds under the notion that this architectural feature amounts to nothing more than an idiosyncratic "custom" of the Jornada population, a custom supposedly universal to that population, and not occurring among their neighbors. Cordell and Plog (1979) have recently made the point that such normative generalizations in Southwestern archeology are often empirically wrong. They are certainly wrong in the present case. In the overview area, which according to Mera should evidence only compact architecture, dispersed room blocks have been recorded dating to the Jacal Period (Caperton 1981). In the Jornada area, which should display only dispersed settlements, compact pueblos have been recorded (e.g., Marshall 1973).

Mera's notion that ethnic and linguistic groups can be identified by a particular architectural form, and that such a form constituted an idiosyncratic "custom," is surely oversimplified. Prehistoric Southwestern communities varied in such factors as population size, number of constituent groups, integrative mechanisms, degree of planning, defensive considerations, availability of building materials, developmental history, and the like. The form that a prehistoric pueblo took reflected the combined influence of these and other factors. To single out ethnicity or linguistic identification as the sole source of community organization is not only oversimplified, it is incorrect.

Vivian's interpretation, that the supposed Jornada immigrants were responsible for delayed adoption of Anasazi characteristics, rests upon the notion that the behavior of a group's neighbors will automatically be imitated. It assumes that mere knowledge of an alternative form of behavior is a sufficient reason for adopting that behavior. This assumption is easily countered by the observation that, if it were correct, the world would be culturally homogeneous. On a more practical level, one can observe that forms of cultural behavior vary in their energy costs. Even among seemingly equivalent solutions to the same problem, such as kiva form, there are likely to be differences in the costs of construction and maintenance. This fact alone suggests that the notion of automatic diffusion of innovations is unwarranted.

It should be kept in mind that diffusion, if and when it occurs, is a process to be explained. Why does a population adopt new modes of behavior? Not from mere knowledge of alternatives, but from compelling need or perceived benefit. Thus, the lack of adoption of ceramic and architectural innovations at Gran Quivira is not as surprising as Vivian finds it. It may merely reflect the lack of need for, or benefits from, the new features. It is not necessary to invoke the deus ex machina of population incursions to account for it.

At the most basic level, the idea of a Jornada Mogollon migration to the Salinas Province is

uncertain. Vivian's suggestion, that the Jornada immigrants constituted a faction practicing tattooing, enjoys the benefit of being essentially untestable (unless a cemetery of mummified Gran Quivirans could be found, and it could be shown that the tattooed individuals were biologically more similar to Jornada populations than those without tattoos. As noted in the previous chapter, McWilliams (1981) could find no evidence for biological change through time in non-metric oral traits. Since immigration would result in some degree of biological change, the likelihood of such a population movement is considerably diminished.[1]

We are, of course, led to ask: what then happened to the Jornada Mogollon population when the Tularosa Basin was depopulated? It is possible that population segments went to other areas, such as the northern Jornada del Muerto, the Piro territory, and the lower Rio Grande below what is now El Paso. Yet, if skeletal samples from these areas fail to substantiate such population intrusions, then we would truly be left with a puzzling explanatory problem. Perhaps serious attention should be given to Wimberly and Rogers' (1977:451-453) suggestion that the presumed abandonment of the Jornada area may reflect, in whole or in part, localized population decline, with the remaining population reverting to a less intensive form of land use, one more difficult to recognize archeologically.

The nature of changes occurring in native societies as a result of Spanish domination has not been adequately addressed. Most students working in the area note the dramatic population decline and subsequent abandonment, attribute these to excessive Spanish demands, drought, disease, and Apache raids, and proceed no further. Yet there is much more to be learned.

The floral remains from Abo, and the faunal remains from Abo and Gran Quivira, yield a picture of a historic era Salinas Province diet which differed markedly form the aboriginal one. The 17th century diet apparently was based upon domesticated fauna, supplemented by native species, and primarily native flora, supplemented by introduced cultigens. Butchering marks on the Gran Quivira domesticated fauna reveal lack of native familiarity with the animals. If, in the native societies, faunal resource procurement and processing was a predominantly male activity, and floral resource procurement and processing primarily a female sphere, then the imposition of Spanish control may have affected male subsistence activities more than female ones. A similar observation was made by Deetz (1963) on the basis of his excavations at La Purisima Mission in California. Perhaps this can be generalized as a common pattern in Spanish colonial situations in the New World.

We can, at present, only begin to appreciate the complexity of the cultural changes that occurred under Spanish domination. In singling out drought or raids as the reason for the abandonment of the region, we undoubtedly oversimplify the situation. Droughts and raids, after all, occurred in the prehistoric era, and apparently did not lead to abandonment. Brown has criticized this tendency to suggest single variables as causes for disruption of Indian cultures.

Brown suggests that multiple, interacting, independent and dependent variables be examined, and the feedback relationships among these delineated (1979). In her own study of the historic-era Illinois, Brown was able to demonstrate relationships among such variables as village solidarity, ritual observances, political structure, population, technology, and subsistence (1979:254-263). Her observations about the breakdown of Illinois culture are not directly comparable to the present situation, but her demonstration of the complex causal relationships leading to this collapse is. Our understanding of the collapse of the Salinas Province will be furthered considerably when the interdependent relationships among Spanish economic demands, religious persecution, subsistence change, labor scheduling, trade, technology, community organization, native political change, climate, and external relations are considered. Such factors, acting in concert, brought about the abandonment of the area. The immediacy of drought and raids may have only been the reasons why the Spanish permitted the population to leave.

Cultural/Temporal Sequences

Scientific inquiry is a process which relies, at the most basic level, on classification. Without at least the most rudimentary forms of classification no scholarly study could proceed, for it would be impossible to filter out irrelevant observations. In archeology, classification has been a central process, often pursued to the point where questions about the meanings of our classifications have been relegated to secondary

priority.

Archeological classifications dealing with artifacts will not be dealt with here, except to note that, as elsewhere in the Southwest, ceramic classification would benefit from clear statements of which attributes are sought for classification, why these are sought, and how they are measured. Instead, a few comments will be addressed to the topic of cultural and temporal sequences.

Table 11

Agriculturalist Sequences

Year	Riverine Area	Upland Area
1700		
1600	Colonial Piro	
1500		Masonry Period
	Ancestral Piro	
1400		
1300		
1200	Late Elmendorf	Jacal Period
1100		
	Early Elmendorf	
1000		Pithouse Period
900	Tajo	
800		
700		
600	Basketmaker III (San Marcial in the South)	
500		
400		

Among the sequences proposed for the agricultural occupation of the study area, one for the riverine area (Marshall and Walt 1984), and one for the upland region (Caperton 1981), are shown in Table 11. Toulouse and Stephenson (1960), Hayes (1981), and Baldwin (1983) have shown that these sequences might be considerably refined. When more work has been done in this area, they undoubtedly will be.

The point of this section is to call for reflection on the procedure commonly followed in constructing cultural/temporal sequences. The overview area is unusual in that it is one of the few regions of the Southwest where no sequence has been established that is customarily adhered to. Thus, the opportunity exists to develop chronologies that avoid some of the pitfalls that Cordell and Plog (1979) have outlined.

Cordell and Plog (1979) point out that normative classifications are often wrong, ignoring important ranges of variation within classes. Of equal importance is the fact that classifications that focus on normative constructs do so to the exclusion of a wide range of interesting sociocultural phenomena (Tainter and Gillio 1980: 115). Not only may cultural and temporal classifications focus on artifactual and architectural similarities or dissimilarities, they may also concentrate on such things as forms of social organization, subsistence mode, population density, focus of external trade, or any other characteristic that is relevant to specific research questions. Thus, there can be developed many cultural/temporal classifications for an area, all useful for specific purposes, all equally valid, all equally "real."

In effect these paragraphs issue a challenge to whatever archeologists in the future begin the task of developing cultural/temporal classifications for central New Mexico. Let us make certain that we state the purposes of these classifications, what they are designed to accomplish, what characteristics are relevant to establishing classes, how these are to be measured, and what is the range of variation within classes. Such classifications would be almost unique in archeology, and would be well worth the effort.

CONCLUDING REMARKS

In this chapter I have touched upon some topics that might be pursued in future research in the overview area. Few answers have been given to the questions that have been raised. Instead some general issues pertaining to these topics have been delineated, with the objective of, hopefully, sharpening and focusing future work. Our state of knowledge about the area does not allow more to be done. But in a more optimistic vein, the study area permits the opportunity for essentially a "fresh" research start, one that will allow both the evaluation of what we think we know about the prehistory of the Southwest, as well as afford the opportunity to address new questions.

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1. In a previous study of this kind I noted that skeletal samples from the Puerco Valley of east-central Arizona do not substantiate the interpretation that Mogollon immigration accounts for the appearance of Mogollon characteristics in the area (Tainter and Gillio 1980:85-86). David Stuart has questioned this interpretation, suggesting that the population of the region may have been genetically homogeneous, so that migrations would not show up in skeletal characteristics (Stuart and Gauthier 1981:121, 127). This point is obviously pertinent to the present case.

Stuart makes the assumption that neighboring populations may interact to such a degree as to be genetically indistinguishable, and yet maintain striking cultural dissimilarities. I find such a notion implausible, requiring as it does the unrealistic assumption that in-marrying affines totally abandon the behavior patterns of their natal groups. Indeed, Stuart seems to agree with this when he suggests, at a later point in his work, that ethnic differentiation and restricted marital linkages (leading to within-group genetic homogeneity) will covary (Stuart and Gauthier 1981:170). Of course, at this point he contradicts his previous assertion that ethnic differentiation and biological differentiation will not covary. I find it more likely that cultural differences observable archeologically will correspond in varying degrees with genetic differences. When cultural differences and similarities arise from the process of interaction, no other outcome seems possible.

In fact, there are empirical cases which substantiate this point. As part of his research among the Yanomamo of the Amazon Basin, Chagnon (1972) showed that tribal organization does lead to localized genetic microdifferentiation, and that divergent tribal groups are more genetically distinct than those with close historical ties. Among archeological cases, in a study of ceramic distributions in the Lower Illinois Valley, Houart (1975) found a correspondence between a social boundary identifiable in ceramic characteristics, and a biological boundary observable in skeletal remains. And in the South Point, Hawaii, cemetery, Underwood (1969) was able to distinguish between the skeletal remains of consanguines and coresident affines. Lane and Sublett (1972) have demonstrated the possibility of distinguishing modes of post-marital residence in skeletal samples. Their techniques were successfully applied by Buikstra (1972) in a study of Hopewellian skeletal remains from the Illinois Valley. When osteologists can demonstrate the capacity to observe such subtle genetic distinctions in skeletal remains, it seems unlikely that massive population incursions could not be discerned.

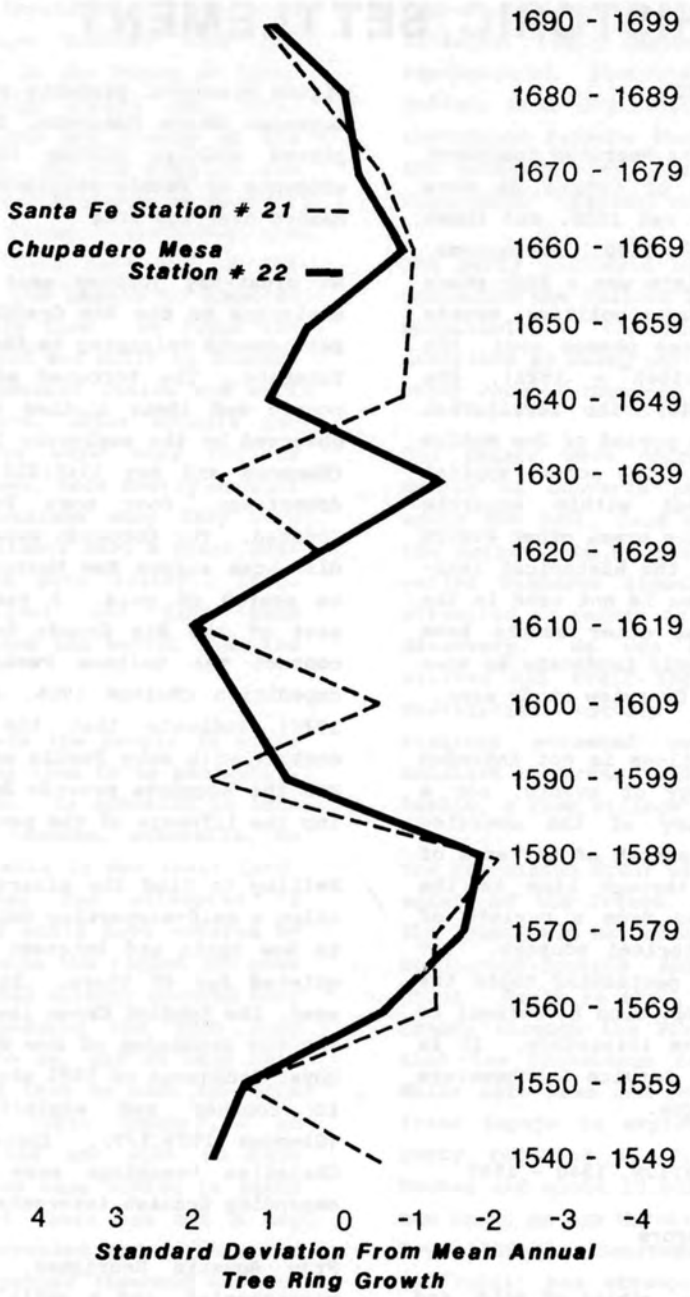

Figure 5. Dendroclimatic variations, Chupadera Mesa, A.D. 1540 to 1699 (after Dean and Robinson 1977).

HISTORIC SETTLEMENT

INTRODUCTION

The documentary history of the American Southwest begins with the chronicles of Cabeza de Vaca recorded between about 1528 and 1536, and those by the Coronado Expedition in 1540. Historians, geographers and anthropologists use a four-phase scheme to characterize the major political events of New Mexico history. These phases are: the Spanish Colonial Period (1540 - 1821), the Mexican Period (1821 - 1846), the Territorial Period (1846 - 1912) and the period of New Mexico Statehood (1912 to present). The scheme applies throughout New Mexico, but within separate geographic regions and culture areas other events may have had more impact on the historical landscape. The four-phase scheme is not used in the following discussion because other events have had more impact on the historic landscape as seen from the perspective of the Overview study area.

The culture history that follows is not intended to be a detailed chronology of events, nor a comprehensive social history of the overview area. It is intended as a sketch of patterns of land-use as they changed through time in the study area. The text draws from a variety of cultural, economic and historical sources. For more information about any particular topic the annotated bibliography (by Dr. John P. Wilson) is a comprehensive guide to the literature. It is on file in the USDA Forest Service Southwestern Regional Office in Albuquerque.

SPANISH COLONIAL EXPLORATION, 1540 - 1598

The Conquerors

Tales of incomparable riches, cities of gold, and pagan souls, prompted entrepreneurs and friars to leave the mining and ranching frontiers of Nueva Vizcaya to explore north of New Spain (Mexico). Legends of the Seven Cities of Cibola, the cities of gold, were carried back to New Spain in 1536 by Esteban (Estevanico), a Negro Moor who survived a shipwreck on the Texas coast in 1528. Esteban guided Fray Marco de Niza to Cibola in 1539. At the Zuni Publo of Hawikuh the Moor was killed, and Fray Marco returned to the frontier with more tales of fabulous wealth to be had. A conquering expedition under the direction of Francisco Vasquez de Coronado left New Spain in 1540. After wintering at the pueblos of the Tiguex Province, probably at the site now called Coronado State Monument, Coronado's troops explored widely, giving the first eye-witness accounts of Pueblo settlement in the central New Mexico overview area.

An eight-day journey east of Zuni brought the explorers to the Rio Grande where they found 12 settlements belonging to the province they called Tutahaco. The terraced adobe pueblos of these people and their clothes were similar to those observed by the explorers in the Tiguex Province (Hammond and Rey 1940:220). Exploring further downstream, four more Tutahaco pueblos were located. The Coronado expedition traveled great distances across New Mexico to the Great Plains in search of gold. A party explored the area east of the Rio Grande but apparently did not contact the Salinas Pueblos. Records of the expedition (Bolton 1916, 1949; Hammond and Rey 1940) indicate that the conquerors came in contact with many Pueblo and non-Pueblo Indians, and the accounts provide brief sketches concerning the lifeways of the people.

Failing to find the mineral deposits that would allow a self-supporting colony, Coronado returned to New Spain and interest in the far north was quieted for 40 years. In this interlude, however, the Spanish Crown issued strict regulations for the expansion of New World settlements. The Royal Ordinance of 1573 strictly forbad colonists to conquer and exploit native populations (Simmons 1979:179). Instead, pacification and Christian teachings were to be the means of expanding Spanish interests in the New World.

Fray Agustin Rodriguez, two other Franciscan missionaries, and a small army led by Francisco Sanchez Chamuscado attempted the first missionary expedition in 1581. The first village the party reached on their journey up the Rio Grande was located about 30 miles south of present day Socorro. It was abandoned. This was probably the Piro Pueblo of San Felipe. The chronicle of the expedition gives the following report of a settlement thought to have been the Piro pueblo of San Miguel.

> The following morning we left the abandoned settlement and after traveling the two leagues which the Indians had indicated, came to a pueblo of many houses three stories

high, but found no inhabitants. They had left the night before because they had noticed our approach. In the houses we found many turkeys and much cotton and corn. Although we did not see any people in the pueblo on entering it, we did find in the valley many cornfields like those of Mexico, and also fields of beans, calabashes and cotton. We did not dare take any of the goods, for we wanted the people to know we did not intend to harm them. We found the houses very well planned and built in blocks, with mud walls, whitewashed inside and well decorated with monsters, other animals and human figures. There were many curious articles in these houses, more neatly wrought than those of the Mexicans when they were conquered. The inhabitants have a great deal of crockery, such as pots (ollas), large earthen jars (tinajas) and flat pans (comales), all decorated and better than the pottery of New Spain.

We endeavored to locate the people in order to calm them and bring them to us peaceably, which we managed to do. We appealed to them by friendly gestures because, otherwise, we should not have been able to see their land. Nevertheless, if they had attempted to prevent our coming we would have entered by force in order to examine the region and what it contained, for we had already endured many hardships, but it pleased God that some Indians should come to us, and we sent them away in peace telling them to make the sign of the cross with their hands as an indication that we did not wish to harm them. The news that we were coming in peace spread so widely that there was not a day when we were not surrounded and accompanied by more than 12,000 people (Hammond and Rey 1966:82).

Shortly after that, the party met other Piro who gave the explorers corn, and told them of Indians upstream with whom they were at war.

The Chamuscado-Rodriguez party passed through at least 16 Piro pueblos (Table 12). Schroeder (1979:240) lists five on the west bank of the Rio Grande and 11 pueblos on the east bank of the river. In these 16 settlements he listed a total of 853 "houses." The Piro told the explorers there were 20 pueblos in their nation (Hammond and Rey 1966:82). The explorers were much impressed with the "orderliness" of the Piro villages, their customs, and the abundance of agricultural products, cotton, turkeys and buffalo meat available in the Piro towns. The chronicler remarks that "for a barbarous people the neatness they observe in everything is very remarkable" (Hammond and Rey 1966:102).

The party journeyed east of the Rio Grande and contacted the Salinas Pueblos. They were not as hospitable as the Piro. In fact, they were described as being war-like and greatly feared by other Pueblos (Hammond and Rey 1929:77).

The friars were overwhelmed by the potential number of converts in the area they explored among the Zuni, Taos and Rio Grande pueblos and the settlements of the plains nomads, whom they called Vaqueros (Apaches). One of the friars attempted to return to Mexico with news of their discovery. He was murdered by Indians who stalked his trail through the Galisteo Basin. Hostilities between the Pueblos and their visitors worsened until Chamuscado and the soldiers departed leaving the friars at Puaray Pueblo, a Tiwa village located near Bernalillo.

The Franciscan Order of Mexico, concerned for the safety of the friars, sent a rescue party under the leadership of Don Antonio de Espejo, an eager soldier-of-fortune and wealthy colonial merchant. Early in 1583, en route to the Upper Rio Grande through the Piro country, Espejo learned that the Franciscan fathers had been murdered. While this news did not stop the expedition, it freed Espejo to explore for profits. Espejo's party recorded 12 Piro pueblos totaling 250 houses and about 10,000 people between the areas now known as San Marcial and La Joya (Hammond and Rey 1966:21; Schroeder 1979:238). Schroeder (1979:241) has attempted to correlate the Piro pueblos recorded by the Chamuscado-Rodriguez and Espejo parties.

Exploring east of the Manzano Mountains, Espejo visited the Margrias (Manguas) Pueblos. Here, he estimated, there were 11 pueblos with 40,000 residents (Vivian 1964:12; Schroeder 1979:238). Diego Perez de Luxan, the chronicler of the expedition, considered these people to be more hostile than the Piro. Luxan describes the villages as masonry room blocks built around large plazas. He notes that the rooms were whitewashed and that the kivas were used for dances as well as for baths. Mines, presumably salt mines, timber and pine nuts were resources

that explorers noted were readily available to the residents of the three villages the party visited (Hammond and Rey 1929:76-78). Espejo's own account (Bolton 1916:180-181) notes that the Pueblos had difficulty obtaining water, but that they had abundant food and natural resources, namely hides, cotton and mines. These pueblos were also referred to in the Espejo and Luxan documents as the Xumana or Jumano pueblos.

The meaning of the term "Jumano" has been the subject of considerable debate (Scholes 1940). The term appears in documents with reference to many different Pueblo and non-Pueblo groups. Scholes (1940) analyzed the term and deduced that it was used most consistently when describing people who practiced some form of body decoration or tattooing (in Spanish the term "rrayados" or striped was used), evidently a common practice in pre-Hispanic times.

Pre-Hispanic Settlement and Land-Use Practices

The chronicles of the exploration period permit broad generalizations to be offered concerning the pre-Hispanic settlement and land-use

Table 12

Possible Correlation of Piro Pueblo Names

Rodriguez-Chamuscado Party, 1581 - 1582		Espejo, 1582 - 1583
West Bank	East Bank	Location not given
Taxumulco: 123 houses, 2-3 stories	Tomatlan: 70 houses, 2-3 stories (in 2 sections)	El Termino de Puala: 60 houses, 20 houses (2 stone pueblos)
	Mexicalcingo: 40 houses, 2 stories	(3 leagues)
Piquinaguatento (Chiquinagua): 100 houses, 2 stories	Caxole: 15 houses, 2 stories	Juevas de las Camadres (a place?)
	Pueblo Nuevo: 25 houses, 2 stories	
	Ponsitlan: 25 houses, 2 stories	
	La Pedrosa: 14 houses, 2 stories	within 5 leagues, 4 pueblos in ruins and 1 small one
	El Hosso (El Osso): 50 houses, 2 stories. Elota: 14 houses, 2 stories	
Pina: 85 houses, 2 stories (2 plazas). Piastla: 35 houses, 2 stories. Santiago: 25 houses, 2 stories	San Juan: 40 houses, 2 stories San Miguel: 47 houses, 2 stories	El Gallo: 100 houses, 800 people 50 houses, 400 people 50 houses, 400 people 50 houses, 400 people 50 houses, 400 people
	(2 leagues)	(3 leagues to 5 pueblos close together)
	San Felipe (San Phelipe): 45 houses, 2-3 stories	First pueblo: 50 houses, 400 people

NOTE: The Pueblos are listed in the order encountered from south (bottom) to north (top). West bank and East bank Pueblos given on the same line are described as opposite each other .
(from Schroeder 1979: 241).

practices of central New Mexico Pueblos. The explorers found the greatest concentration of people living in agricultural villages along the Rio Grande and its tributaries, from the vicinity of present-day San Marcial to Taos. They distinguished among the villages on the basis of their language, dress, and architectural attributes. Schroeder (1979) summarizes the documents of this period and provides a useful synthesis of the New Mexico pueblos at the time of Spanish contact. Some researchers may, however, find it difficult to accept some of his interpretations of documentary sources.

The documents for this period distinguish two different Pueblo groups within the central New Mexico overview area. Although they do not agree on the names of the settlements, Coronado, Chamuscado-Rodríguez and Espejo differentiate between those people living along the Rio Grande and the Pueblos living on the eastern flanks of the Manzano Mountains. Despite the documentary records, anthropologists are still not certain of the relationship of these groups. Did they, in fact, speak the same language, or did they speak a mutually intelligible dialect? Those Indians described by the Spanish as living along the Rio Grande are referred to as the Piro. Only fragments of the Piro language have been recorded (Bartlett 1909; Harrington 1909). Most linguists (Davis 1959:76; Hale and Harris 1979:171) believe that Piro may not even be part of the Tanoan language family to which Tiwa belongs. They speculate that Piro may be part of an as yet unidentified language family, and await archeological data to establish the larger cultural affinity of the Piro.

The pueblos located on the eastern flanks of the Manzano Mountains are collectively referred to as the Salinas pueblos. Some researchers (Schroeder 1964; Kessell 1979a) group six major pueblos (Chilili, Tajique, Quarai, Abo, Tabira and Las Humanas or Gran Quivira) as Tompiro Pueblos. In this they imply that Tompiro is a dialect of Piro and ultimately Piro and Tompiro are Tiwa languages. Others (Bandelier 1890:281; Scholes 1940; Wilson 1973:15) distinguish two groups among the Salinas pueblos, Tiwa speakers who lived at Chilili, Tajique and Quarai, and Tompiro speakers who occupied Abo and Las Humanas (Gran Quivira). Tenabo and Tabira (Map 13). The basis of distinguishing a Tiwa-Tompiro split is contained in letters of the Spanish Archives of New Mexico (Twitchell 1914:268-280).

According to the documents, the Piro lived in villages located along both banks of the Rio Grande as well as "away" from the river (Hammond and Rey 1966:219). When the explorers arrived in Piro villages they mentioned that they had been temporarily abandoned, perhaps indicating that the Piro had refuge settlements to which they retreated in times of danger. The multistoried, adobe pueblos in which they made their more permanent homes were, walled and ranged in size from villages containing 14 or 15 houses to villages made up of over 100 houses (Hammond and Rey 1966:103-104, 115-116, 219; Schroeder 1979:240). The definition of a house is not clear. The abundance of turkeys, beans, squash, corn and cotton products mentioned by the explorers imply that domesticated produce formed the staple of Piro diets. This observation may, however, illustrate the amazement with which the Spanish viewed any sign of "civilization" among native peoples, and may not be an accurate picture of Pueblo subsistence strategies. The fields described by the explorers bordered the rivers in valleys near the pueblos (Hammond and Rey 1966:172) and Schroeder (1979:236) mentions the use of diversion ditches for irrigation.

The discussions of the Salinas pueblos during the exploration phase are very brief. Located as they were on the flanks of the Manzano Mountains, these pueblos had greater access to the grazing herds of buffalo, abundant sources of pine, pinyon nuts and minerals. The documents are not explicit about the extent to which these products were used in the pueblos. Woven cotton mantas, turkeys and maize were supplied to the explorers by the Salinas pueblos (Hammond and Rey 1929:78). Espejo (Bolton 1916:180-181) mentions that these villages had no surface water, but they did have extensive agricultural fields. Neither Espejo nor Luxan describe the deep wells which later expeditions found so unique among the Salinas pueblos.

The Aftermath of Exploration

At the close of this phase of Spanish exploration, it is unlikely that the settlement practices or material cultural of any of the pueblos was much changed. That the lands north of New Spain contained souls to be saved and resources that could be exploited was certainly proved by the explorations of Coronado, Espejo, and Chamuscado-Rodriguez. Whether such a venture could be self-supporting was another matter.

Unable to wait for the approval of an ineffectual government, Gaspar Castano de Sosa and a party of 170 colonists in 1590 ascended the Pecos River to establish a colony in New Mexico. The party was arrested at Santo Domingo Pueblo for this illegal colonization effort in late winter 1591 by Captain Juan Morlete and returned to Mexico. The prisoners were marched down the Rio Grande, presumably through the Piro settlements. Documentation of the Morlete Expedition is sparse, and provides few details of the route traveled by the party or their observations of Pueblo life (Hammond and Rey 1966).

Simmons (1979:179) points out that the contacts between the Pueblos and explorers, although brief, set the pattern for future conflicts between the two cultures. Contact between the Piro and Spanish, and the Salinas pueblos and the explorers, was more amicable than the contact the explorers had with other Tiwa, Tewa, Keres and Zuni pueblos. Conquest was strictly prohibited by Royal Ordinance but, by any name, the events that accompanied the post-exploration mission and colonization programs amounted to the subjugation of Pueblo and non-Pueblo peoples.

COLONIZATION AND MISSIONARY PROGRAMS 1598 - 1680

Onate's First Attempt

When Juan de Onate established the first Spanish colonial capitol in New Mexico in 1598, he located it on the far northern Rio Grande near the Tewa pueblo of San Juan. The capitol was north of the hostile Tiwa pueblos of the Middle Rio Grande but still close to available laborers and converts. From his base among the Tewa pueblos, Onate began ecclesiastical pacification of a new Spanish frontier.

Enroute to the colonial capitol the 400 colonists, soldiers and missionaries spent more than one month among the Piro. Part of this time the group spent living in tents along the river bank below the pueblo they called Qualacu (Hammond and Rey 1953:318). The Piro living at Teypama Pueblo supplied the party with corn, and the village of Sevilleta was the first pueblo in which they camped for protection (Hammond and Rey 1953:318). Onate records at least 45 settlements in the province he referred to as Atzigues or Tziguis (Schroeder 1979:239). This area undoubtedly included Piro and Tompiro settlements. Later documents refer primarily to eight Piro and Tompiro villages. From north to south they are San Juan Baptista, Sevilleta, Alamillo, Pilabo, Teypama or Teypana, Qualacu, San Pascual, and Senecu (Marshall 1975:4).

In September 1598, when New Mexico was proclaimed a field of the Franciscan Order, missionary assignments were made to various pueblos (Simmons 1979:180). Three pueblos of the "Xumanes rrayados" or Tompiro were included in this first assignment (Scholes 1940:276). Conversion of the Piros did not begin until 1626 (Hodge et al. 1945:62).

Onate briefly visited the Tompiro pueblos at Abo and Las Humanas in October, 1598. Las Humanas, no doubt, was the site now called Gran Quivira (Vivian 1964:8). In 1599, the first of many hostile encounters between the colonists and the Salinas pueblos took place. Sargento Mayor Vincente de Zaldivar and a dispatch of soldiers were sent to one of the Tompiro pueblos to collect supplies and mantas or cotton blankets which were used in colonial times as tribute and barter. The villagers refused to supply the goods, and as a further insult, presented the hungry soldiers with stones to eat. Onate was not a man with whom to trifle; he returned to the pueblo (not named in the documents), collected a small number of blankets and punished the villagers for their defiance of his nephew Zaldivar. Punishment was indeed harsh; Onate burned a portion of the pueblo, fired shots into the crowd killing five or six people, and then hanged three of the more belligerent and undoubtedly outraged natives (Scholes 1940:276; Vivian 1964:14).

The Battle of Agualco (Acolocu) fought in December 1600 or 1601 was another punitive expedition sent to the Salinas pueblos. Spanish troops were sent to the Salinas area to retaliate against an ambush of five soldiers who were attempting to return to New Spain. At Agualco they met an allied force of Salinas Pueblo fighters in a battle that lasted 6 days. The Pueblos were defeated, and the colonial soldiers took slaves from among the Pueblo captives. Between 800 and 900 Pueblo Indians were killed in this battle. The location of Agualco has not been positively identified; Scholes (1940:278) believed it was the village of Chilili. Toulouse (1949:3) and Wilson (1973:15), suggest that it may have been Quarai. Toulouse bases this on the high percentage of Glaze E (V) ceramics found in a thick charcoal deposit during the excavation of

the West Mound at Quarai. Another battle, fought between the Spanish and residents of Las Humanas (Gran Quivira) some time before 1601, is not well documented (Vivian 1964:15).

The colony suffered many defeats in 1601. Having fought a savage battle at Acoma, where his nephew was killed, Onate was then faced with the mass desertion of colonists and missionaries who had become disillusioned by harsh conditions and the prospect of a bleak future (Kessell 1979a: 87-30). By 1608, when Onate resigned, it was obvious that the New Mexico colony could not be self-sufficient but neither could the clergy turn from their charges. In January 1609, the decision was made to maintain New Mexico as a missionary field (Vivian 1964:16). This decision did not obviate the underlying problem of supporting an expanding population in a land of scarce resources. In fact, it began a conflict that would characterize 17th century New Mexico - the conflict between church and state for the control of limited resources that included the Pueblos.

France Scholes (1936-1937) traces the important history of church and state conflicts, and the ultimate effect this strife had on the Pueblos. He divides the conflict into two periods. The time from 1610 to 1650 he considers the most stressful period, in which there was almost open rebellion by Hispanic colonists against the powerful clergy (Scholes 1936:25). During the second period, from 1659 to 1664, the Inquisition controlled the colony and colonial adminstrators through fear, superstition and threat of excommunication (Scholes 1936:25). Quarai played a major role in the Inquisition (Wilson 1973:18). When the capitol of the colony was moved to Santa Fe in 1610, Governor Pedro de Peralta conscripted Pueblo laborers to construct public buildings. This caused conflict with the friars in missions close to Santa Fe who lost valuable herdsmen and farmers to the public building program (Scholes 1936:32; Simmons 1979:181).

At this point, it is necessary to mention the encomienda and repartimiento, systems devised in the 16th century to extract tribute and labor from the Pueblo Indians. Simmons (1979:182-183) describes these two economic institutions as follows:

> The encomienda...was a privilege extended to certain favored subjects to collect an annual tribute from a specified town or number of Indians. The proprietor of such a grant, the encomendero, was expected to exercise a trusteeship over his tributary subject, providing material to their church and offering military protection. Although the amount of tribute he was allowed to collect from the pueblo in the form of maize and cotton blankets was strictly limited by law, the system here, as elsewhere in New Spain, cloaked all manner of abuses.

During Governor Rosas term of office (1637-1641), the number of encomiendas in New Mexico was fixed at 35. The workings of the system are well known, but the names of the encomenderos and the amount of tribute taken from the Pueblos are not well documented. Tribute was generally set at one manta and one fenega of corn per household per year. Table 13 lists the known encomenderos for the Piro and Tompiro pueblos.

The repartimento was ". . . a system of forced labor designed to provide workers for Spanish farms and haciendas" (Simmons 1979:182). The laborers were seldom paid the pittance required by law.

Missions of the Piro and Salinas Pueblos

Fray Alonso de Peinado, seeking refuge from the political intrigues of the Rio Grande missions, chose to begin the conversion of the Salinas Pueblos in the period 1613-1614 (Scholes 1936:31; Scholes and Bloom 1944-45:(19), 335). By the late 1620s, missions had been founded at Tajique, Cuarac (Quarai), Las Humanas and Abo (Scholes 1940:279) and the mission program was extended to the Piro pueblos (Hodges et al. 1945:248; Scholes and Bloom 1944-45:(20),63). Table 14 lists the approximate dates at which missions were established in Piro and Salinas villages.

The mission program in the colony was given a great boost in 1626 with the arrival of Chief Prelate Fray Alonso de Benavides and 12 friars. The total of mission priests was then about 30. Benavides was aided in his three year tenure among the Pueblos by his amicable relationship to the governor, something not enjoyed by many previous or later members of the clergy. Benavides is credited with the conversion of Las Humanas Pueblo (Gran Quivira). The construction of San Isidro Chapel at Las Humanas (Gran Quivira) was probably supervised by Fray Francisco Letrado, an aid and successor to Benavides, between 1629 and 1631 (Vivian

1964:63). San Gregorio de Abo was probably constructed by Fray Francisco Fonte, another member of Benavides party between 1626 and 1634 (Toulouse 1949:4). Among the 14 or 15 Salinas pueblos, Benavides reports six missions including Cuarac (Quarai), Las Humanas (Gran Quivira), Abo, Tajique, Chilili and Tabira (Hodge et al. 1945:65).

Few dates for the establishment of Piro missions are known with certainty, but Hodge, Hammond and Rey provide sound reasoning for dates they offer based on an analysis of the documents. As early as 1626, Benavides makes reference to visits to Senecu and Socorro. Testimony of a soldier taken in August 1626 mentions a convent or residence of friars at Socorro (Hodge et al. 1945:250 fn 72). It is possible that his reference is to the same mission as Nuestra Senora del Socorro de Pilabo, which was certainly established by 1629. When Benavides left New Mexcio in 1629, there were three missions among the Piro at Senecu, Socorro and Sevilleta. Later, Sevilleta seems to have been abandoned, possible because of Apache raids, and replaced by Alamillo where Fray Diego Lopez was listed as guardian in 1638 (Hodge et al. 1945:250 fn 72).

The Benavides Memorial and other historic sources raise interesting questions about the number of Piro settlements in the period from 1598 to about 1630. Schroeder notes a total of 44 named Piro pueblos in 1598, but by 1620 these were apparently reduced to 15 pueblos and 6000 people (1979:237, 241). Was this reduction due to the abandonment of certain pueblos, the aggregation of Piro villages around mission centers, or problems in the ethnic and political boundaries recognized by Onate and Benavides? Or, is it possible that later scholars have combined sources of different time periods?

By the mid 1630s, the missions were well established among the Piro and Salinas pueblos. With changes in colonial governors every 3 years, there were also changes in the application and enforcement of laws designed to protect the rights of the Pueblos and the obligations of church and civil authorities. Among the most venal of the colonial governors was Luis de Rosas who served from 1637 to 1642. Rosas extracted tribute from the Pueblos far beyond that intended by the encomienda. He established workshops in the capitol where Pueblo Indians and Apache captives were forced to produce textiles for export (Scholes 1936:300). The profits were kept by Rosas.

Events that had been building through the first 30 years of colonization came to a climax. The conflict between encomenderos and clergy over the disposition of agricultural products and livestock left the Pueblos with critical shortages. The encomenderos in the Rio Abajo and

Table 13

Encomenderos of the Piro and Tompiro

Encomienda	Encomendero	Date	Source
Las Humanas	Capitan Alonzo Rodriguez	165?-1659	Scholes 1937:286
Las Humanas	Capitan Miguel Ynojos (Hinojos)-later restored to Alonzo Rodriguez	1661	Scholes 1937:381
1/2 of Quarai	Francisco de Anaya Almazan	1662	Hackett 1937:252-253
Las Humanas	Juan Dominguez de Mendoza Cristobal Duran y Chavez	1662	Scholes 1941:34-38
1/2 of Abo	Francisco Gomez Robledo	1662	Kessell 1979:185-187
Sevilleta	Capitan Diego de Guadalajara	1661	Scholes 1937:162 Chaves 1954:42-43
Senecu	Felis de Carvajal	1661-1664	Chavez 1954:15

Salinas Pueblos were so brazen that they were openly living on Pueblo lands or very near the Pueblos, practices strictly forbidden by law (Scholes 1937:389; Hackett 1937:131; Wilson 1973:21). Civil officials often made a mockery of the mission programs by encouraging native religious practices, and by publicly challenging the authority of the friars. During the term of Rosas, the Apaches were becoming increasingly hostile to frontier settlements and pueblos. Rosas used retaliatory raids as an excuse to seize captives from hostile as well as neutral Apache groups (Scholes 1936:301). This practice continued under later governors who exported captives for sale in Mexico.

There appears to have been a slight climatic change at this time, reflected in tree-ring growth. Specimens collected from archeological sites and living trees in the vicinity of Chupadera Mesa exhibit growth rings which indicate that the period between 1630 and 1639 was drier and warmer than the previous 47 years, as shown in Fig. 5 (Dean and Robinson 1977). Apaches attacked the Rio Grande frontier pueblos in 1640 and burned 20,000 fenegas of corn (Vivian 1964:25), crops that none of the pueblos could afford to lose. In the same year, an epidemic swept through the pueblos killing 3,000 Indians, about 10 percent of the Pueblo population (Vivian 1964:25). The Apaches must have been stressed too, for they increased their attacks on the pueblos. In 1643, Las Humanas (Gran Quivira), usually the scene of lively and friendly trade

Table 14

Central New Mexico Mission Establishment Dates

Date	Name	Franciscan Father*
	Salinas Pueblos	
1612-1613	Chilili	Fray Alonso de Peinado
1622-1626	San Gregorio de Abo	Fray Francisco Fonte
1627	San Isidro at Las Humanas (Gran Quivira)	Fray Alonso de Benavides
1660-1668	San Buenaventura at Las Humanas	Fray Diego Santander
	Piro Pueblos	
1626-1627	Socorro (?)	Fray Alonso Benavides Fray Martin de Arvide
1626-1629	San Antonio de Padua at Senecu	Fray Antonio de Artega Fray Garcia de San Francisco
prior to 1629	Nuestra Senora del Socorro de Pilabo	
prior to 1629	San Luis Obispo de Sevilleta at Seelocu	
prior to 1629	Alamillo	Fray Diego Lopez (1638)

* The names of later friars and dates of their service are listed in the Revised Benavides Memorial of 1634 (Hodge, Hammond and Rey 1945:246-252 fn 72, 263-265 fn 29, 265 fn 80).

See also Scholes and Bloom (1944-1945).

between Apaches and Pueblos, was attacked. The attackers may have been the Siete Rios Apaches, whose traditional use area extended south and east of the Piro and Tompiro pueblos (Forbes 1960:147). No doubt one reason for the increasing hostility was retaliation for the part that Piro and Tompiro pueblos had taken in Spanish attacks against Apache settlements on the Plains.

Hodge et al. (1945:248) list the population of Pilabo as 400 in 1641, and list Alamillo and Sevilleta as visitas of the Socorro mission. The residents of Sevilleta were moved by the Governor to Alamillo in 1656 (Schroeder 1979:237). The friars recommended this move to facilitate the conversion of the Sevilleta residents who were reverting to "idolatry" (Scholes 1937:162). Three years later the next Governor, Bernardo Lopez de Mendizabel, ordered their return to Sevilleta. He was said to have done this to safeguard the encomienda of Captain Diego de Guadalajara, and to ensure a labor force for his own interests (Scholes 1937:162). Six Indians were hanged at Senecu in the 1650s for the role they played in an Apache attack near Magdalena on five settlers, including the Alcalde Mayor (Forbes 1960:63). Sorcery was also on the rise among the Piro, clearly an indication of stress within the villages.

A claim filed in 1661 by the church against former Governor Lopez shows the extent to which Piro and Salinas Pueblos were pawns in the struggle between church and state. The following claims were made against the Governor:

> . . . 50 Indians from Senecu, 36 from Socorro and 10 from Alamillo, and a number of pack mules and horses from each pueblo were employed for about 2 weeks transporting pinyon to a warehouse in Senecu; 63 Indians from Socorro worked for 3 days carrying salt from the east bank of the Rio Grande to the pueblo of Socorro; 60 laborers from Cuarac (Quarai) were forced to go to the pueblo of the Jumanos and from there to the Rio Grande with loads of pinon and were engaged in this labor for 17 days; 19 Indians from Abo worked for 6 days carrying maize from Tabira and the Jumano Pueblo to the house of Captain Nicolas de Aguilar, the Alcalde Mayor of the Salinas district; as many as 40 Indians from Jemez were employed at one time taking pinyon to depots in San Felipe, Cochiti or Santa Fe; 22 Indians from Galisteo were sent to the house of Captain Aguilar in the Salinas area for maize to be transported to Santa Fe: Indians from Tabira loaded salt at the salt marsh and took it to the house of Sargento Mayor Francisco Gomez who had an estancia called Las Barrancas on the Middle Rio Grande (Scholes 1937:394-395).

In addition, the following claims were made for stockings manufactured for the Governor: Senecu 100 pairs, Socorro 30 pairs and Alamillo 46 pairs (Scholes 1937:395). This was the same Governor who ordered that mission livestock be moved from Las Humanas (Gran Quivira) to Abo because the Indians were exhausting themselves hauling water from deep wells for the animals (Scholes 1940:282). To his credit, Governor Lopez increased the wages for Indian laborers from one-half to one real per day, for which he was criticized by the friars as well as encomenderos. The friars seem to have had some control over the produce of Abo. An organ for the church was purchased in 1661 from the sale of pinyon nuts (Toulouse 1949:4).

At a time when strains in the colony must have been clearly evident, it is surprising that the mission at Las Humanas (Gran Quivira) was being renovated. A new and rather elaborate church was constructed between 1660 and 1668, dedicated to San Buenaventura (Vivian 1964:88). Fray Diego Santander was the first resident friar at Las Humanas (Gran Quivira), and he apparently directed the construction. The labor required to build San Buenaventura, coupled with the demands of the encomenderos and the conflict between civil and clerical authorities over the performance of kachina or traditional dances, would have been enough to foster rebellion. At Quarai, witchcraft and magic spread through the pueblo in 1668 when a German trader, Bernardo Gruber, offered the Indians magic slips of paper that would protect those who swallowed the substance (Hackett 1937:273-276). Gruber was arrested, escaped, and died on the run through the Jornada del Muerto.

A three year drought (1666-1669) brought famine, and epidemic disease once again raged through the Salinas pueblos. In this same period, the Apaches showed no greater mercy. On September 3, 1670, Las Humanas (Gran Quivira) was attacked by Apaches from Siete Rios (Scholes 1940:283). In a report dated 1679, Fray Francisco de Ayeta reported that five villages (Chilili, Abo, Cuarac [Quarai], Las Humanas [Gran Quivira] and

Las Salinas [Tajique]) were abandoned between 1672 and 1679 (Scholes 1940:283). Tabira was depopulated in this troubled time and presumably Tenabo was also evacuated. Some of the survivors went to live among the Manso missions at El Paso, others joined Piro villages on the Middle Rio Grande.

Times for the Piro were no better. Apaches from the Gila and Siete Rios areas attacked Senecu on August 1, 1671, less than one month after they had attacked a wagon train bringing the new Governor (Juan de Miranda) to New Mexico. A counter-offensive force of Hispano and Piro soldiers was ambushed, and warfare against the Piro settlements intensified (Forbes 1960: 166-167). An Apache attack on January 23, 1675 forced the abandonment of Senecu (Hodge et al. 1945:248 fn 72). Fray Francisco de Ayeta appealed to royal authorities for help in sustaining the province against Apache attacks.

To protect frontier settlements, Ayeta and a small troop of soldiers attempted to reoccupy Las Salinas (Tajique) and Senecu. The force held the missions from autumn 1677 to March 1678, when they apparently retreated (Forbes 1960:172-173). Ayeta had plans to resettle Cuarac (Quarai) and to launch a major offensive against the Apaches in the Galisteo Basin. Before the battle was mobilized, the Pueblos united and with the help of the Apaches drove the Hispanic colonists, friars and soldiers from New Mexico, ending the first phase of New Mexico colonization.

The Hispanic Colony in the 17th Century

The group of settlers that came to New Mexico with Onate was by no means culturally or ethnically homogeneous. Very few Spaniards or other Europeans were included. Mexican Indians, primarily Nahua speaking Tlaxcalans, mestizos of Indian and European parentage, and creoles, Europeans born in the New World, made up most of the party (Dozier 1969:52; Swadesh 1974:12; Cordell 1979:113). Swadesh (1974:12) uses the term "Hispano" to describe this diverse group of settlers. In spite of their differences, the rituals of the Catholic religion and the isolation and hardships of frontier life tended to neutralize diversity to produce a more widely shared set of norms and cultural values.

Population figures for the Hispanic colony vary. Scholes (1935:96) believes that the community never exceeded 2,500 in the period 1598 - 1680, and that the average figure was much lower. Hackett (1937:328) believes that the population at the time of the Pueblo Revolt was probably closer to 2,800. Simmons (1979:182, 186) is more vague, saying that there were no more than 2,000 settlers in the first decades of the 17th Century and that by 1680 there were 2,500 to 3,000 non-Indian people in New Mexico.

The Hispanic population was settled in three main areas: in the capitol village of Santa Fe, around the Tewa settlements near present day Santa Cruz and along the Rio Grande from Santo Domingo to Socorro (Scholes 1935:96). Santa Fe was the only planned community, built according to prescribed Spanish policies for the establishment of towns and distribution of lands (Simmons 1969:8). The rural population lived in more isolated farmsteads usually referred to in the documentary records as estancias or ranchos. David Snow (1979:47) describes the 17th Century rural landscape as follows:

> Perhaps as many as 1,000 Spaniards living in ranchos and estancias scattered between Taos and Socorro (and not including those in Santa Fe), occupied some 464,000 acres of irrigable bottom lands and had access to over 4,000,000 acres of grazing land.

Table 15 lists the haciendas and estancias noted in colonial documents that were along the Rio Grande and within the Central New Mexico Overview area. Colonists were strictly forbidden to locate within Pueblo lands, but this condition was frequently violated by colonists who drew on the labor force and perhaps the spiritual support of the missions. In 1633, Fray Estevan de Perea complained that settlers in the vicinity of Cuarac (Quarai) were establishing farms in pueblo fields and ruining valuable arable land by constructing houses and corrals (Hackett 1937: 127-131; Wilson 1973:20).

The types of structures and facilities built by the colonists during this period are not well known. David Snow (1979) and Mark Simmons (1969, 1980) appear to be at odds concerning the structure of colonial settlements. Simmons (1969:10) believes that two patterns occurred in the 17th Century. On land grants made to prosperous families, he believes that haciendas were established. In other cases, the rural population built ". . . farmsteads strung along river or stream courses" (Simmons 1969:10). Snow (1979:47) does not believe that it would have

Table 15

Haciendas and Estancias in the Rio Abajo
Noted in Colonial Documents

Name	Location	Reference
Hacienda of Luis Lopez, Alcalde Mayor of Piro, 1667	Between Socorro and Qualacu	Chavez 1954:58 Hackett & Shelby 1942:I:ccix, 1942:II:364
Hacienda of Las Barrancas, Francisco Gomez	Twenty-three leagues beyond (north) the pueblo of Senecu, and ten leagues below Isleta	Hackett & Shelby 1942:II:223, 1942:I:cxxx
Hacienda of Francisco de Valencia	Between Isleta and Socorro, north of the Estancia of Thome Dominguez	Hackett & Shelby 1942:I:xcxi, 27
Estancia of Cristobal de Anaya (Las Salinas?)		Hackett & Shelby 1942:I:23-24
Estancia of Thome Dominguez de Mendoza	Below Isleta Pueblo, 14 leagues above the pueblo of Socorro	Chavez 1954:25 Hackett & Shelby 1942:I:xcxi
Estancia Alanco Perez Granillo	Two leagues from Alamillo	Chavez 1954:88
Unknown	Four deserted estancias between San Pascual and Socorro	Hackett & Shelby 1942:II:205
Farm of Felipe Romero	Between Alamillo and Las Barrancas	Espinosa 1940:66

been possible to establish haciendas in a country with such a scarcity of arable land, and whose extensive cattle-raising industry lacked market outlets. Part of their argument may be due to the differences implicit in the way they each use the terms rancho and hacienda.

Simmons uses the term "rancho" as a land-use pattern describing ranchos as ". . . loose agglomerations of small farmsteads" (1969:11) or as ". . . one or more Spanish households located adjacent to farm and orchard lands" (1969:13). Snow (1979:51) characterizes the ranchos as socio-economic units of kin-based residents living in virtual isolation and engaged largely in self-sufficient food production. Snow does not define the term hacienda but seems to be accepting the definition of an extensive agricultural and stockraising enterprise with far-reaching social and economic control over the lives of resident laborers, such as described in the studies of Mexican haciendas by Chevalier (1963) and Harris (1975). Simmons (1969:11) states that this pattern might have emerged had the Pueblo Revolt not taken place, but he does not describe the attributes of a 17th Century New Mexican hacienda. Simmons and Snow are in agreement that stockraising and agriculture formed the basis of the colonial economy. Little archeological evidence is available at this time to clarify the structure of the 17th Century colonial settlement pattern in the Middle Rio Grande or Salinas area. The available data will be summarized in a later section of this overview.

The powers of government in colonial New Mexico were vested in four major offices: the governor, the secretary of government and war, the lieutenant governor, and the alcaldes mayores (Scholes 1935). Twenty-three governors served between 1609 and 1680. On the average, each governor served 3 years. Each decided how to interpret his charge of promoting the advancement of the missions and industries of the province, ensuring internal peace, and protecting the pueblos, missions and colonial settlements from encroachment by enemy attacks (Scholes 1935:74-90).

The secretary of government and war acted as advisor and notary to the governor. Lieutenant governors performed special and largely ceremonial functions until 1660 when, as a result of increasing settlement in the Rio Abajo, the lieutenant governor was responsible for the administration of the colony between Santo Domingo and Socorro (Scholes 1935:91).

The colony was divided into six rural districts administered by the alcaldes mayores. The area east of the Manzano Mountains was included in the Alcaldia of Sandia and the Rio Abajo was within the Alcaldia of Albuquerque. The alcaldes mayores had judicial powers to oversee the distribution and use of lands, waters and laborers, which they did justly or unjustly depending upon the man, the issue, and the circumstances.

The majority of settlers were professional soldiers who made their living as encomenderos and estancieros. Craftsmen, servants, miners and slaves also served the colony. Although they may have received more prosperous encomiendas or more productive land grants, the few wealthy colonial families were not spared the hardships of the frontier.

Culture Change and Cultural Exchange

For almost a century Hispanic colonists and missionaries sought to change the cultural landscape of the New Mexico colony and to convert the Pueblo Indians from semi-autonomous villages to servants of the church or vassals to an encomendero. The Pueblos were subject to a program of directed cultural change executed by resident friars and designed to fully integrate the Indians into the Hispanic colony. At the same time, to the encomenderos, estancieros, and public officials who sought to exploit the Pueblo labor force, the idea of Pueblos moving from neophytes into other spheres of colonial life to become rival stockmen, traders or farmers would have been economically disastrous for colonial enterprise (Simmons 1979:182).

A few Indians became important figures in colonial society. Don Estevan Clemente, resident of Abo, was a trusted Pueblo leader in the 1650s. Governor Lopez Mendizabal supplied Clemente with goods that he then traded with the Apaches of Siete Rios. Clemente was able to amass great wealth and to command the respect of the government, friars and the Salinas Pueblos. When he attempted to lead a rebellion against the harsh conditions among the Salinas pueblos in the 1660s and 1670s he was hanged for treason (Kessell 1979b:2-3; Scholes 1935:96).

The century of colonial rule ended with neither the friars nor the encomenderos in control of the Pueblos, but with significant changes introduced into many aspects of Pueblo life.

By 1680 the Pueblo population had been reduced to 17,000 people (Simmons 1979:186) through the combined effects of epidemic, famine, and warfare. Likewise, the number of Pueblo settlements had been reduced as the population assembled around mission centers or fragments of beleaguered villages aggregated. The Salinas pueblos were abandoned before the Pueblo Revolt. The Piro and those former Tompiro villagers who had joined the Piro pueblos in the 1670s, fled their Rio Grande villages during the revolt, abandoning forever some of the most productive land in the valley.

In spite of the variety of cereal grains, fruits, vegetables and domesticated animal products introduced into the Pueblo diet by the friars and colonists, and the improvements made in agricultural practices (Scholes 1935:105; Schroeder 1972:53), neither the mission stores nor the encomienda farms were able to contribute enough food to prevent repeated famines from decimating the Pueblos. Scholes (1935:105) believes that even when food was plentiful, the new cultigens never replaced the Pueblo staples of corn, beans, and squash.

Toulouse (1949:13-21) found a quantity of plain ceramic wares of a new type in the excavation of Abo, and Warren (1972) suggests that there is evidence of a ceramic industry in the Salinas pueblos that was supplying local Hispano and

Indian communities with pottery. New vessel forms such as soup plates, pitchers, and mugs suggest that Pueblo potters may have been imitating Spanish vessel shapes, and new design elements show the influence of Mexican made pottery. Snow (1973:57) suggests that the Hispano population adopted Pueblo pottery because the Hispanos found ceramic production to be "below" their status.

Wood working, blacksmithing, improved form moulding of adobe bricks, and other crafts were learned in the missions and in private workshops. Metal tools and weapons were treasured items, even among the colonists. While most of the industrial crafts learned by the Pueblos were used in constructing churches and other public buildings, the architectural details seem to have been used to adorn buildings that were only slightly modified from the compact forms and plans of pre-contact Pueblo architecture (Dozier 1970:65). Bread ovens, the beehive shape still seen among Pueblo and Hispanic villages, may have been introduced during this early colonial occupation (Schroeder and Matson 1965:117-120).

During the century in residence, the colonists and friars introduced many material and non-material changes into the pueblos. The Spanish language was adopted as a common language among the Pueblos and Hispanos (Dozier 1970:69). Catholicism was embraced by some Pueblos, but for most Indians this new religion was a veneer over traditional religious ceremonies. In times of stress, as in the period preceding the Pueblo Revolt when famine and Apache warfare overwhelmed many villages, traditional practices emerged again as Pueblos sought to restore order to their lives and revitalize their ancient cultures.

THE PUEBLO REVOLT AND RECONQUEST 1680 - 1696

Revitalization Among the Pueblos

Acts of defiance, outbreaks of sorcery, accusations of witchcraft and the resurgence of native catzina (kachina) dances signaled in the Pueblos the beginning of a process known as "revitalization" to anthropologists. In this process, ritual and magic are combined to bring about a change in political, economic and social conditions. The Pueblos, desiring to be free of colonial exploitation, religious servitude, and Apache predation, appealed to the forces they trusted to restore order to their lives.

Resistance to Hispanic domination began with first contact, and by the mid 1600s the Pueblos were openly practicing their traditional religion, and in some places were fostering rebellion. Friars living among the Piro tried to discourage what they termed idolatry by moving the residents of Sevilleta closer to the mission at Alamillo. At Senecu, men accused of sorcery were hanged and trusted leaders like Abo resident Don Estevan Clemente spoke against the oppressive conditions in the pueblos. Even schemes like the panacea Bernardo Gruber offered the residents of Quarai were accepted with the hope that somehow by swallowing bits of paper their burdens would be lifted.

In 1675, Governor Trevino sought to end sorcery among the Tewa of northern New Mexico by imprisoning 47 pueblo religious leaders and hanging three of them (Hackett and Shelby 1942:I:xxii). Their release was won by Pope (Popay), an important religious leader from San Juan Pueblo, who henceforth devoted himself to devising ways to free the Pueblos from their oppressors. Pope was driven from his own pueblo and moved on to Taos, where he claimed the status of a prophet speaking for three divine forces who foretold the death of the Christian God and the flight of the Hispanos. By 1680 Pope and other religious leaders succeeded in uniting the upper Rio Grande Pueblos for an all out assault on the missions, estancias, and Pueblo traitors. The Piro were not informed of the plan. Some have suggested that they were excluded because of their complicity with the Hispanic friars and settlers. This is a surprising conclusion since the Piro were as much victims of Hispanic intolerance and exploitation as any of the northern Rio Grande villagers. Revitalization turned to revolt in August 1680.

The Pueblo Revolt and Hispanic Retreat

Testimony of Indians who later described the planning for the revolt indicates that a knotted cord was circulated through the pueblos signifying the number of days to pass before the planned uprising (Hackett and Shelby 1942:I:xxvi:fn 13). The capture of two loose-lipped messengers hastened the Pueblos into action, and at dawn on August 10th, 1690 missionaries and settlers throughout the colony were slain in retaliation for a century of oppression. Before the siege was over, 21 of the 33 friars in the colony and

between 380 and 400 colonists were slain (Dozier 1970:59).

Governor Antonio de Otermin held the capital city for 9 days. After their water supply was cut off by the allied Pueblo forces, the colonists had no choice but to retreat. On August 21 Otermin and a party of nearly 1,000 frightened colonists left Santa Fe.

Lieutenant Governor Alonso Garcia was left to handle the defenses of the Rio Abajo settlements when the Tiwa pueblos of Puaray, Sandia and Alameda joined the revolt. Although they tried repeatedly to make contact, Garcia and Otermin were never able to communicate, and each thought himself the leader of the only survivors of the uprising. Garcia, with a small party of clerics and soldiers, combed the Rio Abajo rescuing those men, women and children who had survived the brutal attack. The Pueblo of Isleta harbored the refugees until they were assembled for the southward retreat.

On August 14 about 1,500 settlers, including 120 soldiers, left Isleta (Hackett and Shelby 1942:I:li). Garcia estimated that 120 people were killed in Rio Abajo estancias, the majority in the densely populated district near Sandia. Otermin's party reached Isleta on September 3, and on September 13 the two parties were united near the Fra Cristobal Mountains.

An advance party from the northbound supply train met Otermin's column at Alamillo, supplying the refugees with much needed provisions. Sixteen days after the two parties of refugees met, they encountered the northbound supply train at La Salienta, located about 15 miles north of El Paso.

By most accounts the Piro pueblos were abandoned during the revolt, as the Piro and some Isleta residents joined the colonists in their retreat from New Mexico. The Piro then established two villages in the El Paso area - Senecu del Sur and Socorro del Sur. In a rather short period of time, the Piro appear to have been so thoroughly enculturated into Mexican village life that even their language vanished (Fewkes 1902a; Bartlett 1909; Hackett 1937:506-508). Testimony presented to Governor Otermin in 1681 by a former resident of Socorro states that those Piro who did not join the retreat took refuge at Isleta, Acoma, and settlements in the Fra Cristobal Mountains (Hackett and Shelby 1942:I:243, 339).

The Attempted Reconquest

Otermin remained in the El Paso district until November 1681 before attempting to launch an expedition to reclaim the colony. A force of 146 poorly armed soldiers, 120 allied Pueblos and 28 servants comprised the reconquest army (Hackett and Shelby 1942:I:cxxii). On November 26 the army entered the Pueblo of Senecu. The following quotation from Hackett and Shelby describes the scene of desecration and destruction that greeted Otermin's party (1942:I:cxxvi-cxxvii):

> The place was found absolutely deserted. Many signs were seen which indicated that the natives had been oppressed by the Apaches and had left their homes through fear. The walls of the burned church and monastery had been left standing, though these were beginning to crumble. Two bells were found in the belfries, and a third one without a clapper was found in the cemetery. In the latter place a bronze cannon of about 175 pounds weight, which had formerly served as defense for the church and pueblo, and an old pine cross were found. Another cross was found in the main plaza of the pueblo. In the sacristy, the wig and diadem of a crucifix were found lying on the ground, likewise an altar, or communion table, and two fragments of another one. By order of Father Ayeta, some crosses, found in the houses of the pueblo that were intact, together with the wig and the diadem of the crucifix and a few other things from the altars were piled in a heap and burned. The altar and fragments of the other one were thrown into the river. Father Ayeta then requested Otermin to have the clappers removed from the bells in the tower and the bells secured so that they might be carried to the wagons. Otermin granted this request and at the same time gave similar orders regarding the cannon. The three bells and the cannon were not taken away from the pueblo at that time . . . but were hidden and taken to El Paso when the army passed this pueblo on its retreat in January of the next year. Otermin then ordered the pueblo set afire and the rest of the day was spent burning it.

The army then proceeded upstream passing through the ruins of San Pasqual and four deserted estancias before entering Socorro, which had also been sacked and burned (Hackett and Shelby 1942:I:cxxvii). The soldiers gathered up and