BETWEEN THE MOUNTAINS
BEYOND THE MOUNTAINS
Papers in Honor of
Paul R. Williams

Edited by:
Emily J. Brown
Karen Armstrong
David M. Brugge
Carol J. Condie
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Note: Much of the following relies on the Taos Archaeological Society’s (TAS) nomination of Paul submitted by Carolyn J. Johnson for the society.

Paul Williams was born and raised in Longmont, Colorado. After a brief false start with a B.A. degree in psychology from the University of the South, he made lengthy trips to Mexico and Europe, which engendered a permanent devotion to archaeology and he proceeded to earn a master’s degree from Northern Arizona University in 1985. For the past 28 years he has been an archaeologist with the Bureau of Land Management (BLM), the last 24 of those years as the Taos Resource Area Archeologist.

He has served BLM energetically and productively. He helped to establish valuable ACEC status (Area of Critical Environmental Concern) for the seven major pueblos in the Ojo Caliente area at the west edge of Taos Valley, worked to implement the Galisteo Basin Archeological Sites Protection Act that covers 24 major archaeological sites, helped to initiate the North Central/Taos Site Watch program (and continues to train and encourage 30 Site Watch volunteers), and has conducted studies of such important historic sites as the Apodaca Trail segment of the Camino Real and the Embudo Pass battleground (of 1847 Taos Rebellion fame).

Paul's time outside the office has not been wasted. He has a genius for seeing what needs to be done in the Taos Valley and not only figuring out how to do it, but also leading the way to implementation. He has encouraged universities to devote summer field sessions to conducting comprehensive archaeological inventories of the Taos Valley. He started a volunteer group in 1985 via the simple expedient of placing an ad in the Taos News. The Taos Archaeological Society was founded in 1987 and since then Paul has remained active in the society, including serving as president from 1997 to 1999 and as leader of innumerable field trips to sites in the Taos Valley and to Mexico and Central America. From early on he engaged the TAS in archaeological surveys of the valley, discovering and recording numerous sites, many replete with rock art and trails, both prehistoric and historic.

—And always, he includes the children. The TAS nomination remarks "Paul has taken virtually all 5th grade students in the Taos Valley on archaeological field trips sponsored by the organization Rivers and Birds.” For over 10 years he has visited elementary school classes to explain the significance of archaeological sites and artifacts and the values of site stewardship.

Paul's eternal enthusiasm for both archaeology and people is perhaps best demonstrated in a paragraph drawn from the TAS nomination recounting the time when Katherine Wells enlisted his advice regarding the spectacular petroglyphs on her property:

Paul was contacted by Katherine Wells when she first acquired her property on Mesa Prieta (Black Mesa) at the southern entry to the Taos valley. Paul realized the importance of the thousands of petroglyphs on Katherine’s land, and that surveying and analyzing the archaeological remains would be a very long term task requiring considerable resources. Paul was instrumental in developing the summer youth programs sponsored by Vecinos del Rio on Mesa Prieta, and has worked each day during the six summers of this program, teaching, encouraging, and supporting the young people from nearby pueblos and communities. Paul has found time to attend organizational meetings, planning meetings, orientation meet-
ings for neighbors and professionals throughout the remarkable development of the Vecinos del Rio organization which seeks to record and protect the glyphs and to educate the public about the irreplaceable patrimony of Mesa Prieta.

In 1987, in recognition of his work in public education, Paul received a Take Pride in America Award and was among the group of award recipients hosted by President Ronald Reagan at a reception on the White House lawn. His selection, 22 years later, as honoree of the thirty-fifth annual ASNM volume, is a recognition that his love for and dedication to Southwestern archaeology, and especially the archaeology of the Taos Valley, have never flagged over the intervening years.

Carol J. Condie
I felt a little surprised, and also greatly honored, to be selected as the 2009 honoree for the Archaeological Society of New Mexico’s (ASNM) annual conference. As time has gone on, I have also felt quite challenged in writing about myself: I have laughed remembering good times, ground my teeth over some of the rough spots, and mostly felt quite humbled. To get past a stage of humbleness that was becoming paralytic, I asked several friends-colleagues to help me prepare my biography. Corky Hawk, local historian and trail explorer, Carmen Acosta Johnson, Taos Archaeological Society guru, and Sher Churchill, biologist-mediator-former Bureau of Land Management (BLM) planning coordinator, have added some contributions, as noted below.

This narration is divided into three sections which overlap, but are distinctive parts of my life. The first, “In the Beginning...” describes my “formative” years, rich in family character. The second, “Archaeology,” speaks to the years in which I studied archaeology formally and began my professional career. And the third, “Archaeology and People,” describes the late 1980s to this very busy, present moment, highlighted by work with the Taos Archaeological Society, volunteers and schools, and the management challenges and opportunities I face as the Archaeologist and Cultural Resource Program Manager for BLM-Taos, all in this incredible New Mexico landscape.

IN THE BEGINNING...

I was born in Longmont, Colorado in 1949. My father was a dentist and my mother was a wonderful homemaker. They provided a great home for my older brother, Leslie, and me. I actually came from a line of dentists, including my grandfather, two uncles and my brother. My father was born in Chickasha, Oklahoma back when it was Indian Territory. He was one of five sons. Back in the early 1900s my grandfather spent his summers in Carrizozo, New Mexico while his wife and five boys remained in Chickasha. He set up his dental chair in the back of the Old Paden Drug Store and provided the only dental care that people in that area had. During that time he acquired a good deal of Native American crafts much
of which he traded for his dental services. I developed a great appreciation for these baskets, beaded dolls and moccasins, and beautiful woven blankets looking at his New Mexico acquisitions. When my grandmother passed away many years after my grandfather's death, the five sons played hands of poker for these beautiful crafts. My father wasn't much of a poker player, but did come home with a beautiful Mescalero basket which was handed down to me and which I cherish.

My grandmother spent her teenage years at Fort Sill where her father was an English teacher. One of my favorite memories is of playing canasta with my 90-year-old grandmother while she told me stories of Geronimo and other Apache people at the fort. She always felt very sorry for the treatment of the Apaches at the fort. Time spent with my grandparents certainly spurred my interest in native cultures and anthropology.

My mother was quite a rock hound, and we would stop in every little rock shop that we encountered on our automobile travels. This really started my interest in rocks, although I had no idea that I would spend most of my life looking at rocks altered by human hands.

Longmont was a wonderful town in which to grow up. Back then it was a town of 12,000 people and was there to support all the agriculture and ranching in the area. I can still smell the Monfort feed lots on the north end of town. I attended Longmont High School where I excelled in sports earning a total of 10 letters in football, basketball and golf.

After I graduated from high school, I attended the University of the South in Sewanee, Tennessee where my father and three of his brothers studied. I received a Bachelor of Arts degree in Psychology and returned to Longmont and my beloved mountains of Colorado. My B.A. earned me a position as a laborer pushing a broom around a cement factory. I told my old Sewanee friends, most of whom worked in white collar jobs, that I was in cement. I just did not tell them that I was standing in it most of the time. I made good money at the cement factory, which allowed me to travel. It was during trips to Europe and especially Mexico that I fell in love with cultures and archaeology. When I returned from my excursions through Mexico, I started taking Anthropology classes at the University of Colorado. After a year of classes, I talked Dave Breternitz into hiring me as the thirty-fifth student out of 35 for a summer of field work at the University's Mesa Verde Research Center. During that summer I worked on excavations of the Escalante Ruin, which is on the hill above the Anasazi Heritage Center. I also excavated at numerous sites within the Ute Mountain Reservation, preparing for the building of the road in anticipation of the Tribal Park, which is a wonderful place to visit. I also worked on inventories for the Animas-La Plata water project, locating and recording many interesting archaeological sites along the way. After this hands-on introduction to archaeology, I was hooked. I had finally found my calling.

It was during this time that I met the love of my life, Judy, and we were married. These were not easy years with me leaving home to pursue archaeological field work opportunities. Judy worked to support my graduate school studies.

**ARCHAEOLOGY**

I spent a number of years working in the field and attending graduate school at Northern Arizona University (NAU) in Flagstaff, Arizona. Along the way I worked for the Museum of Northern Arizona inventorying on Cedar Mesa in Southeast Utah, the Laboratory of Public Archaeology at Colorado State University, the BLM in Montana, the Coconino National Forest, and the National Park Service supervising excavations of Archaic Period campsites overlooking Blue Mesa Reservoir near Gunnison, Colorado.

At NAU, my Lead Archaeology professor, Dick Ambler, set me up with an excavation of a Sinagua pueblo in the Verde Valley. It was a great opportunity, and I gladly took it on. The only problem was that there was no money attached, so I recruited anthropology students and others to provide the volunteer labor.
We excavated six rooms of this little site which is located on a ridge next to a spring creek overlooking beautiful Oak Creek Valley. I supervised the excavations, analyzed all of the artifacts, and wrote the report that served as my thesis. I learned a great deal about everything it takes to carry out an archaeological excavation. I also enjoyed working with volunteers which set me up for my future work with the BLM.

In 1980, I received a phone call from the BLM Area Manager in Glenwood Springs, Colorado offering me a job as the archaeologist in his office. I was quite surprised to get the offer because I had not applied for or even heard of the job. I had taken the old Pace government exam and was placed on a list of persons meeting the requirements for the position. After discussions with my wife, I accepted the job even though I hadn't finished my thesis at NAU. After many years of being a poor graduate student it was nice to get a salary and health benefits. We moved from Flagstaff to Glenwood Springs. I figured that I would work for the BLM for a year or two and then get back to archaeological research and field work. Little did I know that I would spend the next 30 years with the BLM.

We organized a small crew of energetic rock art recorders, including Sally Cole who went on to do wonderful work in the field, and started recording the petroglyphs and pictographs in the area around Glenwood Springs. We also put volunteer crews together to document wickiup villages and perform archaeological inventories. I also taught classes at Colorado Mountain College on archaeological subjects. During these years I learned to fly fish and spent some wonderful times out fishing the Roaring Fork and Frying Pan Rivers and many of the small creeks in the area. Judy and I made some good friends in Glenwood Springs and have many great memories. The best of these memories involved the births of our two oldest children, Ben in 1981 and Sarah in 1983. Andy would be born three years later in Taos.

ARCHAEOLOGY AND PEOPLE

In 1984, I was offered the BLM archaeologist position in Taos, so Judy and I packed up the kids and the dog and headed for Taos. It was January, and the temperatures were very cold. By the time we passed through Alamosa, Colorado it was 16 below zero. I
was in the old Volkswagen bus with the dog, and Judy was in the Toyota with the kids. Needless to say there wasn’t much heat being produced in the VW, so the dog and I were freezing. I got into my down sleeping bag and zipped it up to stay warm. By the time we got to Taos it was even colder. We stayed at the Taos Inn down off the plaza for the first night. Judy wanted me to bring the couple of house plants that we had in the VW into the room to keep them warm. They were frozen solid, but I dutifully brought them to the room. While I was carrying a heavy houseplant walking as fast as I could through the back entrance to the inn I slammed my head into a viga. I saw stars but did not fall to the ground. I figured that was just Taos saying hello and welcoming me. I’ve been looking for low-lying vigas ever since.

**Taos and Pre-Historic Archaeology**

One of the first places I visited in the spring when the weather warmed up was the Rio Grande Gorge near Questa. I absolutely fell in love with the place and decided that I would like to do some archaeology there. So, because of my long-time work with volunteers, I advertised in the *Taos News* for volunteers to help inventory and record archaeological sites on BLM lands. No experience needed. Quite a few interested persons showed up at our meeting and we set up our first project which consisted of backpacking into the Rio Grande Gorge within the Wild Rivers Recreation Area. Not a single archaeological site had been recorded within this area of the gorge, so I was curious to see what we would find. It did not take our crew long to start identifying the dark basalt and obsidian flakes that make up the lithic scatters in this area. We located and recorded five archaeological sites, highlighted by the discovery of the Big Arsenic Springs Petroglyph Site. We were walking transects along the terrace on which the Big Arsenic Springs Campground is located when I heard our female college student screaming for her life. I ran over to her end of the transect line expecting to find her cornered by a rattlesnake or something like that. She was standing in front of a large boulder covered by all kinds of animals including deer, bighorn sheep, bears and humans. She had never seen anything like this, and needless to say was quite excited. We spent two days recording our first petroglyph site, which set us off on a journey which is ongoing today.

The volunteer group returned to the Rio Grande Gorge in 1986 and located and recorded 12 archaeological sites including campsites, hunting locations, a lithic quarry and petroglyphs. These sites dated to the Archaic and Early Pueblo periods. During the summer of 1987 a growing number of volunteers helped map two pueblo sites, La Caja Pueblo and Pueblo Sarco in the Santa Cruz Reservoir area near Cundiyo. During another project, we recorded a series of sites along Punche Arroyo near the Colorado-New Mexico border east of San Antonio Mountain. The Punche Lake Tipi Ring Site, which was located during this survey, was mapped during a two-day project later in the summer.

John Roney, the Albuquerque BLM Archaeologist and active ASNM member, was very helpful with the training and supervision of the volunteers. These projects provided BLM with important archaeological data in areas not previously studied. The common bond among the volunteers who participated in these projects was that they had always wanted to take part in archaeological studies, but had never been given an opportunity. Many of these volunteers were the driving force in the creation of the Taos Archaeological Society in 1987. In 1989, this wonderful volunteer spirit led to a “Take Pride in America” National Award presented to the Taos Archaeological Society by BLM Director Cy Jameson.

**Historic Archaeology**

One project that I am especially proud of was the stabilization of the Ward Ranch house along the Rio Chama down river from El Vado Reservoir. In 1988, a 24.6-mile section known as Chama Canyon was designated as a National Wild and Scenic River by the
U.S. Congress. A few years later the BLM acquired a parcel of land adjacent to the river that contained historic structures that was known as the Ward Ranch. The primary structure was a four-room, two-story house built on a homestead parcel of land back in the 1920s. Our first recording of the site showed that the structure was in poor condition. It was losing its roof and was coming apart and leaning precariously. We were concerned that it may not last through the next winter, especially if a good deal of snow fell. So, we brought in some expertise from the Forest Service, developed a stabilization plan, secured some funding, and prepared for the project. The biggest challenge was getting to the site which no longer had vehicle access since roads had long ago eroded away. All crew members, equipment, lumber, tools, food and water had to be rafted down the Rio Chama to the work site. In May of 1994 we carried out the stabilization project. The first group of rafts carried all the materials and tools to the ranch house including lots of lumber, posts, bolts, nails, corrugated roof panels, hammers, saws, and heavy jacks. A couple days later we floated in the crew of twelve hearty volunteers with all of their camping gear. A river company was contracted to supply and prepare all the food, so the cook floated in on a raft loaded down with food and a full camp kitchen. We spent two weeks working on the structure. Our first project was to clean out the hot spring which was immediately out the back door on the west bank of the Rio Chama. This supplied us with a hot tub to rest our bones each day after work. Basically, we jacked the building up and supported it on large posts, built up the foundation, and replaced the roof with new corrugated steel. Our goal was to stabilize the structure without altering its wonderful visual setting. One of the rooms had remnants of
newspaper that was used as wallpaper. One newspaper clip was about Babe Ruth, who wanted a whopping $150,000 a year to play for the Yankees. There was a great picture of the Babe leaning on his bat. The structure is still standing today and hopefully will remain that way for many years to come.

After the project was finished, the Rio Grande Sun newspaper ran a nice article about our stabilization of the Ward Ranch. Soon after that I got a call from a lady who had seen the article. She asked me if I would like to talk to Nellie Ward, who had lived at the ranch for many years back in the 1920s, '30s, and '40s. I was thrilled to meet with Nellie at her house in Blanco, New Mexico. She was 97 years old, and we had a wonderful conversation about her life at the ranch. I incorporated that conversation, with some photos that her brother gave me into a binder which interprets Nellie's life at the ranch. Now, people rafting the Rio Chama Wild and Scenic River can stop by the Old Ward Ranch and learn a little bit about life during the Homestead Period.

In recent years I have been able to work more on historic archaeological projects. These have been fascinating individually. And some have the added benefit of giving us more information about the early years of European contact and the interaction of Pueblo and Spanish cultures. Corky Hawk has been an extremely knowledgeable and fun comrade from whom I have learned a lot about historic trails. He has guided me to numerous trails, and contributed much information to agencies and our local communities about historic trails in northern New Mexico. Corky has provided a considerable amount of detail in this section.

In the fall of 2000, Congress added the El Camino Real de Tierra Adentro to the National Trails System. BLM and the National Park Service were given the job of planning and administration of those portions of the historic trail on public land. I had the great pleasure of working with a number of historians and archaeologists on this project, which is ongoing. Our fearless leader was Mike Marshall, whose knowledge of the routes of the Camino Real south of Santa Fe was indispensable. This was my first field experience with historic trails, which I soon discovered were archaeological sites of great potential. I recall walking along the deeply rutted remains of the old trail and marveling at how well preserved it was. At one point the trail went directly through the site of an abandoned and unexcavated pueblo. It was clear that the pueblo was occupied during the early days of the Camino Real, and that the road was an important part of the life of the people who lived there. This was just one example of the many subjects for further study which the Camino project produced.

We also made a valiant effort to locate remains of the trail's route through the Santa Fe River Canyon. This was probably the earliest route in the area used to approach Santa Fe, and was extremely rough. Time and nature had taken their toll on this portion of the trail. But what remained reinforced the respect all of us had for the ingenuity and toughness of the men who built it. During the Santa Fe Canyon study, we were "baptized" many times in the Santa Fe River. Some of these immersions were intentional because the trail was forced to cross the river many times. Others were the result of occasional missteps. I took great pleasure in photographing my companions thus experiencing "up close and personal" one of the hazards of trail travel! They, of course, returned the favor. I hope all of those photos have since been destroyed. At least none were included in the published report of our work.

In 2003 a joint team of BLM, Forest Service and National Park Service archaeologists began searching for the site of the Battle of Cieneguilla. This fight between the Jicarilla Apaches and Dragoons from Cantonment Burgwin occurred in 1854. It was a major defeat for the U.S. Army. For over 150 years there have been many questions about the conduct of the battle. The archaeological project, led by Dave Johnson of the Carson National Forest, was intended to locate the site of the Dragoons' defeat. If the site could be found and studied, it was hoped that an ac-
curate picture of the battle would emerge. I was the BLM archaeologist participating in the search for the site. From the documentary record, the battle could have been fought on BLM, National Forest or state land. Our team of eight to 10 professionals and volunteers searched a square mile of very rugged mountains east of Pilar, New Mexico. The effort lasted two seasons. In the spring of 2004, our metal detectors finally revealed the battle's artifacts. The site was not where local legend had placed it. Because it was on Carson National Forest land, Dave Johnson led the subsequent study. The resulting archaeology did indeed help solve many of the mysteries of the battle and has helped set the historical record straight.

In 2005, the BLM acquired 11,000 acres of pristine view shed south of Taos. The area has both prehistoric and historic sites which need to be inventoried and studied. Some of the most challenging are historic trails, including the Camino Real extension from Santa Fe to Taos, which cross the parcel. Beginning in 2006, Charles Haecker of the National Park Service and I have been leading an archaeological study of what we believe are some of the oldest sections of these trails. To date the study has uncovered artifacts from pre-Spanish Pueblo, seventeenth and eighteenth century Spanish, and early American eras. The picture is emerging of a travel route from Taos Pueblo to the south which has seen continued use by many peoples for centuries. This project will hopefully continue for years.

BLM's inventory of historic trails has also helped to identify other historic sites for further study. An example is the site of the Battle of Embudo Pass. This was one of three battles fought in January 1847, during the Taos revolt against newly imposed American authority. The resistance fighters from Taos first tried to defeat U.S. troops under Sterling Price at Santa Cruz. They were not successful, and the rebels retreated. The second effort against Price's troops was a blocking action in the mountains along the trail between Rinconada (then La Joya) and Dixon (then Embudo Plaza). Again the U.S. troops were victorious. The rebels retreated to Taos where further fighting led to their surrender. There is good documentation about the battle and its location. We have also located the line of the trail over which Price's troops would have advanced on the Taos rebels' position. We hope through metal detector study to accurately locate the battle site. The artifact location and type may also allow us to follow the course of the fight, and compare the picture revealed by archaeology to the contemporaneous battle reports of 1847.

Many other historical sites, lost until now and never studied, are on public lands in our area. It is critically important to locate these and protect them for later study by historic archaeologists and historians.

In closing, I would like to say that I find the southwest landscape and archaeology inspiring and humbling—there is still a lot to see, ponder, and take care of. There are awesome folks who want to be part of the discovery, have conversations about our heritage in this area, and who want to help. I am really lucky to be part of all this!

Taos Archaeology Society, Volunteers, Kids and Sitewatch

(Contributed by Carmen Acosta Johnson, Taos Archaeological Society)

Paul has continuously inspired, taught and enabled volunteers, students and researchers from his office at the BLM. And he has been critical to the formation and evolution of the Taos Archaeological Society (TAS). The early history of the TAS can be found in detail in the 2000 annual volume of the Archaeological Society of New Mexico (ASNM). The distinguished antecedents of the current TAS, notably Helen Blumenschein and Dr. Bertha Dutton, are remembered there as are the many fine archaeologists who supervised the excavations and survey work of the group. Pit houses in the Hondo valley near the Lawrence ranch, the Pot Creek cultural site, Tsiping,
the Llano Quemado and Arroyo Seco sites under Jeff Boyer were all part of the early TAS work. There is also mention of the (now fondly remembered) advertisement in the Taos News in 1985 by Paul, calling for volunteers to help survey and record archaeological sites in the Taos valley. In all 16 rock art sites were accurately recorded by the TAS volunteers who responded to Paul’s call for help. These irreplaceable archaeological treasures formed the beginning of the BLM inventory in the Taos valley and continue to provide a valuable resource to researchers today.

Three prestigious awards were bestowed upon that early TAS group for their contributions to public archaeology: The Take Pride in America award (a first place award), the Volunteers for Public Lands award from the BLM, and again the Take Pride in America award. Frequent classroom presentations, organization and enrichment of the Archaeology section of the Taos Public Library, river trips which included surveying and monitoring archaeology on the Chama, and camping trips to Pecos conferences and ASNM meetings, Chaco and other notable sites were all added to the full, rich activities list which became the inheritance of the current TAS group.

When Paul learned of the work currently underway at Paquimé in Chihuahua, Mexico, he organized a TAS field trip to the new Paquimé museum and impressive ruins. The story of the reproduction of ancient pottery by contemporary Mexican artists led to field trips for 11 years to the pottery-making village of Juan Mata Ortiz near Paquimé. Three outlier Paquimé settlements have now been included in these study trips, the Arroyo de los Monos, the Cueva de la Olla, and Cuarenta Casas. The trips to Paquimé stimulated a zest for archaeological travel. Day trips and camping trips have been organized to such places as Chaco, Ute Mountain Ute Tribal Park, Hovenweep, Jemez, Zuni Shalako, Navajo Pueblitos and many more. Numerous trips have been arranged to Mexico, Belize, and Guatemala to experience Olmec, Maya, Toltec, and Casas Grandes horizon sites as well as to Peru and Italy.

With training and coaching by the Mesa Prieta group, Vecinos del Rio, a small cadre of experienced volunteer petroglyph recorders has now added five more petroglyph concentration sites in the Taos Valley to the BLM list. Of special note are glyphs in nearly all of the sites which are thought to be of Archaic design and technology as well as being heavily patinated. In several

Figure 4.
Paul and Judy at Teotenango archaeological site south of Toluca, Mexico on Taos Archaeological Society trip in 2008.
cases lithics have been found at the same sites, which strengthens the Archaic hypothesis. The Piñon award to Vecinos del Rio was also in recognition of Paul's constant efforts on behalf of the Mesa Prieta petroglyph recording projects. A recent discovery by Ron Barber of Los Alamos has demonstrated that one of the most beautiful Archaic period sites is a solar marker for the summer solstice. In this way Paul's efforts continue to contribute to the understanding of early human presence in the Taos Valley.

Speaking to grade school children about archaeology, taking dozens and dozens of classrooms out to “discover” petroglyphs and to imagine how children went about their lives so long ago has been one of Paul's major contributions here in the Taos Valley. Children now grown recall these outings which profoundly influenced their appreciation of the Taos landscape. The classroom presentations and grade school hikes continue to this day, frequently with the organization Rivers and Birds. And greatly to Paul's credit, he has himself modeled the respect and care he expects of Taos children, as well as TAS volunteers and the general public, when in the presence of ancient artifacts.

Two years ago Paul sponsored, oriented and coached a new effort by TAS to protect the archaeological sites by forming a Taos chapter of Sitewatch. Currently some 10 teams visit the sites routinely and provide a protective presence for the archaeological treasures of Taos.

Brown bag lunches have taken advantage of the BLM conference room to introduce TAS members to many eminent archaeologists and their work. Support for scholarships for young archaeology students and for the Popé statue from Ohkay Owingeh Pueblo which now stands in statuary hall in Washington, D.C., and hosting the ASNM annual convention are also bright memories in the rich mix of activities and friends of the TAS. Paul's willingness to work with amateurs has blossomed richly.
Management of Archaeological Resources on Public Lands

(Contributed by Sher Churchill, environmental planning and mediation consultant, Galisteo Coordination Committee member)

Paul has been and is an amazing force at BLM-Taos, playing an integral role in planning and implementing a diverse array of projects on public lands across northern New Mexico. As Archaeologist and Cultural Resources Program Manager for BLM-Taos Field Office, he works with biologists, range conservationists, soil scientists, other archaeologists, geologists, paleontologists, and fire, recreation and realty specialists, and varying levels of managers, all bobbing and weaving together through political, funding, and staffing constraints to manage our public lands in northern New Mexico. Paul brings incredible knowledge, humility, and a great sense of humor to interdisciplinary team work, where the trade-offs in terms of resource impacts are examined for all projects, large and small. He is a passionate and respected leader, who stays open to hearing new perspectives and information, yet remains dogged in his desire to identify and conserve archaeological resources. As an advocate for cultural-archaeological resources he brings passion and insight while supporting good management for all resources.

(Also, there is a well-founded rumor that he incites laughing fits amongst the biologists, soil scientists, engineers, range conservationists and recreation specialists ...especially after he has sat through yet another day-long, indoor meeting.)

Paul has walked and explored much of the land Taos Field Office manages, and has a good grounding in the landscape context in which the archaeological/cultural resources are located. His ability to articulate the importance of much of the archaeology in the larger landscape context provides opportunities for managing landscapes instead of isolated sites.

A number of the projects Paul has been involved with are large in scale and far-reaching in terms of current and future social and natural resource impacts. One of these projects is the revision of the current Resource Management Plan (RMP) for the Taos Field Office. The current plan is over 20 years old, and Field Office staff has been working for several years to revise it to reflect current and projected future conditions and needs. In this revision process, Paul has a lead role in identifying areas that need cultural resource surveys and/or protection: he has played a significant role in clarifying travel management rules (specifically off-highway-vehicle access) in the El Palacio area, a beautiful badlands landscape full of archaeological sites which lies between Velarde and Chimayo. Paul has engaged community folks and the Pueblo of Ohkay Owingeh in discussions about the values of these archaeological/cultural resources and how they can best be protected. He has brought a heightened awareness to management of this area, and most importantly has been instrumental in developing specific travel restrictions to protect sites.

In another part of the RMP revision process, Paul has been able to put shape to a vision that he has held dear for many years, that of identifying and protecting the homeland of the Tewas, in the Ojo Caliente and Rio Chama drainages. His vision is to preserve and protect the large, Tewa-speaking villages in this area which predate the contemporary Tewa communities. These ancient adobe villages, now melting back into the earth, include Posi-owingeh, Howiri, Hupovi, Ponsipa Akeri, Sandoval, Hilltop and Ku. Through his persistence and his ability to articulate the importance of this landscape, hence gaining the support of his BLM colleagues, he has succeeded in developing a proposal that this area be formally designated as an Area of Critical Environmental Concern. This designation will emphasize the presence and importance of archaeological resources in the area and provide the basis for sensitive management for the present and well into the future.

In 2004, Congress passed the Galisteo Basin Archaeological Sites Protection Act (P.L. 108-208) recognizing the national significance of archaeological sites in New Mexico's Galisteo Basin as a legacy for future generations.
The Basin's valleys contain some of the largest, culturally richest Pueblo ruins in the Southwest, a stunning number of spectacular rock art panels, indigenous agriculture features, historic period Pueblo villages, early Spanish missions, settlers' trails and ranches, and ancient quarries and mines. Under the direction of the Secretary of the Interior, BLM was charged with creating a coordination committee to carry out the provisions of the law, and, because the Basin includes lands managed by BLM-Taos, the coordination responsibilities came to Paul. Paul had been a passionate advocate for Congressional recognition and protection for the area, and stepped up into a leadership role once the legislation was passed. He helped form a consortium of archaeological and historic preservation organizations, local, state and federal agencies, Native American tribes, educational and research institutions, and private landowners to plan for and to protect the Galisteo sites. A smaller version of the consortium now serves as the Coordination Committee, which Paul chairs. The Committee has worked hard to develop and nurture partnerships with Native American tribes, property owners, and local and State jurisdictions, which in 2007 led to the State legislature allocating funds to the Committee to prepare site assessments and a multiple-property nomination to the National Register of Historic Places. With Paul at the helm and tracking all the nuances, the Committee currently is distributing the summary reports of the site assessments and completing the nomination; providing information and support to Santa Fe County planners in their efforts to develop an oil and gas ordinance for the Basin which is sensitive to the archaeological resources; providing information about the archaeological resources in the Basin to the Governor for his consideration as the State develops oil and gas development guidance; working with private landowners to protect sites on their property; identifying potential new acquisitions and site boundary changes necessary to include the full sites in the Act; and preparing to develop a general management plan for all the sites once federal funding is obtained.

While some of the larger projects that Paul is involved in capture the limelight, he has been involved in hundreds of smaller projects that, while not in the spotlight, are still important to the public and to sound management. These may range from prescribed burns to installation of cattle guards and fences to siting regional landfills—all of which require an archaeological inventory, consideration of the impacts to archaeological and cultural resources (for example, potential destruction of a site and access to special areas by Native Americans), and possibly formal tribal consultation. Heap the planning work on top of the petroglyph and site recording and working with schools, volunteers, and SiteWatch, and Paul is a pretty busy guy! Below are two short examples of the types of projects which command Paul's presence in a number of ways.

The first example is the Buckman Direct Diversion, a direct water diversion of the Rio Grande to accommodate burgeoning water needs in the Santa Fe area. The project was preliminarily proposed in 2000 and is just now being constructed. The project lies on public lands managed by BLM and the Santa Fe National Forest, as well as on private lands. It includes a diversion structure at the Rio Grande in the area of the old Buckman townsite northwest of Santa Fe, and about 13 mi. of multiple water lines and water treatment plants along the Buckman Road to the Caja del Rio area. This is a huge and very complex and challenging project, with issues around current and future water use, groundwater and surface water rights, endangered species, and potential quality of life changes. Paul was instrumental in working with the Forest Service to consult with the tribes about the project, to help identify infrastructure routes that minimized impacts to archaeological resources, and to develop a monitoring plan to protect archaeological resources that is being used as the project is being constructed and operated.

The second example is a smaller scale but challenging project, the North Central Solid Waste Authority (NCSWA) landfill proposal. In 2001, the NCSWA proposed that BLM authorize a regional landfill on public lands on the mesa just east of the community of Ojo Caliente. The community and the NCSWA were very
mistrustful of the government planning process, and the
tenor was pretty hostile at times. Paul’s direct, sincere
and honest communications style served him and BLM
very well and he was able to bridge many communica­
tions gaps with real information. He took a very active
role in the analysis of that proposal, working with com­
community members, tribal neighbors, and technical con­
sultants, as well as directly expressing his thoughts about
the potential impacts to archaeological resources. Paul
had been describing the importance of the area as part
of the Tewa homeland for some time, so there was a
heightened awareness about the archaeological values
there amongst the BLM staff and in the community.
Preparation of the analysis and documentation was very
challenging as there were potential negative impacts to
many resources as well as to the community, and in
2003, the NCSWA found a more cost-effective and less­
impacting solution and withdrew their proposal.

In sum, Paul has made and is making many significant
contributions to planning and management of our pub­
lic lands and resources. Those contributions center on
Paul’s personal and professional integrity, his passion for
and knowledge about the lands and resources he is en­
trusted with, his curiosity, and his great heart. I,
amongst others, am grateful for the opportunity to be
his friend and to work with him.

“One quickly learns that the best lectures
must be caught at Paul’s elbow as he moves
across an archaeological site narrating the
features, adding careful interpretations,
dropping references to the archaeological lit­
erature, telling folk stories and pointing out
the subtle beauty of the landscape. No one
is too young or too old, too foreign or too
modestly educated but that Paul will take
them under his wing to guide and coach.
Public archaeology as a patrimony of the
people is well and truly exemplified in Paul’s
professional life.”

Carmen Acosta Johnson, TAS

“Paul has been involved with rock art on the
mesa since before I came here. I met him in
the summer of 1992...I introduced myself and
the rest is history. He was the first person I met
here who had any expertise about rock
art. Paul hooked me up with the ASNM Rock
Art Field School run by Jay and Helen Crotty
who came with 30 volunteers and did the first
recording of the petros here. I frequently con­
sulted with Paul about one thing or another.
He was very helpful and encouraging in the
Vecinos del Rio fight with [another landowner]
about mining on the mesa where there are pet­
ros. Then he attended the first and I think all
subsequent meetings about the Mesa Prieta
Petroglyph Project and was instrumental in
helping us get it off the ground and was a full
partner in developing our Summer Youth In­
tern Program. Could not have done it with­
out him—and some of the great volunteers he
brought along!”

Katherine Wells, Española Valley—
working with Paul to record and preserve
petroglyphs on her property and Mesa Prieta
INTRODUCTION: SETTING THE SCENE

The 400th anniversary of Francisco Vázquez de Coronado's 1540–42 entrada into the American Southwest was nationally recognized by the release of a 3-cent commemorative postage stamp at the main Albuquerque, New Mexico post office on Saturday, September 7, 1940 (Figure 1). Other commemorative activities took place in all of the other states that had been touched by the Coronado expedition: Arizona, Colorado, Kansas, Oklahoma and Texas, but those in New Mexico may have been the most elaborate. There, the anniversary was celebrated with a dramatized historical pageant that traveled throughout 1940 to cities across the state and by the dedication on Wednesday, May 29, 1940, of Coronado State Monument upon the ruins of the southern Tiwa Pueblo of Kuaua (Figure 2) on the west bank of the Río Grande just north of Bernalillo (Stevens 1940).

The Spanish Ambassador to the United States, Juan F. de Cardenas, gave the keynote address at the dedication of Coronado State Monument. Pablo Abeita (1871–1940), "the Grand Old Man of Isleta Pueblo" (Figure 3) according to the Santa Fe New Mexican, a prominent official of that southern Tiwa Pueblo was...
among the notables invited to speak on that occasion (Ellis 1979:363; Guggino 1995:119). No verbatim record of his talk that day seems to have survived but vivid recollections by Pueblo people who were there were recorded years later, most notably by Jemez Pueblo historian Joe Sando, and they make it clear that Abeita thought it unseemly to honor Coronado at all (Sando ca. 1970-80). He was most especially offended by the gauche placement of a monument to Coronado upon the remains of an ancestral Tiwa pueblo where his soldiers had almost certainly committed atrocities.

I am afraid I will have to contradict some of the things you gentlemen have said. Coronado came by Isleta, and (as) you who have read his chronicles know, was given food and royally received. He came on up the valley, and what did he do? We had better say no more about it, for his record isn't good and you know it.

This paper examines issues raised that day by Abeita in an attempt to understand how and why the pueblo of Kuaua came to be transformed into a monument to the man whose arrival signaled impending disaster for the Pueblo world and, more immediately, was directly responsible for atrocities that were probably committed at Kuaua and had certainly occurred at neighboring Tiwa communities during the winter of 1540-1541.

**THE WINTER OF INFAMY**

The tragic events of the bitterly cold winter of 1540-1541 that were hinted at by Abeita began while Coronado was still encamped at Zuni with most of his army that included about 1300 to 1700 men counting Spanish cavalry and infantry and a large number of Mexican Indian allies. In early November of 1540 he sent an advance party commanded by one of his most reliable and experienced officers, García López de Cárdenas, to the Rio Grande valley to prepare a winter camp for the entire force among "the best villages" that had been observed earlier by Alvarado, another Coronado lieutenant (Dutton 1963:4). By late November, Cárdenas' detachment of about 15 cavalry and an unknown number of Mexican auxiliaries reached the cluster of villages located on both sides of the Rio Grande both north and south of present-day Bernalillo that the Spanish called "the Tiguex (Tiwa) Province."

There they solved their winter quarter problem by coercing the people of the southernmost of those pueblos, which Spanish chroniclers called *Confor* or *Alconfor*, to "temporarily" vacate their town on the
west bank of the Rio Grande (Bolton 1949:55, 193, 201; Flint and Flint 2003:174). Kuaua was tenuously identified by several scholars in the 1930s as Coofor, but there has never been definitive agreement about the location of that village and other candidates are no less credible. In any case, Coronado arrived at Coofer with his main force in late December and it remained the expeditionary headquarters until his small army returned to Mexico in the Spring of 1542 (Bolton 1949:197, 201; Dutton 1963:3-18; Hammond and Rey 1928:17, 322; Schroeder 1979:242).

Initially, Cádiz’s men traded for or paid for the food, clothing and other essentials that they acquired from local villages but, with Coronado’s knowledge and approval, they soon imposed forced levies upon neighboring pueblos. As a consequence, a cycle of intimidation, resistance, retaliation and atrocity was already well-established by the time the main force arrived (Kessell 1987:17-21). But even before then, Coronado had singled out for punitive destruction two pueblos that had resisted intimidation: Arenal, about “two leagues” upstream, and Moho (Mohi), also called Tiguex, “five leagues” further north (Bolton 1949:216).

Following orders, Cádiz had already razed Arenal before Coronado’s arrival and there his soldiers, apparently on orders from Coronado, had burned a number of Pueblo men at the stake after they had laid down their arms and surrendered. The village of Moho, perhaps inspired by that atrocity and others committed at Arenal, held out for several months longer, but a similar fate befell a number of men there who finally surrendered in February, 1541. As a consequence of all those actions, beginning in late December of 1540 and despite the bitterly cold weather, most nearby pueblos were abandoned and the Tiguex villages remained largely depopulated until after the Spanish returned to Mexico.

"EL TORO" IN THE 1930S

To better understand how and why Kuaua came to be the site of a monument to Coronado we leap forward to the early 1930s. By then, scholarly interest in the Coronado entrada was being stimulated and supported by a variety of institutional, political and economic forces that recognized potential benefits to be had from exploiting the up-coming 400th anniversary of the entrada. By coincidence, those interests intersected with the Great Depression of the 1930s, a world-wide economic catastrophe that had begun dramatically in the United States on October 24, 1929 with the spectacular collapse of the New York Stock Market. It did not end until after the United States had entered World War II 12 years later.

By 1933, when Franklin Delano Roosevelt had become president, unemployment levels in the United States were at 25 percent or higher and all sectors of the economy were still seriously impacted. Activities that were not directly perceived as economically productive were especially hard-hit, including academic studies such as history and archaeology, the pictorial and musical arts and museums and other cultural institutions. The managers of many of these activities and institutions found it increasingly difficult to maintain their facilities, programs and staffing levels without governmental economic support. Thanks to several economic stimulation programs created under the rubric of Roosevelt’s “New Deal” that support became available in a variety of forms to a broad spectrum of art and other intellectual and cultural activities. Very quickly governmental support along with its inevitable rules and bureaucratic oversight developed into a critically important institutional and artistic survival factor (Hoefer 2003).

Edgar Lee Hewett (1865–1946) (Figure 4), aptly nick-named “El Toro” by his staff and students, was one manager who was impacted by the depression because of the several institutions for which he was responsible. It is only somewhat hyperbolic to describe him as a small-scale, early twentieth century version of
Sam Wall, the late twentieth century entrepreneur of Wal-Mart fame. Unlike Wall, who specialized in developing gigantic retail outlets, Hewett was an educator and archaeologist who specialized in creating archaeological institutions, academic programs, museums and other related organizations. He began his lengthy career as a skillful, pragmatic and sometimes ruthless cultural entrepreneur modestly enough by serving from 1897 to 1903 as the founding President of New Mexico Normal School, now New Mexico Highlands University, in Las Vegas, New Mexico. He then spent time in Washington where he helped write and successfully lobby for passage of the 1906 Antiquities Act that, for the first time, gave legal protection to archaeological sites on Federal land. About that time also, he played a major role in gaining national monument status for archeological sites and districts including, in 1907, Montezuma Castle, the Gila Cliff Dwellings and Chaco Canyon. A decade later, after many delays, he succeeded in having Frijoles Canyon protected as Bandelier National Monument in honor of Adolph Bandelier.

Hewett created a permanent base for himself in Santa Fe in 1907 by convincing the Archeological Institute of America (AIA) to establish The School of American Archaeology (SAA) there and name him as its director. SAA became independent of AIA in 1917 when it was renamed “The School of American Research” (SAR). In 1909, SAA’s need for a permanent repository for the archaeological materials that it had excavated and Hewett’s desire to control a venue for educating the public about archaeology were simultaneously satisfied when he convinced the Territorial legislature to establish the Museum of New Mexico (MNM) in Santa Fe. MNM became the state museum after statehood was gained in 1912 and its founding legislation, which Hewett had written, specified that the director of SAA, a private institution, would be director of the publicly owned MNM. Hewett held both positions concurrently and continually from 1909 until his death 37 years later and it was not until 1959 that the New Mexico Supreme Court ended what had been an obviously unconstitutional managerial arrangement.

In 1911, Hewett agreed to organize anthropology exhibits for the 1915 San Diego Panama-California Exhibition that was then being developed to celebrate the opening of the Panama Canal. When the Exhibition ended, its anthropology building became the San Diego Museum of Man with Hewett as its director, a position he held until 1928. While commuting regularly between Santa Fe and southern California, Hewett found time to create an anthropology department for San Diego State Teachers College which became California State University at San Diego. Then, in 1928, while also
establishing an anthropology department for the University of New Mexico (UNM) in Albuquerque, he organized yet another department of anthropology at the University of Southern California in Los Angeles where he was appointed as an unpaid professor. At UNM, he served as chairman of the anthropology department for several years and as a faculty member until 1938 (Bock 1989; Chauvenet 1983).

Throughout his career, Hewett harnessed his two Santa Fe institutions to support archaeological field work in northern and north-central New Mexico, most persistently at Chaco Canyon and on the Pajarito Plateau. Ignoring the fact that MNM and SAR were legally and organically separate organizations he treated them as though they were units of a single entity and seems also to have treated—or tried to treat—the UNM anthropology department as another unit of that same de facto “entity.” However, the integration of field research, field collecting, laboratory analyses and publication activities of all three institutions was never more than a mixed success that ultimately resulted in considerable managerial confusion.

In 1931 Hewett persuaded the state legislature to establish a state monument system and to have it administered by his Museum of New Mexico; Coronado State Monument was created four years later. Hewett was less successful at first in persuading the Governor and legislature to create a commission to plan and develop state-wide celebrations during 1940 of the 400th anniversary of the Coronado entrada (Zimmerman ca. 1944, Box 1). Their refusal to act may have been a response to concerns they had about shrinking budgets in those early Depression years. Perhaps because of those concerns, Hewett soon framed the proposed celebration, and most especially the entrada, pageants, in terms of their hypothetical potentials for generating large-scale economic and patriotic benefits.

Even though Hewett’s projections about the benefits to be had from those events were never more than rhetorical statements of faith, they were elaborated upon with extraordinary optimism and no evidence by the Coronado Cuarto-Centennial Commission when it was finally established by the Legislature in 1935. The Commission, including a number of of Anglo and Hispanic academics, projected the costs of the pageant program at $200,000 and naively predicted that it would “pay for itself” (Zimmerman ca. 1944: Minutes 1935; 1936; “Suggestions for Coronado Celebration” 2/24/36; Analysis of Suggestions, 1/15/38; Coronado Cuarto-Centennial Commission ca. 1938). In the event, the Cuarto-Centennial programs, including the pageants, were economically disappointing and politically ineffective (Pan. 1995). The Commission seems never to have had a Native American member and, except for Abeita’s presence at the Coronado Monument dedication and a newspaper report “that all Indian tribes” would be represented on that occasion, there are no indications of any consultations about the Cuatro-Centennial between any Native American and either Hewett or the Commission (Albuquerque Journal, 27 May 1940).

Hewett was an advisor to the Commission in its early years and it quickly adopted his traveling “semi-historical pageants” as the centerpiece of the 1940 Coronado celebrations; the dedication of Coronado Monument during the centennial year appears to have been an afterthought. In any case, during 1935 and 1936, with its major decisions having been made for it and with little or no funding available, the Commission seems to have spent much of its time bloviating about the potential political and economic benefits of the pageants. It made pie-in-the-sky forecasts that pageant earnings would somehow result in “full employment” in New Mexico and predicted that the year-long celebrations would promote “a new American national psychology” based upon the belief that the “foundations of America’s intra-montane empire” had been laid by Coronado’s “…real discovery of North America.” Though it was never put so bluntly, that expectation implied faith in the assumption that the rest of the United States would blandly re-write the national history to have it begin in the Hispanic Southwest rather than at Plymouth.
Rock (Zimmerman ca. 1944, “Suggestions for Coronado Celebration” 2/24/36 and Analysis of Suggestions 1/15/38). Eventually the Commission may have realized—and it certainly accepted—that its true role was to raise money from State and national legislatures to develop Hewett’s programs (Zimmerman ca. 1944, Annual Report for 1937).

Well before 1935, Hewett, as much Lone Wolf as Raging Bull, organized a search for an appropriate location on which to establish a permanent memorial to Coronado. His preference was for the ruins of a sixteenth or seventeenth century Tiguex pueblo that Coronado may have visited and, although archaeological work at Chaco Canyon continued, he re-focused the activities of his Albuquerque-based UNM archaeological program to the investigation of protohistoric pueblo sites that were located north and south of Albuquerque, the State’s largest metropolitan area. His primary targets were places that were conveniently near paved roads that might be related either to the Coronado entrada or to the first decades of Spanish colonization or both.

In early 1934, UNM graduate and undergraduate students began testing two Tiguex pueblos near Bernalillo just north of Albuquerque that met most criteria: Puaray and Kuaua.6 Extensive excavations were completed at Puaray within a few months and, not long afterward, on June 26, 1934, full-scale excavations began at Kuaua (Evergreen), so-named by the people of nearby Sandia Pueblo (Dutton 1963:19-23; Tichy 1936:63-66). The ruins of that large, adobe-walled pueblo were among the best-preserved and most accessible of the Tiguex communities that had almost certainly been seen by the Coronado expedition. And, while Kuaua has never been definitively identified with Coofer—or any other place named by Coronado’s chroniclers—it has never been definitively eliminated as any of them either. In any case, for the next five years, excavations and extensive reconstruction work took place there as a joint UNM, MNM, and SAR project under Hewett’s general direction.

On February 12, 1935, in one of those rare bits of luck that can make the most mundane of archaeological ruins important, the best preserved pueblo mural paintings that had ever been excavated until then were discovered in Kiva III at Kuaua by the field supervisor, graduate student Gordon Vivian (Vivian 1935:113-119). From then on, Kuaua was the chosen place and every effort was made to not only preserve the paintings (Figure 5) but to develop the site as both an outdoor and conventional museum exhibit with re-built walls, a full-scale replica of the painted kiva and a museum building.

Early in 1935, not long after the discovery of the murals, Kuaua and Puaray were jointly named “Coronado State Monument” which was one of the five original New Mexico State Monuments (El Palacio 1935:69-74). Hewett was usually meticulous in citing scholarly concerns about identifying Kuaua with Coofer, Coronado’s winter camp and headquarters, but by permanently identifying Kuaua with Coronado he created a special relationship that implied identity of Kuaua with Coronado’s headquarters (Hewett 1940:172-181). As a footnote that underlines Hewett’s ambitions for the Coronado year, seven of the first eight State Monuments were proto-historic pueblo communities of which six, excepting only those of Coronado Monument, are more-or-less remote pueblo ruins. All but one of those places (Paako) have massive remains of Franciscan Mission “fortress” churches: Guisewa (Jemez State Monument), and four that have since been incorporated into National Monuments—Pecos, Gran Quivera, Quarai and Abó (Kubler 1940:29-30).

Although Coronado State Monument pre-dated the Commission it is not mentioned by it until its second annual report in 1936. In that document, the Commission budgeted $125,000 for landscaping, and construction of a stone “memorial shaft” and a museum at Coronado State Monument (Zimmerman ca. 1944 Box 1 Minutes; Annual Reports 1935, 1936 Coronado Cuarto-Centennial Commission). No allocation was made for Hewett’s dream of a large statue of Coronado...
and, in the end, neither that nor the memorial shaft were ever funded. In 1939, Congress allocated $200,000 to the Cuatro-Centennial Commission to develop its 1940 programs and at that point the Commission scheduled the dedication of Coronado State Monument for the late Spring of 1940 (Zimmerman ca. 1944: “History of the Coronado Celebrations” 1940).

The preservation and exhibition of the mural paintings combined with transformation of the place where they were found into a public museum that had nothing to do with those murals and everything to do with European colonization of the Southwest, proved to be an unbeatable fund-raising combination. The development of Kuaua as Coronado State Monument was paid for primarily by New Deal agencies including the Federal Emergency Relief Administration (FERA), the Works Progress Administration (WPA) and the National Youth Administration (NYA) (Matero n.d.). Additional funding came from other federal sources including a Congressional allocation to the Cuatro-Centennial Commission, SAR, and a private donor. Archaeological investigations there were soon reduced in favor of reconstructing portions of the site, recreating Kiva III, and creating a museum and visitor center (Edgar Lee Hewett Papers: “Summary Report”, Ely to Hewett, 1/7/38; Dutton 1963:33-34). And, until Pablo Abeita raised the issue, questions about the propriety of placing a monument to Coronado upon the remains of a Tiguex community seem never to have been asked.

The Memorial Plaque for Edgar Lee Hewett at the Museum of New Mexico describe him as a “...wise counselor and true friend of the Indian...” It is true that he consulted with Pueblo people about his archaeological work and treated his consultants honorably and with discretion. It is also true that he knew from decades of experience when consultation with Native peoples was appropriate and when it was requisite so that it is difficult to avoid the conclusion that Hewett's ambition to develop—without interference from any source—his vision of an appropriate monument to Coronado caused him to ignore that knowledge. The exclusion of Pueblo people from having any role in the development of Coronado State Monument may or may not have been deliberate, but it effectively guaranteed that Hewett's vision was not to be modified. Coronado is memorialized upon the remains of a Tiquex village.
As it happened and living up to his nickname, Hewett was the irresistible force that activated the Cuatro-Centennial Commission and the Commission became the rubber stamp that certified his vision. Its adoption of his program with little debate and no recorded dissent demonstrates that they were blind to, or blinded themselves to, the possibility that Coronado’s entrada was a memorably negative event for pueblo peoples. Hewett knew what he was doing but it is not clear that the Commission did. Ignorance is led while arrogance leads.

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END NOTES

1. chutzpah, n. effrontery. (Yiddish).

2. The Spanish “league” may be thought of as the distance a walking horse will travel in an hour. In this context it is probably about four miles.

3. In 2007 SAR went through another name change and is now “The School for Advanced Research”.

4. The Commission liked the sound of the word “cuarto” and after some discussion of the fact that it translated as “1/4” rather than “fourth” it chose to continue using it (Zimmerman ca. 1944, Coronado Cuarto-Centennial Commission, Correspondence, 1936).

5. The Commission was presided over by UNM President James F. Zimmerman. Other officers included Erna Ferguson, Vice President and Gilberto Espinosa, Secretary. Other members included B. C. Hernandez, Riley M. Edwards, Charles M. Martin, Ruth Laughlin Alexander and Orville Ricketts. Edgar Lee Hewett was an advisor and Herbert O. Bayer was the paid director.

6. Among UNM graduate and undergraduate students who played significant roles at Kuaua during the 1930s and later became professional archaeologists and/or museum professionals were Wesley Bliss, Bertha Dutton, Albert Ely, Wesley Hurt, Robert Lister, Gordon Page, Marjorie Ferguson Tichy (Lambert), and Gordon Vivian.
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MAPPING TIJERAS PUEBLO, A WORK IN PROGRESS

INTRODUCTION

Tijeras Pueblo (LA 581) is a fourteenth century Ancestral Pueblo site on the grounds of the Sandia Ranger Station, Cibola National Forest, New Mexico (Figure 1). Archaeological work at Tijeras Pueblo began in the 1930s. The site was the subject of intensive study in the 1970s as a summer field school project of the Department of Anthropology at the University of New Mexico (UNM) (Cordell 1975, 1977a, 1977b, 1980, 1989; Judge 1974).

Tijeras Pueblo was entered in the National Register of Historic Places on November 17, 2005. A self-guided interpretive trail through the site and a new interpretive center are available for visitors. Public education events, including workshops, lectures, and a “Junior Archaeologist” program, are sponsored by the Sandia Ranger District in partnership with the Friends of Tijeras Pueblo, an organization of dedicated volunteers. A model of the site, reconstructed as it looked near the end of its occupation history serves to orient visitors. The model and published renderings of the site (Figure 2) show a narrow U-shaped structure open to the east. The U-shaped structure generally referred to as the “main mound,” masks earlier underlying buildings. A series of smaller room blocks and other structures are partially visible north and east of the main mound, and while these are pictured on signs on the interpretive trail, the relationship between these structures and the main mound is not clear to visitors.

Figure 1.
Map of the Middle Rio Grande region with Tijeras and other locations mentioned in the text.
In fact there are no accurate maps of Tijeras Pueblo that show the configuration of its room blocks, plazas and other structures at any time in the pueblo's history. Two published maps, purportedly of “early” and “late” structures at Tijeras Pueblo (Cordell 1980:Figures 7, 8) are seriously flawed. The caption for one map directs the reader to “note the large circular kiva,” which is not on the map. One goal of our work is to produce accurate maps of Tijeras Pueblo that can be used to show visitors changes in the configuration of the village over time. We also want to develop maps of the site that can be used to address questions about different patterns of community formation in the Rio Grande region during the fourteenth and fifteenth centuries. This paper presents our mapping efforts to date along with our intentions for continuing work. Here, we briefly outline the cultural context within which Tijeras Pueblo was established and provide a short history of excavation research at the site. We then outline the conceptual tools we are using to generate maps of Tijeras Pueblo over time and provide glimpses of the maps and their associated data so far. These are works in progress.

CULTURAL BACKGROUND AND QUERIES

In the fourteenth and fifteenth centuries, the American Southwest witnessed dramatic social and demographic changes dominated by population movement and the formation of aggregated communities many of which are ancestral to today’s Pueblo Indian villages (Adams and Duff 2004). In New Mexico, Ancestral Pueblo communities expanded eastward to Pecos Pueblo and Gran Quivira. North of Tijeras Canyon, the Galisteo Basin emerged as a major population center between the Albuquerque Basin and Pecos (Graves 2004; Snead, Creamer and Van Zandt 2004).

Recent archaeological research focuses on comprehending the social dynamics entailed in community formation and on how new social identities were forged during this period of intense demographic change (Adams and Duff 2004; Spielmann 1998a, 1998b, 2004). Tijeras Pueblo is one site that can yield information on local and regional social dynamics at this time. Spielmann (1996) points out that there were two periods of aggregation over much of the Rio Grande after about 1250. The first, in the 1300s, accommodated immigration and indigenous population growth culminating in relatively small (ca. 50 to 200 rooms) pueblos, many of which were deserted in the first half of the 1400s. The second period, beginning in the early 1400s, saw consolidation of population in much larger villages consisting of as many as 30 multistoried room blocks. Many of these settlements were occupied through the Spanish entradas (Graves 2004; Spielmann 1996). By occupation date (ca. 1300 to 1425) and size (ca. 200 rooms), Tijeras Pueblo fits in the first period of aggregation.

Tijeras Pueblo is near the Albuquerque Basin, the Salinas district, and the Galisteo Basin, yet its patterns in architecture, pottery traditions, mortuary practices, and other characteristics differ from contemporary sites in these neighboring areas. Unlike its neighbors in the northern Salinas district, and Paa-ko, its neighbor at
the edge of the Galisteo Basin, potters at Tijeras Pueblo made both Rio Grande White Ware and Rio Grande Glaze Ware pottery (Eckert and Cordell 2004; Graves 2004). Unlike early aggregated sites in the Salinas district, early room blocks at Tijeras Pueblo are not organized around a central plaza. Tijeras Pueblo lacks cremations known from the Salinas district Jumanos Pueblos (Graves 2004). However, skeletal remains from Tijeras Pueblo manifest two forms of cranial deformation, as is documented from Gran Quivira (Reed 1981; Williams 2005:66). Also, Tijeras Pueblo, like Kuaua in the Albuquerque Basin, had both a square kiva and a circular kiva that were built and seem to have been in use at the same time (Bertram and Cordell 1975; Eckert and Cordell 2004).

Tijeras Pueblo has not been claimed as an ancestral site by any modern Pueblo Indian Tribe. At this point, we would not characterize the population of Tijeras Pueblo as necessarily representing a single ethnic or language group or descendants of one pre-existing settlement. We hope that accurate maps of the site along with tree-ring dates of building episodes and distributions of artifacts will begin to help us sort out how the people of Tijeras Pueblo came together and related to others in neighboring and more distant communities.

HISTORY OF EXCAVATION

Tijeras Pueblo was visited in the early 1930s by H. P. Mera and W. S. Stallings. Mera made a sketch map of the site (reproduced in Judge 1974), and Stallings collected tree-ring samples that yielded 27 dates (Judge 1974). At that time, LA 581 was called the Cedro Cañon site. The record (no. 1297) at the Laboratory of Anthropology, Museum of New Mexico (MNM) notes “one large house group with smaller mounds scattered for several hundred feet to the north and west. Pottery types similar at all the mounds.”

In 1948, the UNM Field Session worked at two sites in Tijeras Canyon, LA 581 (Tijeras Pueblo), and LA 586 (Vulture Gulch). Stanley Stubbs supervised work at Tijeras Pueblo. A report on Vulture Gulch was written by Fred Wendorf and is on file at MNM. Stubbs did not file a report but student notebooks are held at the Maxwell Museum at UNM. Collections resulting from the 1948 work at LA 581 and LA 586 are curated at MNM. Students working at Tijeras Pueblo excavated 22 rooms and one pithouse in the main mound and four trenches north and east of the main mound. No maps of this work have been located (Judge 1974).

In 1968, Stuart Peckham conducted salvage excavation of a small room block (14.5 rooms) east of the main mound prior to construction of a Forest Service warehouse. Peckham’s map is on file at MNM. At this writing, there is no final report of this work. W. James Judge (1974) cites Peckham as stating that the predominant ceramics at the site were “Glaze A Red and Galisteo Black-on-white,” and no stratigraphic separation between them could be determined. Also in 1968, a burial was excavated that was eroding out of the site. The skeleton was taken to the Osteology Laboratory at UNM. In 1969, David Snow, then of MNM, trenched an area south of the main mound in anticipation of the Forest Service putting in a road. The road was re-routed. Notes are on file at MNM.

From 1971 through 1973, the UNM Summer Field School in Archaeology excavated at Tijeras Pueblo under Judge’s direction (Judge 1974). Field school excavations continued under Linda Cordell’s direction through 1976. Reports of this work were published by the Forest Service (Cordell 1975, 1977a, 1977b; Judge 1974) filed at the MNM and at UNM. Collections and associated documents are at the Maxwell Museum. A total of 461 tree-ring dates have been obtained from the site, and tree-ring samples are at the Laboratory of Tree-Ring Research at the University of Arizona. Papers, theses, book chapters, journal articles and books were produced based on UNM excavations at Tijeras Pueblo (e.g., Cordell 1980, 1989; Devor and Cordell 1981; Eckert and Cordell 2004; Habicht-Mauche and Ginn 2004; Williams 2005).

In 1979, the Office of Contract Archaeology, UNM excavated two test pits south of the main mound at
Tijeras Pueblo prior to installation of support towers for Public Service Company of New Mexico (Amaro 1979). In 1986, preceding construction of two houses on private land north the main mound at Tijeras Pueblo, the Archaeological Society of New Mexico (ASMN) excavated two room blocks. AS-10A consisted of an L-shaped room block of perhaps 20 rooms. AS-10B was somewhat larger and T-shaped. A report (Sundt and Bice 1989) and map are on file at MNM, and the artifacts are at the Maxwell Museum.

THE CURRENT PROJECTS

The Map

Current work is focused on satisfying the needs of the general public and researchers. There is an obvious need for accurate, comprehensive maps for visitors to the site. Researchers also need such maps and the ability to link information about the site (tree-ring dates, distributions of ceramic types, etc.) to such maps. Two unrelated but complementary research projects underlie the direction we have taken to satisfy these needs. First, Mark Mitchell became interested in understanding varying social dynamics that can underlie differences in the physical layout and construction history of architectural spaces. Using data from two pairs of sites, Betatakin and Kiet Siel in the Kayenta region (Dean 1969) and Tijeras Pueblo and Arroyo Hondo Pueblo (Creamer 1993) in the Rio Grande, Mitchell identified two contrasting leadership strategies and explored their significance for Puebloan history. He wished to take this further for Tijeras Pueblo because of the large number of tree-ring dates available for the site, but there were no maps linking the tree-ring dates and architecture. Second, reanalysis of the pottery from Tijeras Pueblo became important because of resurgent interest in using Rio Grande Glaze Ware as a tool for understanding fourteenth century Ancestral Pueblo demographic and social dynamics (Habicht-Mauche et al. 2006; Eckert 2008), which in turn was fueled by advances in analytical techniques (Habicht-Mauche et al. 2000). Tijeras Pueblo is among the Albuquerque area sites that produced early Rio Grande Glaze Ware. There are many tree-ring dated contexts for this pottery from the site, and the distinctive mica schist temper used by potters at Tijeras Pueblo could allow tracing the extent of trade of this pottery.

The public and research needs encouraged us to produce a geographic information system-based (GIS) map of Tijeras Pueblo rather than simply create an electronic representation of the site with a vector graphics application. The most important advantage of GIS is the ability to link various types of archaeological data, such as tree-ring dates, to defined spaces, such as rooms or structures. GIS maps can be tailored for public interest or for researchers, and the database can be designed and manipulated to address specific archaeological research issues.

Creating the GIS map (Figure 3) was initiated by Cordell and Mitchell in Boulder in 2005, and is being completed by Glenda Deyloff in Santa Fe. To translate the existing paper maps of the site into a GIS, Cordell and Mitchell used excavation field notes and other data to refine wall placements and alignments and to assign particular walls and rooms to one of three occupations, with the understanding that these could be adjusted as more data, such as tree-ring dates, are added. These three components are defined very conservatively based on published interpretations (Cordell 1977a; Judge 1974). The early occupation, shown in Figure 4, consists of those rooms and only those rooms that were built on sterile ground or bedrock, as determined from the excavation notes. The map of early component rooms does not therefore include unexcavated (though potentially early) rooms. We suspect that the early component is under-represented on the map. Similarly, the late component (Figure 6) consists only of rooms that had been visible on the surface to Judge (1974) and were known through excavation to be superimposed on (although often off-set from) lower walls. Judge (1974) referred to the late occupation as a “veenier,” because it consisted of partial masonry walls and some exposed hearths suggesting ephemeral use of the site. We follow this interpretation and suggest that the late component is also under-represented on the map.
In contrast to early and late occupations, the middle component is probably over-represented on the map (Figure 5). Most of the rooms excavated by the field schools were assigned to the middle component, in part because sub-floor tests were not made in all these rooms. A chronology for the site is suggested based on tree-ring dates but must be taken with caution until all dates and architectural associations are evaluated. With this proviso, the early occupation dates to ca. 1315–1340, the middle occupation from 1341–1400, and the late component from ca. 1401–1425.

After all of the excavated walls and rooms had been assigned to one of these components, the annotated paper maps were scanned and the wall outlines were digitized using a “heads-up” digitization process. Three shape files, corresponding to each of the three defined occupations, were created in ESRI’s ArcGIS application. This was done by Michael Hinke, a lecturer and professional research
attaching data files to the map and being able to examine the ceramics and other materials excavated from Tijeras Pueblo necessitate being able to access the artifacts and their associated documentation including, most important, their provenience information, but the electronic database of accessions to the Maxwell Museum had been corrupted and in any case did not record provenience information. The rich archaeological data of collections and documentation were essentially lost. With encouragement from David A. Phillips of the Maxwell Museum, volunteers from the Friends of Tijeras Pueblo undertook the Tijeras Archiving Project in fall 2006.1 The project has re-housed the Tijeras Pueblo collections in plastic containers, reshelved the collections at the Maxwell Museum and created a new electronic database for the col-

The Data

Assistant in the College of Architecture and Planning at the University of Colorado. Hinke and Mitchell worked together to match walls and rooms spanning more than one map and to ensure that each wall polygon was correctly digitized and assigned to the proper coverage. Mitchell, Hinke, and Cordell met periodically to review the developing map and make adjustments and corrections.

The final steps, being carried out by Deyloff, involve georeferencing the site map, and adding data files. Global positioning system (GPS) data were collected for several mapped locations and matched to other coverage, including topography. Tabular data are being added to the room polygons. These include room number and some ceramic data, tree-ring dates and excavation level. Figure 7 shows the data currently associated with the first excavated floor of Room 96. For now, only a few rooms contain data in the tree-ring and ceramic fields. In the future we will add links to associated photographs and illustrations for each of the rooms.
collections that includes provenience information. The catalogue system Judge implemented for Tijeras Pueblo retains provenience information, in coded form, for each artifact, sample, and bulk artifacts (bag of sherds). These data have been incorporated in the new database, along with the shelf location of containers. The new database already has been put to use for research.

Judith Habicht-Mauche conducted preliminary analysis of some Tijeras glaze pottery and has begun a full study of all the ceramics from the site. In winter 2007/2008, Snow and Cordell examined decorated pottery from 40 tree-ring dated room floor or roof contexts at Tijeras Pueblo. These data were shared at a workshop at the Santa Fe Institute in January 2008 that explored using quantitative biostratigraphic techniques (Sadler 2003) for archaeological seriation. Some of those data are included here (Table 1), and can be used to refine the maps as well as our understanding of social dynamics at Tijeras Pueblo. For example, Table 1 compares data from five rooms shown in Figure 7. Rooms 96, 55 and 64 are attributed to the middle occupation (ca. 1341–1400). Rooms 108 and 128 are displayed as early occupation structures (ca. 1315–1340). The tree-ring dates in Table 1 support the component designations that were based on our interpretation of the paper maps and field notes and incorporated into the GIS map. The ceramic data in Table 1 support previous observations that both Rio Grande White Ware and Rio Grande Glaze Ware co-occur on the site. However, Table 1 also reveals far more non-local glaze ware than previously reported. Interestingly, the non-local glaze ware is more common in the early component rooms than in the middle component rooms. Further, non-local glaze ware apparently derives from southern (Los Padillas Glaze-polychrome) or western (St. Johns Glaze-polychrome, Heshotauthla Glaze-polychrome) sources. These suggested source areas are also locations where fourteenth century glaze ware may have originated, which in turn should shed some light on the transfer of this tech-
nology into the Rio Grande region (Habicht-Mauche and Huntley 2007). There are obvious cautions to be raised here. The sample sizes for Rooms 96 and 55 are very small, as only floor contact sherds are included. Also, both Room 64 and 108 are kivas and therefore likely represent non-domestic contexts of deposition. Finally, no whole vessels are included in the counts, nor did we include what to date may be our most interesting example of “technology transfer” (Figure 8).2

**CONCLUDING CAVEATS AND PROMISE**

The overall site map (Figure 3) is a work in progress. Use the utmost caution in using this map. It does not yet include all excavation units (grids, test trenches, or test pits). It does not yet include Peckham’s 1968 excavations of rooms under the Forest Service warehouse. It does not include AS-10A or AS-10B. There are more than 400 tree-ring dates to be added, and the pottery analysis by Habicht-Mauche has just begun. We intend to attach photo records and ceramic analyses as these become available. The Forest Service will maintain the final map with digital copies available at the Maxwell Museum, the Tijeras Pueblo Interpretive Center, and the MNM. We hope that as the map develops, it will be used by site visitors and researchers. We hope you will add the results of your research to the map and to an accumulating body of information about Tijeras Pueblo and its historic context.

**Table 1.**
Provenience, Tree-ring, and Pottery Type Data Associated with Five Rooms at Tijeras Pueblo. Data are incomplete but support and amplify information in Figure 7.

<table>
<thead>
<tr>
<th>Room</th>
<th>Room 96</th>
<th>Room 55</th>
<th>Room 64 (kiva)</th>
<th>Room 108 (kiva)</th>
<th>Room 128</th>
<th>Totals n/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>Floor</td>
<td>Roof/Fall &amp; Floor</td>
<td>Floor</td>
<td>Floor</td>
<td>Below Floor</td>
<td>Floor</td>
</tr>
<tr>
<td>Best Tree-ring Date or Cluster</td>
<td>1341 vv (#1)</td>
<td>1352 vv (#2)</td>
<td>1387 vv (#4)</td>
<td>1294 vv (#2)</td>
<td>1287 vv (#3)</td>
<td>58 (11%)</td>
</tr>
<tr>
<td>Occupation</td>
<td>middle</td>
<td>middle</td>
<td>middle</td>
<td>early</td>
<td>early</td>
<td>58 (11%)</td>
</tr>
<tr>
<td>Los Lunas Smudged</td>
<td>1 (4%)</td>
<td>----</td>
<td>1 (1%)</td>
<td>33 (22%)</td>
<td>3 (3%)</td>
<td>58 (11%)</td>
</tr>
<tr>
<td>Santa Fe B/W*</td>
<td>2 (7%)</td>
<td>2 (22%)</td>
<td>20 (18%)</td>
<td>94 (39%)</td>
<td>20 (19%)</td>
<td>138 (26%)</td>
</tr>
<tr>
<td>Wiyoo B/W</td>
<td>----</td>
<td>----</td>
<td>38 (16%)</td>
<td>25 (24%)</td>
<td>63 (11%)</td>
<td></td>
</tr>
<tr>
<td>Galisteo B/W</td>
<td>1 (4%)</td>
<td>2 (22%)</td>
<td>48 (42%)</td>
<td>4 (1%)</td>
<td>27 (26%)</td>
<td>82 (13%)</td>
</tr>
<tr>
<td>Chupadero B/W</td>
<td>----</td>
<td>----</td>
<td>18 (8%)</td>
<td>5 (4%)</td>
<td>23 (4%)</td>
<td></td>
</tr>
<tr>
<td>Heshotaultha G/P**</td>
<td>3 (11%)</td>
<td>2 (22%)</td>
<td>9 (7%)</td>
<td>21 (9%)</td>
<td>12 (11%)</td>
<td>129 (24%)</td>
</tr>
<tr>
<td>Los Padillas G/P</td>
<td>----</td>
<td>1 (11%)</td>
<td>2 (2%)</td>
<td>1 (1%)</td>
<td>----</td>
<td>4 (-5%)</td>
</tr>
<tr>
<td>St. Johns Polychrome</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>3 (1%)</td>
<td>----</td>
<td>3 (-5%)</td>
</tr>
<tr>
<td>Glaze A Red (Agua Fria)</td>
<td>20 (70%)</td>
<td>2 (22%)</td>
<td>31 (27%)</td>
<td>5 (2%)</td>
<td>11 (10%)</td>
<td>69 (11%)</td>
</tr>
<tr>
<td>San Clemente G/P</td>
<td>----</td>
<td>----</td>
<td>2 (2%)</td>
<td>----</td>
<td>----</td>
<td>2 (-5%)</td>
</tr>
<tr>
<td>Total</td>
<td>27 (100%)</td>
<td>9 (99%)</td>
<td>113 (9%)</td>
<td>239 (100%)</td>
<td>105 (99%)</td>
<td>513 (100%)</td>
</tr>
</tbody>
</table>

* B/W=Black-on-white ** G/P=Glaze-polychrome

Figure 8.
Kwakina Glaze-polychrome (or local copy) sherd, from midden at Tijeras Pueblo, with split design elements (Agua Fria/Kwakina), and with ground malachite and yellow ochre on the interior. (Maxwell Museum cat. no. 78.67.399). Photo by Paul Kinslow.
END NOTES

1. We are indebted to the Tijeras Project Archiving Crew: Karen Armstrong, Tim Brown, Sonya Dobberfuhl, Lionel and Sandy Hutkoff, Roger Houghton, Jeanice Jansen, Jacqueline Johnson, Candace Lord, Patty McCourt, Libby Raddiffe, Luther Rivera, Lou Schuyler, Judy Vredenberg, Nancy Woodworth, Connie Wuelde, Ann Yeck, and Diann Zentner. Lou Schuyler created the new database, and Karen Armstrong choreographed re-boxing and data entry.

2. We thank Paul Kinslow of Scottsdale, AZ for photographing the large sherd in Figure 8 (Maxwell Museum cat. no. 78.67.399).

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INTRODUCTION

The Lemitar Shelter site (LA18139) is located in San Lorenzo Canyon, Socorro County, New Mexico along the southern boundary of the Sevilleta National Wildlife Refuge (Figure 1). Prior to the work reported in this paper, the cross-dating of temporally diagnostic artifacts from the site had suggested that the upper levels of Lemitar Shelter were occupied during the late Archaic period (1800 B.C.-A.D. 200), the Basketmaker III-Pueblo I period (A.D. 300-900), and the Pueblo III period (A.D. 1100-1300). The lower levels of the site had not been systematically investigated.

This paper focuses on recent findings at Lemitar Shelter and presents arguments about the potential of the site to contain cultural deposits from the Paleoindian period. Initially, I present a background for Paleoindian research in the region and a suite of reasons why Lemitar Shelter might be relevant to that research. This is followed by a description of the Lemitar Shelter site, a discussion of both historic and recent archaeological investigations at the site, and a summary of recent data from the site that underscores the potential for Lemitar Shelter to contain significant Paleoindian remains.

Figure 1.
Location of Lemitar Shelter.
the typical Paleoindian remains found throughout the region, many researchers have characterized this period as one dominated by big-game hunting. Stratified Paleoindian sites are not common and, for the most part, Paleoindian materials occur as surface finds. Few rockshelters or caves with Paleoindian occupations are known in the region.

From a geographical perspective, typical Paleoindian site contexts in west-central New Mexico and the surrounding region include deflated and eroded portions of sand dunes (Hurt and McKnight 1949), as well as the open plains, the foothills of mountainous areas, topographic features near marshes and ponds (Berman 1979), and in caves or rock shelters. The Mockingbird Gap site is found in a dune setting near Chupadero Wash, east of Socorro (Elyea and Doleman 2000; Weber and Agogino 1968), and the Ake site rests in a sandy setting in the Plains of San Augustin (Beckett 1980; Holliday et al. 2006). Paleoindian artifacts have been identified at the Boca Negra Wash site (Huckell 2002; Huckell et al. 2003) and the Rio Rancho site (Dawson and Judge 1969), which are located in open areas west of Albuquerque. Finally, Sandia Cave (Haynes and Agogino 1986) north of Albuquerque, and possibly Bat Cave (Dick 1965), in Catron County, may both have been occupied during the Paleoindian period.

A benchmark comprehensive study of Folsom-related materials in the region, completed by James Judge (1973) in the central Rio Grande Valley, documented 15 Folsom sites and 14 Folsom localities. More recently, isolated late Paleoindian points have been reported in the Socorro and Magdalena Mountains (Gossett and Gossett 1990:82; Dello-Russo 2001b; Walker and Dello-Russo 2005), and a Folsom point base, made of Edwards Plateau chert, has been documented just south of the Socorro Mountains (Dello-Russo 1997, 2001b; LeTourneau and Weber 2004a). A Scottsbluff point base has been reported just west of the Socorro Mountains (Dello-Russo 2001a) and Clovis use of the Black Canyon quarry in the Chupadera Mountains has been inferred through trace element studies using XRF (Dello-Russo 2004). While scientific studies of Folsom diet breadth and land use (Amick 1994), Folsom tool stone procurement (LeTourneau 2000), the geomorphological setting of Folsom sites (Huckell 2002; Huckell et al. 2003) and the geoarchaeology of Folsom deposits in cave settings (Haynes and Agogino 1986) have been completed within the broader region surrounding Lemitar Shelter, only a few sites or finds in the region have been radiocarbon dated (Table 1).

Data compiled from the New Mexico Archeological Records Management System (ARMS) indicate that, as of 2004, 1153 Paleoindian sites have been documented in New Mexico. Twenty-one of those have multiple Paleoindian components. Among all the Paleoindian-Era Radiocarbon Dates from Sites in New Mexico.

**Table 1.**

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>NM County</th>
<th>14C Date (Years BP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 39937</td>
<td>Sandia Cave</td>
<td>Bernalillo</td>
<td>13,700±400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13,450±150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12,920±400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11,880±280</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11,850±1000</td>
</tr>
<tr>
<td>LA 8121</td>
<td>Folsom</td>
<td>Colfax</td>
<td>12,389±83</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11,500±39</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11,100±130</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10,760±140</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9220±50</td>
</tr>
<tr>
<td>LA 3324</td>
<td>Blackwater Draw (Clovis)</td>
<td>Roosevelt</td>
<td>11,630±400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11,040±900</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10,600±320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10,490±900</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10,250±320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10,170±250</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9900±320</td>
</tr>
<tr>
<td>LA 26748</td>
<td>Mockingbird Gap</td>
<td>Socorro</td>
<td>10,590±95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9925±155</td>
</tr>
<tr>
<td>LA 123142</td>
<td>---</td>
<td>San Juan</td>
<td>9683±250</td>
</tr>
<tr>
<td>LA 124474</td>
<td>Boca Negra Wash</td>
<td>Bernalillo</td>
<td>9540±580</td>
</tr>
<tr>
<td>LA 80320</td>
<td>---</td>
<td>San Juan</td>
<td>8410±775</td>
</tr>
<tr>
<td>LA 6437</td>
<td>San Jon</td>
<td>Quay</td>
<td>8260±210</td>
</tr>
<tr>
<td>LA 43031</td>
<td>H-39-47</td>
<td>San Juan</td>
<td>7900±125</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7580±670</td>
</tr>
<tr>
<td>LA 31674</td>
<td>Pigeon Cliffs</td>
<td>Union</td>
<td>7840±160</td>
</tr>
</tbody>
</table>
leoindian components, excluding that proposed for Lemitar Shelter, only 10 have been dated by radiocarbon ($^{14}$C) techniques (Table 1) and three have been dated by obsidian hydration (LA 23920, LA 80603 and LA 89556). The remaining components have been assigned to the Paleoindian period on the basis of projectile point typology, scraper morphology, reduction technique or the presence of B. bison antiquus (LA 8021) or other megafauna remains (LA 6776). Thirty-four Paleoindian components had been documented in Socorro County.

The abundance of Paleoindian materials and localities in west-central New Mexico, and in Socorro County in particular (LeTourneau and Weber 2004b), reflects the importance of the area during Paleoindian times. However, in order to assess the nature of Paleoindian occupations in the region, stratified deposits, such as those sometimes found in deep, open sites or in caves and rockshelters, must be located and investigated. Such deposits are vital to understanding and modeling Paleoindian cultural history. As noted by Haynes et al. (1992:364), "... the only foreseeable way we will be able to determine the relative age (and) diversity of Paleoindian complexes appearing in the few centuries following Clovis will be through stratigraphic succession at multicomponent sites." Interestingly, it has been suggested that the widespread use of rockshelters in Paleoindian times did not begin until after 9500 B.P. (essentially the late Paleoindian period), with only minimal use of rockshelters occurring between 12,000 and 10,000 B.P. (Frison 1991). Some evidence for the use of rockshelters by early Paleoindian groups has been documented in Wyoming at Two-Moon Shelter (Finley et al. 2002), in New Mexico at Sandia Cave (Haynes and Agogino 1986), in Mexico at Cueva de los Grifos (Santamaría and García-Bárcena 1984:7) and Guía Naquitz (Smith 1997:933), and possibly in Arizona at Ventana Cave (Huckell and Haynes 2003). A much larger number of rockshelter sites with both early and late Paleoindian occupations are known in Texas (Bousman et al. 2004; Collins 1991).

THE POTENTIAL FOR PALEOINDIAN RESEARCH AT LEMITAR SHELTER

In terms of Paleoindian land use, Lemitar Shelter is strategically situated at the intersection of several major physiographic provinces, including the Basin and Range, the Southern Great Plains, the Colorado Plateau and the southern Rocky Mountains. The diversity of topography and the access to a range of subsistence resources in this area suggests the potential for a wide range of adaptive strategies on the part of prehistoric groups. Thus, residential land use and winter occupations incorporating rockshelters might be expected in the area. Yet, until recently, no rockshelter sites were known in Socorro County that dated chronometrically to Paleoindian times.

Accordingly, the discovery of Paleoindian occupations at Lemitar Shelter could add significantly to a small sample of dated Paleoindian rockshelter sites in New Mexico and beyond. Furthermore, it would help refine our current understanding of Paleoindian chronology in the region and would perhaps allow us to explore regional and temporal variations in the accepted models of Paleoindian land use and site distribution. The preceding discussions underscore not only the need for additional Paleoindian chronometric data from New Mexico, but provide a rationale to search for Paleoindian materials at Lemitar Shelter, where deeply stratified deposits have now been found and charcoal samples have now been dated (Dello-Russo and Walker 2004; Dello-Russo et al. 2004).

PHYSIOGRAPHY OF SAN LORENZO CANYON

The Lemitar Shelter site is located at an elevation of about 5300 ft (1630 m) above sea level within San Lorenzo Canyon, a large, intermittent tributary of the Rio Grande. The intermittently active channel that drains San Lorenzo Canyon meets the Rio Grande at about 4660 ft (1439 m) within the Socorro Basin.
The Socorro Basin is defined geologically by the Joyita Uplift on the east and the Socorro Uplift on the west (Denny 1940:73), the latter of which is a mountain chain comprised of the Socorro Mountains and the Lemitar Mountains. The Lemitar Mountains are tilted fault blocks (Debrine et al. 1963:123) with a maximum elevation of 7292 ft (2244 m) at the top of Polvadera Mountain.

The drainage running through San Lorenzo Canyon heads to the west along the east edge of the La Jencia Basin and then flows east to the Rio Grande, initially cutting through eolian and alluvial sediments and eventually through sandstones, conglomerates and volcanic rocks of Tertiary and Quaternary age. As many as nine springs and seeps can be found throughout the canyon.

The oldest geological exposures in the canyon are mainly Tertiary rhyolitic and andesitic flows and tuffs of the Datil Formation (Denny 1940), and these are interbedded with sedimentary deposits of the Popotosa Formation (a fine-grained conglomerate of pebbles from proximal fan deposits of earlier volcanic materials). There are also some late Miocene and/or Pliocene deposits of the Santa Fe group, a massive and poorly sorted formation consisting of siltstones, sandstones, conglomerates and volcanic basalts. Recent pediment gravels, alluvium, and colluvial deposits cap these formations. Lemitar Shelter is “a relatively deep overhang shelter formed along a fault line in the conglomerate and sandstone of the Popotosa (Formation)” (Anzalone 1973:42) by the meandering of San Lorenzo Arroyo and cyclical weathering. The shelter mouth, which is approximately 65 ft (20 m) above the canyon bottom, faces south and sits atop a steep talus slope (Figure 2).

**BRIEF HISTORY OF ARCHAEOLOGICAL RESEARCH AT LEMITAR SHELTER**

During the 51 years before the 2003 field season, Lemitar Shelter was the subject of four archaeological research efforts. In 1952, C. Vance Haynes, Gerald Shelton and several others formed the Haynes-Shelton party to conduct excavations into the shelter deposits, removing an estimated 240 ft³ (7.0 m³) of fill from a north-south trench approximately 20–30 ft long. Shortly thereafter, in 1953, William L. Weinrod, a graduate student at the University of New Mexico, excavated an estimated 1750 ft³ (49.5 m³) in a block area that measured approximately 25 by 25 ft. A third excavation effort was undertaken in 1972 by a graduate student at Eastern New Mexico Uni-

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**Figure 2.** Photograph of Lemitar Shelter looking north.
versity, Ronald D. Anzalone, under the direction of Cynthia Irwin-Williams (Anzalone 1973). More recently, Escondida Research Group (ERG; Dello-Russo 2002) completed a limited program of archaeological testing at the site in order to evaluate the nature and integrity of remaining cultural deposits. Based on the results of this work, I suggested that at least 150 m² of unexcavated area remained at the site and that Stratum V deposits (the lowest geological sediments identified at that time) were a minimum of 1.24 m deep (suggesting a total depth of deposits greater than 2.74 m below the current ground surface).

Even though these previous efforts recovered numerous charcoal and other organic samples, none of the samples have been subjected to radiocarbon analysis for dating purposes. In addition, none of the previous researchers ever reached the bottom of the shelter deposits.

**FIELD EFFORT SUMMARY FOR THE 2003 SEASON**

In 2003, a more comprehensive field effort by ERG took place in collaboration with the Argonaut Archaeological Research Fund, University of Arizona. The general field methods and results for the 2003 season are described in detail in Dello-Russo and Walker (2004). A total volume of 16.26 m³ was removed from Lemitar Shelter during the 2003 project. Of this volume, 3.56 m³ were thought to have been the back dirt and wall slump of previous projects and 12.70 m³ were previously undisturbed (intact) sediments. The vertical relationships among the previous four excavation efforts and the 2003 effort are illustrated in Figure 3, while the horizontal relationships among them are illustrated in Figure 4. In all, 12 study units, covering an area of 9 m², were excavated in 2003. Detailed descriptions of each study unit can also be found in Dello-Russo and Walker (2004).
Figure 4.
Plan view of excavations in Lemitar Shelter.
### Table 2.
Descriptions of Geological Strata at Lemitar Shelter.

<table>
<thead>
<tr>
<th>Stratum No.</th>
<th>Description</th>
<th>Depth Below Surface (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Bioturbated, gravelly reddish gray sand with abundant charcoal, rodent bones, rodent burrows and tunnels, rhyolite roof-fall clasts</td>
<td>0 to 0.61</td>
</tr>
<tr>
<td>II</td>
<td>Charcoal-rich, gravelly reddish brown and gray sand with some fine laminations, some bioturbation, rodent bones</td>
<td>0.61 to 0.79</td>
</tr>
<tr>
<td>III</td>
<td>Reddish brown sand, gravels, roof-fall clasts with distinct unit of guano or rodent feces, charcoal</td>
<td>0.79 to 0.93</td>
</tr>
<tr>
<td>IV</td>
<td>Bioturbated dark reddish brown and gray sand, gravels (decreasing with depth), abundant charcoal, some roof-fall clasts</td>
<td>0.93 to 1.45</td>
</tr>
<tr>
<td>V</td>
<td>Aeolian fine red sand with lens of guano or rodent feces, some pea gravels, rodent bones, roots decreasing with depth, some roof-fall clasts</td>
<td>1.45 to 2.65</td>
</tr>
<tr>
<td>VI</td>
<td>Uniform and laminated fine brown sands, interspersed with damp areas of abundant roof-fall clasts that are exfoliating and rotting in place, rodent bones, gravels, charcoal flecks</td>
<td>2.65 to 3.40</td>
</tr>
<tr>
<td>VII</td>
<td>Fine, dry light gray-orange silt with fewer roof-fall clasts and possible increase in gravels</td>
<td>3.40 to ??</td>
</tr>
</tbody>
</table>

**General Descriptions of Geologic Strata in Rockshelter Deposits**

Results of the 2003 field effort indicate that the sediments in Lemitar Shelter were laid down in a minimum of seven geological strata. Each of these strata is generally described in Table 2 and illustrated in Figure 5. The upper levels of the shelter, Strata I, II, III and IV, are all culture-bearing strata currently thought to date from the end of the late Archaic period through the Pueblo III Ancestral Puebloan period (Figure 6). They were previously described and illustrated by Anzalone (1973) and Dello-Russo (2002). Stratum V is also a culture-bearing stratum, at least in its upper portion, dating from the middle Archaic into the late Archaic. Stratum VI, which was identified during the 2003 effort, dates, minimally, to the early Archaic and late Paleoindian periods. It currently exhibits no associated cultural materials. Stratum VII is the deepest geological stratum identified in 2003. It is likely that this stratum represents late Pleistocene–early Holocene deposits which, at this point, are also culturally sterile.
Figure 5.
South wall profile, 2003 excavations, Lemitar Shelter.

Profile 7
South Wall Study Units
1, 2, 3, 10, 11, and SU2001-1
N506.50 (SU 10, 11, 12)
N507 (SU 1, 2, 3)
E494 - 497
Strata I, II/III, IV, IVB, V, VI, VII

Base of SU 10
1.51 m bgs
E498
1.86 m bgs

Base of SU 11
1.36 m bgs
E496.90

Base of SU 3
2.77 m bgs
E498

2003 Surface
(base of crater left after previous excavations)

2001 Profile 1
(South wall of SU2001-1)

Area of unconsolidated slumping sediments
Estimated stratigraphy only

Stratum I
0.73 m bgs

Stratum II/III
1.12 m bgs

Stratum IV
1.46 m bgs

0.73 m bgs

Stratum V
2.70 m bgs

3.32 m bgs

Base of SU 1
3.54 m bgs
E495

Profile 7 / South Wall
at Lemitar Shelter
Dates of Field Illustration:
May 09, 2003 and June 21, 2001

View Looking South
at South Wall of
Excavation Units

0 0.5m Scale
ROBERT D. DELLO-RUSSO

Lemitar Shelter 2003: Cultural Feature Data.

Figure 6. Cultural stratigraphy at Lemitar Shelter.

Table 3.
Lemitar Shelter 2003: Cultural Feature Data.

Feature No. | Type     | Study Unit No. | Stratum No. | Depth Below Surface (m) | Notes                                                                 |
-------------|-----------|----------------|-------------|-------------------------|----------------------------------------------------------------------|
1            | Thermal   | 1              | V           | 1.96 - 2.00             | charcoal, ash, carbon-stained sediment and FCR w/ in-situ flaked stone artifacts |
2            | Clay-lined basin | 1, 4       | V           | 2.26 - 2.45             | deep depression with charcoal on inside base, in plan view and west and north wall profiles |
3            | Thermal   | 4, 7           | II-III      | 1.02                    | lens of carbon-stained sediment and charcoal in plan view and west wall profiles |
4            | Thermal   | 8, 9           | IV          | 1.45 - 1.51             | charcoal, carbon-stained sediments, FCR, artifacts / heavily bioturbated / associated with En Medio point mid-section |
5            | Thermal   | 4              | IV          | 1.76                    | carbon-stained sediments and charcoal w/ ceramic sherd directly below Anzalone trash / bioturbated |
6            | Thermal   | 1, 4           | V           | 2.59                    | in plan view and west wall profiles, basin-shaped ash and charcoal lens / associated with Pinto point base |
7            | Thermal ?/ Occupation floor | 1       | VI          | 3.14 - 3.23             | thin shallow parabolic shape with tiny charcoal in west wall profile |
8            | Thermal   | 2              | V           | 2.68                    | ephemeral, ambiguous lens of carbon-stained (?) sediment |
9            | Thermal   | 3 (upper)      | V           | 1.86                    | in south wall profile, charcoal, ash and carbon-stained sediment lens |
10           | Thermal   | 8              | II-III      | 1.07                    | in north wall profile, charcoal and carbon-stained sediment lens |

Description of Cultural Features

In all, 10 cultural features were identified during the course of the 2003 field work. These are listed and described in Table 3. All features, except one (Feature 2), were thermal features that were identified either in plan view or profile view or both. Feature 2, within Stratum V, represents a large clay-lined basin (Figure 4). It probably extends short distances horizontally to both the north and west of the 2003 excavations. Based on the vertical orientation of its south and east sides, it probably functioned as a basin for water storage.

Feature 4 in the lower portion of Stratum IV appears, at present, to be spatially associated with one (or possibly two) late Archaic En Medio projectile point mid-sections and Feature 6 in the middle portion of Stratum V is associated with one (or possibly two) middle Archaic Pinto projectile point bases. These associations suggest that the lower portion of Stratum IV may date to the late Archaic between 2800 B.P. and 1600 B.P. (before present) and the middle portion of Stratum V may date to the middle Archaic between 6000 B.P. and 4000 B.P. By extrapolation, Feature 7 in Stratum VI may have been utilized sometime between the Paleoindian period (11,500 B.P.) and the early Archaic period (7500 to 6800 B.P.). Newly reported radiocarbon dates from some of these features, presented below, support these assumptions.
Collected Samples from the 2003 Season

The 1,890 samples collected in the field were grouped into the following classes: flaked stone, ground stone, ceramics, bone, charcoal, wood identification, clay fragments from Feature 2, sediment for calcium carbonate (CaCO₃) flux analysis, bulk sediment, feature fill and pollen.

Flaked stone artifacts included lithic debitage (flakes and cores) and tools (scrapers, utilized flakes, bifaces and projectile point fragments). Of five projectile point fragments recovered, three can be assigned to a known temporal-cultural type. These include a medial section of an En Medio (late Archaic) corner-notched point, a basal portion of an En Medio corner-notched point, and a base of a Pinto or San Jose (middle Archaic) indented stem point. The remaining two point fragments probably represent an additional En Medio point midsection and an additional Pinto point base but were too fragmentary to make positive identifications.

Of the suite of flaked stone artifacts, 34 were made of obsidian, including one Pinto projectile point base, and are amenable to XRF source analysis. Ground stone artifacts include two fragments of slab metates.

The majority of bones noted during excavation and in the screen were from rodents, and it was assumed that these were not deposited by human occupants of the shelter. Rabbit bones (or those of small mammals larger than rodents), when identified in the field, were collected, along with any bones and bone fragments from larger mammals. These were assumed to have most likely been collected by human site occupants. Unique among these was a single shaped and incised long-bone fragment that may be the remains of a composite weapon socket. No human bones were encountered.

When cultural features were identified, charcoal—or in the case of Feature 2, clay and charcoal—samples were collected for radiocarbon analysis. The seven fragments of clay from Feature 2 were collected in the hopes that the carbon in the clay could be dated as well. In the lowest strata of the excavation, where cultural features were not identified, charcoal samples were collected for their potential to date geological strata. Of the 28 charcoal samples collected, 25 were of a size determined to be dateable. Of the 25 dateable charcoal samples, portions of six were set aside for wood identification analysis (or backup radiocarbon analysis, if required).

Sediment samples included 23 CaCO₃ flux samples, 23 pollen samples, bulk sediment samples taken from each identified geologic stratum, and fill from cultural features (where possible).

<table>
<thead>
<tr>
<th>Table 4. Lemitar Shelter 2003: Results of ¹⁴C Analyses.</th>
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</table>
Results of $^{14}C$ Analysis

Six charcoal samples from the 2003 field effort were submitted for $^{14}C$ analysis. Three of the samples were retrieved from cultural features and the remaining three were associated with geological strata rather than cultural features. These six samples were selected because 1) they represented a good range of depths below the original ground surface (2.31 to 3.95 m); 2) they included samples from the greatest excavated depths in the site; and 3) they provided a first order evaluation of the stratigraphic integrity of the rockshelter sediments.

The resulting dates for the six charcoal samples are provided in Table 4, along with their associated cultural features (if any), the depth of each sample below the original ground surface, and the named cultural period in New Mexico that is associated with each date. The results indicate that Feature 2 (the clay-lined basin) was constructed during the early portion (Armijo phase) of the late Archaic period. Feature 6 (a hearth associated with a Pinto projectile point fragment) was utilized during the middle Archaic period. The date(s) for Feature 6 are consistent with cross-referenced dates for Pinto points from other areas.

The date associated with Feature 7 (a possible hearth or occupation surface) represents use of the site during the latter portion (Bajada phase) of the early Archaic period. The date(s) for Feature 6 are consistent with cross-referenced dates for Pinto points from other areas.

The two remaining dates are also statistically the same and suggest an occupation of Lemitar Shelter during the late Paleoindian period (e.g., Cody Complex). Because the two dated samples were found in two geological strata, it is possible that rodent burrowing may have moved one or both samples. No cultural artifacts or features were found in association with either charcoal sample.

SITE FORMATION ISSUES AND PALEOINDIAN OCCUPATIONS

It is possible that the floor of San Lorenzo Canyon was significantly higher in elevation at the end of the Pleistocene, or during the early Holocene, than it is today. If so, the Lemitar Shelter site may not have been available for occupation during the Paleoindian period. The idea that arroyos in the Southwest experience cycles of erosional down-cutting is not new (Karlstrom 1988; Kottlowski et al. 1965; Love 1977; Mann and Meltzer 2007; Patton and Schumm 1981). Similarly, the base elevations of large canyons, such as Mile Canyon (the location of Bonfire Shelter) in Texas have dropped over time (Byerly et al. 2007:132-135). The possibility that the floor in San Lorenzo Canyon has eroded down to a lower elevation is supported by the presence of large blocks of alluvial sediment left suspended well above the current floors of both San Lorenzo Canyon and the Rio Salado Box (next major west-to-east drainage north of San Lorenzo; see Figure 1). If dateable charcoal samples can be found in these stranded blocks of sediment, and the elevations of these samples can be compared to elevations within Lemitar Shelter, then an argument can be made as to whether and when, at the end of the Pleistocene or early Holocene, the shelter mouth was open to human occupants.

SUMMARY AND DISCUSSION

There are some provocative indications that Paleoindian cultural materials might be recovered from Lemitar Shelter in the future. With radiocarbon dates in hand, we are now confident that sediment deposition occurred at the site during the late Paleoindian period, although it is unclear if the dated charcoal samples washed into the shelter from outside when the floor of San Lorenzo Canyon was higher in elevation, or if the samples were products of human activities in the shelter itself. Evaluations of the stranded blocks of sediment may help to clarify this issue.
While the radiocarbon dates suggest the possibility of late Paleoindian occupations at the site, the two earliest charcoal samples were not associated with cultural features or artifacts. While this also casts some doubt on the cultural origin of the dated charcoal samples, it is worth noting some observations by Pitblado (2003:79-124). She argues that dated late Paleoindian occupations in the Rocky Mountain region have statistically similar age ranges, with median ages falling between 9000 and 8790 years B.P. These dates closely bracket the median age for the two deepest charcoal dates at Lemitar Shelter (ca. cal 8800 B.P.). In addition, these same Rocky Mountain late Paleoindian dates are associated with Great Basin Stemmed, Eden/Firstview, Scottsbluff, Jimmy Allen/Frederick, and Angostura projectile point types. So, despite the current absence of Paleoindian artifacts at Lemitar Shelter, the dated charcoal samples may simply represent the “tip of the iceberg” and the presence of Paleoindian artifacts at the site should still be anticipated.

Finally, two additional points are worth noting. First, we estimate that there remains at Lemitar Shelter a large area (ca. 120–140 m²) of intact deposits that range up to 4+ meters deep. Second, the area from which the late Paleoindian era charcoal samples were secured was an extremely small “window” that represents less than 1 percent of the total area of intact deposits remaining at the site. The fact that two dateable charcoal samples were recovered from such a tiny area is quite encouraging and leaves open the possibility of associated cultural materials in other portions of the site.

Obviously, the challenges for future research at the site are not insignificant. The deposits are complex and deep and contain abundant roof fall clasts. In addition, future excavations will require extensive shoring. Nevertheless, the wealth of remaining intact, stratified sediments and the potential implications of Paleoindian era dates serve as strong warrants for additional archaeological research at Lemitar Shelter. Time alone will tell.

**ACKNOWLEDGMENTS**

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MAKING VILLAGES OUT OF ADOBE HILLS:
MICRO-TOPOGRAPHIC MAPPING OF ANCESTRAL
TEWA SITES IN THE TEWA BASIN, NEW MEXICO

INTRODUCTION

In one of the earliest archaeological investigations to take place in the American Southwest, Adolph Bandelier (1892) recognized the ruins of prehispanic villages in the northern Rio Grande as one of the largest in the region. However, the majority of these large pueblos were built primarily with adobe, not stone. Over 600 years of erosion, deflation, and grazing have reduced these grand, sometimes three-story, structures to a collection of earthen mounds. A common visitor reaction when standing on top of the three-story roomblock in the middle of the pueblo Pose’uiinge (LA 632) is, “where’s the site?”

Archaeologists have had a difficult time interpreting these large sites as well. Due to a dearth of modern excavation data delineating wall boundaries, in many cases researchers have had to make general outline maps of the melted adobe mounds, kiva depressions, and midden deposits. Even the work of H. P. Mera (Daw 1990; Fugate 1995), whose maps of these surface features are strikingly accurate and precise (Duwe and Duwe 2008), is plagued by the subjectivity of defining melted and eroded architecture.

An alternative to subjectively mapping the boundaries of room mounds and kiva depressions, which is the concern of this paper, is to use modern survey equipment to create micro-topographic maps of pueblo architecture. Creating three-dimensional maps allows for the construction of objective representations of architectural remains, and also aids in drawing two-dimensional plan maps. Although this is not a novel method in Southwestern archaeology, I argue that its use can provide archaeologists with more accurate spatial representations of sites without the use of excavation. Wide-scale use of site-level micro-topographic analysis over a large study region is imperative for understanding residential mobility in the past, and also for examining detailed questions such as social change.

The Tewa Basin Archaeological Research Project (TBARP), of the Department of Anthropology, University of Arizona, has sought to understand the social and cosmological implications of village coalescence (or population aggregation) for ancestral Northern Tewa populations in the northern Rio Grande region during the Coalition (A.D. 1250–1325) and Classic (A.D. 1235–1600) periods. To understand the social effects of coalescence it is necessary to first understand how and when coalescence occurred. This requires both mapping of sites to see patterns of growth and depopulation and ceramic analysis to gain chronological control of residential mobility.

This paper outlines the methods used and preliminary results achieved in mapping Classic and Coalition Period Tewa sites in the Tewa Basin of northern New Mexico, particularly in the Rio Chama drainage. I evaluate and compare the utility of instrumental survey mapping and global positioning system (GPS) technology in mapping large adobe sites and also offer suggestions for future research.
THE RESEARCH AREA

The Tewa Basin is positioned along the Rio Grande, running north to south from the upper tributary reaches of the lower Rio Chama to the northern Pajarito Plateau. The area is bounded by the Sangre de Cristo Mountains to the east, the Jemez Mountains to the west and south, and the Pajarito Plateau to the south. The primary rivers, the Rio Chama and Rio Grande, are the lifeblood of the region, and the majority of the 40 ancestral villages and countless archaeological remains are located on the benches above these rivers and their tributaries (Figure 1).

Like many pueblo sites in northern New Mexico, the majority of ancestral villages in the Tewa Basin were built with coursed adobe and were very large, the biggest averaging over 1,000 rooms (Beal 1987). Some of the largest sites in the Tewa Basin, Pon-sipa’akeri (LA 297) and Pose’uinge (LA 632), measure 6 and 12 ha, respectively. However, without regular maintenance adobe architecture will begin to decompose and erode (melt) within only a few years. Through the pressures of time, erosion, and grazing, these sites have been reduced to collections of mounds and depressions (buildings and kivas, respectively).
The resulting eroded architecture was described by Bandelier when performing the earliest archaeological reconnaissance in the region. His observations of site layout, occupation sequences, and residential mobility in the Tewa Basin were perceptive and anticipated future research. Of Howiri’uinge (LA 71, a pueblo neighboring Hupobi’uinge [LA 380]) he stated, “The pueblo was probably built of adobe, and the condition of the mounds indicated that its decay antedates that of the most southerly pueblo in the valley, the one which the Tehuas call Pose-uingge” (1892:39).

The first comprehensive research that involved accurate site mapping was conducted by H. P. Mera in the 1920s through the 1940s (Daw 1990). Mera, who possessed a keen eye for archaeology that was honed over nearly 30 years of fieldwork as well as a background in graphic design (Fugate 1995), used both compass-and-pacing and a plane table to map hundreds of sites in the American Southwest (Daw 1990). These maps, while seemingly incredibly accurate and precise (Duwe and Duwe 2008), were based on Mera’s subjective eye. His maps, and those made by others who followed him, provide excellent interpretations of site layout but do not offer additional data for the spatial reanalysis.

The TBARP is primarily interested in understanding how and why Ancestral Tewa populations in the Tewa Basin coalesced in the Coalition and Classic periods. In order to understand changes in village size through time, data recovery consists of mapping and remapping large (>50 room) sites to create accurate maps that record not only the location of architectural features but also their height and volume. As of the summer of 2008, the TBARP has intensively mapped eight sites using both total station and global positioning systems (GPS) technology.

**METHODS**

Three-dimensional site mapping is not new to archaeology, and established methods have been constructed worldwide to address increasingly complex theoretical questions (see Lock and Harris 2000 for an overview). Micro-topography has been used in contexts as varied as ancient hominin landscapes in Olduvai Gorge (Kamau 1977) to European cities dating to Late Antiquity (Keay et al. 2007). Researchers in the American Southwest have also successfully made use of micro-topographic site maps to interpret architectural building sequences and pueblo population estimates (Liebmann 2006). The increasing amount of non-invasive or “surface archaeology” (Sullivan 1998) in the American Southwest is directly related to a changing archaeological and political climate that deemphasizes excavation in favor of other methods of data collection (survey, mapping, and the analysis of existing collections and reports).

Micro-topographic mapping, or the ability to visualize in three dimensions ground relief at a high resolution, is especially applicable to the sprawling adobe villages in northern New Mexico based on two factors: elevation and subjectivity. The ground elevation, which is loosely related to original wall height or kiva depth, is often difficult to measure due to vegetation growth and disorientation. Subjectivity is an unavoidable artifact of archaeological fieldwork (especially mapping) where the researcher is forced to make interpretations in the field. Both instrument mapping and GPS record space in three dimensions; this information can be measured and analyzed more accurately out of the field and in the laboratory. These data can also be shared with others who may make different interpretations.

Both survey instrument mapping and GPS were employed to 1) test the efficacy of using these technologies to create three-dimensional micro-topographic mapping on large adobe sites; 2) aid in drawing accurate two-dimensional plan maps of the sites; and 3) evaluate the relative strengths and weaknesses of the two technologies in creating micro-topographic maps.
**Instrument Mapping**

The TBARP carried out high-resolution micro-topographic instrument mapping on eight Coalition and Classic Period sites in the Rio Chama valley during the 2007 and 2008 field seasons (Figure 1). Mapping was performed using a Leica Total Station TC 307 (supplied by the Integrative Graduate Education and Research Traineeship [IGERT] archaeological science program at the University of Arizona) which is accurate to approximately 3 mm in favorable conditions. Two people are required to map a site (one operating the station and the other holding the stadia rod and prism). In most cases a single arbitrary datum (Pose'uinge required a secondary datum due to its large size) was established at the highest point on the landscape. The UTM coordinates of the datum were subsequently recorded by a Trimble GPS, and all points shot with the total station were georeferenced into a fixed, global coordinate system.

To record visible architecture and interpret site layout (the subjective in-field observations), features such as roomblocks, kivas, plazas, and rock alignments were first identified by walking the site and setting pin flags (mapping using in-field observation is important because not all architecture and site features will be resolved in the micro-topographic analysis). Multiple points were shot using a total station to define the features’ outlines. These points were imported into ArcGIS 9.2 and drawn to reflect my initial impression of the site layout.

The creation of micro-topographic surface maps required recording many points across a site that captured changes in elevation across space. Each site was gridded into 5 x 10-m units and points were shot at the corner of each unit, providing on average 800-1500 points devoted to capturing subtle relief. Mapping in the field generally took two to three full days.

All three-dimensional data points recorded with the total station (both from feature mapping and the topographic grid) were converted into three-coordinate points (easting, northing, elevation) and georeferenced into real space as UTMs. These coordinates were imported into Surfer 8.0 mapping software to generate surface maps of the sites.

Both shaded relief and contour maps generated with the Surfer software were imported into ArcGIS and compared to my in-field interpretations of surface architecture. When there were discrepancies, the roomblock or kiva outlines on my two-dimensional plan map of a site were adjusted to concur with this topographic data.

**GPS Mapping**

A Trimble GeoXH GPS was used throughout the mapping process to record features outside the range of the total station (approximately 150 m) including shrines and material remains of agricultural activity. The Trimble GPS was chosen because of its sub-meter accuracy that averaged a standard error of 20 cm. Due to the relatively time-consuming nature of using the total station to record micro-topography, and the ability of the GPS to record three-coordinate points in quick succession, I tested whether a GPS alone was capable of recording high resolution micro-topographic variability.

The Trimble was set to record a line with individual spatial points recording every second. By setting the antenna height to the distance the GPS was held above the ground, it was possible to walk 10-m transects across a site and collect 3,000-4,000 topographic points. This process took two hours to complete.

In the laboratory these GPS points were corrected using Trimble Pathfinder software to a standard error of 20 cm. The individual points that comprised the line were exported as three-dimensional UTM coordinates (easting, northing, and elevation) and imported into Surfer 8.0 software where surface maps were created.
RESULTS

For the sake of brevity, four sites were selected to illustrate the results of the analyses: Ponsipa’akeri, Pose’uinge, Ku’uinge (LA 253), and Hupo-bi’uinge. These sites are located on Bureau of Land Management land. The first three sites demonstrate the use of micro-topographic mapping and the last site, Hupo-bi’uinge, provides an example of the potential data quality of GPS applications.

Instrument mapping

It was immediately apparent that the data generated by the total station were sufficient in resolving micro-topographic variation at the site level. At Ponsipa’akeri (Figure 2), Ku’uinge (Figure 3), and Pose’uinge (Figure 4) house mounds and kiva depressions are clearly outlined in relation to the natural topography of the ground surface. Plaza areas are also clearly defined, which is best seen in the small plaza roomblock in the northwestern portion of Ponsipa’akeri.

Micro-topographic mapping also made it possible to distinguish ephemeral architectural features that appeared amorphous during field observation. This includes the small roomblocks in the southwest portion of Ponsipa’akeri (Figure 2) that appeared to be midden area, but were resolved as small mounds on the contour and surface maps. These likely represent a Coalition Period habitation at the site that predates the larger Classic Period architecture based on associated Santa Fe Black-on-white and Wiyo Black-on-white ceramics (author’s personal observation).
As stated in the previous section, a site map is a subjective representation of an ancient village. Archaeologists will interpret the layout of a site based on personal experience and in-field judgment (i.e., how the edge of a mound is defined based on elevation above the perceived natural ground surface). For this project, I used this contour data to redraw my subjective two-dimensional plan maps to better fit the objective data. This was particularly useful at Ku’uinge (Figure 4) where areas of heavy erosion had distorted the house mound boundaries and their definition was only possible after examining the topographic data. Of course, the identification of midden areas, shallow kiva depressions, and eroded house mounds that are not resolved on the micro-topographic maps require field observation. The combination of in-field observation and objective micro-topographic data allow archaeologists to make a “best-fit” decision on the spatial layout of a site without putting a shovel in the ground.

I argue that the most important aspect of creating (and publishing) micro-topographic data of hard-to-define pueblos is that it keeps us honest. When combined with two-dimensional plan maps archaeologists can make interpretations about site layout, but at the same time leave room for future interpretation from researchers who possess better data or approaches. An example is at the site of Ku’uinge (Figure 4) where an extension of the western roomblock continues to confuse me. I have labeled this extension as “possible roomblock,” and its identity can be tested by future excavation or remote sensing activities.

**GPS mapping**

Due to the preliminary nature of this project, only the micro-topography of Hupobi’uinge was mapped using the GPS. The results, however, are striking. When the surface maps generated from the total station and the GPS are compared side by side (Figure 5) it is apparent that the GPS resolved the same melted house mounds and kiva depressions as the total station data. The GPS map appears somewhat rougher, which is likely due to the greater error inherent in GPS technology (20–50 cm vs. 3 mm accuracy). Points recorded using even a GPS with sub-meter accuracy can vary within tens of centimeters while the error inherent in data recorded with a total station is much smaller and more standardized. This lack of standardization with a very large quantity of data creates maps with areas of high resolution (such as the large kiva in the southwest portion of the site where the eastern entrance is clearly visible) and areas of lower resolution (the eastern plaza is poorly defined). Because the total station and GPS provide sometimes different spatial data, the use of both may be desirable to create accurate site maps. However, if a researcher is in need of low-cost and efficient maps, using only a GPS to collect data is a viable option especially when the number
of person-hours is weighed against the differences in spatial resolution and standardization. Approximately 40 person-hours can be saved using just the GPS method. The topographic data created by a GPS can be used to create two-dimensional plan maps and can be subjected to the same types of analysis as the data generated by the total station.

**DISCUSSION AND CONCLUSIONS**

The results of this research have demonstrated that micro-topographic mapping is an efficient means of creating detailed site maps of large sites composed of melted adobe. This method can objectively capture subtle changes in elevation that are indicative of the boundaries of large-scale architecture and the location of ephemeral features. When combined with in-field observations these data are also useful in constructing accurate and precise two-dimensional plan maps for reports and publication. It also allows for archaeologists to test the accuracy of their field observations, and provides raw data for future researchers to make different interpretations based on additional (or better) data and more advanced field and theoretical perspectives.

A second, unexpected, conclusion is that while the total station can generate fine-resolution topographic data, a Trimble GPS unit will also produce good results in only a fraction of the time. This is useful to researchers who want to perform regional analysis over many sites, and also to land and cultural resource managers whose time and budgets are limited.

This research is still in its preliminary stages but the possible scope of data manipulation for the TBARP is already apparent. Due to the limited time required to thoroughly map a site, many sites can be mapped in a relatively short period of time. This is useful for large-scale regional architectural analysis including determining village growth patterns. Additionally, in conjunction with excavated data, this three-dimensional information will be useful in interpreting original pueblo wall height and the number of roomblock stories. By measuring the size of a pueblo in three dimen-

![Comparison of surface topography maps from Hupobi'ungle (LA 380) generated by the total station and GPS.](image)
sions room count can be estimated, allowing for the interpretation of population size, growth, and decline: fundamental information for answering how populations coalesced in the Classic Period.

This method can also be applied to non-research based questions. By occasionally mapping a site, land managers can monitor erosional changes and pot-hunting activity. These maps can also be used for disseminating archaeological information to the public.

It is important to state that no amount of technological innovation can substitute for time spent in the field. Sets of human eyes and archaeological knowledge and experience will always result in the most accurate interpretation of a site. However, with micro-topographic mapping the amount of time and energy spent in the field is greatly reduced, and the amount and quality of data is greatly increased.

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INTRODUCTION

For the Jicarilla Apache, Taos is the center of the earth (Opler 1938). For nearly 500 years they lived and died there, raised families, and with their Taos neighbors fought the Spanish and later the Americans (Gunnerson 1974). Their most sacred shrines dot the stunning landscape of the San Luis Valley and are still visited by the Apache community today. Taos lives in the hearts and minds of the Jicarilla even though their presence is easily overlooked by local residents, historians, and archaeologists. In this paper, I consider the Taos region from a Jicarilla perspective, identifying their sacred places and major settlements through ethnographic and historical documents. Archaeological survey and excavation similarly confirm a strong and distinctive Jicarilla presence in the area. Taos is important to our understanding of Jicarilla history and archaeology, and as such is the focus of archaeological efforts that exemplify Paul Williams' characteristic dedication to the region and its people. These efforts are aimed at elevating Taos heritage and culture while producing new knowledge about the unwritten histories of the region through community-based research and education.

JICARILLA COSMOLOGY AT TAOS

As Morris Opler once observed, it is easy to locate the heart of the Jicarilla universe but not so easy the place of emergence. Taos is the heart of the Jicarilla world, a world that was populated with mythical heroes, vanquished monsters, and holy deities made by the earth and sky. These deities included the sun and the moon, each of whom after their emergence near Taos produced a child with White Shell Woman, a young Jicarilla girl who was separated from her band. White Shell Woman gave birth to Naïyenesgani (Killer-of-the-Enemies) when the sun shone upon her, and later to Kubate'ístcine (Child-of-the-Water) while sleeping under the moon.¹ She lived near Taos with her two sons. The powers of Child-of-the-Water, the more feminized character being involved with moisture, plants, and organic increase, ultimately generates some of the situations in which Killer-of-the-Enemies, the more masculinized counterpart, has to intervene. The saga of Killer-of-the-Enemies and his brother Child-of-the-Water forms a major part of the Jicarilla creation narrative that touches upon themes of cognitive or ritual geography, the origins of ceremony, and protection and alliance with neighboring Pueblo groups. Their heroic adventures establish the Taos landscape as Jicarilla cultural space, where they play important social and economic roles in shaping the history of the region.

The Rio Grande Gorge, for example, is more than the geological wonder that is billed in tourist brochures and visitor exhibits. To the Jicarilla, this breathtaking canyon was etched into the earth by the horns of a giant killer elk that was speared and skinned by Killer-of-the-Enemies with the help of a gopher assistant and four differently colored flint-bearing spiders. This event began somewhere near Baldy Mountain at Eagle Lake east of Taos, but ended in the gorge where the animal was slain (Mooney 1898:204). Jicarilla stories contain incredible details about the techniques
and rituals surrounding the capture of specific animals. In the killer elk story, the gopher conjures the magic of the hunt by digging four tunnels in each of the four directions. The spiders weave a magical web at the end of each tunnel to capture the elk, and stand ready with their protective flint shields, colored according to each of the four cardinal directions. The gopher tunnels directly beneath the sleeping elk enabling Killer-of-the-Enemies to spear it in the heart four times from below. The Rio Grande Gorge and other large canyons are ploughed into the earth by the raging elk as he searches the tunnels in vain. He is finally halted at the gorge by the web of the black flint spider from the north.

From this story, we not only learn how to look at the Taos landscape from a different and more wondrous perspective, but also about Jicarilla hunting strategies and magic, and some of the spiritually charged items that were provided to the Pueblos and other communities for exchange. In the killer elk story, the animal is ultimately skinned and butchered, leading to the origins of leather clothing. Some of the butchered meat is given to the gopher and the rest is taken to Taos Pueblo. The skin clothing is used later as a magic shield to protect Killer-of-the-Enemies from the talons of a murderous eagle at Standing Rock on the Navajo Reservation. Again, the feathers from the vanquished giant eagle were given to the Taos people (Curtis 1907:68). In another encounter with eagles near Picuris Pueblo, Killer-of-the-Enemies learns how to fly, helps the eagles defend themselves from their enemies, the bees, and returns with feathered gifts for the pueblo (Opler 1938:104). These and other stories clearly point to the role of ceremonial exchange in Plains-Pueblo interactions and the historical developments that would bring the Jicarilla into even closer historical contact with Pueblo communities in the northern Rio Grande (Ford 1972; Spielmann 1982).

The next adventure reveals the important role of the Jicarilla as protectors of the Pueblos and tells us something about how they came to be accepted at Taos Pueblo. In this story, Killer-of-the-Enemies takes the form of a vagabond. Wandering into the pueblo for food, he is mistreated and then chased from the village. This happens four times. Each time he leaves, he transforms the pueblo corn stores into masses of writhing snakes. Alarmed, the Taos people call him back and beg him to undo his magic. After realizing that his powers might actually help them, the Taos people ask Killer-of-the-Enemies to rescue some of their people from a monstrous frog, which had dragged them to the bottom of a lake. This frog kept them as slaves in his house and struck terror into the hearts of everyone in the land through his croaks that sounded like sheet lightning at night. James Mooney, who collected this story in 1898, states that the lake is marked by a spring about a mile west of the pueblo. The lake is also described as a sinking place or a marsh for which the only likely candidate is the spring at El Prado where pueblo herds are still grazed today. Identified as Los Estírcoles in 1776, this land was an extensive swamp and lush pasturage for grazing cattle (Jenkins 1966:99). Killer-of-the-Enemies returns to rescue the Taos people. Using hoops of different colors, he opens the center of the lake and descends to the bottom by a long ladder, leading the victims out one by one under the cover of a smoke plume created by a magic fire drill. The people are so grateful that they invite White Shell Woman and her sons to take up residence at the pueblo, a well-remembered and documented alliance that persisted through the historical period (Gunnerson 1974; Opler 1938).

This story not only reveals the protective aspects of the Jicarilla alliance with Taos Pueblo, it also culturally encodes thematic elements of social and paramilitary resistance to colonial and postcolonial enslavement. The thinly veiled character of the monster frog could easily be played by Spanish slavers, who, wielding their thunderous muskets, pressed the Pueblos into service for their colonies, markets and missions (Brooks 2002). The story also recounts with great accuracy the role of the Jicarilla in facilitating
Pueblo insurrection and their many flights from Spanish oppressors throughout the 1600s. In short, the lush pastures of El Prado sustain more than just cattle. They also speak to a long and vibrant history of Jicarilla paramilitary strength (Eiselt 2006).

Anyone who has had the misfortune of finding themselves at Embudo Station during the torrential summer monsoons that dislodge large boulders, carrying people and equipment to the bottom of the gorge, will appreciate this next story of the galloping rock. Powered from the inside by a magnificent pair of black and white rams, the killer stone lived at Pilar and rolled all over the land, crushing and terrorizing its people. After four vain attempts, Killer-of-the-Enemies manages to head off the rolling rock and shoot it in the spine. Splitting in half with a thunderous clap, the rock releases the two rams. In one version, Killer-of-the-Enemies shoots the giant rams with white flint and obsidian tipped arrows and in another they are told to retreat to the mountains. The killer rock still lies where it was shot in the Rio Grande. The Jicarilla still visit it today; only now they share the space with mostly non-native kayakers, fisherman, and sunbathers who are unaware of its healing powers. Powder and shavings from the rock can heal wounds and illnesses and protect military servicemen and veterans of war (see also Opler 1938:73).

After vanquishing numerous other monsters, Killer-of-the-Enemies travels to the Taos area to counsel the Jicarilla one last time and provide them with one final gift before leaving to live with his father the sun. He remade the northern Rio Grande in the form of his mother, White Shell Woman, locating her heart at the El Prado Marsh where he previously had killed the monster frog (Goddard 1911:206; Opler 1938:43). The four sacred rivers, each representing the gendered halves of her body, flowed from her heart to form the Rio Grande, the Canadian, the Arkansas, and the Pecos. Water from two of them, one male and one female, is obtained and mixed together for the Long-life Ceremony of newborn children.

White Shell Woman’s heart also is the focal point of the first Bear Dance ceremony. The heart is located where the first fires for the ceremony stood. Opier (1938:43) records that these fires flared up at the marsh on two different occasions following the ceremony. During the first time, the Taos Indians were powerless to stop it. They dug ditches and filled them with water, but the water burned like oil. Finally they called upon an old Apache man and woman to put it out. The second time it burned, it was brought under control by the spirit of an old Apache man who had recently died. Jicarilla prophecy states that the El Prado marsh will burn two more times and on the fourth time it will burn all over the world (Opler 1938:113).

The protector spirits of the Jicarilla reside within the body of White Shell Woman. Roughly equivalent to Pueblo Katsinas, the Hactcin are the formal personifications of the power of objects and of natural forces. There is a Hactcin of every animal, bird, substance, or natural phenomenon that you might encounter near Taos, and the Jicarilla are able to call on these natural forces for protection and assistance in times of need. Principal Hactcin reside in the mountains surrounding the valley where they were placed by Killer-of-the-Enemies. These areas are marked with rock shrines that can still be seen today. Other important shrines in the Taos area are shared with Pueblo people. Like Taos, the Jicarilla obtained ochre from the Blue Lake area and considered Hopewell Lake near Tres Piedras a holy place of emergence. Red clay was obtained near Questa and was used by the runners in their annual relay races (Opler 1944).

Micaceous clay shrines also figure prominently in the Jicarilla landscape. This clay was so important to Jicarilla women that it was embodied by its own Hactcin spirit. Pottery making was a mainstay of the Jicarilla economy throughout most of the historical period and women relied upon it to generate income for the family. Commenting on Jicarilla pottery making in 1865, Father Antonio José Martinez of Taos stated that the Jicarilla had always lived between the
villages and the intermediate mountains, “working
and selling pottery to our people” (Keleher 1964:48-
49). Opler (1938:238) recorded a lengthy account of
how the clay Hactcin taught women to make pottery.
This story, like the adventures of Killer-of-the-
Enemies, provides detailed information about the
nature and organization of Jicarilla ceramic manufac-
turing, clay processing, and the array of vessel forms that
were produced. Clay is a form of currency in this story
and raiding for horses is attributed to the need for
women to transport their clay and pottery products.

The story of the origins of clay pots takes place in the
Picuris Mountains where the clay Hactcin lives, and
although clay shrines are associated with all of the
major micaceous clay sources in the northern Río
Grande, the most sacred one is located at the Cueva
Blanca mine south of Taos (Opler 1971:30).2 The
pipes for the rain ceremony and other sacred cere-
monies had to be made with this clay, and much of
the pottery produced by Jicarilla women for trade
likewise came from Picuris sources nearby (Eiselt
2006; Opler 1938:218). Symbolic attachments to
clay, taken from the body of White Shell Woman and
sanctified by the divine essence of the clay Hactcin,
reveal the cognitive basis for ceramic manufacturing
and the important role of Jicarilla women in the trade
economy of Taos.

The animated world of the Jicarilla reveals the ways in
which ethnicity, cultural boundaries, and economy
were embedded within society, and how they built
upon traditional views of community and exchange
stemming from long standing traditions of Plains-
Pueblo interaction. Jicarilla cosmogeography also ex-
plains, in part, the nature of settlement pattern and
archaeological site distributions in the region. The
special rites, observances, and ceremonies associated
with the worship of White Shell Woman ensured a
constant circulation of people through the territory,
but specific areas affiliated with the principal Hactcin
at Taos served as the district headquarters for individ-
ual bands throughout the historical period.

JICARILLA SETTLEMENT
OF THE TAOS REGION

Historic documents reinforce Jicarilla concepts and
cosmologies and help to establish some of the likely
locations of archaeological sites. These documents
also reveal a long and complex history of Jicarilla set-

tlement in the region. Up until the 1700s, Jicarilla
occupation of the Taos and Picurís areas was seasonal
but regular, involving large trading caravans from
neighboring territories extending to the west, north,
and east. These Jicarilla bands over-wintered at Taos
and Picurís Pueblos, and were a regular feature of the
social landscape for five centuries (Eiselt 2006).

The earliest reports of the Taos Apaches include
groups that would later be known as the Jicarillas. In
1625 Benavides described the territories of the
Quinías and Manansas as extending some 50 leagues
to the east of the Navajo, on the west side of the Río
Grande along the Chama River and 10 leagues “in-
land” (east) of Taos (Ayer 1965:41; Gunnerson
1974:78; Schroeder 1974:253). A short-lived mis-
sion was established for them in 1627, probably
somewhere in the vicinity of their major settlements
in northeastern New Mexico. The Achos and Río
Colorados of the 1680s as well as the Jicarillas may
have been one and the same with the Quinías and
Manansas of Benavides time (Gunnerson 1974:91).
The Achos were first mentioned in 1646 and were the
only Apache group identified by name in the Pueblo
Revolt. The Achos, along with their Taos and Picurís
allies, led the battle in Santa Fe and after the Spanish
were defeated, the Achos followed the retreating car-
avans to El Paso to ensure their departure. The Río
Colorados were mentioned with increasing frequency
during the Spanish Reconquest in the 1690s. Dolores
Gunnerson (1974:119) argues that the Río Colorados
may have shared the Red River Country north of Taos
with the Achos. Their name may have been an alter-
nate title for the Achos used to indicate geographic
location, or the Río Colorado Apaches may have been
a specific division of a larger group called Achos. Var-
gas was told by his interpreters that the mountains that ran along the edge of the Red River were inhabited by the Achos during his 1694 campaign to reduce Taos Pueblo after the Reconquest. Soon after this, the Spanish began to refer to all of these bands as Xicarillas after the province they inhabited in northeastern New Mexico. La Xicarilla quickly became important as the last line of defense for the Spanish against Comanche and Ute raiders, who, backed by French arms, threatened the northern frontier.

Widespread dislocation of Plains Apache groups accompanied this expansion. Refugee populations coalesced in La Xicarilla from points west, north, and east in 1695, and for a time between 1704 and 1722, La Xicarilla was a temporary stopping point for nearly all of these refugee groups. Apaches from the Texas panhandle were pushed into La Xicarilla by the Caddoans, the Achos and Río Colorados fled their mountain strongholds on the heels of Ute aggression, and the Plains Apaches from El Cuartelejo abandoned their camps in South Dakota, Nebraska, and Colorado due to Comanche raids. Some of these bands remained with the Jicarilla, while others moved to Pecos and southern New Mexico where they were allied with the Faraon (proto-Mescalero) and Lipan. These refugee Plains Apaches later became the Llanero division of the Jicarilla after rejoining their kinsmen at Taos (Gunnerson 1974:171).

Because of these ongoing hostilities and threats to La Xicarilla by the Comanches, the Jicarillas and some of the refugees from El Cuartelejo agreed to be baptized, settle into pueblos, and accept an alcalde mayor and mission in 1723, thus becoming Spanish subjects legally entitled to the protection of Spanish military forces (Gunnerson 1974:199). By the following year, most of the La Xicarilla Apaches had moved into the colony at Taos (Gunnerson 1974:203; Jenkins 1966:97; Thomas 1935:208). This event marks the beginning of an encapsulated or enclave Jicarilla population in the northern Río Grande. Best thought of as a confederacy made up of previously autonomous Jicarilla and Plains Apache tribes, the Jicarilla enclave was organized into two territorial moieties: the Ollero, or white clan, maintained farms within the colony at Taos and the Llanero, or red clan, who after living for a time among the Mescalero, returned to the plains of northeastern New Mexico. The encapsulated component of the Jicarilla enclave was the Ollero band who served the colony as guides, guards, and spies. The Olleros were the descendents of the earliest Taos Apaches who occupied La Xicarilla and the Red River area above Taos.

The Olleros never experienced forced resettlement, but instead maintained their own autonomous villages and local group districts within communal and public lands near Hispanic and Pueblo grants. During the initial colonization of the Taos area, they located their villages and camps along the northern slope of Picuris Mountain from the Arroyo Hondo east to the Río Grande del Rancho and its tributaries (See Woosley and Olinger 1990:356-357). The western end of this area encompassed the Cristóbal de la Serna Grant. This grant had been recently purchased by Diego Romero of Servietta, a self-described “coyote” who had moved his family to Taos in 1714 and quickly began to accumulate wealth and prestige as one of the first Spanish settlers to the area following the Reconquest. He settled on the northern boundary of his grant near the Río de Don Fernando in 1722 and his son, Francisco Xavier Romero (alias El Talache or the mattock) later established his hacienda, “Talachia,” along the Río de las Trampas near the Apache settlements (Hooker and Santistevan 1996:13).

Jicarilla involvement with the Romero clan was complex and involved everything from economic to religious entanglements in addition to a few nefarious court cases. In 1719 and 1722, Diego Romero stood as godfather to Apaches baptized at the Taos Mission, and in 1731, the Jicarilla were implicated in a complaint by the Pueblo of Taos to the Spanish governor concerning livestock theft by the family. A later case
involved rumors of adultery with a Jicarilla woman. The Romeros’ ecclesiastical efforts balanced their checkered legal background. The family was instrumental in the Church’s early conversion efforts of the Apaches. They helped Fray Juan José Peréz de Mirabal build the first Jicarilla mission in 1723, which local residents suggest was somewhere in the vicinity of Llano Quemado, either at the site of Nuestra Señora del Carmel, or across State Road 68 in a nearby field (see also Gunnerson 1974:216-219); or, as others believe, on the west side of the Ranchos de Taos Plaza.

In 1734, 10 years later, the Jicarilla mission supported about 130 Apaches as well as the Romero family. In 1738, Bishop Crespo noted that “tame” Apaches were still living in the area and attending services, but by 1744 the missionary efforts had largely failed (Gunnerson 1974:216). Baptismal records nonetheless show that 81 percent of the 900 Apache baptisms recorded during the 1700s took place during the 1720s to the 1750s (Brugge 1985:22-23; see also Brooks 2002:146), with many of them likely originating at the Mission.

By the 1760s, the Taos Olleros were divided into two local bands. The first of these was at Las Trampas, where the Apaches were reported some 40 years earlier. Bishop Tamarón made note of encampments of “peaceful” Apaches on the road from Picuris to Taos in the vicinity of Las Trampas in 1760, and a census of New Mexico taken five years later indicates that 25 “unconverted” families (about 100 people) lived in this area under the jurisdiction of the governor of Taos (Cutter 1975:350). The second band was located in the vicinity of Cieneguilla (present day Pilar) or La Hoya (known today as Velarde). In 1766, the mestizo servant of Angela Martín killed a Jicarilla man named El Chimayó. El Chimayó was described as a loyal servant of the Crown who had gone on numerous expeditions against the Comanche (Gunnerson 1974:241). His ranchería was located within a few miles of La Hoya, either one league north on the Río Grande in the vicinity of Cieneguilla or west along the Arroyo Ocole. These areas were situated within the Sebastian Martin grant, established in 1712. Documents pertaining to this case show that the Jicarilla of La Hoya, like those at Taos, were closely involved with the local residents, visiting them often, staying in their houses, and hiring their servants for various kinds of labor.

At some point between the 1760s and 1770s, one of the two groups (possibly the Las Trampas band) left the area to take up residence with the Utes in the San Juan Mountains (Gunnerson 1974:250-251). By this time, the Ute and Comanche alliance was broken, and the Apaches increasingly paired up with their Ute friends in retaliatory raids against tribes that were still hostile to the Crown. The Jicarillas were reported with the Utes north of Taos in 1779 and assisted Juan Bautista de Anza in his final defeat of the Comanche soon after. In 1818 they were found again with the Utes west of the Río Grande by Americans traveling through the area (Thomas 1929). After the 1840s, they were regularly reported in the Tusas Range and Chama Valley region. Referred to as the Dachizhozhin or Nachizhozihn this group of so-called “renegades” maintained a headquarters north of El Rito throughout the remainder of the historic period. In the middle of the nineteenth century, they were led by a man named Panteleón who was identified as a principal leader of the Olleros after 1840.

The La Hoya group, later known as the Saitinde maintained their camps in the vicinity of Cieneguilla until the middle of the nineteenth century. Early information regarding these Apaches comes from Hispanic land grants dating to the period. In 1795 Governor Fernando Chacón made a community grant to 20 petitioners of a tract of land bordering the Río Grande above the Sebastian Martin grant. Grant boundaries extended northwest from Cieneguilla to the summit of Picuris Mountain and the Río Hondo. Although no prior mention of Jicarilla occupation was made at the time of the original petition, the Jicarilla chief Espilin claimed that the Cieneguilla town site was the location...
of his group’s farming villages. In 1822 Espilin petitioned and was granted permission to reside with the settlers by Governor Fecundo Melgares. A report by the settlers protesting the Jicarilla request admitted that they had planted small pieces of land at Cieneguilla prior to making the grant, but that they had no legal claim to the land following the conquest of New Mexico by Juan de Oñate. To support their case, the settlers complained of various acts of violence and other injuries committed by Espilin’s group in league with the Llaneros, who by 1801 and after a protracted chase in the Picurís mountains by Spanish forces, had re-established themselves in northeastern New Mexico under the protection of the Crown.

Implicated in some of the attacks committed by Espilin’s band was a man named Captain Francisco who was accused of killing cattle. In an earlier 1818 document, Francisco was listed as a “chief” of the Jicarilla who was involved in a possible uprising stemming from the murder of several Jicarilla by the residents of Taos. This person was probably none other than Francisco Chacon, a famous leader of the Olleros during the 1840s and 1850s. Apparently, the Jicarilla lost their legal battle for Cieneguilla, for in May of 1849, Chacon and his extended family of 16 lodges was found by Sergeant James A. Bally of the U.S. First Dragoons camped at the edge of the Cieneguilla land grant in the vicinity of the Agua Caliente near the northwest corner of the present Picurís Pueblo boundary. A related camp of 30 lodges, also led by Chacon, was located near Ojo Sarco south of Picurís. The total number of individuals in both bands was in excess of 100 people. Bally was concerned that the Picurís Olleros were involved in “depredations” then being committed by their Llanero kinsmen in league with Hispanic rebels at Mora following the Taos Revolt of 1847 (Bender 1974:21).

Hostilities and outbursts by the Llanero continued along the Santa Fe Trail and Las Vegas until 1854 when the Americans finally declared war on the Jicarilla. Although there is no evidence that Chacon’s band was involved in any of these raids on the plains, they soon found their Agua Caliente camps under siege by the First Dragoons from Cantonment Burgwin. In the ensuing battle, 22 soldiers were killed, another 23 were wounded, and 45 horses were lost. This resounding defeat led to the closure of Cantonment Burgwin and ultimately to the resettlement of Chacon’s band of Olleros west of the Río Grande following their surrender several months later. Despite the best efforts of their agents, however, the Jicarilla continued to be regular visitors to the Taos valley. An 1858 memo by Kit Carson reported that the residents assisted the Jicarilla “by purchasing their earthen ware, willow baskets and paying for their labor” (Bender 1974:70), and in October of 1867, the Indian agent for the Jicarilla Apaches, William E. M. Arny, reported that the Saatinde of Abiquiu included some families who had just returned from La Junta (near Picurís) where they were involved in making pottery for trade with the Mexicans (Garland Publishing, Inc. 1974:205).

These and other historic documents demonstrate that the Jicarilla presence in the Taos area was complex and long-lasting. Permanent occupation spanned over 130 years, from 1722 until 1853. During the mid-1700s, the Jicarilla enclave constituted around 15 percent of the total population although their numbers probably never got above 200 permanent residents. On numerous occasions the Jicarilla assisted their friends and allies, joining forces in the Pueblo Rebellion against the Spanish and later in the 1847 Taos Rebellion against the Americans. They facilitated several spectacular escapes from Taos and Picurís when rebels in these Pueblos sought protection from Spanish abuses, and they defended their Spanish neighbors from Ute and Comanche attacks. During the initial phases of their settlement in the Taos region, the Jicarilla were involved with the Romero clan and other Hispanic villagers in the Ranchos de Taos area, establishing camps along the Río de las Trampas and Río Chiquito by 1722. After the break-up of the Comanche and Ute alliance and the movement of the
Llaneros back to *La Xicarilla*, the Taos contingent appears to have split up, with some of them moving to the San Juan Mountains, while still others shifted their settlements closer to modern day Pilar and Velarde. Upon loosing their bid to occupy the Cieneguilla land grant, the Olleros moved closer to Picurís Pueblo and Ojo Sarco where they were found by American forces in the 1840s. As noted above, this area in turn became the site of one of the most decisive Indian victories in the history of American occupation of New Mexico.

The Jicarilla were important to the local barter and exchange economy of Taos as well and were critical to the survival of small land holdings and villages. This is evident in historic documents, settlement pattern, and material culture. Settlements were located on the fringes of or within the communal portions of major land grants and also along major commercial routes, either the Camino Real through Taos or near the Apodaca and related trails leading into the valley. The economy was focused primarily on exchange with the Pueblos and Hispanic villages in addition to sheep herding and farming on Hispanic ranches and in plots of unclaimed lands in tributary streams. The archaeological expression of Jicarilla occupation of the Taos area is known only superficially but includes evidence for farming, hunting, pottery manufacturing, and trade.

**JICARILLA ARCHAEOLOGY OF THE TAOS REGION**

In 2007, the Southern Methodist University (SMU), Department of Anthropology initiated a multi-year archaeological research program focused on the history and environments of the Taos area. Supported in part by the SMU-in-Taos Fort Burgwin archaeological field school, this program uses archaeological data, historical documents, and ethnographic information to investigate the multi-ethnic history of Taos, the evolution of Hispanic society, and issues of power and identity in the colonial frontier. A major goal of the research is to expand our understanding of the Jicarilla Apache occupation of the area, specifically the emergence of the Jicarilla Apache enclave in the Taos area and its subsequent development leading up to U.S. control. This focus on the Apaches fills an important gap in our understanding of Taos history and the hidden influences of Jicarilla culture in historical narratives of the region. It also fills an important gap in our understanding of Jicarilla society. I have argued elsewhere that the emergence of the Jicarilla enclave was a major turning point in their history (Eiselt 2006). Ethnohistoric records and archaeological evidence suggest that enclavement was a sophisticated political strategy with roots in the diplomatic ties and relationships stemming from Plains-Pueblo interactions that later became the basis of their moiety system. This strategy enabled the Jicarilla to retain and even elevate key aspects of their economy and society and to rapidly adjust to the unfolding conditions of contact.

The enclave archaeology project for the Jicarilla investigates these political and social strategies as extensions of earlier patterns of Plains-Pueblo trade and associated social connections. A second goal is to investigate Jicarilla land use and ceramic production in relation to Hispanic settlement and village economy. Patterns of exchange between women and the barter network of the region is a major focus of this research. This work includes non-destructive survey and mapping of Jicarilla sites, and documentation of Jicarilla trade and ceramic manufacturing through excavations at Hispanic archaeological sites and geochemical analysis of pottery sherds. Research at Taos is a continuation of earlier work in the Chama Valley (Eiselt 2006). The Chama Valley research documented key aspects of the Ollero enclave after these bands were moved to their agency at Abiquiu.

Jicarilla research at Taos also builds upon earlier studies conducted by Southern Methodist University. During the 1980s Ann Woosley and Jeffrey Girard recorded 93 archaeological sites containing micaceous pottery that may be attributed to the Apaches (see Girard 1988; Woosley and Olinger 1990) (Figure 1).
These sites also contain historic Pueblo ceramics, lithic tools and debris, metal arrow points, rock rings, and clusters of rock piles. Chemical analysis of ceramics revealed a broad signature likely representing multiple clay sources. As demonstrated in the Chama Valley, the pattern of clay-source utilization is consistent with an itinerant pottery producing tradition where raw clay was transported with the aid of the horse (Eiselt 2006). The locations of Taos valley Apache sites also are consistent with our findings in the Chama Valley and elsewhere. They are situated on exposed ridges above open grazing lands, and in upland settings with good vantage points and good access to permanent streams or intermittently flowing drainages. Moreover, these sites appear to be located in the communal portions of land grants and in public lands between grants, as in the Chama.

The Woosley surveys were well-situated to locate early Apache sites along the northern slopes of the Picurís
Mountains and in the tributary drainages of the Río del las Trampas (Río Grande del Rancho). Many of these sites probably date to the late colonial period, although subsequent survey by SMU has identified nineteenth-century camps and occupations dating to the establishment of Cantonment Burgwin. All of these sites are currently being revisited and documented with the goal of establishing additional identifying characteristics of sites and dateable assemblages. Survey collections also are being re-examined for their potential inclusion in an expanded geochemical study that includes historic Pueblo plainware ceramics and additional clay source survey. Ceramics from our excavations at the Ranchos de Taos Plaza are included. These pottery collections represent Hispanic consumer assemblages. Most of the ceramics recovered so far are Indian made and nearly 50 percent of the micaceous ceramic rim fragments can be attributed to the Jicarilla. Additional evidence for trade with the Apaches includes a single metal arrow point. With input from Picurís Pueblo, we hope to re-examine Herbert Dick’s collections from the historic pueblo that are currently housed at Fort Burgwin. This collection would help us to understand additional aspects of trade with Pueblo people that complements our work on the plaza. Initial examination of the collection revealed numerous Jicarilla micaceous ceramics including Ocate and Cimarron Micaceous types (Eiselt 2006).

Finally, we are interested in mapping the cognitive and cultural landscape of the Jicarilla through the development of a comprehensive rock art recording project. Our rock art study focuses on survey and documentation of archaeological sites on Bureau of Land Management (BLM) property east of Rinconada and Pilar where late eighteenth-century Jicarilla camps are reported in historical documents. Volunteers working for BLM already have recorded possible Apache rock art in this area, and additional work by SMU in 2007 identified tipi ring encampments that appear to predate the nineteenth century. We also have recorded possible Jicarilla rock art in the Rio Grande gorge in the vicinity of the rolling rock shrine mentioned above. This work is currently being expanded by Severin Fowles of Barnard College. Although at this time we cannot eliminate Ute or Comanche origins for the rock art, site distributions are nonetheless concentrated in areas of known Jicarilla settlement. Rock art themes, motifs, and techniques are distinctive and include horses and battle scenes, tipis and tipi camps, and parfleches with geometric designs (Figure 2). Earlier motifs tend to be pecked and abraded, whereas later motifs are scratched, probably with metal tools. Jicarilla rock art documents, in part, their perceptions and responses to state domination and religious conversion.

In sum, our Jicarilla archaeology program is currently focused on site documentation and inventory of known and possible Apache sites using non-destructive pedestrian survey and collections analysis. This research will help us to develop a better understanding of Jicarilla site structure and site contents, the distribution of sites, and chronological indicators of settlement. Evidence for trade and other aspects of the economy also are being recorded. Survey is located in areas of known Jicarilla settlement, much of which is on BLM land. Ongoing research not only assists the BLM in achieving some of its management objectives, but also promises to expand our appreciation of Jicarilla society and archaeology while contributing to a broader research agenda on the multi-ethnic history of the region. The emergence and development of the Jicarilla enclave is a major focus of research that examines settlement, economy, landscape ideology, and other social interactions with settled villages and American military forces.
CONCLUSION

The Jicarilla Apaches helped to shape the history of the Taos region and they consider this area the center of their world. The adventures and exploits of their most important culture heroes took place here and are recorded in the stunning landscapes and natural wonders that attract thousands of tourists each year. Their sacred sites and holy places speak to a hidden history that is easily overlooked by residents and archaeologists even though they are an important component of Jicarilla religious practice today. Apaches were regular visitors to the valley during the initial phases of Spanish contact and they assisted their Pueblo allies in resisting Spanish authority during the 1600s, but permanent settlement of the area really begins with the establishment of the Jicarilla enclave in 1722. This occupation was significant and long-lasting. Major villages were located at Las Trampas and Cieneguilla where the population was relatively large. Hundreds of individuals, most of them Olleros, lived in scattered camps in these and other locations until the mid-1850s. The 130-year occupation of the Taos area is reflected in the archaeology of the region, and previous and ongoing survey demonstrates this, although more work is needed to document the distinctive aspects of the Jicarilla record and establish good settlement chronologies.

Figure 2.
Example of possible late-period Jicarilla Apache rock art in the Rio Grande Gorge. Elements 3 through 7 represent parfleches with geometric designs that are scratched into the patina of a basalt boulder in the gorge. Elements 1 and 2 appear to be Archaic in origin.
The SMU-in-Taos archaeological research program seeks to expand our understanding of Jicarilla history and the role of the Jicarilla enclave in sustaining local economies and villages through trade and mutual defense. This multi-year and interdisciplinary project would not be possible without the help and support of Paul Williams, and our efforts are aimed at developing the type of archaeology that exemplifies his characteristic dedication to the region. Our vision, based on his example, brings together the resources of university faculty and students, community leaders, private land owners, and local, state, and federal government agencies to preserve and elevate Taos heritage and culture. Although this review has focused primarily on the Apaches, archaeological programming is broadly conceived to incorporate Hispanic, Pueblo, and Anglo histories as well through community-based research and education in the Ranchos de Taos Plaza and neighboring communities and schools. Like Paul, we believe that cultural heritage research has a positive role to play in these communities and that local scholars and residents are vital partners in these efforts. They help set the agenda for our research and constitute some of our most enthusiastic supporters. Currently at SMU, we are benefiting from Paul Williams' "army of volunteers" as they are sometimes called, and look forward to working with them more in the future on this and other related heritage projects.

ENDNOTES

1. Other versions state that White Shell Woman was the mother of Killer-of-the-Enemies and that White Painted woman gave birth to Child-of-the-Water (Opler 1938:58). These two women were either sisters or mother and daughter (Goddard 1911:196), but were frequently referred to as grandmother in nearly all cases of the story.

2. Residents of Taos Pueblo and Ranchos de Taos have used this source until recently for white-washing the interiors of adobe houses. The sparkling white clay is applied to the interior walls for decoration.


4. Documents dating from the early 1800s reveal some of the emerging tensions between local residents and their Ollero neighbors following the return of these once hostile bands. Seeking protection from the Comanches, the Llaneros sought and won the assistance of their Apache relatives at Taos, eventually settling in northeastern New Mexico where they remained until the 1880s. After this point, the Llaneros were more closely affiliated with Taos Pueblo and the Olleros with Picuris (Parsons 1936:12).

ACKNOWLEDGMENTS

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BACKGROUND

Mesa Prieta, which is also called Black Mesa and Canoe Mesa, is located between Chamita and Embudo, New Mexico, on the west side of the Rio Grande. It is formed from 2.8 million-year-old basalt that flowed south from the Taos Plateau and covered Santa Fe group sediments and sandstone deposits (Chronic 1987:137-138). The lava cooled into columnar shapes, cracked, and darkened with desert varnish to a reddish-brown of various shades. From a distance the basalt appears black at certain times of the day. Natural processes, including gravity, earthquakes, and erosion of the underlying, unconsolidated sediment, have resulted in basalt boulders covering the sides of the mesa. During the past 7,000 years, people from different cultures have pecked or cut the surface patina on the upper bedrock or the free-standing basalt boulders to produce images or glyphs and ground cupules. Older petroglyphs have been re-patinated but recent carvings stand out as light figures in a dark rock matrix.

Katherine Wells moved to New Mexico in 1992 and purchased 188 acres on the east slope of Mesa Prieta precisely because of the presence of petroglyphs and her desire to protect them from destruction and vandalism. Paul Williams met Katherine that year by accident and informed her that the Archaeological Society of New Mexico’s Rock Art Field School directed by Jay and Helen Crotty was seeking a new recording site. Katherine volunteered her land and the inventory and recording of petroglyphs on her property began in 1993. The success of this project and her recognition of the great number of glyphs elsewhere on the mesa spurred her to begin a project to record as much as possible there. Undaunted by the scale of the project she enlisted adult volunteers to assist on private lands where she had permission to trespass and, since 2002, middle school and high school students from the area, mostly Hispano and Pueblo, to participate with the recording. A major portion of the land on the 22 mile long mesa is managed by the Bureau of Land Management (BLM) and the cultural resources are the administrative responsibility of Paul. His interaction with Katherine is a very fortunate convergence of interests.

Since Paul first came to the Taos office of BLM, he has had an interest in public education and the public’s participation in archaeology. He revitalized the Taos Archaeological Society and coordinated numerous meaningful field projects, including recording petroglyphs, by its members. He became well acquainted with the archaeology of the Ojo Caliente area and the spectacular sites on BLM property. When Katherine Wells contacted Paul about youth recording petroglyphs, he saw the petroglyph recording project as an educational outreach by the BLM to youth in the area and a new extension of Ojo Caliente archaeology to rock art. The impact on Paul’s professional life was immediate, as one would expect. As part of his goal to protect the cultural properties of the Ojo Caliente area, Paul devised the “Tewa Homeland” Project and incorporated his recently recorded petroglyphs from Mesa Prieta into that master plan. Katherine’s goal to record all the rock art on Mesa Prieta began with the 6,000 or so glyphs on her property. About 11,000 glyphs, including those surveyed by the youth on BLM property, have now been recorded. It is estimated that there are 20,000 on the mesa. Paul and Katherine continue to
work together on youth education through hands-on participation in archaeology and to protect the archaeological resources of Mesa Prieta through petroglyph surveys, careful recording of sites and artifacts, and potential purchases of archaeologically sensitive land.

As the two professional archaeologists continuously associated with Vecinos del Rio Youth Rock Art Recording Project, Paul and I have treated the discoveries as we would any archaeological inventory. First, we had to develop a working chronology of the petroglyphs. Second, we had to recognize how they were produced. Third, we had to discern their distribution in space.

Building a chronology of petroglyphs on the mesa has been based upon a general dating of archaeological sites based upon comparative artifact analogy and the subjects of the glyphs. The earliest archaeological culture appears to be Folsom, based upon one campsite and scrapers from the northern end of the mesa. There is no recognized rock art from this period. There are scattered surface finds of Early Archaic (5000 B.C.-3000 B.C.) points and there are abstract images usually associated with shamanistic practices and deeply repatinated cupules from this time period. The later Archaic (3000 B.C.-A.D. 400) has several sites, scattered points, and petroglyphs in direct association. These petroglyphs have spirals, concentric circles, footprints, and the first serpents. However, the sites are unexcavated and lack radiocarbon dates. All dates are relative based on cross-dating of projectile points, the extent and depth of the desert varnish, and the amount of lichen growth over some of the petroglyphs.

The first ceramic sites (A.D. 500-A.D. 1150) are very few in number. The petroglyphs are the same as those in the latest Archaic but add lightning symbols and serpents. By A.D. 1200 the petroglyphs are more numerous, larger, and obviously ceremonial with costumed figures, elaborate shields, phallic fluteplayers, large hands, animals, two-horned serpents, and primordial figures. These are Ancestral Pueblo (A.D. 1150-A.D. 1598) identified by large agricultural communities characterized by Rio Grande Style petroglyphs (Schaafsma 1992:87-91). By A.D 1598 the Historic Tewa are identified in Spanish accounts and the presence of European artifacts and horse glyphs reflects a major cultural change. The post-Pueblo Revolt period witnesses petroglyphs made by Spanish and later Mexican settlers and probably Genizaros. The glyph inventory changes entirely with many Christian religious symbols, especially a variety of crosses, horses, churches, and secular topics like fandangos and figures in colonial dress. Schaafsma (1992:148-155) recognized Hispanic rock art and its distinctive subjects. This period is the subject of my essay.

Recently, Paul Williams has contributed another previously ignored culture that made petroglyphs. It is the Jicarilla Apache (A.D. 1640-A.D. 1890), recognized by their stylized horses and perhaps tipis and battle scenes. The final historic petroglyphs, usually modifications of earlier Pueblo images, are mid-to-late twentieth century petroglyphs carved by Anglo residents (A.D. 1945-A.D. 2005).

The production of petroglyphs parallels the cultural developments reflected in the chronological changes. Before A.D. 1598, most are made by different degrees of pecking, most apparently with quartzite cobbles struck directly on the basalt surface as a hammer stone or by indirect percussion with a hard cobble and a quartzite or hard antler (?) stylus. After the Spanish arrived metal tools were added to earlier techniques to produce images. With metal tools they could scratch, abrade, and carve basalt surfaces as well as make deeper pecks. All characterize the techniques of historic petroglyphs.

The distributions of petroglyphs on the landscape are culturally dependent. During the Archaic periods the petroglyphs are in hidden locations, mark trails and water sources, and are the first glyphs on multi-cultural shrines. The Pueblo locations for petroglyphs duplicate the pre-agricultural distributions but add field borders, society shrines, and coming of age places with most of them facing east. In contrast, the Jicarilla petroglyphs are along trails and mark water holes and campsites, or create shrines.
The Spanish and Genizaro petroglyph locations are different from Native Americans but are also patterned and predictable. They are not random on the landscape or graffiti on Indian shrines. The historic petroglyphs can be divided into religious symbols and secular images. Crosses are used to mark trails or religious pilgrimage routes and to protect lamb pens. Most crosses were made by herdsmen or others away from home hunting, trading, or cutting firewood. Some individual Christian crosses are personal descansos made on Holy days or mark locations of prayer by men living in the hinterland. Others are made around campsites and have Penitente religious symbols or names, initials, and dates.

Christian crosses are found on basalt boulders that were previously marked with Native American petroglyphs from one or many cultural time periods. These glyphs have been viewed as graffiti to mar earlier glyphs. There is little evidence for this because the crosses are mostly additions to the faces and rarely cover the earlier images. Moreover, it has been argued that they represent the domination of Christianity over pagan beliefs. This is possible but their placement in the interstices of the glyphs and not over them does not support this position. The exception is the Abiquiu area where Father Juan Jose Toledo and Alcalde Carlos Fernandez, in 1763 and later, exorcized rock art and encouraged congregants to obliterate petroglyphs or to cover them with crosses to reflect the importance of Christianity over idolatry (Ebright and Hendricks 2006:15). However, a better explanation for crosses on Pueblo shrines is that these crosses were placed there by Genizaros who recognized these stones as powerful places and believed in the power of the Cross as a symbol of Jesus. The boulders were appreciated as ancient shrines with power in their own right where they had seen Pueblo friends worship. The addition of the Christian cross brought more power to the shrine and acknowledged the spirit of Jesus to help those who worshipped there.

Secular historic petroglyphs are wide ranging in subject matter but are also usually located away from the home. They can include boundary markers and texts, livestock—horses and cattle, costumed people, colonial activities including feeding a possible goose, mining, a fandango, wagons, and even crude attempts to copy Pueblo petroglyphs. It is not surprising to find one or more of these on boulders in rangeland or at remote campsites near springs or on hilltops.

**HISPANO-GENIZARO IDENTIFICATION**

When we first began to recognize hundreds of historic petroglyphs on Mesa Prieta, their identification as Hispano was certain because of the religious subjects and the metal tools used to make them. The light repatination confirmed their recent origin. The surprise came when we began to find a new type of ceramic directly associated with the glyphs. It was unlike any of the historic Pueblo wares. The pottery has not been formally defined, but it is found with shepherds' camps and lamb pens. The sherds are a highly burnished yellowish-tan inside and out, and forms are mostly bowls or small ollas. The necks have a red band that is polished to a degree that it appears as a glaze. The highly fired pottery produces very hard sherd that can be used as a tool to scratch basalt to make glyphs. A small informal conference consisting of Dr. Charlie Carrillo, Dr. Sunday Eiselt, professional potters Felipe Ortega and Debby Carrillo, and I examined the pottery and informally named it “Genizaro ware.” Subsequently it has been found in a nineteenth century colonial site excavated near Lyden by Dr. Heather Trigg. The discovery of this pottery in direct association with petroglyphs led us to conclude that some of the Christian religious petroglyphs were made by Genizaro herdsmen. However, since it is impossible to distinguish them from Hispano artists, we can only speculate that some of the historic petroglyphs were made by Genizaro men.

There is support for this as a reasonable conclusion because so many of the herdsmen in the Mesa Prieta area were from an Indian background. Genizaro-ra (Genizaro-ra) is a social category in the complex racial
classification of colonial Spanish and Mexican New Mexico. Basically the term refers to de-tribalized Indians who were raised as Catholics in Spanish-speaking households after being captured, rescued, or purchased from nomadic tribes. After a period of time, they could be freed from their chores, but many who were the offspring of Spanish men and their Indian servants chose to stay in their domestic roles in the household. Some freed men lived in barrios in colonial towns and were soldiers for colonial authorities (Cobos 2003:113, 129).

United States Census records for nineteenth century communities between Taos and Española reveal that many of the rich families—as measured by the number of livestock, especially sheep, they owned—had male Indians of nomadic background serving as herders in the household. As inaccurate as these early citizen records are, they do suggest that many herders were Genizaros. Furthermore, some were members of the lay Catholic religious order, the Pious Fraternity of Our Father Jesus Nazarite, or Los Hermanos Penitentes where their Catholic faith was reinforced and not questioned as some were by the Inquisition a century earlier. In the twentieth century, Hispano herders who worked for sheep owning families were from Genizaro backgrounds even if not acknowledged.

The petroglyphs on Mesa Prieta and elsewhere in northern New Mexico are a male folk art. The location of the glyphs and their individual style of production suggest that they were made by single men far from home and outside the areas where women usually traveled. Recent surveys away from Mesa Prieta recall a similar well recognized but misunderstood male folk art. It is the dendroglyphs or aspen art found in the high mountains bordering the Rio Grande trough, which are often attributed to Basque sheep herders who make similar bark carved art in the Great Basin. In northern New Mexico, most carved aspens were made by Spanish-speaking herders, although some may have Basque heritage. In the Tusas Mountain area Hispano herders make dendroglyphs in the summer when the sheep graze in the high valleys above Hopewell Lake and they produce petroglyphs in the winter when the herds are back in the lower river valleys and on local pastures.
CHRISTIAN RELIGIOUS SYMBOLS

Some of the more common historic petroglyphs throughout the Rio Grande valley are Christian crosses. The most familiar is the Franciscan cross, which is a common cross atop a globe. The globe represents the world and together this figure symbolizes the conquest of Christi-
Star (i.e., the five wounds of Christ), fish, and crosses inscribed on boulders surrounding the place where Holy Week crosses had been erected. It is also recognized by the petroglyph of three crosses together on a boulder high on hillsides facing east. This represents Golgotha (Calvary) hill where Jesus and two criminals where crucified together outside the city of Jerusalem. A previously unrecognized archaeological site type is ceremonial caves, which are hand dug into the sandstone of the Santa Fe group underlying the basalt mesa cap. A dozen have been located in the Mesa Prieta area. The caves are only large enough for one to three people to enter together. The walls of the cave have Christian crosses carved into the soft sandstone at different times (probably years) during their use. A few individual crosses are painted red with ground red ochre. Obviously, the Christian belief of the Holy Sepulcre comes immediately to mind, where, following Hebrew tradition, Jesus’ body was placed in a hand-excavated grave tomb. On Mesa Prieta these are reputed to be old Penitente religious chambers.

**SECULAR COLONIAL SUBJECTS**

The lands of colonial settlers were administered by Spanish government officials and later by Mexican authorities until the Americans took hegemony in 1848. Very few administrative petroglyphs have been found but two are known. One is a boundary marker with the Lion of Spain on it (Figure 7). The second is a text dating possibly March 1780 and signed by Jose Miguel Quintana. The content is poorly translated but may be a land claim (Figure 8).

Livestock were important to colonial settlers. While no petroglyphs have been located depicting their numerous sheep, there are many well executed of horses, sometimes with male riders wearing distinctive hats, and long horned cattle.

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**Figure 6.**

Looking into the opening to a so-called Penitente cave. Typical of others on Mesa Prieta, they are hand dug into Santa Fe group sandstone and all have Christian crosses carved into their walls.
Figure 7.
Royal León. Possible colonial boundary marker.

Figure 8.
"Jose Miguel Quintana," perhaps carved in March 1780.
The text has only been partially translated.
On the upper right side are two figures that are a colonial male and a colonial woman with a very full skirt.
There is also a Christian cross that is earlier than the text.
The historic glyphs are covering pre-Contact, Ancestral Pueblo petroglyphs.

Figure 9.
Horseback rider with hat.

Figure 10.
Steer pecked with metal tool.
Colonial activities are recognized. Mule deer neatly incised on boulders have been located. Perhaps they relate to hunting. A more obvious activity is a colonial woman possibly feeding grain from a basket to a putative goose.

Another is a horse-drawn wagon. There is a *fandango* colonial dance on one boulder. Legends persist in northern New Mexico that Spanish gold and Indian treasure are buried on Mesa Prieta. Many stories relate to relatives finding them only to forget the location. A special petroglyph solves the problem. It is a miner with a shovel pecked on a boulder overlooking a hole that has been dug open and filled again many times. It misleadingly advertises to “dig here!”

There are several petroglyphs where the artist attempted to copy Pueblo petroglyphs. One depicts a sun-like figure similar to katsina figures found on the mesa. Oversized hands rising from within boulders are known in several pre-Contact mesa locations. These are shrine areas and the hands are associated with Pueblo curing. A single large hand in Pueblo style has been located made by scratching with a horseshoe, which is still resting near the basalt boulder.

*Figure 11.*
Colonial dressed woman feeding a goose.

*Figure 12.*
“Dig here!” Worker with hammer and shovel.

*Figure 13.*
Horseshoe-scratched copy of an ancestral/ceremonial Pueblo hand.

Are there pornographic petroglyphs? It depends upon your definition of same. I have pointed to a parallel between dendroglyphs and petroglyphs but there are distinct differences. Aspen art is characterized by initials enclosed in hearts and some busty women. Neither has been found in Hispano-Genizaro petroglyphs. The one exception is phalli, which are numerous in the Pilar area and appear to have been carved into basalt by the same artist. Nothing similar is known from Mesa Prieta or elsewhere.
CONCLUSIONS

Historic petroglyphs produced by Spanish-speaking men are a previously unrecognized folk art in New Mexico. They are found where men left their homes to herd livestock, to trade, to hunt, and to cut firewood. Although some are found close to farms and ranches, most are discovered by going into the hinterlands. The subject matter includes many religious artifacts dominated numerically by Christian crosses. Penitente symbols are quite common as are those that mark where the Brothers held Holy Week ceremonies and pilgrimages.

Historic petroglyphs are a unique complement to documentary evidence and oral history about life in colonial New Mexico and rural happenings. Glyphs record a visual history of rural life in the eighteenth to early twentieth centuries. Pictures of men and women in their common dress are found. Some put their names, initials, and even the dates they drew the images. Activities of the time periods supplement written records but are found in places where documents are unavailable.

Paul Williams, through the BLM, made it possible to survey remote areas where many of these petroglyphs are found. Many would remain unknown today if not for Paul’s administrative foresight and his field archaeological example. Without Paul the variety of historic petroglyphs described here would still be unknown.

Despite these exciting rock art discoveries, much remains to be done to explicate them. We must still distinguish between Hispano and Genizaro petroglyphs. We need to differentiate the petroglyphs and the subjects they depict by decades rather than occurring within a 250 year period. A start has been made to illuminate an important and fascinating subject but much more specific history can be teased from the data.
ACKNOWLEDGMENTS

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Schaafsma, Polly
CAMINOS ANTIGUOS: HISTORIC TRAILS, ARCHAEOLOGY AND HISTORY IN TAOS

“Historic trails are simply long, narrow archaeological sites, and should be studied as such.”

—Paul Williams

From the beginning of Spain’s colonization of northern New Mexico in 1598, Taos Valley was a magnet for Spanish settlement. The valley was endowed by nature with everything needed for success. Six stream systems converged in it from the surrounding mountains. Abundant water from these snow-capped reservoirs created a potential agricultural oasis in an otherwise dry environment. The soil in the valley was potentially rich with many thousands of acres subject to surface water irrigation. It had an adequate, if short, growing season. Abundant grasslands could support cattle, horses and sheep. Wild game was plentiful.

Taos Valley was also near the plains of northeast New Mexico. This promoted local trade with the nomadic tribes of that area. Trade opportunities were certainly equal to those at Picurís and Pecos.

Finally, others had already proved the valley’s potential. The Taos Pueblo people had occupied it for several centuries before Spain’s colonists arrived. The new arrivals from the south likely felt that expansion of existing irrigation systems, crops and livestock could make the valley even more productive. They were right. Eventually, after years of struggle, Taos Valley became the breadbasket of northern New Mexico.

TRAILS THROUGH THE MOUNTAINS

Reliable access to Taos was essential for Spanish, Mexican and later American commercial and military purposes. Fortunately for the early Spanish colonists, the Pueblos and other Native Americans had already pioneered many of the needed trails. When the Spanish arrived, well established paths linked Picurís to San Juan and other southern Pueblos (Bolton 1949). Well worn trails also linked Taos Pueblo to pueblos, now abandoned, in the Chama Valley. Others allowed travel from Taos to the Apache tribes on the eastern plains and the Navajos to the northwest (Hendricks and Wilson 1996; Thomas 1935).

Thus the first trails to Taos used by Europeans were the existing Native American ones. Most were usable on foot or horseback only. Particularly in Taos, the limits of geography forced Indian and Spanish trails to take similar routes. Indians needed only footpaths; the Spanish had to bring horses, livestock and small carretas in and out of the valley. Under Mexico, increased commerce between Taos and Santa Fe required even better roads. This need only grew under the United States. Over the years the trails evolved to meet these changing needs. Some were used well into the 1900s. They are likely among the oldest continuously used roads in the United States.

FINDING THE OLD TRAILS

Fortunately for history, the mountains and high mesas around Taos have protected remnants of many long
forgotten trails. Finding and studying them can tell us much about the people who used them, as well as the dates and purposes of use.

Finding and identifying the old trails involves a combination of research, field work and archaeological study. The most important piece of the puzzle is historic documentation. For trails in the Taos area, there is precious little. But there are, from the early 1700s to the late 1800s, some useful documents. Spanish military campaign journals, official reports, diaries and published accounts of travel over the trails have survived (Hammond and Rey 1940, 1943).

For example, Spanish soldiers kept excellent journals. Although usually brief, they almost always recorded distances, direction and important landmarks. The following is part of the campaign journal of one of Vargas' most experienced and trusted military commanders, Roque Madrid. In July 1705, he left the Pueblo of San Juan on a punitive expedition against raiding Navajos. His campaign journal has survived, and been edited and published by Rick Hendricks and John Wilson as *The Navajos in 1705: Roque Madrid's Campaign Journal* (1996). According to the editors, his force was sizable: up to 100 Spanish soldiers and settlers, 300 or more Pueblo allies, and 700 horses. Apparently no wagons were used.

Madrid's force did not go through Taos Valley. His goal was Navajo country in northwest New Mexico. However, the journal shows his second day's travel took him from the area of Velarde over Embudo Pass to Picuris. On the third day, August 2, he marched northwest from Picuris to Cieneguilla. He described the day as follows, at page 13:

On the second day of said month and year, I set off, marching with my company, struggling through a land of very difficult terrain because of the many rocks and woods. Arriving at a spring called La Cieneguilla I learned that the reverend father chaplain was awaiting me there. He had been appointed chaplain of my company by the very reverend father vice-custos, Father Fray Francisco Jimenez, who is in charge of the mission of the pueblo of San Geronimo de Taos.

I ordered my company to march ahead and went to see the reverend father. Forty Indians of the Taos nation joined us at that place, whereupon I examined their weapons, because they had not passed muster in the plaza de armas. I found them to be adequate, for which I was thankful, and took the route of my company in order to overtake them. I joined them in the gorge, on the banks of the Rio del Norte. We crossed it with great difficulty and manifest risk to our lives, which God was pleased not to endanger. Once the whole company had crossed, I set up camp on a narrow bank with much tanglebrush and little pasture, because there was no more suitable place to halt. I traveled six leagues that day.

While this journal entry is far from clear, it indicates that a trail up Cieneguilla Creek to Taos Pueblo from Pilar was in use by the Spanish at least as early as 1706. Madrid's "Cieneguilla Spring" was clearly near Pilar. There are springs in present Pilar, at the mouth of Agua Caliente Canyon, and also 2 mi up Cieneguilla Creek towards Taos. Madrid met his chaplain in one of these locations. The Agua Caliente is about .75 mi up Cieneguilla Creek from the Rio Grande. What is now called Apache Spring is about 2.5 mi up the creek. Madrid apparently sent his command down Cieneguilla Creek to the river, while he met with the chaplain and inspected 40 Taos Indians. To get to any of the likely meeting places, the party from Taos Pueblo must have followed the trail across Taos Valley and descended Cieneguilla Creek. No other route would have put them at the spot where they met Madrid.

One important fact of this day's journal is the distance recorded. Madrid says he marched six "leagues." Hendricks and Wilson (1996), on page 65, note that Madrid's distance measurements were not consistent. They tended to average about 2.8 mi per league. Thus the recorded march from Picuris to "Cieneguilla Spring" and the meeting with the Taos group, then back to a campsite across
the Rio Grande at Pilar was 16.8 mi. This distance, by any of two or three possible trails, is slightly too far for a march directly from Picuris to Pilar. However, the distance is quite close if the assumption is made that Madrid's “spring” was the one 2 mi north of where he struck Cieneguilla Creek at the mouth of Agua Caliente Canyon. This distance not only fits, but it explains the need for Madrid to make a short side trip to meet with the Taos group. It also makes sense that a party of 40 Taos Indians would want to wait for Madrid some distance away from his line of march in order to avoid being mistaken for hostiles.

Thus while Madrid’s journal tells us nothing about the exact route of the trail from Taos Pueblo down Cieneguilla Creek in 1706, it confirms that the trail was well known and used by both the Taos Pueblo people and the Spanish.

Unfortunately, early Spanish maps are not very helpful. Most are simply not very accurate. But they can be helpful in showing the general location of routes of public travel, e.g., Miera y Pacheco's 1779 map in Dominguez (1956:387). Later maps, especially after 1846, are more accurate and very useful. The best are the Wheeler Survey maps from 1876–77. A complete set of the Wheeler maps for Taos valley is available in the map collection at the Palace of the Governors in Santa Fe.

Spanish land grant surveys and survey notes are also invaluable. In many early grants in the Taos area, the grant boundaries were the existing major roads in use at the time. For example, the west boundary of the 1714 Gijosa Grant was the “middle road to Picuris.” Similarly, the 1710 Cristobal de la Serna grant’s west boundary was the “Taos to Picuris Pueblo road.” When these grants were professionally surveyed by the US government in the late 1800s, these roads were accurately located and mapped. The surveyed boundaries, and the old trails they followed, can still be located today.

Some land grant surveys also give us descriptions of other important trails—some no longer in use even in the late 1800s—within the grant. An example of such a very helpful grant survey is that of the 1796

Figure 1. Portion of the 1877 government survey of the Town of Cieneguilla Land Grant (Cieneguilla Grant, 1700s-1800s).
Town of Cieneguilla Grant (1700s–1800s). The 1877 survey is included as Figure 1. The many trails and roads noted above by the 1877 surveyor, while not all accurate, nevertheless help confirm information from other sources. Equally important, during fieldwork they provide clues about where to look for possible traces of the old trails.

Along with survey maps, the recorded testimony of witnesses taken as part of land grant adjudication gives many clues. Such testimony was taken from persons very familiar with not only grant boundaries but resources, including trails and roads. An example follows, again from the 1795 Town of Cieneguilla Grant adjudication (Cieneguilla Grant 1700s–1800s). Descendants of the grantees of the 1795 Cieneguilla Grant petitioned for confirmation of that grant in the Court of Private Land Claims. Testimony was taken from long time residents to establish the boundaries of the claim. One witness was Albino Lopez, who testified on April 24, 1895, in Santa Fe. Mr. Lopez was 53 years old. The following questions and answers are in the transcript of his testimony:

Q. Do you know a trail within the limits of the grant as you have given them, called the Cieneguilla Trail?

A. I know several trails; I know what was called the old road coming to Santa Fe [the Apodaca Trail] and I know another trail on the other side of the river; the old road is within the grant.

Q. Do you know whether there is any road leading from the settlement of La Cieneguilla in the direction of the Picuris mountains, southeast?

A. Yes; it is called the Agua Caliente trail, to the summit of the mountains.

Q. About how far is it from the settlement of La Cieneguilla, along that trail, to the southeast line, on the summit of the Picuris mountains?

A. Six [miles], more or less.

Mr. Lopez identified two prominent trails. The one he called the “old road” to Santa Fe, which ran through the middle of the grant, was clearly the Apodaca Trail. The other, running from the village south–east to the summit of the Picuris range, he identified as the “Agua Caliente Trail.” Mr. Lopez’ testimony therefore gives us the popular name of the road during the time it was used. It also confirms its location. The trail follows Agua Caliente Canyon, for almost exactly 6 mi, to the crest of the Picuris range. On the other side the trail meets the Middle Road to Picuris.

A final example of useful primary documents are books written by travelers on the old trails. They are all written by American or British travelers. Most were written after the American conquest in 1846. A book with a very accurate description of the trail from Velarde (then La Joya) to Taos is by W.W.H. Davis (1962). Davis was the first Territorial Attorney for New Mexico following the Mexican War. He made many trips to Taos from Santa Fe, and describes one made in early March, 1854, as follows at page 156:

We were in the saddle betimes the next morning and on the road to Taos [from Los Luceros], yet forty miles distant. We continued up the valley [of the Rio Grande] for six or eight miles, where the road inclines to the right to pass the mountains, while the river turns to the left and is soon lost from view. The wagon road winds round through the depressions in the mountain, while the bridle-path, which we followed, leads in the more direct route over some of the highest peaks. The first four miles of the way was through a little valley, until we arrived at the village of El Em­bugo, when we commenced the ascent in earnest, here steep and difficult. This distance across is about six miles by a single mulepath; and, in many parts of the way, a slip of two or three feet would send the unfortunate wight rumbling headlong hundreds of feet below. The path is winding in its course, and in some places too steep for the rider to keep the saddle.
From the summit of the peak we crossed, the view is neither romantic nor picturesque, but dreary and forbidding in the extreme. We found the descent much more difficult than the ascent and led our horses down the slopes. We reached the valley below in safety, and halted to lunch on the bank of a small stream that flows through it.

Davis also includes landmarks along his route. He describes the place on the trail where he turned north to begin his ascent “in earnest.” A large sandstone column prominently marked the turn. The column is still there for us to follow today, shown in Figure 2 above. Comparing Davis’ description with modern maps, it is clear that he took the Apodaca Trail from Embudo Plaza to Cieneguilla and then to Taos. Both his distances and details of terrain are remarkably accurate.

FIELDWORK: LOCATING THE TRAILS ON THE GROUND

Fortunately, northern New Mexico’s terrain has protected the traces of most of the old trails and roads leading to Taos valley. Unfortunately, the extensive logging and mining which occurred in the late nineteenth and twentieth centuries have had a major impact on some. Generally, trails in the mountainous area north and south of Taos are better preserved and easier to locate. Those on the rolling flatter land to the west are more difficult. This is because they were used for much shorter periods of time, and because wind and water erosion have destroyed entire sections.

Surviving historic trails and roads all seem to share certain “signature” characteristics. These common features are important both in locating very faint traces, and in avoiding following more recent roads associated with mining, logging and ranching. First, the older trails into Taos valley went straight. There were few switchbacks, no long detours around hills to avoid steep grades. Most followed pre-Spanish Pueblo trails. Native American runners could use narrow, sometimes steep, trails with ease. The Spanish, either on foot or horseback, could use the same trails. It was not until the Mexican and American periods that use of freight wagons required gentler grades and “roads” were actually improved or altered. For example, it was 1876 before a reliable road for wagon traffic was built between Santa Fe and Taos (Santa Fe Weekly New Mexican 1876). Before then, depending on the
weather and erosion, only small wagons and carretas, with much effort, could reach the valley.

Second, old trails were not “built.” They followed the natural terrain. The most common strategy, certainly originated centuries ago by Pueblo travelers, was to follow the crests of gentle ridge lines. Where a ridge line headed in the desired direction, it was followed. When one ridge either became too steep or changed course, the trail would drop off, cross a drainage, ascend and follow an adjacent ridge. A good example is the Camino Medio de Picurís, which was the main trail from Picurís Pueblo to Taos Pueblo. This ancient trail climbed the west slope of the Picurís Mountains, using a surprisingly easy route along the crests of ridges.

Third, especially on flat terrain, the old trails have blended back into their natural surroundings. They are very well camouflaged. Some are grass or sagebrush covered. Some have eroded in sections into what look like natural arroyos. But the old traces can still be identified by the well worn swales left by the traffic they carried. Often swales are deep and up to 50 ft wide; sometimes they are almost invisibly shallow. But an original old route will almost never be a “two-track” road across the prairie!

The above are only three of many characteristics of the very old trails and roads. Fieldwork is continually adding new features that make identification and mapping easier and more accurate.

**ARCHAEOLOGY AND THE TRAILS**

Documentary research and field work enable us to find the traces of historic trails. Often, however, there is more than one “trace” that may or may not be the old route we are seeking. Also, finding the remains of a historic trail alone does not confirm its age, purpose of use, or who traveled on it. Historic archaeology is the tool for answering these questions. The author has been involved in three professional studies of trails in Taos valley. The archaeologists conducting the work were Paul Williams of the Bureau of Land Management (BLM), Charles Haecker of the National Park Service, and David Johnson, now Regional Archaeologist for the U.S. Forest Service Southwest Region.

The first step is choosing what section of a particular trail to study. Probably the most important factor is whether the current remaining swales have minimal “modern” intrusion. Some sections of very old routes have continued to be used as ranch roads, forest roads, or logging roads until quite recently. Some of the old trails have been essentially destroyed by uses unrelated to the historic purpose of trade and travel. Fortunately, many sections of the old roads, particularly those in more rugged terrain, have seen almost no traffic since their use as arterial roads declined and ended. The studies I have been fortunate to participate in were of trails which have virtually no modern use. One was in the Picurís Mountains south of Taos, and two were in Taos valley.

The methods used by the archaeologists in each study were the same. Close surface observation, both on the remains of the trail and along its perimeter, reveals non-metallic artifacts. These are most often pot sherds, small manos, flint, basalt and obsidian flakes and other Native American materials. But the essential tool has been the metal detector. It is the hand forged Spanish iron artifacts that enable archaeologists to begin to date a trail’s earliest European use. These are almost always buried, and could not be found without current metal detector technology.

The three studies referred to above have each been successful in providing important archaeological evidence to better interpret a trail’s history and use. First, Forest Service archaeologist David Johnson’s team needed to date use of a section of the Cieneguilla Trail as part of their study of the Battle of Cieneguilla. The battle was fought in 1854 between U.S. Dragoons and the Jicarilla Apaches. The question was whether the trail involved was the one followed by the Dragoons into the mountains. Metal detector study found artifacts along the old trail, unrelated to the battle, which confirmed the trail was in use at the date of the fight (Johnson 2007:235).
Second, Paul Williams of the BLM and Charles Haecker of the National Park Service have been using metal detectors in an ongoing study of one of the main Spanish trails across Taos valley to Taos Pueblo. Close study of selected sections of this trail have produced dozens of metal artifacts that support use of the trail by the Spanish as early as the mid-1600s. Some of the artifacts are shown in the photos on this page. Figure 3 is a hand forged iron spur. Figure 4 shows other artifacts, most of which are hand forged iron coscojos, used as ornaments on Spanish bridles and saddles.

Third, David Johnson, Forest Service Archaeologist Bill Westbury and the author studied a 150-yd. section of the same trail a few miles closer to Taos. A list of the items found, most by metal detector, is as follows:

1. eight iron mule shoes, most broken; these could not be dated with certainty; most were handmade
2. nine iron horse shoes, most broken; these could not be dated with certainty; most were handmade
3. five sardine cans; dates 1890–1920
4. one top of sanitary food can; date 1880–1910
5. many small pieces of baling wire, most twisted
6. one partial glass bottle bottom; purple color; date 1880–1913
7. one iron sewing needle; hand forged from square stock; 3 ½ in. long
8. many hand forged horse or mule shoe nails; various sizes
9. one one-hand mano; granite; smooth on top and bottom; likely pre-Spanish or Spanish Pueblo era
10. two iron ornaments from Spanish horse bridles; dates uncertain
11. one iron ring; possibly saddle ornament
12. four metal tobacco cans; early twentieth century

Again, these items are consistent with use of this trail from the pre-Spanish era through the early twentieth century.
The maps on the following pages show portions of historic trails identified to date. The trails and roads shown are those which enter Taos valley from the south. Solid lines are trail sections which are visible and can be followed. Broken lines are sections for which observable traces are uncertain, or where the old trail has been reclaimed by nature and all traces are gone. The source for the data is GPS readings taken on the ground. These were then transferred to ArchMap software. The maps are printed from ArchMap.

Figure 5.
Map showing historic routes of the Los Cordovas Trail, the Camino Media a Picuris, and the Miranda Canyon Road (left).

Figure 6.
Map showing historic routes of the Ranchos-Talpa Cutoff, the Miranda Canyon Road, and the U.S. Hill Road (pg 89).

Figure 7.
Map showing historic routes of the Camino Medio Cutoff, Los Cordovas Trail, the Ranchos-Talpa Cutoff, and the Camino Medio a Picuris (pg 90).

Figure 8.
Map showing historic routes of the Picuris Trail, Los Cordovas Trail, the Camino Medio Cutoff, the Ranchos-Talpa Cutoff, and the 1876 Military Road (pg 91).
THE TRAILS AND HISTORY

Historic trails and roads are also historic sites. The routes themselves tell us much about communication and transportation development over many centuries. They confirm how difficult it was for Pueblos, Spanish, Mexicans and Americans alike to reach Taos valley. Taos' relative geographic isolation in turn explains in part why Taos has always been a favored location for trade fairs, smugglers, unlawful fur trappers and other activities prohibited by whichever government was in power in Santa Fe.

In addition, knowledge of the location of historic routes and their topography can solve historic puzzles. Three examples from the Taos area follow.

Did Don Juan de Alvarado visit Taos Pueblo in 1540?

Ever since Herbert E. Bolton's 1949 publication of Coronado on the Turquoise Trail, the accepted answer to this question has been yes. But knowing exactly how Alvarado had to get to Taos, and the time he had to do so, strongly suggests that he did not reach the valley. Unfortunately, few dates are given in Coronado documents. Therefore, constructing a time line for Alvarado's movements in 1540 is difficult and at best educated guesswork. But the following is at least consistent with the original sources (Flint and Flint 2005; Hammond and Rey 1940).

29 August 1540: Coronado orders Alvarado to leave Zuni and proceed east to explore Pecos and see the reported "cattle" (buffalo). Alvarado takes 20 men and a priest. He is ordered to report back to Coronado at Zuni in 80 days. This would be mid-November, 1540.

7 September 1540: Alvarado and his men reach the Rio Grande in the vicinity of Bernalillo. He discovers many pueblos and is greeted peacefully.

8 September to 15 September: After arriving at Tiguex, Alvarado is visited by Indian delegations from surrounding areas; all are peaceful. It is assumed he took some time to examine the immediate area. He wrote at least two reports back to Coronado at Zuni, one recommending the army winter at Tiguex. The other report(s) describe what Alvarado had seen to date. Alvarado and his party then leave Tiguex for Pecos.

15 September: Alvarado leaves for Pecos.

20 September: Alvarado arrives at Pecos. He makes no detours, but probably visits and spends some time at pueblos on his route. The distance is about 70 mi. Most is easy traveling.

20 September to 24 September: Alvarado's men spend "a few days" resting at Pecos before continuing east to the buffalo plains.

24 September: Alvarado leaves Pecos for the plains. He would have known he had to return to Pecos no later than 1 November to get back to Zuni within his 80-day limit. He likely would not have wanted to cut it that close. That means he could explore east for about two weeks before starting his return to report to Coronado.

24 September: Assuming Alvarado sent his first reports from Tiguex to Coronado on 15 September, those reports (including the recommendation to move the army to Tiguex for the winter) would have reached Coronado at Zuni at about this date.

26 September: Coronado orders Cardenas to march to Tiguex to prepare the area for arrival of the army for winter.

27 September: Alvarado reaches the Pecos River. He follows it east for 100 leagues, or 280 mi. At 15 mi per day, this would consume 17—18 days.

4 October: Cardenas and his advance party get to Tiguex and begin their work.

11 October: Alvarado, far east on the buffalo plains, starts his 20 to 21 day trip back to Pecos.

16 October: The army leaves Zuni for Tiguex.

1 November: Alvarado returns to Pecos. He starts immediately for Tiguex.

6 November: Alvarado arrives at Tiguex and finds Cardenas already there working on winter quarters. Alvarado has with him "the Turk," Coronado's future guide and nemesis.
10 November: Coronado, with a scouting party, arrives at Tiguex from downriver.

12 November: Coronado sends Alvarado back to Pecos to find and apprehend persons who allegedly knew about a gold bracelet.

22 November: Alvarado returns to Coronado at Tiguex with two hostages.

Last part of November: One or more of the Tiguex pueblos revolt.

1 December: The balance of the army arrives at Tiguex.

This rough timeline incorporates the dates which are referenced in the documents and, importantly, the 80-day time limit Coronado placed on Alvarado’s mission. If this is close to being accurate, there appears to be no time for Alvarado to have gone to Taos on his way from Tiguex to Pecos or on his return. Again, knowing the route he had to take, the difficult terrain, and the time he had available calls Bolton’s long accepted conclusion into question.

Did the Jicarilla Apaches Ambush U.S. Dragoons at the Battle of Cieneguilla?

On March 30, 1854, a force of 60 U.S. Dragoons fought a band of Jicarilla Apaches in the mountains 20 mi south of Taos. In this fight, named the Battle of Cieneguilla, the Dragoons suffered a serious defeat, losing more than a third of their force. From the time of the battle, this engagement has been painted as a cunning ambush by the Apaches, who supposedly lured the Dragoons into a trap. This popular explanation for the decisive defeat of U.S. troops made the surviving soldiers heroes and the Apaches villains.

For example, the following appeared in the Taos Valley News on January 29, 1910:

The ambush of '54 took place near Cieneguilla [now Pilar], when a company of American troops, comprising 53 men, led by Lieut. Davis, and on the way to Jicarilla, now Old Baldy, was attacked in the narrow pass and 23 were killed, while many more were severely wounded. The massacre was by the Apaches with the old chief Canach in command…

After years of searching, a battlefield archaeology team led by Carson National Forest Archaeologist David Johnson found the site of the battle. Their analysis showed that the fighting took place at and near an established Apache campsite, with nearby water from Agua Caliente Creek. The Apache camp was located on a well established trail between Picuris Pueblo and the present town of Pilar. Figure 9 is a map of the site (Johnson 2007).

Among other facts established by Johnson’s team, precisely locating the Agua Caliente Trail next to the village made it clear that the battle was not the result of an ambush. To the contrary, the trail led the soldiers directly to the village—which included women and
children. The Dragoons attacked the village; they were not surprised or ambushed. The reasons for defeat were many, but Apache treachery was not one. The archaeological findings, combined with knowledge of the location and use of the Agua Caliente Trail, have finally put the "ambush" theory to rest.

Where was the exact location of the Battle of Embudo Pass, fought as part of the uprising of 1847?

One of the most important events in New Mexico history was the bloody 1847 uprising against newly imposed American sovereignty. The insurrection was centered in Taos, and involved both Mexican citizens and Taos Pueblo people. It began with the murder of newly appointed Governor of New Mexico Charles Bent. It ended with American forces attacking Taos Pueblo and capturing the revolt's leaders. Most were hanged after trials of questionable fairness.

The U.S. forces were led by Col. Sterling Price. Before marching into Taos valley in January 1847, he had already fought two battles. One was at present Santa Cruz. This American victory forced the rebels to retreat north and ended their effort to march on Santa Fe. The second battle was a few days later. It was fought in the mountains between present Velarde and Dixon. Again it was an American victory. The rebels retreated to Taos, where many fortified themselves in Taos Pueblo to await Price's troops.

The military reports (including maps) of Price's campaign give the general location of the second battle north of Velarde, now called the Battle of Embudo Pass. But the exact location has been a matter of dispute for years. Beginning in 2007, initial work began to find and map the battlefield. In addition to the documentary record, one of the most important clues would be the exact location of the 1847 trail from Velarde to Dixon. The rebels' blocking positions were along this trail, and fighting took place on both sides of it.

Fieldwork has not yet begun on this project. If the 1847 route can be located, it and the other available evidence should permit the battle site to be found. As with other battles, the historic trail may be the only remaining physical feature on the battlefield. Knowing where the trail ran will enable BLM archaeologists to focus on the most promising areas for close study. Perhaps another long unanswered historic puzzle will be solved.

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Standing walls are rare in the Galisteo Basin, so the 4-m high wall of the San Cristóbal Pueblo church is a landmark as one drives down Highway 285. Through a series of circumstances we became very well acquainted with the wall and the mission of which it is part. The more closely we looked at the wall, the more questions arose. We explore here what we have learned about this tall wall, and what that monument is that we see, discuss our mapping of the complex, and provide some context for this part of this impressive pueblo.

THE CHURCH

A Brief History of the Church

By the time the Spanish arrived in the Tierra Adentro, several of the large pueblos in the southern Galisteo Basin were no longer occupied (Figure 1). Across the northern basin, in the most favorable locations, the large pueblos the Spanish named San Marcos, Galisteo, San Lazaro, and San Cristóbal had substantial populations and the Spanish established a mission at each. The mission at San Cristóbal was probably the smallest; for at least part of its history it was served as a visita from the larger establishment at Galisteo Pueblo 8 km to the west (Kubler 1940; Mednick 1996). It also seems to have the fewest known historic documents associated with it.

The mission was probably started in 1621 on the north bank of San Cristóbal Creek, immediately adjacent to the pueblo, between the pueblo and the creek. As was the pueblo, the structures were primarily stone masonry, although the pueblo does have mixtures of stone and adobe construction (Figure 2).

Figure 1.
Galisteo basin drainage area showing the seven pueblos in which N. C. Nelson worked in the summer of 1912, and San Marcos, a mission pueblo where he worked in 1915.
Figure 2.
View to the northeast from Nelson's Building III. Nelson excavated Building III in 1912 and the mixture of stone masonry and adobe is visible. The church wall is across San Cristóbal Arroyo from building III. The date of the photo is unknown but long enough after 1912 for weeds to have grown in the rooms but the adobe not to have fallen; the khaki dress of the individual suggests post World War II. Building III is now (2008) just a mound with some visible wall alignments. (Laboratory of Anthropology Photo archive, UN85.177-1)

Figure 3.
Shaded relief topographic map of San Cristóbal church and convento with outline of surface indicated walls and overlay of the San Marcos church and convento (Map by D. Huelster).
Mission Layouts

Plans of New Mexico missions are remarkably similar from one site to the next (see e.g., Giffords 2007:63; Hayes 1974:26, 36; Hurt 1990:195; Ivey 1988; Kubler 1940:80-99; Vivian 1964:86). This fact makes it possible to superimpose plans from excavated structures on unexcavated topographic maps with a great deal of confidence and with remarkably close fits (Figure 3) in this case the San Marcos mission (Thomas 2003) on that of San Cristóbal. Clearly there was a very definite mental template for what a complex should be.

Giffords (2007) considers northern New Spain churches in tremendous detail. The following are relevant to the noted repetition of mission plans.

The early clerics, master masons, and architects of northern New Spain were not confronted with the problem of designing unique structures for novel situations. Products of fifteen hundred years of development, the religious structures from these individuals' backgrounds, vocations, and education served as their guides...

Although neither the Catholic Church nor the various religious orders dictated the exact shape or size of a church building, there were certain absolute requirements. The structure had to be built as a church and never used for any other purpose. It had to be permanent and to have the following elements: a sanctuary area (in sight of, but separate from, the congregation) for an altar and celebrants, where services would be performed, a nave for the congregation, and a choir for the singers (Giffords 2007:43).

Size, axis, material, and form of the church building might vary, but the plan for a church complex contained certain essentials from which there could be no deviation. The mission church complex comprised a church, atrio (walled courtyard), and burial ground, which was usually enclosed by a wall...

To the side of the church, and connected by its own passage, was the convento. This consisted of a series of rooms and spaces, arranged around a small enclosure, claustro (cloister), for the Indian retinue... An entrance to the convento facing the same direction as the main church façade allowed direct access to the patio... There was usually also access to the quarters from the patio, or to the gardens, orchards, or attached corral from the cloister (Giffords 2007:61).

All of these elements are visible in Galisteo-Pecos area missions, and readily identifiable from surface indications at San Cristóbal. As noted below, both Bandelier and Nelson map the enclosed courtyard or camposanto, which we have been unable to see as an enclosure; there is only a level area east of the church.

Siting

Rather than being the nucleus to a new settlement as was the case with Spanish settlements, missions to pueblos were imposed on existing villages (Figures 4, 5).

Upon arriving at the pueblo the friar purchased one or two rooms from an Indian family... The houses served as his church, convento, and storerooms during planning and construction of the permanent buildings... The friar's next step was to secure permission to build a church. The leaders of the pueblo had to give permission to use a particular tract of land for this purpose” (Ivey 1988:37).

Eric Blinman (personal communication 2008) believes that the location set aside for the San Cristóbal mission was deliberately selected by the pueblo in a location that was avoided by the pueblo builders due to flooding risk. The mission at Hawikku is similarly located, though those at other Galisteo sites and Pecos are not.
Figure 4.
Redrafted N. C. Nelson (1914) map of San Cristóbal Pueblo showing location by the creek and the mission complex.

Figure 5.
San Cristóbal site view from Watch Tower Hill, looking ENE, "General View from S.W.,” by N. C. Nelson August 1912. San Cristóbal Arroyo curves across the frame, with the mission visible on the flat area left of the arroyo. Nelson's excavated Building III (Figure 2) is visible at the right edge; the main pueblo is the bare area at the center of the frame (Negative 15845, American Museum of Natural History).
Archaeological Work at the San Cristóbal Mission

Bandelier made this observation July 7, 1882:

The church is partly standing, the choir entire, but the roof is gone. The walls are about 18 feet high, 32 inches thick, and composed of thin plates of sandstone superposed with adobe mud between. The front part is entirely ruined. The walls run east and west. In front of the church is the old cemetery enclosed by a stone wall, and to the south are yards and the foundations of buildings. The church is 500 feet from the eastern curve of the arroyo, and on the south side of the arroyo lies another pueblo (Lange and Riley 1966:335).

Bandelier sketched the ground plan and provided a few measurements. He shows a walled “yard” area east of the building of which no trace remains.

Nels Nelson (1914) dug a stunning (by today’s standards) number of rooms at seven Galisteo Basin pueblos in 1912, and created an excellent map of each. His map and account of San Cristóbal Pueblo, the site of his first and most extensive work that year, clearly show the mission and indicate the parts of the pueblo which he considered to be historic and prehistoric. He did not excavate in the mission—it was “not an essential part of the subject” (Nelson 1914:48). Nelson notes that his measurements were “radically at variance” with Bandelier’s. Since Bandelier did use metric measurements sometimes (e.g., Lange and Riley 1966:352), conversion of the figures on his sketch from feet to meters brings them reasonably close to Nelson’s dimensions. Among other things he measured the wall to be “nearly twice that of Bandelier’s figure” or 25 ft. He describes the wall:

Only the altar end portion of the chapel stands today, owing to the bracing effect of the four angles embodied, and it shows a fine piece of masonry laid up of thin stone slabs embedded in adobe. The total height of the visible wall is not less than 25 feet, but the base is buried in debris. (Nelson 1914:48)
As does Bandelier, Nelson notes the presence of a yard or cemetery east of the church, which, again, is not visible today. Nelson also notes the site in general “gives abundant evidence of the treasure hunter’s energy.” A photo from the early 1900s (Figure 7) shows some of this major disturbance at the east end of the building.

It is also clear that digging has taken place in the altar area. Jake Ivey says (personal communication 2006) that the treasure hunters “know” that the gold is stashed under the altar and that area is almost always disturbed. We do not know whether this folk knowledge has ever rewarded its believers.

The only recorded work that has been performed at the church is stabilization. Two projects were performed under the auspices of the School of American Research (SAR), in 1977, directed by Richard Lang, and in 1988, directed by David Breternitz (Breternitz 1988) (Figures 8, 9). These projects involved masonry joint repair and masonry replacement in the large defects present at the time. The 1977 project placed steel plates and jacked up portions of the wall (Figure 8). Both projects were, however, working on a standing structure.
The Department of Cultural Affairs Office of Archaeological Studies (OAS) and the Museum of New Mexico Foundation Friends of Archaeology (FOA) first became involved with the San Cristóbal church through stabilization, as well. As is the nature of any unroofed wall, the church wall was showing signs of deterioration. The mortar joints were severely eroded and occasional blocks were falling. The base of the wall was eroded and it took only cursory examination to see that the wall was unstable. The ranch owners expressed some interest in performing stabilization,
Table 1. Comparative church areas

<table>
<thead>
<tr>
<th>Church</th>
<th>Year</th>
<th>Church Footprint Area m²</th>
<th>Interior Church Area m²</th>
<th>Convento Only Area m²</th>
<th>San Cristóbal &quot;Corral&quot; Area m²</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abó</td>
<td>1630</td>
<td>256</td>
<td>187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abó (late)</td>
<td>1670</td>
<td>495</td>
<td>341</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawikú</td>
<td>1640</td>
<td>331</td>
<td>215</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galisteo</td>
<td>2</td>
<td>270</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Buenaventura</td>
<td>1670</td>
<td>504</td>
<td>327</td>
<td></td>
<td></td>
<td>Area based on estimate from surface features</td>
</tr>
<tr>
<td>San Cristóbal</td>
<td>2</td>
<td>176</td>
<td>601</td>
<td>631</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Marcos</td>
<td>1635</td>
<td>209</td>
<td>161</td>
<td>1230</td>
<td></td>
<td>Area based on estimate from surface features</td>
</tr>
<tr>
<td>Quarai</td>
<td>1632</td>
<td>451</td>
<td>295</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>337</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

and, as an initial step in that direction concluded, with OAS, that a detailed map should be made. In 2005 when the project was initiated there was a remarkable growth of primarily saltbush (*Atriplex*) and sage (*Artemisia*) on the entire building complex: shrubs over 2 m tall, some with trunks 15 cm in diameter. This growth obscured any surface detail. Our first action was to spend a number of hard days clearing brush with dedicated volunteer labor. We then proceeded to make a detailed topographic map using a total station transit and using the collected data to create maps with a mapping program (Figure 10).

THE CONVENTO

It appears that the mission to San Cristóbal was staffed for a fairly brief period before becoming a *visita* of Galisteo, 1621–1626 (Mednick 1996:102-103) but the convento complex looks complete. As is true of the rest of the mission complex only a careful excavation would clarify whether it underwent the remodeling phases seen at other pueblos’ missions, such as Galisteo and Pecos. It is generally accepted that the pueblo and the mission were not re-established after the revolt of 1680. The total area of the San Cristóbal convento is very similar to that at San Marcos (Table 1, Figure 3). These measurements, however, include a large walled area south of the convento buildings labeled “corral” by both Bandelier and Nelson (see Figure 10). Most plans of mission complexes include a corral (see e.g., Giffords 2007:62-63 [Acoma]; Vivian 1964:86 [San Buenaventura, Gran Quivira]; Hayes 1974:36 [Pecos]). As Thomas and Ivey discuss (Thomas 2003:6-11), remarkably little is known of convento room use in the Southwest. Only targeted excavation in the convento area could ascertain the uses of the area, but it appears that the built portion of the convento corresponds to the small area of the church.

THE WALL

We had worked around the wall clearing brush and mapping for some time assuming that we were in the presence of an ancient structure, used to its iconic presence by the pueblo. We knew that some stabilization work had taken place, but were somewhat surprised to find large metal plates built into the wall near ground level (Figure 8). We then began to look more and more closely at the wall to determine how much was original and if what we were seeing was the same as what Bandelier and Nelson saw, and what the friars left behind.

There is a sporadic photographic record of the wall dating to at least 1912 with Nelson’s photos (Figures 2, 5, 7, 8, 9, 13). Bandelier’s photos have never been found (Lange and Riley 1966:xii). Some early twentieth century pictures in the Laboratory of Anthro-
polity photo archives lack precise dates. Nelson took a remarkable number of photos of remarkably good quality. His subjects included his excavations and features, as well as very useful environmental shots of the many sites he worked on. One aspect of the recent assessments done for the sites in the Galisteo Basin Archaeological Sites Protection Act was to find and reshoot Nelson's views for comparison over nearly a century (Toll and Badner 2008).

In an effort to capture present day photographs that match as closely as possible those taken by Nelson in August of 1912, a few basic techniques were used. Most important was trying to locate the position on the landscape from which Nelson's photograph was taken. Since we were using modern digital cameras with zoom lenses, it was important to try to obtain the same perspective and then try to match the field of view.

Nelson's photo was printed on a full-size letter sheet to use as a field guide. Important elements were marked on the print, such as the horizon line and key vertical elements. For example, a rock feature in the foreground or middle ground may align vertically with a distinctive feature on the horizon. The field work involved a lot of walking around until one could find that "spot" where the alignment elements would coincide. In one case (Figure 6) we have a very good idea of where the Nelson's photographer was standing since the shadow of him and his tripod appear in the foreground of the photograph.

The camera and tripod set-up was made to check the proposed spot and then the lens was adjusted to match the field of view. Where it was not possible to achieve the same field of view—the camera could not capture the wide field that Nelson's did—then a panorama of two separate shots was made and merged in the photo processing software.

Final adjustments were made in the processing software by placing Nelson's original on one fixed layer and then overlying the new photo and adjusting it to match at horizon and field of view at the same resolution. Then both layers were cropped to match and the individual layers saved to file.

**Analyzing Wall Structure**

In an effort to see if the standing southeast wall of the church apse we see today matches that of Nelson's day, 96 years ago, the pattern of the masonry coursing and individual rock patterns were analyzed. The existing wall displays the angled apse form common to many seventeenth century churches (see Ivey 1988; Ivey 1998:47-48), as noted by Nelson above (Figure 11). Compared to other existing church walls this one is not as thick—around .5 m as opposed to .75 to more than 1 m in Salinas Pueblos (Ivey 1988:47). The smaller size of the San Cristóbal structure required less thick walls; what stands now may not represent the full thickness of the original walls.

![Figure 11.](image)

Plan view drawing of the church apse (map by D. Huelster 2007)
Masonry Coursing

Initially the wall shown in both photographs appears to be very similar—the structure is about the same size and shape, and the materials seem to match. However, a general analysis reveals that the 1912 photograph shows about 64 courses high of masonry compared to about 54 courses in the new photograph (compare Figures 6 and 12). Further close inspection reveals that the courses are less fine and regular in the new photograph. This process reveals differences not seen at first glance.

Matching Stone Patterns

By looking at stone pattern detail it is possible to search for segments present in 1912. Two different views were available from old photographs; Nelson's photograph of the outside southeast wall segment and a Huddelson photograph of the interior west wall of the apse. Three different areas were chosen from each of the early photographs which seem to show a unique pattern of rocks. A tracing of the rock pattern was made in each area (Figures 13–16). These three patterns were then placed as an overlay on the contemporary photograph to see if a match could be made—i.e., would the patterns of rocks from the early photographs align with those of 2008 (Figures 13–16)? To account for some slight differences in scale between the photographs, each of the patterns was moved around in the general area to see if it could be made to align with the recent photograph. Alas, no luck.

Since neither method seems to give us a match to the 1912 reference, it certainly appears as though the repairs and stabilization work have resulted in a structure that has only the general shape and construction of what Bandelier and Nelson saw many years ago.
CONCLUSION

At its simplest, this study of the San Cristóbal church wall shows that stabilization changes walls, sometimes dramatically. We, of course, find the results more interesting than that. The amount of work that has been necessary to leave the wall in its currently rather precarious state suggests that maintenance of even a stone wall (to say nothing of adobe) may need to happen as often as every 20 years. There is evidence that the wall that Kubler photographed in 1935 is different from that seen by Bandelier and Nelson 30 to 40 years before. This raises the question as to whether the wall was maintained various times between its abandonment—and possible initial destruction—in 1680 and the latter 1800s. Could post-Pueblo residents of the vicinity—there are nineteenth and twentieth century settlements nearby—have maintained the wall as a monument to earlier missionary efforts? Or was the wall sufficiently well built that it survived until twentieth century work, some documented, some not, took place? The photos from the early twentieth century (Figures 2, 7) show walls far more intact in Nelson’s Building III across the arroyo from the mission and of the convento than any wall today, indicating how fast weather, gravity, and cattle can cause walls to collapse.

This study is also a demonstration of the possibilities for photo reconstruction given modern digital technologies, especially when old photos are of very good quality, as are Nelson’s. It is now possible to examine individual rocks built into walls and superimpose new photos on older ones.

The standing wall at San Cristóbal is a monument to a rich history of contact between two very different cultures. There are many things that the site, and perhaps the documents, could still tell us about that place and that era, but even as it now stands it is greatly evocative.
ACKNOWLEDGMENTS

We want to thank the Singleton family and the San Cristóbal Ranch staff, especially Wesley Layman, for allowing and facilitating our work at the remarkable site of San Cristóbal Pueblo. The hard labor of a number of Friends of Archaeology members clearing brush from the church and convento area made mapping possible. Funds from the Friends of Archaeology also made much of the work reported here possible. Laura Holt of the School for Advanced Research Library helped us with photos of past work, and David Grant Noble not only helped clear brush; he also contributed his past knowledge of projects and photos. Dave Breternitz made his 1988 stabilization report available to us. Daniel Kosharek of the Palace of the Governors Photo Archive provided those photos very rapidly and Diane Bird gave us access to Laboratory of Anthropology photos. Jake Ivey and Dedie Snow consulted with us on mission architecture.

We also acknowledge Paul Williams’ long term efforts in coordinating the Galisteo Basin Archaeological Sites Protection Act and the communication among the many landowners and agencies. I (Toll) have enjoyed working with Paul beginning in the 1970’s on Dave Breternitz’s Mesa Verde and Mancos Canyon projects, and more recently (much more recently) in the Galisteo. Pablo cut some brush, too.

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Vivian, Gordon
During the 2003–2008 span, site visiting, recording, survey, and reconnaissance activities in the southern San Andres Mountains area located 50 km northeast of Las Cruces identified prehistoric agricultural sites dating to the A.D. 900–1400 period. This paper, which is a portion of our detailed report to White Sands Missile Range, Bureau of Land Management, and the Jornada Experimental Range (Kemrer 2008), discusses agriculture during the A.D. 900–1140 interval when four of the 11 villages in the study area were occupied (Figure 1).

ENVIRONMENTAL CONDITIONS

The southern San Andres Mountains provided benefits to the prehistoric farmers. Fractured and tilted rock layers capture and hold rain and snow melt that feed springs and runoff for domestic and agricultural water. The mountains obstruct warm moist air, forcing it upward to higher elevations, where it cools. The cooled air causes water to condense forming clouds and eventually falling as rain or snow onto the farm fields.

Figure 1.
Map of the study area.
Soil

Most of the farming occurred on the western piedmont slope, the eastern edge of the Jornada Basin. The soil is an eolian sandsheet. The study area contains a uniform arable soilscape. The sandy soil compares with that farmed by the Hopi and Zuni for hundreds of years. Puebloan studies describe the positive qualities of sand agriculture. Maize, the primary prehistoric staple crop, prefers well-aerated and well-drained soil consistent with eolian sand (Muenchrath and Salvador 1995). Sand absorbs water rapidly and resists surface runoff loss, allowing more moisture from precipitation to be available to the crop (Hack 1942). The uppermost sandy surface dries quickly and this layer acts as a mulch, reducing evaporation loss. Soil profiles usually contain sand, clay and silt laminae which have the high water absorption properties of sand and the low rate of subsurface water loss of silt and clay (Dominguez and Kolm 2005). Crops benefited from eolian organic and essential mineral fertilization (Sandor 1995). Where present in the local profile, beneath the sand-silt soil, older hard, clay-rich or dense caliche paleosols serve as aquacludes, trapping groundwater and making it available to the crops (Blair et al. 1990; Gile et al. 1981; Hall 2007; Monger 1993).

Climate

Local climatic data provide the intra-annual parameters for planting and harvesting. Climatic data from the Jornada Experimental Range (JER) headquarters, about 10 km southwest, provided estimates. The annual precipitation is 24.7 cm at JER (United States Department of Agriculture 1987). Southwestern ethnographic data indicate that a minimum of 15 cm of water is needed for aboriginal drought resistant corn (Dominguez and Kolm 2005:741) with 50 cm producing optimum maize growth (Rhode 1995:86). A tree-ring based climatic model for the southern Rio Grande Basin 40 km distant (Grissino-Mayer et al. 1997) provides an estimate for annual precipitation in the A.D. 900–1400 period. The modeled annual precipitation mean is 24.2 cm, similar to the 24.7 cm JER average. The early A.D. 800–1200 interval exhibits higher year-to-year variation and more droughts compared with the later A.D. 1150–1450 period. The four villages occupied during the A.D. 900–1130 interval show highest use during the A.D. 1040–1130 period, when optimum climatic conditions occurred for agriculture. All four villages were abandoned by 1140 shortly after the severe A.D. 1130–1180 drought began. Subsequent to a depopulation period during the A.D. 1140–1275 interval, the study area was heavily repopulated. During the A.D. 1275–1400 span, six villages were occupied. Favorable climatic conditions for agriculture sustained the large late period population.

Landscape Transformation

Dramatic changes in water availability and the agricultural landscape took place in the study area. All but a few of the prehistoric surface water sources had disappeared by the 1930s. None of the drainages exhibited perennial or protracted seasonal flows after the 1920s. Wells for watering livestock destroyed these resources. JER research provided data concerning the prehistoric landscape (Gibbens et al. 2005). The prehistoric farmland was covered with grassland and sparse low shrubs. Overgrazing reduced the grassland by half by the 1920s and entirely by the 1960s. The loss of the stable grassland increased erosion and dune formation. The outcome was widespread deflation and burial of the prehistoric landscape, making our work challenging.

AGRICULTURE IN REGIONAL PERSPECTIVE

The history of agriculture in south-central New Mexico and northwestern Texas is relatively long. Maize (8- and 10-row varieties) and beans were recovered from the Fresnal Shelter east of Alamogordo (Bohrer 1973). Tagg (1996) analyzed corn and bean radiocarbon samples with the earliest corn fragments dating to 1369–941 B.C. and 1255–836 B.C. at the 95 percent level of significance. The ear-

No studies of prehistoric farming settlement, methods, or technology have been performed east of the Rio Grande in southern New Mexico, the location of our study area. Previous research in this area consists of the recovery of some combination of maize, beans, squash and bottle gourd cultigens (see, for example Miller and Kenmotsu 2004) and construction of models that identify site locations suitable for farming (Carmichael 1986; Maudlin 1986; Whalen 1982). Sites containing cultivated species became increasingly common during the A.D. 200–1450 in the southern Jornada area. Ubiquity analysis of maize, bean sp., mesquite and cacti/succulents from 18 sites spanning the A.D. 400–1450 interval demonstrates that agricultural food becomes substantially more important after A.D. 1150, especially in the A.D. 1275–1450 Late Pueblo period (Miller and Kenmotsu 2004:249).

West of the Rio Grande, direct archaeological evidence of farming methods and technology is present. Linear terraces, check dams, field borders, irrigation systems, diversion dams and reservoirs have been found in west-central New Mexico (Doolittle 1985; Neely 1995), and in the Mimbres area in southwestern New Mexico (Herrington 1982; Kemrer 2005; Shafer 2004). These water and soil management systems initially appear in the A.D. 800–1000 and persist to A.D. 1400 Puebloan abandonment.

Community organization studies within the Mimbres area show that farming communities date to the A.D. 1000–1140 interval. Drainages contain architecture that varies by size, with the largest representing community centers and the smallest field houses. Community size and architectural complexity vary by agricultural potential (Herrington 1982). Stokes (2003) found settlement data consistent with a land tenure system hypothesized by Shafer (1999). The earliest communities occur in the main drainage with the best arable land but later communities were established along less desirable tributaries.

Despite the importance of prehistoric farming, agricultural implements remain under-reported and under-studied. Such data occur only west of the Rio Grande in southern New Mexico. Neely’s (1995) work in the Reserve area produced a detailed analysis of hoes. Manufactured from thin tabular split rock, these tools have elongated ovoid and subcircular shapes. Thin, narrow triangular flaked “hoes” often occur in Mimbres sites, including Swarts (Cosgrove and Cosgrove 1932), Galaz (Anyon and LeBlanc 1984), and Old Town (Creel 2006). A wide range of possible stone hoes are shown in the Swartz Ruin report (Cosgrove and Cosgrove 1932; Plates 53 and 54).

**Agriculture in the San Andres Study Area**

We applied settlement patterning, ethnographic information, and existing detailed archaeological studies to aid in the accurate identification of field houses. Haury (1956:7) observed that farmers aggregating into villages needed field houses at distant fields to occupy when cultivating, protecting, and harvesting crops. Most, if not all, A.D. 900–1140 occupation in the study area was village-based and we expected to find field occupations distant from the villages.

The Hopi farming model applies to the study area. The Hopi derive from a Puebloan tradition and engage in farming in eolian sandy settings similar to the study area. Ethnographic accounts describe the Hopi field house as a small shelter occupied primarily in the planting and harvesting seasons and used as a place to sleep, prepare and consume meals, store tools and the crop during the harvest, and as a shady place to rest during the hot summer afternoons (Beaglehole 1937:42; Hack 1942:71-72). The Zuni one-person field house and associated cooking feature illustrated by Cushing (1920: Plate V) mirrors the Hopi architectural description.
The number and duration of Hopi and Zuni farming tasks necessary to produce a crop during the annual cycle required a field house (Beaglehole 1937; Cushing 1920; Dominguez and Kolm 2005; Hack 1942; Stewart 1940). Prior to planting, as early as February, fields are cleared of vegetation. Soil, water, and wind control devices such as check dams, terraces and wind breaks are built or repaired at this time. During the mid- to late spring, several crop plantings take place. The fields are usually weeded two or three times during the spring and summer. During the early growing period when the plants are vulnerable to birds, insects, and rodents, the farmer will occupy the field continuously, protecting the crop. If long intervals occur between seasonal rainstorms, producing crop water stress, the farmer will carry water to the crops, known as pot-watering. Usually harvesting involves several tasks as the different crops dry in the field are collected and transported to the village.

The few archaeological studies in the region describing field houses exhibit characteristics consistent with those generally postulated for this architectural class. LaVerne Herrington’s (1982:79) survey of Mimbres agriculture in three major drainages outside of the Mimbres Valley identified field houses as one- to two-room structures “less sturdily constructed than the pueblos.” Margaret Nelson’s (1993; 1999) surveys and excavations in the eastern Mimbres area also note that Classic Mimbres one- or two-room field houses closer to the villages contain less occupational debris than those at more distant locations.

Field Houses

A structure type found frequently the study area meets the criteria for the seasonal, one-person agricultural field house and is consistent with Hopi field house construction and usage. Such structures exhibit less sturdy construction than that found in the villages. They consist of a hearth or a shallow cooking feature, a small trash dump, and often the remains of a one-room cobble foundation with walls less than 1.5 m in length (Figure 2). Trash usually occurs in a discrete area adjacent to the structure, an indicator for a relatively high level of occupational intensity, usually residences (Binford 1983:189-190). Artifact types vary among field houses and can include stone tools such as ground stone manos, occasional metate fragments, battered and abraded tools, ad hoc informal flaked tools, and agricultural implements. Firecracked rock, pottery, and lithic debris occur on all field house sites.

Figure 2.
Two A.D. 900-1140 field house foundations. The scales are 20 cm long.
Field house architecture styles vary among the villages. Cobble foundations occur only associated with the Cedar Well and Cottonwood-F villages located close to the mountains (Figure 1). Foundations lacking cobbles characterize field houses found near Jaggedy and Bruton Bead villages, situated more distant from the mountains.

Studies of settlement location demonstrate that agriculture played an important role. Villages are located in areas with relatively good agricultural potential. Farming usually took place immediately adjacent to drainages, near the villages, and at highly dispersed farming areas containing field houses. Farming areas, and especially Mimbres Black-on-white pottery, a proxy for the A.D. 900–1140 period, occur in all settings that offer agricultural potential throughout the study area, including canyons within the mountains, the foothill zone, and the lower open piedmont slope. In contrast, Mimbres pottery occurs only rarely in areas with low agricultural potential.

Farm fields are identifiable by the presence of seasonally occupied sites, often with a sparse scatter of jar sherds from pot-watering the crops and broken agricultural tools. Ethnographic data suggest about 3 ac were cultivated per person, and field sizes ranged between 7–12 ac per household (Beaglehole 1937:37). Among the various farming methods utilized by southwestern native groups, only two could be identified in the study area—dry farming and the Ak Chin method. Dry farming, which represents at least 90 percent of the fields found in the study area, consists of farming swales, hill slopes and basins where both surface runoff and ground water would be available. Ak Chin farming uses the runoff from seasonal drainages from the mouths of canyons or other similar settings where water flow naturally spreads.

**Figure 3.**
A water or soil control feature in the study area. Dots designate cobble locations. Smaller stones migrated downslope.
Soil, Water, and Wind Control

Southwestern Puebloan farmers had a thorough understanding of soil, water, and wind effects on their crops and developed technologies to ensure successful harvests. An example is the cobble alignment perpendicular to a slope (Figure 3) that was found in an A.D. 900–1140 field area. Gaps occur between all of the stones indicating that construction originally included mud, brush, or possibly fencing materials described for the Hopi and Zuni (Cushing 1920:157, Plate II; Dominguez and Kolm 2005:755; Hack 1942:33, Plates Ve, Vla; Stewart 1940:322).

Agricultural Implements

An important aspect of agricultural technology includes tools essential for performing field preparation, planting, and weeding tasks. The Hopi and the Zuni used the digging stick for all of these (Beaglehole 1937:37; Cushing 1920:Plate III) and these were undoubtedly used by the study area occupants. A postulated field-clearing tool occurs in agricultural contexts throughout the San Andres study area from the entire A.D. 900–1400 interval: the cobble uniface. It is found in the farming outskirts, in field areas, and on field house sites. The cobble uniface is a rounded hand-sized cobble from which flakes were removed on one side, producing a working edge. They usually exhibit slight rounding or polishing use wear from digging in the sandy soil. The cobble uniface functioned as a grubbing tool likely used to remove the abundant perennial grasses that grew throughout the study area before overgrazing. The grasses have deep, long roots and the cobble uniface would expose grass roots more efficiently and thoroughly than the digging stick.

Another tool found on agricultural loci probably served as a weeding tool similar in use to the elongated scythe tools described for the Hopi (Beaglehole 1937:73), the Zuni (Cushing 1920) and the “split-stone hoe” Neely (1995) described and illustrated for A.D. 1000-1150 Reserve Phase agricultural sites. They were hafted onto a handle and likely used in a pushing or side-to-side motion cutting the weeds in the shallow sandy mulch layer (Cushing 1920:194). These long, narrow tools measure 15–24 cm or more in length and are thin—less than 1 cm in the center with the margins tapering to sharp knife edges. The favored material occurs in thin layers in dolomite, common in the mountains. Trimmed elongated pieces serve as tools and are periodically resharpened by retouching. These thin, fragile tools frequently break, producing fragments often found in the farming areas.

RELIGION AND AGRICULTURE

The Hopi (Beaglehole 1937) and the Zuni (Cushing 1920) utilize religious and magic methods applied to all aspects of agriculture. Before the farming season at the winter solstice, prayer sticks and effigies of the crops are buried in the fields to ensure fertility. A ceremony in the field and the placing of prayer sticks precedes planting. The harvest also includes ceremonies and feasting. A Puebloan stone tiponi field shrine found in the study region near the Rio Grande (Schaafsma 1990) confirms the importance of religious rituals in agricultural practice.

Further evidence of this was found in the study area in the form of an effigy discovered in a field (Figure 4). It is made of limestone sculptured in bas-relief.

Figure 4.
Limestone effigy. Length: 10.4 cm.
The segmented body indicates that it represents an insect, perhaps a grasshopper based on the elongated, jointed legs. However, it could represent a corn-ear worm pupa that would be present in reused fields if the artisan identified the encased wings as legs. Regardless of species, the effigy represents a serious crop insect pest and was likely used to protect the crop from such pests.

**A Case Study**

The reconnaissance survey located a farming area in sufficient condition for use as a case study. The farm area is located immediately west of the foothill zone and on the southern side of a relatively substantial drainage (Figure 5). The size and width of this watercourse indicates that it produced significant seasonal flows from the foothills for domestic and supplemental crop water.

Pottery sherd distribution indicated the boundaries of the agricultural area. Topography within the boundaries and the spatial distribution of the field houses indicated two farming field areas. The western farm area measures about contains approximately 5.13 ha (12.7 ac). The eastern area contains about 4.7 ha (11.7 ac). Each farm would sustain a household.

The topographic setting indicates that the farmers utilized dry land methods, relying mostly on rainfall and downslope subsurface interflow from the northwestern oriented hillside. The western field area is a shallow basin receiving water generally from the hill slope, especially water from a swale that enters the southeastern portion of the area. An alignment comprised of stone mixed with other material, discussed previously (Figure 3), probably controlled erosion by retarding and spreading both surface and groundwater onto the field area. Occasional use of pot watering using water from the drainage was necessary, as indicated by the presence of utilitarian potsherds in both field areas. The effigy (Figure 4) location in the western edge of the eastern field area likely served to protect crops from an insect pest.

Each of the 19 field houses accommodated only one person, based on the cobble foundation measurements. Architecture and ceramic characteristics indicate that
all but one of these farmers lived in the Cedar Well village (Figure 1), 2 km to the north. Field house construction and associated cooking and trash features are consistent with those previously described. Based on the Mimbres Black-on-white microstyle dating (Shafer and Brewington 1995), the occupation lasted 100 to 160 years within the A.D. 970–1130 production of Late Style II through Late Style III. The length of occupation of this farming area indicates a land tenure system likely operated among its residents.

ACKNOWLEDGMENTS

This study would not have been performed without the Environment Stewardship Division, White Sands Missile Range, particularly James Bowman, Archaeologist, and the assistance by David Anderson, Peter Bullock, Junior Kearns, Michael Mallouf, Carol Placchini, and especially John Kennedy who performed geological and GIS work. I also thank Bureau of Land Management Las Cruces District Archaeologist Thomas Holcomb and GIS Specialist Ray Hewitt. Kris Havstad provided access and range research to the Jornada Experimental Range. I thank those who worked in the field with me: Marylin Harkey, Warren Harkey, Jack Mathews, Janet Mathews, Frank Parrish, Frank Sherman, and Lee Webb.

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Haury, Emil W.

Herrington, LaVerne

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Rhode, David

Sandor, Jonathan A.

Schaafsma, Curtis F.

Shafer, Harry J.
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Stewart, Guy R.

Stokes, Robert J.

Tagg, Martyn D.

Whalen, Michael E.
A BISON EFFIGY FROM SITE LA 157590
NEAR DEMING, LUNA COUNTY, NEW MEXICO

INTRODUCTION

Site LA 157590 (HSR-2007-19-12) is a single component prehistoric site located in a flat composed of an old soil surface shallowly overlain with sand. A 5-m diameter blowout is centrally located within the site. The site component is early Pueblo Mogollon (A.D. 1100-1200). It is possible that the site has an earlier Late Archaic (1800 B.C.-A.D. 200) component. The oval-shaped site measures 70 m (north-south) and 55 m (east-west), for an area of 2,736 m². Water, wind, native fauna, and livestock have eroded the site. The vegetation observed at the site is mesquite, soap tree yucca, four-wing saltbush, and forbs.

The site is on private land being developed for a residential subdivision. The subdivision area (357 ac) was surveyed and 25 prehistoric and historic sites were recorded (Kirkpatrick and Kingsley 2008). Several sites were selected for additional testing because of the presence of sheet sand deposits on the site that may have covered intact subsurface features and artifact concentrations. Site LA 157590 was one of these sites. A backhoe was used to mechanically scrape the sand deposits down to clayey and compact sterile soil. Mechanical scraping was conducted in the sandy deposits at the perimeter of the site to determine if subsurface cultural deposits and/or features were present. Detailed discussion of the procedure and the results is presented in Kirkpatrick and Kingsley (2008).

The only artifact found in the scraped areas is a stone mammal effigy. A few isolated and very small pieces of fire-cracked rock were found, but no other artifacts or features were discovered in the southern, northern, eastern, and middle scraped areas of the site. The sediments were loose wind-blown sand over the compact older soil surface that was exposed in the main part of the site. The area has been disturbed by burrowing rodent activity creating sandy deposits around shrubs. Wind-blown sands also have accumulated from agricultural fields to the west.

ARTIFACT ASSEMBLAGE SUMMARY

A total of 122 artifacts were analyzed in the field and in the laboratory (Table 1). These include flakes, chipped stone tools, ground stone tools, a core fragment, and ceramics. Of the 18 lithic artifacts recorded,

<table>
<thead>
<tr>
<th>Artifact Type</th>
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<tbody>
<tr>
<td>Projectile point</td>
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</tr>
<tr>
<td>Biface fragment</td>
<td>1</td>
</tr>
<tr>
<td>Flake</td>
<td>41</td>
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<tr>
<td>Angular Debris</td>
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<td>Core fragment</td>
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</tr>
<tr>
<td>Mammal effigy</td>
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</tr>
<tr>
<td>Chupadero Black-on-white</td>
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</tr>
<tr>
<td>Polished brownware, jar</td>
<td>49</td>
</tr>
<tr>
<td>Polished brownware, bowl</td>
<td>6</td>
</tr>
<tr>
<td>Polished brownware, indeterminate</td>
<td>6</td>
</tr>
<tr>
<td>San Francisco Red, jar</td>
<td>2</td>
</tr>
<tr>
<td>San Francisco Red, bowl</td>
<td>2</td>
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</table>

Total 122
12 flakes, one biface fragment, one projectile point fragment, one core fragment, and three ground stone manos were encountered. Sixteen artifacts were collected, including the stone mammal effigy.

Seventy ceramic sherds were recorded (Table 2). Sixty-one polished brownware sherds (49 jars, six bowls, six indeterminate forms), four San Francisco Red sherds (two jars, two bowl) and five Chupadero Black-on-white jar sherds were found. Sherd densities are high in two to three areas, possibly attributable to single pot drops. Some of the polished brownware sherds appear to have a higher degree of polish than the Alma Plain sherds seen on other sites. These brownwares may be trade wares from the Casas Grandes region. If some of the brownware sherds are part of the Alma series, they would substantiate an earlier temporal component with the San Francisco Red sherds (A.D. 700–1100). The Chupadero Black-on-white jar sherds date from ca. A.D. 1150 to ca. 1400 and are considered a trade ware from the middle Rio Grande region.

Site LA 157190 is interpreted to be a campsite seasonally occupied by Mogollon peoples. The lack of hearths and subsurface features indicates that occupation was short term. The people probably came to this location to obtain lithic materials from the riverbed of the Rio Mimbres for the manufacture of stone tools and to gather and process native food plants. The ceramic assemblage is dominated by sherds from jars that could have been used to store and carry native plant foods back to the main pueblo.

### Table 2.
Ceramics from Site LA 157590

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>Jar</th>
<th>Bowl</th>
<th>Indeterminate</th>
<th>Total</th>
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<tr>
<td>Chupadero Black-on-white</td>
<td>5</td>
<td>5</td>
<td></td>
<td>5</td>
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<tr>
<td>Polished brownware</td>
<td>49</td>
<td>6</td>
<td>6</td>
<td>61</td>
</tr>
<tr>
<td>San Francisco Red</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>56</td>
<td>8</td>
<td>6</td>
<td>70</td>
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</tbody>
</table>

**THE BISON EFFIGY**

A bison effigy was discovered during the mechanical scraping activity while the crew was checking a white stain that indicated the presence of a rock. A 1-m by 1-m test pit was placed around the effigy location and the loose sand and compact sterile fill were removed using a trowel. The sterile fill was excavated to a depth of 5 cm, approximately half the depth of the hole in which the effigy rested. It appears the effigy was slightly embedded in the old sterile soil surface and then covered with blow sand. One Alma Plain sherd was found at the contact point between the sheet sand and the old soil surface.

The bison effigy, made of quartz porphyry, has a distinct body shape with short legs, and a ground groove that indicates the neck area between the body and the head (Figures 1 and 2). Overall, the effigy measures 15.1 cm long, 8.8 cm high, and 7.7 cm wide. It weighs 2 lb 11 oz (1.219 g). The body shows evidence of shaping by the presence of a smooth body surface with some small areas that have a light polish. Two ridges have been shaped for the front and rear feet (Figure 3) but not as individual feet. There are no created ears or natural bumps for ears on the top of the head. Parts of the head and forehead area have not been damaged by the effects of the effigy having been in a fire. Fire cracks are present in the lower part of the body and along one upper side (Figure 1–3). The facial portion of the effigy has been damaged by fire spalls (Figure 4).

The rump portion of the body has been ground nearly flat. There is a polished area that measures 4 cm by 3.5 cm (Figures 5 and 6). It appears that this area may have
Figure 1.
Bison effigy from Site LA 157590.
Photo by John Fitch.

Figure 2.
Reverse profile, note fire-crack damage to head and fracture lines. Photo by John Fitch.

Figure 3.
Feet and belly of bison effigy. Photo by John Fitch.

Figure 4.
Facial view of bison effigy. Photo by John Fitch.

Figure 5.
Rear profile with polished grinding surface on hindquarters. Photo by John Fitch.

Figure 6.
Profile of bison effigy showing convex polished grinding surface on hindquarters. Photo by John Fitch.
been used for grinding on flat surfaces. No other part of the effigy shows this higher degree of polish. The body shape is nearly round. The groove around the neck is 1.5 cm wide and approximately 0.3 cm deep compared to the body. From the edge of the groove to the tip of the head is 2.8 cm. This may be a minimum distance because the head is fire-cracked and some parts are missing.

In the forward part of the back is a small depression that may or may not be natural at the end of the fire crack (Figure 6). If one is holding the effigy around the body, as if to use it for a grinding tool, the depression is a natural fit for a thumb and feels more comfortable in the left hand. Three adult fingers fit in the space between the front and rear legs.

The bison identification is suggested by the impression of a hump or the forward part of the depression on the back of the effigy. Also, the face is short between the neck and a part of the face that was not damaged. Figure 1 shows the head with most of the originally shaped surfaces of the top of the head and left side of the head. The irregular surface is the heat-spall surface. The contour of the undamaged surfaces is suggestive of a short face with a downward orientation of the head and face.

Shortly after the effigy was recovered, images of it were circulated on the New Mexico Archeological Council news list. Several individuals suggested the effigy was a bear, based in part on the similarities with five bear effigies recovered from Paquimé. Only one line drawing of a bear effigy is presented in the Casas Grandes report (Rinaldo 1974:7:Figure 364-7). The bear effigy has a forward projecting face and two raised areas for the ears. It does not have the grooved area around the neck between the head and the front shoulders. Based on these differences, it is felt that the effigy is not a bear. The bison effigy measurements are provided in Table 3 with comparative data from five bear effigies found at Paquimé, Casa Grandes, Chihuahua (Rinaldo 1974:7:298).

Dr. Terry Reynolds, Curator, University Museum, New Mexico State University, contacted the author about a bison effigy in the museum's collection. It was part of a private collection donated to the University Museum from a site on the banks of the Mimbres River on the southwest side of Black Mountain. The cultural affiliation of the site is not known though there are numerous Mimbres Period sites in the area.

This effigy is a small pendant (Figures 7–9) made from a sedimentary rock which has several different colored bands of material. The pendant has a drill

<table>
<thead>
<tr>
<th>Location</th>
<th>Material</th>
<th>Weight (gm)</th>
<th>Length (cm)</th>
<th>Height (cm)</th>
<th>Width (cm)</th>
<th>Legs (average)</th>
<th>Across (cm)</th>
<th>Thickness (cm)</th>
</tr>
</thead>
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<td>Deming</td>
<td>Rhyolite</td>
<td>1,219</td>
<td>15.1</td>
<td>8.8</td>
<td>7.7</td>
<td>.5</td>
<td>1.5</td>
<td>.5</td>
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<tr>
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<td>Limestone</td>
<td>239+</td>
<td>8.8+</td>
<td>6.4</td>
<td>3.4</td>
<td>0.7</td>
<td>1.9</td>
<td>1.1</td>
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<td>Ricolite</td>
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<td>150</td>
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<td>0.1</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
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<td>Ricolite</td>
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<td>9.2</td>
<td>4.3</td>
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<tr>
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<td>300+</td>
<td>14.3</td>
<td>6.1</td>
<td>2.6</td>
<td>0.4</td>
<td>0.9</td>
<td>0.8</td>
</tr>
</tbody>
</table>
Figure 7. Profile of bison effigy from Black Mountain, north of Deming (cm scale). Photo by John Fitch.

Figure 8. Reverse side of bison effigy from Black Mountain. Photo by John Fitch.

Figure 9. Side view of bison effigy from Black Mountain. Photo by John Fitch.

Figure 10. Feet and mouth detail of bison effigy from Black Mountain. Photo by John Fitch.

Figure 11. Modern bison, North Ponil Canyon, Cimarron, New Mexico. Photo by David T. Kirkpatrick.

A brief review of several site reports shows that bison remains or possible bison remains have been found in a number of sites that date to the Mogollon time period. The largest assemblage comes from Paquimé in northern Mexico. Di Peso (1974:243) reported the presence of numerous bison bones in prehistoric Viejo and Medio periods and the historic Espanoles Period deposits. The minimum number of individuals for the Viejo period is five, Medio period 29, and seven for the Espanoles period. DiPeso (1974:245) further states bison is

hole in the middle of the body. This pendant is 2.8 cm long, 1.4 cm high, and .8 cm thick. It appears to have been initially shaped into a rectangular blank as the feet and mouth and the back and head are on the same horizontal planes. Then the body, feet, neck, head, and mouth were ground to the desired shape. The four individual feet were created by making a groove or notch into the raised area on the belly side of the effigy (Figure 10). The same was done to the lower part of the head to create the mouth. The form of this pendant closely fits the stereotype image of a bison (Figure 11).

DISCUSSION

A brief review of several site reports shows that bison remains or possible bison remains have been found in a number of sites that date to the Mogollon time period. The largest assemblage comes from Paquimé in northern Mexico. Di Peso (1974:243) reported the presence of numerous bison bones in prehistoric Viejo and Medio periods and the historic Espanoles Period deposits. The minimum number of individuals for the Viejo period is five, Medio period 29, and seven for the Espanoles period. DiPeso (1974:245) further states bison is
the major protein source for the Viejo and Medio occupants of Casas Grande period. Bison bones account for 93.9 percent of the faunal remains in the Viejo Period, 52.0 percent in the Medio Period, and 26.4 percent in the historic Espanoles Period.

Several Pithouse Period and Mimbres Period Mogollon in Arizona and New Mexico have yielded bison bones. Haury (1940:15) reports the lower jaw bone of a bison being present at the Bear Ruin, a seventh century site in the Forestdale Valley of east-central Arizona. At Tularosa Cave in west-central New Mexico, Martin et al. (1952: 483, 499) report the presence of bison bone in the San Francisco Phase (AD 700–900) and later phases. Cosgrove and Cosgrove (1932:3-4) found bison bone fragments at the Swartz Ruin on the Mimbres River. Hauray in a personal communication to Karl Laumbach (1979:27) stated that in 1963 he had found bones of a calcified bison associated with Mimbres Black-on-white sherds near Lordsburg. The Wind Mountain site is located on Mangas Creek, a tributary of the upper Gila River. It was occupied from Early Pithouse (A.D. 250–500) through Mimbres Phase (A.D. 1000–1150/1200). The remains of domestic cow (Bos taurus) and/or bison (Bison bison) were found in one structure and refuse around the site. Because of pot hunting in the structure, the bones in the structure could be domestic cow that were mixed into the prehistoric deposits (Woosley and McIntyre 1996:19, 405-406).

Site LA 12773 is a Late Archaic and Early Mogollon seasonal site in the dune fields overlooking the playas west of Lordsburg. During the excavations, Laumbach found numerous tracks on the surface of Level D, a sterile, red compact sandy clay strata. Dr. Charles B. Hunt, Department of Earth Sciences, New Mexico State University, interpreted this as a Late Pleistocene stratum, which is overlain by a very thin (1-2 cm) calcium carbonate accumulation (Level C) that leached out from the Early to Middle Holocene (8000 B.C.–3000 B.C.) horizon (Level B). Level A is the modern and recent historic aeolian sand. The majority of tracks were associated with the calcium carbonate layer and were only 1 cm deep (Figure 12). A pair of deeper (5 cm) tracks was found and not associated the carbonates of Level C. Laumbach (1979:24, 27) interprets these cloven tracks (Figure 13) as being from bison living in the area prior to the development of the carbonate level. These tracks may very well indicate a bison population living in southwestern New Mexico during Paleoindian times and into the Mogollon occupation.

In the Bootheel region of southwestern New Mexico, a bison rock art image is present in a shelter in Emory Canyon of the Alamo Hueco Mountains. The pictograph is painted using black pigment (Lambert and Ambler 1961:21-23). DiPeso (1974:243) discusses the problem of the descriptions by sixteenth and seventeenth century Spanish explorers of bison and bison herds in Mexico and the Great Plains of the United States. While the presence of bison bone in archaeological sites documents the prehistoric distribution, it is not known when bison disappeared from the landscape west of the Rio Grande (Findley et al. 1975). Findley et al. 1975:335) state that by 1860 bison did not exist in New Mexico. However, bison herds continued to exist in northern Mexico, especially in the Casas Grandes region. Di Peso (1974:243) cites an article by Lew Wallace (1879) in which Wallace described a bison hunt in the late 1870s on the Corralitos Ranch in the Casas Grandes Valley. Hornaday (1889) also discusses the historic distribution of bison in northern Mexico and the United States. Today in the Bootheel area, a modern bison herd is present in northern Chihuahua (DiPeso 1974:243). While conducting fieldwork near Antelope Wells, Hidalgo County, the author saw a lone bull buffalo that probably strayed north from this Chihuahua herd.
CONCLUSIONS

The bison effigy is the most unusual artifact found on this site as well as all of the other prehistoric sites in the project area. Other bison effigies, without cultural, temporal, and locational provenience, have been reported from the northern Rio Grande region (Julia Clifton personal communication 2008). A small bison effigy, similar to the effigy from near Black Mountain, was recently recovered from a Mimbres-age deposit at a site in the Canada Alamosa, near Monticello, Sierra County (Laumbach personal communication 2008).

The origin of the Deming bison effigy may be from the Casas Grandes region (Gloria Fenner personal communication 2008). The effigy may have been a trade item or was brought to the site by people from the Casas Grandes region. It is assumed the effigy was discarded and then used as a hearthstone, which resulted in the fire damage to the facial area. Alternatively, fire may have been used to end the ritual life or function of the effigy.
Additional research is needed to understand the prehistoric distribution of bison in southwestern New Mexico. The presence of this bison effigy and other bison effigies indicates that a special relationship existed between the prehistoric occupants of the region, possibly similar to those relationships of prehistoric and historic groups of eastern New Mexico and the Great Plains.

ACKNOWLEDGMENTS

I would like to thank Mark Brinton, Rancho Riata Subdivision, Deming, New Mexico, for his preservation efforts associated with the archaeological sites in the project area. A special thank you to Karl W. Laumbach and Kristopher Laumbach for providing the cow and bison footprint photographs from Site LA 12778 and to John Fitch for photographs of the bison effigy from LA 157590 and the site in the Black Mountains area.

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Rinaldo, John B.

Wallace, Lew

Woosley, Anne I., and Allan J. McIntyre
TOO MANY PEOPLE: HOW TANOAN SOCIAL ORGANIZATION COPED WITH LATE PREHISTORIC VILLAGE AGGREGATION

Clan-based social organizational systems cross-cut by ritual sodalities have allowed Hopi, Zuni, and Keres to assimilate incoming peoples as new and separate social groups—clans. Examples of this process can be seen in versions of the Hopi origin story (Courlander 1971; James 1974; Malotki 1993; Nequatewa 1936), and in the presence of clans comprised of former Tewas and Tanos at Hopi, Zuni, and Santo Domingo (Fewkes 1900; James 1974; Peckham and Olinger 1990). Assimilating groups of newcomers is a different process for Tanoans because they lack clans. In contrast to the common assumption, based on Eggan (1950:315-316), that Tanoan moieties represent the disintegration of a clan-based system, Ellis (1964:51) provides an alternative reconstruction of prehistoric Tanoan social organization in which moieties, rather than clans, were the primary structural units. The moieties were male-dominated, controlled initiation, ceremonies, and warfare, and may have had rain societies, but did not necessarily involve seasonal transfer of duties. Villages also included cross-cutting societies for curing, fertility, and warfare. We believe that Ellis (1964) is correct in asserting that moieties were essential elements of prehistoric Tanoan social structure, and provided the means by which Tanoan groups were able to assimilate others and accommodate aggregate communities in late prehistoric times.

Moieties remain essential structural elements of Tanoan communities. They are important organizing mechanisms among the Tewas (Ortiz 1969), and are present but relatively unimportant as organizing mechanisms for the northern Tiwa at Taos Pueblo (Bodine 1979). We contend that this distinction actually describes the difference between structural moieties and organizational moieties. Structural moieties are sometimes described as weak because they are not prominent and do not seem to consistently organize the people or activities of a community, while organizational moieties are sometimes described as strong because they are prominent and serve as mechanisms to organize community members and their relationships and activities. Our contention here is that organizational moieties developed as what we call second-layer moieties in Tanoan communities that needed to accommodate incoming groups of people who would retain corporate identity rather than being fully assimilated. In particular, second-layer moieties became prominent in Tewa communities during the turbulent Coalition and Classic periods.

Demographic reconstructions for the Northern Rio Grande suggest a substantial indigenous population by the late Developmental period (Boyer et al. 2008; Dickson 1976). Continued internal population growth coupled with a filling of the landscape resulted in Pueblo expansion from south to north until the Taos Valley was filled, after which the Pajarito Plateau, Galisteo Basin, and Rio Chama drainage were settled. These circumstances led to a need to aggregate people and communities to better apportion and control resources (Boyer et al. 2008). The result was larger communities than could be efficiently organized by the mechanisms used in late Developmental period communities. Four examples illustrate how this process worked among Tanoans including the Northern Tiwa, Towa, Southern Tiwa, and Tewa.
COMMUNITY GROWTH AND INTEGRATION

Assimilation and aggregation are related in that they involve growth of communities that accommodate incoming people. Following Johnson’s (1978, 1982) seminal research into the scalar effects of community growth on integration and organization, others have explored those effects in Pueblo communities (e.g., Adler 1989, 1990, 1993, 1994; Kintigh 1994). Johnson’s research examines integration of community members through levels of participation in decision making, examined principally in terms of information processing and dissemination (Flannery 1972). His simulations and ethnographic research show that community decision making based strictly on member consensus is efficient only in groups smaller than six households. Consensus decision making can continue to operate when groups exceed this size, but a higher level decision making organization must be created if the community is to continue to grow.

Johnson (1982) states that one of two major forms of higher level integrative organization will develop as communities continue to grow. One is a “simultaneous hierarchy,” or ranked society like a chiefdom. The other is a “sequential hierarchy” that maintains consensual decision making by placing that responsibility in the hands of community subgroups such as families, lineages, clans, or societies. Simultaneous hierarchies are vertical in nature, with the processes and authorities for decision making being placed in people holding ranked positions. Sequential hierarchies are horizontal because they involve as many community members as possible in integrative processes of decision making.

Kosse (1990:277) asserts that the scalar stress of community size and growth is evidenced by three “critical levels of socioeconomic integration”: family level, local, and regional polity groups. Transition from one level to another is associated with community size thresholds (Kosse 1990:275-276). The family level group manifests in two main units: the family/camp is a nuclear family of five to eight people, while the family/hamlet consists of related families totaling 25 to 50 people. Using Kosse’s family figures of five to eight people, family/hamlets contain three to 10 nuclear families, matching the size of efficient member-consensus decision making units identified by Johnson (1978, 1982), which is fewer than 14 households, and ideally fewer than six. They are also close to the two to 20 households able to communally manage farm lands identified by Adler (1994:86). Generally, communities of fewer than about 12 households are efficiently integrated in terms of processing information, making decisions, and sharing economic resources and products through member consensus.

Communities with more than about 12 households will develop a community integrative organization for purposes of information processing and decision making that involves fewer participants than the entire community. Interestingly, the association of community size and integration level is not linear. Efficiency requirements create situations in which growing populations demand different levels of integration, and those levels work best with optimum numbers of people (Johnson 1978) that typically exceed the minimum threshold at which integration transition will occur. Population growth resulting in transition to a higher level of integration encourages continued growth to a point where the new mechanisms will operate efficiently, creating a punctuated or step-like pattern. We can especially expect to see this archaeologically because day-to-day and even year-to-year growth trends are difficult to discern in the archaeological or historical records.

In this paper, we spend the most time discussing the local group, which can be manifested in two levels. The first, which Kosse (1990:279) calls the acephalous local group, includes communities between about 150 and 500 people. Using Kosse’s fig-
ure of five to eight people per nuclear family, acephalous groups normally contain 19 to 100 families, with an average of 23 to 77 families. This is considerably larger than family/hamlet communities, and shows the tendency of populations to grow to meet the efficiency needs of a new integration level. Acephalous communities are most common in a range of 150 to 320 people, while communities approaching 500 are relatively rare and are approaching the threshold beyond which they must transition to a higher level of integration.

Johnson’s (1978) simulation of information processing and decision-making efficiency shows that growing communities reach predictable thresholds in size beyond which there is considerable pressure to create what he calls vertical control units (VCUs). A VCU is an integrative feature in which community information processing and decision making are the responsibility of a group of people selected to represent the community. Formation of VCUs, therefore, creates levels of verticality within community organization. Put simply, a first-order VCU represents a single vertical level above that of the community as a whole. Second-order, third-order, and other VCUs represent the formation of additional vertical levels in community integration. They are formed as increasing community population requires that additional, hierarchical, groups of people, fewer in number relative to group levels below them in the hierarchy and to the size of the community, be made responsible for integrative decisions and actions.

Johnson’s research shows that pressure to create a first-order VCU occurs when a community exceeds six integrated units, such as families. The efficiency of a first-order VCU, however, begins to drop when the number of integrated units exceeds eight. Consequently, if the community continues to grow but does not exceed the next threshold at which another VCU is appropriate, its internal, integrated units will become aggregated into groups, socially if not geographically, which Johnson (1978) calls horizontal specialization units. Horizontal specialization units are, as the name implies, horizontally rather than vertically related to each other and do not have hierarchical authority within the community relative to each other. If those aggregate groups continue to increase in number, a second-order VCU can be expected to form when the community exceeds six such groups. If each group consists of a maximum of six units, a second-order VCU can be expected to form when a community exceeds about 36 units; if the units are families/households and we use Kosse’s figures for nuclear families, then a second-order VCU community should be larger than about 150 people, very similar to the size of Kosse’s acephalous local groups.

Communities of 30 to 150 people are best integrated by a first-order VCU, and population increase creates pressure to divide the administrative workload of the VCU among horizontal specialization units. The first level of horizontal specialization involves development of a two-unit VCU, which divides the administrative workload in half. We propose that this situation is the pragmatic point of the origin of moieties, and that moieties develop in acephalous local groups that use low level integrative facilities which, as Adler (1989, 1990) suggests, develop in groups containing 75 to 500 people.

As the efficiency of a two-unit, single-order VCU diminishes in a community of 30 to 150 people, the number of horizontal specialization units can be increased. In this situation, we suggest that if the parts of a two-unit, first-order VCU constitute moieties, and if the moieties are also a social manifestation of cultural concepts of duality (e.g., Lakatos and Post 2005), then the moiety will be retained as a structural feature when its efficiency as an organizational feature diminishes in the face of a growing population. As structural features, moieties can serve to identify communities rather than organize them as their organizational efficiency diminishes.
Increasing population creates pressure to shift from a two-unit, first-order VCU directly to a second-order VCU (Johnson 1978), but if the community remains below about 150 people, we expect it to use multiple horizontal units because of their organizational efficiency rather than undergo this shift.

Kosse (1990) describes such acephalous local groups as the aggregation, socially and perhaps spatially, of family level groups, integrated in two forms: the lineage or clan and the larger residential unit. As population densities increase, the former define and maintain internal and external relationships, including access to natural resources. The latter may involve either dispersed settlements or aggregated villages. In either case, “what distinguishes the residential unit is that its members are in frequent face-to-face interaction” (Kosse 1990:279).

Keeping in mind that overall organizational efficiency is only partly or temporarily enhanced as more horizontal specialization units are added to a VCU, we can expect them to develop as acephalous communities increase in size but remain below the threshold at which a second-order VCU is more efficient. This situation reiterates our proposal that moieties, initially formed as organizational features that manifest cultural concepts of duality, remain in place as structural/identity features when their organizational efficiency is supplanted by other, higher-order horizontal specialization units such as lineages, clans, and societies.

Horizontal specialization units are distinguished from each other by ritual activities (Forge 1972:371; Johnson and Earle 1987:20); that is, their identities are maintained and reinforced by association with ritual responsibilities. The community itself is a ritually integrated political group that can be identified by evident boundaries and symbolic focal points such as places where community ceremonial activities occur (Kosse 1990:280). We see here the integration of a first-order VCU and its constituent horizontal specialization units. The critical point is that the constituent groups in a community retain their ritual identities within the context of the community's ritual identity; they are both aggregated and assimilated into the community.

When settlement size exceeds 150, organizational relationships become more complex and social segmentation occurs as lineages or clans form societies (Kosse 1990:279). Johnson’s simulations show that a second-order VCU is more efficient than adding first-order horizontal units in populations above about 150, and that adoption of a second-order VCU at about 150 people produces efficiency gains that positively affect populations up to about 390–470. Beyond that, the administrative workload once again begins to increase. However, there is a plateau in that workload between about 480 and 625 people (about 96 households), beyond which the integrative efficiency again drops and the administrative workload increases significantly. The plateau may represent the approximate upper limit of acephalous residential units that can be individual, autonomous villages or units within larger villages, which Kosse (1990) places at about 500 people, and which is also the upper limit of Adler’s (1989, 1990) groups that use low level integrative facilities.

Kosse’s (1990) research may clarify Johnson’s (1978) figures by confirming that, above about 500 people, a single autonomous community is not effectively integrated by a second-order VCU, even with multiple horizontal specialization units. Johnson’s (1978:98) model shows that these very large acephalous groups can continue to add horizontal specialization units, but gains in integrative efficiency are short-lived and amount to plateaus in declining efficiency. Another plateau in efficiency decrease is anticipated by Johnson (1978:98, 99) when the community population reaches about 620 to 770. Adoption of a third-order VCU is almost demanded when population exceeds 174 families/households, or about 870 people (Johnson 1978:98).

Johnson (1978:99) shows that the overall gain in efficiency by adding multiple horizontal units to a
second-order VCU in a population exceeding 500 is rather small, so the level of integrative stress in communities of more than 500 people remains largely the same. The point is that single, autonomous, acephalous communities do not normally exceed about 500 people. This is the effective limit of a second-order VCU in terms of increasing the efficiency of community integration, even if multiple horizontal specialization units are added. Johnson’s figures show that exceeding 500 people brings considerable pressure to create an organizational split in order to divide the number of people into more efficient integrative levels. Assuming that the split is amicable and the new groups so created acknowledge continued relationships, this action creates a “big man collectivity” (Johnson and Earle 1987; Kosse 1990), which can take the form of multiple autonomous but related villages of equal stature integrated into a large community, or of a single, large, aggregated village with internal, relatively autonomous, equal sub-groups. The second scenario can create moiecties by splitting the population into two groups of less than 500.

If a community size of about 500 is the effective limit of second-order VCU integration, the actual limits of that efficiency will be reached as the community approaches double that number; hence Johnson’s (1978:98) assertion that a third-order VCU will be called for at about 870 people. We suggest this is the situation that results in the formation of a third-order VCU by splitting the community into relatively autonomous parts. If the point is to decrease the size of those parts to less than 500 people apiece, only two parts are necessary. They are created by fissioning if social or environmental circumscription is not a problem (Kosse 1990:292), or by forming moiecties if it is. Either scenario allows a community to continue its organization as a sequential hierarchy, maintaining an essentially egalitarian social structure through the use of horizontal units rather than ranked, hierarchical authority to organize integration.

These scenarios should, we propose, hold whether community size increases through internal population growth, the addition of already organized groups of people to an existing community, or a combination of both. We expect that if a large community approaching 500 people experiences growth by the addition of already organized groups of people so that the resulting community is well in excess of 500 people, pressure will be brought to respond by attempting to increase integrative efficiency.

In this type of situation, the level of response may have much to do with the sizes and relationships of incoming groups, and the resulting very large community will respond in one of two ways. If incoming groups are relatively small and do not appear simultaneously, they will be assimilated as horizontal specialization units within the existing second-order VCUs, given memberships in existing horizontal units, or both, spreading them through the community. As long as the resulting community does not greatly exceed 1000 people and timing of the increase does not overwhelm the system’s ability to accommodate new horizontal units, it is possible, though increasingly organizationally inefficient, to integrate within the second-order VCU.

Large incoming groups in the 150–500 person range who possess their own second-order VCUs create an immediate problem because the receiving community needs to accommodate a large number of people with a separate, existing integrative organization. Similarities between horizontal specialization units in both communities may aid in assimilation of the newcomers by allowing memberships to transfer to the receiving units. This has the effect of increasing the number of members in the horizontal units that cross-cut the community, while not increasing the number of decision-making participants representing those units. It does not, however, entirely mitigate the immediate organizational stress, which may require formation of another integrative layer—a third-order VCU.
Aggregation Among The Northern Tiwa: Taos Pueblo

There are no clans at Taos, and while directional moieties are present, they are not important organizing mechanisms (Bodine 1979:260-261), though the kivas at Taos are associated with the moieties. Males are given to kiva societies by their parents, and there are no set rules for this process. Consequently, societies ("kiva groups") are not kinship groups, and moiety membership is determined by the society to which a child is given rather than by kinship relations. Ritual societies are associated with kivas, though some societies cross-cut kiva membership. Each Taos kiva group has a different origin story describing its place in society. Those stories provide a traditional view of assimilative processes. According to Espinosa (1936), the first group to emerge into this world was the Feather People, who moved into the southern Taos Valley in the Rio Grande del Rancho area. In the Stevenson (1906) account, these people did not emerge first—though they would have liked to do so—but third, following emergence of the Ice/Winter People and the Painanna, both of whom are identified as "nomadic" foragers. The Feather People were farmers who raised deer as pets but did not eat them, and their clothes were made of plant materials. This may suggest that their economy emphasized farming over foraging, particularly hunting.

In the Espinosa (1936) account, the second group to emerge was the Shell People, who moved into the northern Taos Valley. Ellis (1974:105) identifies a site near Questa as ancestral to the Day People kiva; in the Stevenson (1906, Folder 2.19:11) account, this site is associated with the Ice/Winter People. Thus, there is a correlation between the Ice, Shell, and Day People; Greiser et al. (1990:48) state, "The Shell people ... were one of the original groups within the Sun, or Day, kiva," and Stevenson (1906, Folder 3.1:3) notes that the Ice People kiva is comprised of the Sun, Day, and "Very Small Oliva Shell" Peoples. The Shell People were hunters rather than farmers; they did not eat plant foods, and their clothing was made of animal skins. Sometime later the Shell People and Feather People began to live together, following a conflict in which the Feather People prevailed (Stevenson 1906, Folder 2.29). The Feather People apparently were convinced to eat deer meat and the Shell People, presumably, began to eat plant foods (Ellis 1974:37; Greiser et al.1990:43; Parsons 1936:113). This may refer to aggregation at Taos Pueblo, though Greiser et al. (1990:49) feel that this aggregation occurred before the move to a location along the Rio Pueblo, perhaps at Pot Creek Pueblo.

The next group to emerge was the Water People, who came out as fish that swam down mountain streams to the Santa Fe River and perhaps even farther south (Espinosa 1936; Grant 1925; Greiser et al. 1990). From there, they swam back up the Rio Grande to its junction with the Rio Grande del Rancho, which they followed to the settlement of the Feather People. Once the Water People arrived in the Taos Valley, they were made into humans by the Feather People and lived with the Feather People for a while before moving elsewhere, particularly Pot Creek Pueblo, considered ancestral by the Water People. Apparently after the arrival of the Water People, the Big Earring, Dagger or Knife, and Sun or Day Peoples moved into the Taos Valley, as did the Old Axe People. However, with the possible exception of the connection between the Day and Shell Peoples mentioned earlier, published migration accounts do not include specific histories of these later groups.

Published accounts do, however, discuss the combination of these groups into two larger groups. The Winter, Ice, or Cold People were hunters who lived in the Rio Hondo area. They included or assimilated the Shell and Day Peoples; whether other identified groups were included in the early years is not clear. In the southern valley were several communities of farmers who included the Feather People and, perhaps, the Water People after they moved into the valley.
These groups correspond to the kivas and societies associated with the directional moieties today.

In these stories, we see Taos Pueblo forming by the aggregation of several groups identified with different societies. Those aggregates initially consisted of small communities located north of and south of the Rio Pueblo, which eventually aggregated at the location of Taos Pueblo. In light of Taos social organization, we propose that as that large community formed and grew, it developed a second-order VCU, with individual small community groups represented by specific societies as horizontal specialization units.

**Aggregation Among The Towa: Jemez Pueblo**

Ellis (1964) provides information on how aggregation worked at Jemez Pueblo, based mainly on oral traditions. While there is an emphasis on clans at Jemez that does not exist in other Tanoan villages, Ellis (1964:10) feels they were borrowed from the neighboring Keres, especially the Zias with whom Jemez has been closely related since at least A.D. 1350 (Ellis 1956). The more important institutions for this discussion are the various societies that exist at Jemez today.

Oral traditions indicate that each ancestral Jemez village contained a single society. When people from one village joined those of another, the organizational complexity of the composite village was increased by the addition of the new group’s society unless the newcomers possessed a cult that was already represented, in which case a few new traits or variations upon a pattern might be all that was added. Legend recalls that the ancestral Jemez moved south in groups containing one or more societies, fought with each other frequently, and finally amalgamated into old Jemez, which contained 13 or 14 societies, including some that rejoined after distant travels (Ellis 1964:11, 56).

Thus, small villages joined others by adding their societies to the existing array of societies or by combining members of societies with similar identities and activities. This pattern created or enhanced horizontal specialization units within the organizational structure of the growing community. New groups were assimilated through conquest or because they wished to join another village. The leaders of assimilated societies were placed in a group of “Fathers,” who controlled the affairs of the village. Interestingly, new society leaders are not selected by the society, but by the Fathers, thus ensuring cooperation and lessening the possibility of conflict (Ellis 1953:392-393).

Ellis (1964:54-56) feels that the Jemez societies originated as extended family groups. She notes that such ritual societies usually contain a few members, with membership often concentrated among relatives and leadership following family lines. This seems to fit with the presence of only one or a few societies in small ancestral villages. Thus, as small villages began to aggregate, the composite groups were tied together through the system of societies and their ritual responsibilities. Ellis’ descriptions suggest that this pattern characterized the formation of aggregate Towa communities from incoming family/hamlet or small acephalous communities. As with the Taos situation, this is what we would expect during the adoption of a second-order VCU by growing aggregate communities, in which societies are incorporated as horizontal specialization units within the VCU, and society heads become members of a village council of decision makers.

Unfortunately, the Jemez example does not indicate whether or how moieties played any part in the process, possibly because their function in this process was obscured by the adoption of a clan system and can no longer be gleaned from stories. Conversely, it may be that Jemez moieties, like those at Taos, are structural rather than organizational, as we also argue for the Northern Tiwa, and played little role in the process of organizing incoming groups of people.
Aggregation Among The Southern Tiwa: Isleta Pueblo

An ethnohistorical account of the assimilation of a group of Keres by Isleta Pueblo (Ellis 1979a:354-355, 1979b:446-448) provides us with a glimpse at how the process of aggregation can work among the Southern Tiwa. Internal factionalism led Laguna to split in the late 1870s. About 40 members of the conservative faction intended to move to Sandia Pueblo but were approached by Isleta leaders who “offered them land in exchange for the benefits of Laguna masked dances..., the presence of its religious societies, and the “power” believed to emanate from the associated religious equipment” (Ellis 1979b:448). The immigrants included the heads of all but one of the major societies at Laguna. Isleta offered to provide land to the immigrants for houses and farming in exchange for their adherence to Isleta’s laws and a promise to never remove their masks or corn mother fetishes from Isleta. The Lagunas were assigned an area for settlement, and were provided with a house for ceremonial use. Their Kachina chief became their cacique, and the immigrants were taken into the Isleta Corn groups that were considered closest in identity and role to their clans. In addition, the heads of the Laguna societies were formed into a single curing society called the Laguna Fathers, which paralleled Isleta’s Town Fathers and doubled as a council for the Lagunas that would appoint their own governor and war captains (Ellis 1979a:355). The Lagunas were never fully assimilated because most of them moved to the village of Mesita within a few years. However, the society heads remained and continue to be known as the Laguna Fathers. The Kachina Father also remained, and his successors continue to act in that capacity for the Lagunas at Isleta as well as those that returned to Mesita.

Ellis (1979a:357) suggests that the Isleta Corn groups may equate to Taos kiva groups, and that before the Spanish arrived each Corn group had its society kiva. These groups are not clans, and (as at Taos) children are given to a Corn group, usually that of one or both parents. Corn groups are not exogamous, and rather than being kinship groups are ritual associations. The moieties control part of the ritual life of the village, but membership is not from kin lines except that children are given to each moiety in the order in which they are born. Perhaps the most important aspect of this example is that the immigrants were accepted as a group and permitted to form their own ceremonial/political hierarchy, paralleling that of the native Isletans. The immigrants were taken into existing Corn groups, ceding their clan memberships and abandoning clan exogamy.

The process of assimilation is probably ongoing at Isleta, but the events that have already taken place are eloquent evidence of this process. The distinction between Isletas and Lagunas may disappear as the latter complete their assimilation. Parallel political leadership may or may not vanish, but the parallel curing societies will almost certainly remain. The process of merging the Laguna immigrants with Isleta was done using the Tanoan principle of duality. The Lagunas were initially organized into a separate entity that paralleled and was tied ceremonially to Isleta. Each group was governed by councils comprised of society heads, and each had their own cacique. Though separate, the two groups cooperated ceremonially.

We suspect that assimilation of the Lagunas caused integrative stress to which Isleta responded using Tanoan concepts of social duality. While the events and processes may not reflect significant population growth, the result was the formation of a dual division (moieties) in which one part represented the incoming group and the other the receiving group. The Isleta case probably reflects a desire by the incoming Keres to retain a separate identity and to be provided with an identity-specific role in the Isleta community. The structure developed to allow Isleta
to absorb the Laguna immigrants closely resembles the layered moieties of the Tewa, and provides clues to how that system might have originated.

**Aggregation Among the Tewa**

Though specific details are few compared to the ethnohistoric accounts from Jemez and Isleta, Tewa oral traditions provide information on how they formed aggregate villages. As a version of the Tewa origin story recounted by Ortiz (1969) illustrates, after their emergence into this world the Tewa separated into two groups and traveled south, one group moving along the east side of the Rio Grande (Winter people) and the other along the west side (Summer people). The Summer people lived by farming and gathering plants, while the Winter people lived by hunting. After living in many villages along the way, the Tewa were eventually reunited at Posi, identified as the Ojo Caliente area in northcentral New Mexico. If Ellis (1964) is correct concerning the antiquity of the Tanoan moiety system and as our scalar stress model predicts, the Summer and Winter peoples each had structural moieties before they joined at Posi.

Origin stories collected from Ohkay Owingeh (San Juan Pueblo) provide more detail concerning this process. Ellis (1987:15-16) paraphrases these stories:

San Juan tradition places one of the units of Winter People as first settling some miles above present San Juan Pueblo but below the opening to Taos Canyon. When their pueblo and their fields were washed out by flood, the inhabitants of that site moved down river and rebuilt. Once again their village was ruined by a flood. This time they went to the people of Yungue, still farther south, and asked if they might resettle themselves across from that pueblo, on the bluff above the eastern edge of the river. Yungue agreed to that arrangement, and the new village still known as Okeh thus was established. The close proximity of the two peoples led to their becoming “like brothers” and they decided to merge into a single tribe though living in two communities about one-fourth of a mile apart. The ritual head of the Summer people would be the chief priest responsible for all activities pertaining to the summer ceremonial sequence (concentrating especially, but not solely, on the growth of domesticated plants) and would be the principal tribal leader during that period. In a parallel arrangement, the ritual head of the Winter people would be the Winter chief and responsible for all activities pertaining to the winter ceremonial sequence, concentrating especially, but not solely, on fertility of animals, wild and domestic. Eventually, it is said, many of the Summer people from Yungue moved to join the Winter people living on the bluff at Okeh. Thus Okeh became the larger settlement.

This suggests that the Summer people at Yungue were the original occupants, while the Winter people moved in from elsewhere. The leaders of each group assumed seasonal leadership roles in the new community. The villages merged, but retained separate residences for a time. Summer people began moving from Yungue to Okey as assimilation proceeded, with the remaining residents of Yungue eventually being displaced by the Spanish of Oñate’s colony, probably because it was the smaller village. This completed consolidation into a single community.

Similar to the process used to integrate the Lagunas at Isleta, Tewa stories suggest that merging groups retained separate identities, cooperating on ceremonies and leadership. Since Tewa communities undoubtedly already had moieties tied together by a council of society leaders, assimilation of a new group in this manner created another layer of duality. Using the principles of duality, the once separate groups were tied together in a new layer that created shared leadership roles and responsibility for different aspects of the ceremonial cycle. Comparing this situation to our scalar stress model, this second-layer moiety reflects the formation of a
third-order VCU that allowed the newly-integrated community to retain an essentially horizontal social organization.

ASSIMILATIVE PROCESSES
AND TEWA SOCIAL STRUCTURE

While moieties occur in all Rio Grande Tanoan villages, they serve different structural and organizational roles. At Taos, moieties are represented by a north-south division of kivas and societies. Society membership is theoretically nonlineal, though it often clusters along family lines (Ellis 1964:48). While some intra-moiety societies at Taos have alternating seasonal/economic jurisdictions, the moieties do not seem to be important organizing mechanisms (Bodine 1979:260-261). Two men's societies reflect the presence of moieties at Jemez. All men join the Eagle or Arrow societies, which are associated with warfare and rainmaking (Ellis 1964:23), and mainly concentrate on conducting tribal initiations, while other societies are responsible for other rituals. Consequently, the Jemez moieties appear to be more structural than organizational. Moieties at Isleta also appear to have both warfare and rainmaking functions. We suggest that the original moieties at Isleta were structural, since they were not used to organize the Laguna immigrants; rather, Isleta created second-layer organizational moieties in order to accommodate the newcomers. In contrast, moieties are the principal organizational elements of Tewa communities, and have very important political and ceremonial functions (Ortiz 1969). Only among the Tewa do we find dual organization taken to a point where there is a transfer of political power between moieties over the course of a year. This is important to understanding how Tewa social organization was affected by aggregation.

Moieties emphasize the dual nature of Tanoan social structure, which recognizes the bilateral extended family. However, moiety affiliation varies between Tanoan communities. At Taos, moiety membership is determined by the kiva group to which a person is given. The Corn groups at Isleta are at least a partial cognate of the Taos kiva groups, but their memberships crosscut moieties and vary according to birth order (Ellis 1979a:357). At Jemez, moiety membership is mainly patrilineal, and the moieties tend to be endogamous (Sando 1979:425). Tewa moiety membership is determined through the patrilineal line, the moieties are not exogamous, and when members of different moieties marry, the wife must switch to that of her husband (Ortiz 1969). The rituals involved in being accorded full moiety membership vary, and the rules and level of instruction are more stringent for Summer people, who receive a great deal of instruction in contrast to the token amount given to Winter people (Ortiz 1969:40).

The proto-Tanoan moiety system reconstructed by Ellis (1964:51) was male in membership, with functions including tribal initiation, warfare, and some rituals. Other rituals were vested in societies, whose membership may or may not have crosscut moieties. Among the modern Tewa there are moiety-based societies as well as nonaligned societies. When one joins a nonaligned society, one ceases to belong to a moiety. While there may be some alternating ceremonial jurisdiction associated with moieties among other Tanoans, only the Tewa have a regular transfer of political power. So how did the Tewa moiety system become so elaborated?

The answer may be hidden deep in Tewa social organization. While the Winter-Summer (seasonal) moieties are paramount in the modern social organization of the Tewa, another layer of moieties exists that includes only males. These are North-South (directional) moieties, in which membership is patrilineal (Ortiz 1969:108-110). Today, the directional moieties at Ohkay Owingeh only participate in a relay race held during the summer solstice, but they
traditionally once also competed in a shinny game at the beginning of the planting season. The presence and identity of the directional moieties is emphasized by competition during the summer races.

The Tewa directional moieties are similar to the proto-Tanoan system suggested by Ellis (1964). They are male-oriented, originally may have had weather-control function, and are structural in their emphasis of the duality embedded in Tanoan society. The aggression displayed during the summer race suggests rivalry between the directional moieties, which could reflect an older role in warfare. These characteristics suggest that the directional moieties represent the ancestral form of Tanoan dual organization, with the seasonal moieties representing an organizational element added to solve problems caused by aggregation at some time in the past. The organizational strength of the seasonal moieties, the existence of shifting village leadership based on moiety affiliation, and the presence of structural, directional moieties suggest that the Tewa used mechanisms that reflect embedded social duality to bind together multiple groups.

Following Ellis (1964) and our scalar stress model, people living in the small villages characteristic of the Northern Rio Grande before the late Coalition period were undoubtedly affiliated with moieties crosscut by membership in various societies whose male leaders formed governing councils. This system appears to have been adequate to integrate small communities (up to 150 people), but would not serve to integrate the larger villages that developed during the Coalition and Classic periods.

Large Tanoan villages of the Coalition and Classic periods represent an amalgamation of the populations of smaller related communities. Those villages could initially accommodate in-coming groups by adding horizontal specialization units to second-layer VCU's. This, we believe, describes the situations recorded by Taos and Jemez stories. However, when it became necessary to integrate communities with populations approaching 500, the Tewa responded by forming a new layer of moieties that recognized the structural identities of the different groups while binding them together. These moieties were identified as seasonal to differentiate them from the existing directional moieties, and to emphasize the specific roles for the different groups within the context of Tanoan dual society. The formation of a rotating village leadership vested power in both seasonal moieties, but the primacy of the original receiving village occupants was recognized by the importance and length of the part of the year they controlled. Since some moiety-affiliated societies at Taos Pueblo have alternating seasonal/economic responsibilities (Bodine 1979:260-261), this principle of alternation may be characteristic of the original Tanoan system, while vesting an alternating chieftainship in the leaders of the merged groups in Tewa communities may have simply been a modification of an existing system. Except for the actual moiety societies, Tewa society membership is not moiety-based, and when a person joins a non-aligned society their prior moiety affiliation is erased and they became "of the middle," a position of mediation rather than conflict (Ortiz 1969). This probably helped bind aggregating groups together by merging society membership and placing them outside the seasonal moieties. In so doing, they crosscut moiety affiliation, possibly replicating aspects of the elementary Tanoan social organizational system proposed by Ellis (1964).

When Tewa groups merged they apparently retained their memberships in the directional moieties that, in addition to most societies, may have initially crosscut the new layer of seasonal moieties and helped bind the groups together. By creating a new layer of moieties the Tewa maintained the important Tanoan principal of duality and expanded it: the two layers of moieties represented a new duality in social and ritual organization, at least initially retaining the separate identities of the merged groups through the seasonal moiety layer, while at
the same time providing a level of crosscutting cohesion through maintenance of the directional moiety layer.

Cohesion of these large villages was probably initially weak and perhaps designed to allow fissioning if that became desirable. Except for the moiety societies, each society contains members originating in both moieties, and each has an important role in all nonmoiety-based ceremonies (Ortiz 1969). Thus, fissioning would deprive neither group of the ritual specialists needed to complete the ceremonial calendar, except for members of the other seasonal moiety society. If a village fractured, two nearly complete villages could form, both having directional moieties, and neither dependent on the other for trained ritualists capable of maintaining the ceremonial cycle (Kosse 1990:292).

Binding groups of people into a single cohesive entity can be difficult, even when they are related and fusion is socially and economically necessary. The way in which the Tewa solved this problem was to turn one of the main features of their social structure sideways by adding a second layer of moiety membership. This permitted the continued acknowledgment of different groups in a village, but allowed them to live together and cooperate, and was amplified by removing most society members from their moieties and placing them in a mediating position. These mechanisms may not have been a good long-term solution to the problem of aggregation, and indeed may not have been intended to accomplish this. Factionalism is common in Pueblo villages, and prehistoric villages regularly fragmented and re-formed. The layered moiety system of the Tewa may have been designed to allow constituent groups to fragment if necessary without irrepairably damaging the duality of Tanoan social structure. Because the seasonal moieties are very visible and are related to the on-going organization of modern Tewa communities, their importance may be eclipsing that of the directional moieties (Ortiz 1969), effectively collapsing the two moiety sets into one as they become both organizational and structural.
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ARCHAEOASTRONOMICAL INVESTIGATIONS
IN THE VICINITY OF AZTEC RUINS
NATIONAL MONUMENT, NEW MEXICO

PROJECT BACKGROUND

Background research for this project began in the summer of 2005. Results are preliminary and should be considered in conjunction with previous archaeoastronomical investigations near Aztec Ruins National Monument (Orbesen 1986a, 1986b, 1989a, 1989b; Wheaton 2006). Aztec Ruins National Monument, located in the City of Aztec, New Mexico, contains a large prehistoric pueblo complex that has been associated with Chaco Canyon about 80 km to the south. Fieldwork involved a number of previously recorded archaeological sites in and around Aztec, New Mexico, including Blancett Ruin and the “Old Indian Racetrack.”

For a number of years the authors have conducted archaeoastronomical research in the U.S. Southwest. At Aztec Ruins National Monument in May 2005, we observed a nondescript hill located directly east of the great kiva (Figure 1). This hill is in a good location to have been used as a horizon calendar for Aztec Ruins. We drove to the top of the hill searching for evidence of a prehistoric sunrise marker. Unfortunately, the hill had been used as a gravel quarry and the entire top had been removed by a depth of several meters (Figure 2). The top of the hill provides an excellent view of Aztec Ruins and the great kiva (Figure 3). We located an un-
Figure 2.
Gravel quarry on Sun Hill.

Figure 3.
The great kiva from the west side of Sun Hill.
usual alignment of rock cobbles on the southwest side of the hill, which was not quarried (Figure 4). The cobbles were deliberately arranged and there was a buried piece of rebar next to the feature; so we thought it might have been a recorded archaeological site. This single feature measures 8 m by 1.5 m and the long axis is aligned NE/SW on a bearing of 60°.

Our next step was to consult the State of New Mexico Archeological Records Management Section (ARMS) database. Records indicated that two archeological sites, LA 57301 and LA 54838, were located on the hill and had been recorded by the San Juan County Archaeological Society (Orbesen 1986a, 1986b). LA 57301 was located directly east of Aztec Ruins and had a single feature, a pile of river cobbles approximately 2 m by 2 m. The other site, LA 54838, was recorded as five mounds of river cobbles.

The site sketch map shows four mounds aligned north, south, east and west, surrounding a central mound. The entire feature measured approximately 9 m by 9 m. Site records indicate the cobbled features were described as "shrines" and related to solstice and equinox bearings from Aztec Ruins (Obersen 1986a, 1986b). There are sky-related components found at shrines, because of the manner in which they are used. shrines must be visited at the proper time and season; rituals are performed in sequence in the appropriate direction (Ellis 1994; Ellis and Hammack 1968; Stephen 1893).

The cobbled features appear to be more related to calendrical observation than to shrine activities. In Pueblo Indian tradition, horizon calendars have been used for hundreds of years (Cushing 1979; Stephen 1969; Stevenson 1902). Archaeoastronomy seeks to trace the use of these calendars from historic back to prehistoric. All known horizon calendars found among the prehistoric pueblos have unique adaptations and no two are alike; however, they all provide accurate time keeping. The astronomical observation conventions used by the prehistoric Puebloan people of the Southwest were similar to the old Mayan and Mexican conventions and accompanied the arrival of corn agriculture (Ellis 1975; 1989). Once established, the horizon calendar remains fixed for a long time, and the knowledge can be handed down to others.

Determining solstice is not difficult, if observations are made at sunrise every morning, from the same observing position and the sunrise location is recorded in some manner. The solstices are the only time during the year when the sun appears to rise in the same location for four days. For the Pueblos, the New Year begins at winter solstice and both the ceremonial and
planting cycle are governed by the appearance of the Sun in his winter house (Zeilik 1983). Preparations for ceremonial activities actually start two weeks in advance, so horizon observations must be anticipatory as well as confirmatory (Zeilik 1983:26). Winter solstice sun rises at 120° and sets at 240°; summer solstice sun rises at 60° and sets at 300° for latitudes of 35°. Alexander M. Stephen (1893) describes the orientation of the Hopi priest as he begins his ceremonial ritual:

The Hopi orientation bears no relation to North and South, but to the points on his horizon which mark the places of sunrise and sunset at the summer and winter solstices. He invariably begins his ceremonial circuit by pointing (1) to the place of sunset at summer solstice, next to (2) the place of sunset at winter solstice, then to (3) the place of sunrise at winter solstice, and (4) the place of sunrise at summer solstice.
In historical Pueblo Indian cosmology, the kiva is the central structure of ceremony and veneration. All ceremony originates in the kiva and radiates out from it. In Chaco Canyon, the great kivas were used as the beginning point to search for astronomical alignments (Williamson et al. 1975). Archaeological survey was also conducted along solstice lines radiating out from the kivas. There have been two projects involving the Great Kiva at Aztec Ruins (Orbesen 1986c; Wheaton 2006). However, there have been no archaeological surveys along solstice lines radiating away from the ruins. We determined to look for sites along solstice alignments away from Aztec Ruins.

We expanded the ARMS data map search to include sites along winter solstice sunset lines, at an azimuth of 240° from the cobble feature. Blancett Ruin (LA 59962), a large Mesa Verde Phase (A.D. 1150-1350) pueblo is located along this bearing, 7.3 km down the Animas Valley (Figure 5). There is no other site along this bearing, but there are three other sites parallel to this line, across County Road 3000 (Figures 5 and 6). These sites are located on three small mesas about 250 m southeast of Blancett Ruin and may have functioned as observation points. The hills are the same elevation and their flat top summits stand about 85 m above the valley (Figure 5). We had four hills, each with a site on top, so for research purposes we needed a way to differentiate between them. Fortunately, each hill has distinct characteristics and using these features as descriptors, each hill was assigned a name. The first hill was named Sun Hill because it is located directly east of Aztec Ruins and the sun rises along its horizon, when viewed from the great kiva. The next hill has a prominent radio tower located on the northeast corner, so we called it Tower Hill. The middle hill was called Ceremonial Hill because it has a prehistoric site complex (LA 6286), which has a great kiva, a tower kiva, and observation platforms. Racetrack Hill is the last hill to the southwest. It has a unique archaeological history going back as far as
80 years. In homesteading days, the people of Aztec named this hill after its only feature, a prehistoric cobble structure resembling lanes of a modern running track (Reyman 1984).

FIELDWORK

Sun Hill—Aztec Ruins Equinox Calendar and Summer Solstice Calendar Alignments

In June, fieldwork was conducted along the solstice sunset bearing of 240° down the Animas Valley to Blancett Ruin and on the three mesas to the southeast. Beginning on Sun Hill, an extensive search for the cobble mound (LA 57301) was made. The feature could not be located and was probably destroyed during quarry operations (Owen and Dragon 2005). The rock cobble feature previously located near the summit on the southwest side of Sun Hill was relocated. This feature has experienced severe damage. The site sketch map indicates there were five small (2 m²) cobble mounds. At present, two of these cobble mounds no longer exist and a two-track road now bisects the site. The cobble mounds form an 8 m by 1.5-m wide barbell configuration (Figure 4). A compass measurement revealed that this feature points to the summer solstice sunrise bearing of 60° east of true north and alternatively to the winter solstice sunset bearing of 240° (Owen and Dragon 2005). Standing at the cobbles on June 21 would provide an excellent view of the rising summer solstice sun.

Blancett Ruin (LA 59967)

Blancett Ruin is a large cobble and sandstone pueblo, approximately 50 m by 30 m (Grove 1972). It is located south of the Animas River at the junction of Blancett Arroyo and the Kello-Blancett irrigation ditch. Blancett Ruin is privately owned and surrounded by cultivated fields. The site has mostly been destroyed by pot hunting, agricultural activities, and a power line, which bisects the ruin. Presently, the site is an oblong chaotic rubble mound that gives the appearance of extensive vandalism. No sunrise observations are possible from the site, because it is covered with a dense juniper thicket and there is a forest of cottonwood trees along the 60° bearing to Sun Hill. Removing the vegetation would provide a clear line of site between Blancett Ruin and Sun Hill. From an observation position at Blancett Ruin the summer solstice sunrise would appear above the cobble feature on Sun Hill. Alternatively, standing at the cobble feature on winter solstice, the sun would set toward Blancett Ruin.

Tower Hill

On Tower Hill, site LA 5626 was recorded by Henry Jackson (1959) and the San Juan County Archaeological Society. When recorded, the site had two large depressions and a 16 by 4-m surface room block. We located the site on the southwest side of the hill, near the top. On inspection, one of the depressions was destroyed when the road to the radio tower was built. The other two features, the two-room surface structure and 18-m depression, are intact and have not recently been disturbed. The structures are displaced southeast by 520 m from the solstice sighting line between Blancett Ruin and Sun Hill (Owen 2005b). The observation position from these structures does not align with the solstice marker on Sun Hill. However, two small peaks on the distant horizon at 60° actually could have been used to mark the summer solstice sunrise (Figure 7).

Ceremonial Hill

The site on the middle hill was also recorded by Henry Jackson (1984) and the San Juan Archaeological Society. The site has a large depression at least 18 m in diameter, three surface structures, an elevated structure, and several circular cobble mounds located toward the edge of the mesa (Jackson 1984). The site is an extensive complex of ruined structures, depressions, cobble piles, and stone rings. Figure 13 shows six of its many features. Feature A is a raised stone structure located on the edge of the mesa, which faces the kivas depressions on Tower Hill, and has at least
three cobblestone rooms. Features B and C are presently cobble piles in the shape of circular raised mounds. They are located close to Feature D and may in fact be related to it (Owen 2005c). Feature D is a small surface room block measuring approximately 20 m by 10 m. Feature E, in the center of the mesa, is a large (18+ m) depression. Although there are numerous trenches and pot-holes at all of the features on Ceremonial Hill, Feature E appears to be intact and has no indication of vandalism (Figure 8). Feature G is an elevated cobblestone structure with an 8-m wide depression in the center (Figure 9). Feature G is surrounded by a surface room block. From the elevated portion of Feature G, the distant peaks align with the sunrise position of the summer sol-stice (Figure 10).
Racetrack Hill

On Racetrack Hill, there is only one prominent feature, the so-called "Old Indian Racetrack." This feature consists of four circular 3-m wide cobblestone "tracks," each separated from the other tracks by two to three rows of cobbles set in the topsoil (Figure 11). Each track spans an angular curve of 75°, has a radius of about 123 m, and is approximately 175 m long. There are two piles of cobbles 3 m in diameter, at the radial center of the curved tracks (Hewett 1976a; Jackson 1968; Owen 2005a). The arc appears to vary from circular, and Reyman (1984) has suggested the curve is parabolic.

A line tangent to the curved track at its northern end points to an azimuth angle of 30° and another line tangent to the track at its southern end points to an azimuth angle of 120°. The directions of these tangents at the two ends of the arc intersect each other to make an angle of 90° (Figure 12). (The 30° tangent is a common angle we have found repeatedly at Mogollon
Figure 11.
Cobble divider between Courses One and Two; rod is two meters.

Figure 12.
Map of Racetrack Hill.
sites with an astronomical function. Unfortunately, at this point we can offer no explanation for this phenomenon. It appears to be cultural rather than astronomical.) The tangent line from the southern end of the racetrack feature points in the direction of the winter solstice sunrise (Figure 12). The site has undergone numerous test excavations but there have been no published scientific reports or analysis (Orbesen 1989b; Reyman 1984). On the surface, the site appears to be level and to have no subsurface features. Presently, it appears as it was when recorded and has not been significantly disturbed or vandalized (Jackson 1968; Owen 2005d; Owen and Dragon 2005).

DISCUSSION

The summit of Sun Hill, is only 2.62 km from the great kiva at Aztec Ruins National Monument and 90° degrees east of the ruins. In 1986, Sun Hill was intact and the two cobble sites were recorded (Orbesen 1986a, 1986b). These sites were in position to have acted as equinox and solstice markers for Aztec Ruins; however, they were only cobble piles with no indication of who made them or when. The entire top of the hill was quarried away and one site destroyed. The other site partially survives, but the original configuration of its features cannot be

Figure 13.
Map showing features on all three hills.
determined. While the remaining features could have been used for the winter solstice sunrise marker at Aztec Ruins, the same features could be used for the summer solstice sunrise at Blancett Ruin (Figure 4) (Owen and Dragon 2005).

Aztec Ruins, Salmon Ruin and Blancett Ruin are all large prehistoric pueblos, which were located on private land. The owners of both Aztec and Salmon Ruins recognized the importance of the sites; they were protected, and one became a national monument and the other a museum. Blancett Ruin has not fared as well. It is still in the hands of the pioneering family that has owned it for almost 100 years, but it has not been protected and today it lies neglected in a field. Blancett Ruin has been vandalized and a power line bisects the site (Grove 1972).

All three sites located on the mesas south of Blancett Ruin have ceremonial features and may have unrecognized astronomical features (Figure 13). Ceremonial Hill and Tower Hill have evidence of ceremonial activities and sighting features aligned toward a distant reference point identified as Piedras Peaks in Colorado. The summer solstice sun rises between the Piedras Peaks when observed from an elevated feature on Ceremonial Hill. If this elevated structure were in fact a tower kiva, this would bring the total number of tower kivas to three, with one at Aztec Ruins and one at Salmon Ruins. The site also has a large intact depression, which almost certainly was a great kiva. Both Tower and Ceremonial Hills have had episodes of destruction and vandalism. Tower Hill has lost one of its large depressions to road building. Ceremonial Hill has trenches through the surface structures and shows evidence of looting.

The “Old Indian Racetrack” was officially recorded by Henry Jackson, the president of the San Juan Archaeological Society and D. L. Huggins, the superintendent of Aztec Ruins National Monument (Jackson 1968). The site was recognized as something different and unique but there were no attempts to understand its features (Jackson 1968). Nothing further was done on the site until 1976, when Nancy Hewett, the archaeologist at Salmon Ruins, updated the site records (1976a). At this time, local archaeologists strongly felt that the site had astronomical features and archaeoastronomers with Illinois State University were contacted (Hewett 1976a).

On July 20, 1976, the archaeoastronomical team of Jonathan Reyman, Gary Urton and Tom Sever began preliminary research on the “Old Indian Racetrack.” Reyman initially doubted that the site was ancestral Puebloan. He felt that astronomy of the prehistoric pueblos was built into their masonry buildings and the “racetrack” has no masonry and was not a building. By 1984, Reyman changed his mind and determined the site was not only prehistoric Puebloan, but also a centralized astronomical observatory and signaling station. Reyman hoped to conduct full-scale investigation on the site but when funding became available, permission of the landowners was not forthcoming (Jonathan Reyman personal communication, 2008).

The next research on the site was conducted by Tom Orbesen (1989b) of the San Juan Archaeological Society. He assembled a larger picture. He began with the great kiva at Aztec Ruins (1989a) and expanded out into the surrounding landscape. He found and recorded the sites on Sun Hill (1986a, 1986b). He was led to the “Old Indian Racetrack” (1989b) by the same solstice lines we were following to the southwest away from Sun Hill. Orbesen had the site professionally surveyed and a number of observations were made (Savage 1985). Orbesen suspected the “race-track” had an astronomical function, but he never connected Ceremonial and Tower Hill to the site (Orbesen 1989b). Local archaeologists who were familiar with the site thought the great stone arc might have been the layout for the foundation of a great house that was never started (Meade Kemrer, personal communication 2008; Roger Moore, personal communication, 2008; Orbesen 1989b; Owen and Dragon 2005). Jonathan Reyman (1984:12) disagrees and believes “LA 9050 was a centralized astronomical
observatory and signaling station which served several, prehistoric Anasazi (Pueblo) villages and towns in this area of the Animas River Valley” (Reyman 1984:12).

Many Chacoan great houses incorporate at least one major curved architectural element in the building design (Sofaer 1997). Table 1 is a comparison of curved walls of Chaco Canyon structures with features similar to the “racetrack.” Given the length of these curved elements, the racetrack compares favorably. Some of the curved structures appear to be walls enclosing courtyards. Some curved structures are the actual back wall of the pueblo as in Pueblo Bonito (Sofaer 1997:88-132). The remaining foundations of Chacoan rooms adjacent to such exterior curved walls are typically about 3 to 4 m across, as are the courses of stone at the racetrack. Exterior structural wall lengths at Chaco approach the length of the “racetrack” with the Peñasco Blanco great house reaching a length of 168 m, and the Chetro Ketl great house reaching a length of 160 m. A good argument against this hypothesis is the fact that test pits excavated by Orbesen (1989b) show that there are no buried features beyond the end of the tracks. If this foundation were the beginning of a great house then it would seem plausible that, though it may change direction and shape, it would continue and expand into the final shape of the entire structure. The project could have been abandoned while still in the planning stage.

Test excavations on the outside “track” have shown that while the surface elevation of the site is approximately 10 cm, the cobble foundation goes into the earth a least a meter (Orbesen 1989b; Reyman 1984). There has been no testing inside the “tracks,” so it has not been determined if there is a floor. Our purpose in writing this paper was to bring attention to the archaeological sites in the Animas River Valley around Aztec Ruins and to provide information on the research efforts that have been done regarding these sites.

Table 1.
Curved walls in Chacoan great houses compared with the “Indian Racetrack.”

<table>
<thead>
<tr>
<th>Great House</th>
<th>Azimuth to which of End of Wall Points + or - 5°</th>
<th>Length of Curved Wall (Meters)</th>
<th>Courtyard Or Structure Wall</th>
<th>Number of Rooms Perpendicular to wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Racetrack</td>
<td>30°, 120°</td>
<td>175</td>
<td>S</td>
<td>4 “tracks”</td>
</tr>
<tr>
<td>Pueblo Bonito (Old Bonito 850-935 AD)</td>
<td>180°, 180°</td>
<td>140</td>
<td>S</td>
<td>Variable but 4 rooms or greater than 4 rooms in depth</td>
</tr>
<tr>
<td>Pueblo Bonito (Completed)</td>
<td>175°, 185°</td>
<td>258</td>
<td>S</td>
<td>Variable but 4 rooms or greater than 4 rooms in depth</td>
</tr>
<tr>
<td>Chetro Ketl</td>
<td>310°, 40°</td>
<td>160</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Peñasco Blanco</td>
<td>100°, 167°</td>
<td>168</td>
<td>S</td>
<td>5 rooms in depth</td>
</tr>
<tr>
<td>Pueblo Alto</td>
<td>20°, 325°</td>
<td>120</td>
<td>C, S</td>
<td>3 rooms in depth</td>
</tr>
<tr>
<td>Tsin Kletzin</td>
<td>0°, 15°</td>
<td>60</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Pueblo del Arroyo</td>
<td>317°, 263°</td>
<td>100</td>
<td>Part of wall is C, part S</td>
<td></td>
</tr>
<tr>
<td>Hungo Pavi</td>
<td>0°, 17°</td>
<td>90</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Una Vida</td>
<td>50°, 325°; 25°, 70°</td>
<td>85,88</td>
<td>C, S</td>
<td>Two curved walls -3, 4</td>
</tr>
<tr>
<td>Pueblo Pintado</td>
<td>93°, 343°</td>
<td>80</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Aztec Ruins</td>
<td>35°, 260°</td>
<td>85</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSIONS

For over 40 years, the research potential of Aztec Ruins outlier sites has lurched forward in fits and languished for years. There have been a number of researchers eager to tackle the project, but something has always prevented a diligent scientific investigation. Times have changed and so has the attitude toward archaeoastronomical research. Projects at both Aztec and Salmon Ruins have been completed (Baker and Mantonya 2002; Orbesen 1986c; Wheaton 2006). As the City of Aztec grows and expands ever-farther outward, outlier sites have become critically endangered. There has been severe vandalism on Sun Hill, Tower Hill, Ceremonial Hill and Blancett Ruin. Only the "Old Indian Racetrack" remains relatively intact. Research has been preliminary and basic. However, past research could be used in planning future projects. Sun Hill, along with the other three hills, provides an important adjunct to understanding the astronomical and calendar capabilities of the prehistoric culture that occupied the Aztec and Blancett Ruins.

Excavations on the "racetrack" feature can provide important knowledge in construction techniques of ancestral Puebloans, whether the site was a great house foundation or an astronomical feature. Further study of the features and excavation may give us more insight into the "racetrack's" intended purpose (Hewett 1976b; Reyman 1984). Unique and one of a kind the "Old Indian Racetrack" should be placed at the top of the list for archaeoastronomical research, before it disappears forever.

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Introduction

Cynthia Irwin-Williams (1973:5) stated that "two kinds of special activity sites are known outside the [Arroyo Cuervo] region: isolated hunting camps in the Jemez Mountains and repeated quarry workshop camps..." Five years later, one of the first systematic surveys in the Jemez Mountains was conducted along the valley of the Redondo Creek at elevations over 8000 ft (Moore et al. 1978). Although they found numerous lithic scatters, they were neither hunting camps nor quarries, but rather, campsites where a range of hunting and gathering activities appeared to have taken place (also see Baker and Winter 1981). However, there has been very little systematic research conducted in these upland settings during the intervening 20 years.

This chapter reviews the archaeological evidence for the Archaic occupation on the central Pajarito Plateau. Recent survey and excavations conducted at Los Alamos National Laboratory has identified over 50 Archaic sites and 175 lithic scatters. The survey evidence reveals the systematic and repeated long-term use of these upland resource areas by Archaic foragers. Indeed, several broad occupation zones can be identified. We summarize the ethnobotanical data on possible plant use for each vegetation community, and suggest a possible seasonal strategy for exploiting these resource zones during the Late Archaic. Debitage artifact data from recently excavated Late Archaic sites are subsequently used to link lowland habitation to upland campsites to illustrate this complementary land-use strategy.

Archaic Land-Use at Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) occupies the central section of the Pajarito Plateau. The plateau covers an area roughly extending from Santa Clara Canyon on the north, to the mesas above Cochiti Pueblo on the south, to the caldera on the west and the mesas overlooking the Rio Grande valley to the east. LANL covers approximately 29,000 acres of land on this high mesa, ranging from about 6000 to 8000 ft in elevation. The mesa has been incised with several deep canyons that drain from the mountain country down to the river valley. Balice et al. (1997) have defined four basic vegetation types at LANL: juniper-savanna, piñon-juniper, ponderosa pine and mixed conifer. Most of the area is covered with piñon-juniper woodlands at the lower elevations and ponderosa pine at the higher elevations.

A total of 51 Archaic sites has been identified at LANL. These sites are characterized by obsidian lithic scatters ranging from 40 to 140,000 m² in size. The assemblages emphasize the production/maintenance of bifacial tools, with occasional one-hand manos and millingstones also being present. The diagnostic Early, Middle and Late Archaic projectile point types on the Plateau are similar to those defined by Irwin-Williams (1973) for the Oshara Tradition (Figure 1). Figure 2 illustrates the relative percentage of sites by Archaic time period. As can be seen, there are very few Early Archaic sites, somewhat more Middle Archaic sites, and mostly Late Archaic sites represented. This pat-
Figure 1.
Diagnostic Early (top), Middle (middle) and Late Archaic (bottom) point types.

Figure 2.
Relative frequency of Early, Middle and Late Archaic sites.
tern does not necessarily reflect the increasing use of these upland areas through time. But rather the long-term effects of various geomorphic processes on the archaeological record. For example, although there is a Late Archaic site present on the surface of Mortandad Canyon, a charcoal sample collected from an 11-m deep core hole that yielded a date of 7260 B.P., indicated that Early and Middle Archaic deposits may be buried within these alluvial settings (Reneau et al. 1996). This chapter will therefore focus on the Late Archaic, given the number of archaeological sites represented, and the relative similarity in environment over the last 3000 years.

Figure 3 illustrates the distribution of Archaic sites at LANL. Since the distribution of sites is sparse, we have combined them with the distribution of all obsidian lithic scatter sites (Figure 4). In the latter case, we have used the actual site boundaries and not single points. These assemblages are also dominated by the production/maintenance of obsidian bifacial tools, but lack diagnostic projectile points. Given the previous data, it is likely that most of these sites represent Late Archaic occupations. Nonetheless, both figures illustrate several broad occupation zones: 1) juniper-savanna zone in the Rio Grande valley, 2) piñon-juniper zone at lower elevations on the Plateau, 3) piñon-juniper/pon-
derosa ecotone at mid-elevations on the Plateau and 4) ponderosa pine/mixed conifer ecotone at the higher elevations. It appears that the ponderosa pine and mixed conifer communities were also important to Late Archaic foragers, and not only the piñon-juniper zone as has traditionally been argued.

SEASONAL USE OF UPLAND AREAS

So, how were these Late Archaic foragers using these upland resource areas? A total of 985 plant species was described in Foxx et al.'s (1998) recent *Annotated Checklist of Vascular Plants in the Jemez Mountains*. This checklist provides information on plant locations, occurrence, seasonality, and uses. Over 200 of the plants identified for the Jemez Mountains by Foxx et al. (1998) are also identified in Dunmire and Tierney (1995), *Wild Plants of the Pueblo Province* as having specific ethnobotanical uses such as food, medicine, implements, etc., many with multiple uses. Using these two references we constructed tables to analyze the possible plant use by elevation and activity for the Pajarito Plateau and east Jemez Mountains. Table 1 summarizes all the uses for the over 200 plants identified. Although many of the plants have multiple uses, we are confining our analysis in this paper to only the 108 plants identified as subsistence plants.

The plants identified as potential subsistence species are available from a variety of vegetation communities, including from lower to higher elevations: juniper-sa-
Table 1.
Plant Uses by Vegetation Community.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Riparian</th>
<th>Juniper-Savanna</th>
<th>Piñon-Juniper</th>
<th>Ponderosa</th>
<th>Mixed Conifer</th>
<th>Burned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicinal (n=148)</td>
<td>18</td>
<td>82</td>
<td>111</td>
<td>73</td>
<td>35</td>
<td>14</td>
</tr>
<tr>
<td>Food (n=108)</td>
<td>23</td>
<td>41</td>
<td>77</td>
<td>56</td>
<td>30</td>
<td>13</td>
</tr>
<tr>
<td>Implements (n=28)</td>
<td>4</td>
<td>14</td>
<td>20</td>
<td>15</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Coloring/Tanning (n=37)</td>
<td>6</td>
<td>19</td>
<td>24</td>
<td>16</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Construction (n=16)</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Smoothing (n=13)</td>
<td>0</td>
<td>8</td>
<td>11</td>
<td>3</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Cordage (n=6)</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>174</td>
<td>254</td>
<td>173</td>
<td>91</td>
<td>41</td>
</tr>
</tbody>
</table>

vanna, piñon-juniper, ponderosa and mixed conifer. Many species can be found in multiple vegetation communities, but some species are limited to certain habitats within a plant community, or may be more abundant in certain habitats. For example, riparian and water resources are associated with multiple zones and are found within the canyon bottoms, along the Rio Grande, and in areas with springs and flowing water. Some species found near watered sites include wild grape, bee balm, willows, and cottonwoods.

Burned and disturbed areas also provide unique potential collecting sites within the piñon-juniper, ponderosa pine, and mixed-conifer zones. Tree-ring data indicate that there were frequent fires prior to 1900, particularly in the ponderosa pine zone (Foxx and Potter 1984). Burning enhances the habitat for species such as wild onion and Chenopods, but also increases the vigor and vitality of these species for a short time, thus making these species more abundant and larger in burned sites (Foxx and Potter 1984). These areas would provide foraging patches within the ponderosa pine or burned areas within other zones. Disturbed areas can be found through all zones and are often associated with Ceramic period habitation sites. Species such as common purslane, wolfberry and Rocky Mountain beeeweed are commonly found in such sites.

To determine the relative potential use of the plant communities and the individual habitats, we took each species and determined which plant community it might occur in, when the plant would most likely be available, and how common it might be. We also looked at other factors that might influence the availability such as the seasonality of the plant or habit.

Figure 5.
Relative percentage of food plants by vegetation community.
Figure 5 illustrates the relative percentage of plant foods by vegetation community. As can be seen, the piñon-juniper community contains the greatest variety of plant foods followed by ponderosa pine zone. Fewer species are found in the juniper-savanna, mixed conifer and riparian communities. If the five percent burned area species are target collecting sites primarily in the ponderosa pine plant community, then that community becomes an enhanced site for collecting species such as wild onion and cheno-ams. Therefore, the piñon-juniper and ponderosa pine communities are potentially the most productive areas for plant foods.

Figure 6 separates the species by plant group (structure or habit), and vegetation community. There are several important patterns. There is an increase in shrubs with elevation vs. a corresponding decrease in annuals with elevation. One factor is the availability of plants as related to the plant structure. Trees, shrubs, and perennial plants will be found in the same locations from year to year because of their long-term longevity. On the other hand, annual plants live only one year and therefore are more dependent on seasonal rainfall patterns and other conditions such as disturbance. Many of the shrubs within the mid-elevation ranges have collectible berries and would be a predictable resource. The increase in diversity of plants within these two zones makes the ponderosa pine and piñon-juniper communities more desirable collecting areas.

Figure 7 illustrates the seasonal availability of food plant species by vegetation zone. The availability is very dependent on the elevational seasonality. High elevations such as mixed conifer will have a shorter growing season than the lower elevations such as the piñon-juniper woodlands. Warming will begin with the juniper-savannah in early spring providing early season species such as Indian ricegrass. By May, greening of the mixed conifer and ponderosa pine will begin and species will start to sprout or leaf out. In the fall, the reverse is true. The seasonal cooling begins at high elevations, and moves downslope. Therefore, in the fall more species would be available for collecting at lower elevations (i.e., the piñon-juniper woodlands). Overall, there is a variety of plant species available to procure at all elevations and at various seasons.

![Figure 6](image-url)
Various portions of a plant can be used at differing times of the year. Many perennial food plants are available for consumption in the springtime and later on during the summer. For example, cheno-ams can be used as greens early in the season and seeds harvested later in the summer. Other plants used for the bulb or root crops such as wild onion will be available throughout the growing season. Some plants such as those with nuts and berries will not be used for greens and are therefore most available in mid to late summer or fall.

In this analysis, a number of plants are available in the spring and early summer at higher elevations. The highest number of food species is available during the midsummer at the middle to higher elevations. In late summer the pattern changes when there is a step-like pattern with decreasing species richness with increasing elevation. In the fall, there are more food plants available in the piñon-juniper community. The drying of soils and south-facing aspect of White Rock canyon and lack of berry producing shrubs and nut producing trees make the lower juniper-savannah less desirable for collecting except within the riparian zone along the river where berry producing species such as wild grape are found.

However, species richness does not necessarily reflect relative species abundance or evenness. Particular target species within each vegetation zone can be more common and productive than other species. Figure 8 provides information related to how common a particular plant is and its availability. Based on personal experience, plant collections, and botanical texts, we have divided the plants into four categories: common, locally common, not common, and abundant. Species identified as common are those that are seen throughout an area. Locally common means that plants are found in patches or groups. Not common indicates they are seen as single plants, not in patches and not throughout an area. Abundant usually refers to a dominant species of an area such as the piñon pine in the piñon-juniper plant community. As can be seen from this figure, many of the species are locally common. This means perennial plants that are locally common would be found in patches. Therefore, we would expect particular target species to be collected in these areas.

If we identify a few possible target species that are both common and abundant in these various communities, then we can suggest a possible annual cycle...
for exploiting these resource areas (see Table 2). In

the juniper-savanna community, cool season grasses
like Indian ricegrass are abundant having seeds that
are available in the early summer. Species used for
greens such as cheno-ams can be found in all dis­
turbed and burned contexts, but their resource
patches could be found represented in the ponderosa
pine zone and lower mixed conifer early in the sum­
mer. In addition, wild onions, berries and wild pota­
toes are also available in these areas during the mid to
late summer time period. In contrast, acorns, pine

nuts, broad leaf yucca and cacti would be available for
consumption during the fall in the piñon-juniper
zone. Dropseed grasses, seeds of cheno-ams and saltbush could have also been exploited during the late summer in this zone. If obsidian raw materials were
procured while a group was foraging at high elevation
quarries, then these materials could have been reduced
while the group was camping at the lower elevation
campsites. This model of Late Archaic seasonal mo­
tility is graphically illustrated in Figure 9.

Table 2.
Target Plant Species.

<table>
<thead>
<tr>
<th>Vegetation Community</th>
<th>Season</th>
<th>Early Summer</th>
<th>Mid-Late Summer</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juniper-Savanna</td>
<td>Greens</td>
<td>Indian ricegrass,</td>
<td>Dropseed, saltbush, cheno-ams, wild</td>
<td>Pine nuts, acorns, broad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>wolfberry</td>
<td>potato, purslane</td>
<td>leaf yucca, cacti</td>
</tr>
<tr>
<td>Piñon-Juniper</td>
<td>Greens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ponderosa</td>
<td>Greens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Conifer</td>
<td>Greens</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 9.
Late Archaic seasonal mobility pattern.
If we consider that the deep canyons could act as natural travel routes to these upland Plateau resource areas, then camping in the piñon-juniper/ponderosa pine ecotone would provide easy access to a wide variety of species within a small catchment area. For example, riparian and some mixed conifer species would be present in the canyon bottoms, ponderosa pine communities along the south facing canyon slopes and mixed conifer on the north facing canyon slopes and piñon-juniper woodlands on the mesa tops. Indeed, if the typical daily foraging radius around a hunter-gatherer campsite is about 10 km, then almost all of the Plateau at Los Alamos National Laboratory would be located within walking distance of a site located in this central zone (Binford 1982; Yellen and Lee 1976).

Lastly, if these Late Archaic populations were practicing some form of incipient horticulture, then how would this activity have been integrated into the foraging schedule? The evidence from Jemez Cave may help us understand this. Ford (personal communication 2002) suggests that maize may have been planted in May, the site abandoned and then reoccupied during September or October to harvest the crop. On occasion this occurred when the maize was still green, and other times when it was mature. Maize plants were probably grown in the mud flats adjacent to a small lake located behind Soda Dam. Broad leaf yucca was also procured and used for textiles, and a variety of game species were hunted (e.g., big horn sheep). The lithic assemblage was dominated by obsidian, with some Pedernal chalcedony/chert (Ford 1975). Therefore, some of these early horticulture sites could have been placed in well-watered settings adjacent to piñon-juniper woodlands and fall plant resource areas. This would have reduced any seasonal scheduling conflicts and provided a backup strategy for natural resource shortfalls (e.g., see Minnis 1985).

THE LATE ARCHAIC ARCHAEOLOGICAL RECORD

Seven Late Archaic open-air sites were selected for this study of debitage assemblages. Together, they cover an elevation range from 5620 to 9450 ft (Table 3). From lower to higher elevations, this includes a possible winter habitation site near San Ildefonso Pueblo that contains a single structure, with storage pits and an outside activity area (Lent 1991). Excavations along Highway 502 at the Los Alamos/Esponola interchange also identified an extensive Late Archaic site containing multiple hearths and activity areas (Moore et al. 1998). Both of these sites were excavated by the Museum of New Mexico and are located in the valley just east and west of the Rio Grande, respectively. Two sites are situated in the piñon-juniper zone at LANL (Biella 1992; Schmidt 2007), with a third located in the Ponderosa pine at the upper elevations of LANL (Larson et al. 1997). An extensive lithic scatter site

<table>
<thead>
<tr>
<th>Site #</th>
<th>Site Type</th>
<th>Elevation</th>
<th>Zone</th>
<th>No. Lithics</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 65006</td>
<td>Scatter</td>
<td>5620 ft</td>
<td>Juniper-Savanna</td>
<td>5,997</td>
<td>Moore et al. 1998</td>
</tr>
<tr>
<td>LA 51912</td>
<td>Structure</td>
<td>5640 ft</td>
<td>Juniper-Savanna</td>
<td>1,747</td>
<td>Lent 1991</td>
</tr>
<tr>
<td>LA 12587</td>
<td>Scatter</td>
<td>6500 ft</td>
<td>Piñon-Juniper</td>
<td>485</td>
<td>Schmidt 2007</td>
</tr>
<tr>
<td>LA 70029</td>
<td>Scatter</td>
<td>6970 ft</td>
<td>Piñon-Juniper</td>
<td>1,420</td>
<td>Biella 1992</td>
</tr>
<tr>
<td>03-1172</td>
<td>Scatter</td>
<td>8900 ft</td>
<td>Ponderosa Pine</td>
<td>1,003</td>
<td>Moore 1986</td>
</tr>
<tr>
<td>BG-21</td>
<td>Scatter</td>
<td>9450 ft</td>
<td>Mixed conifer</td>
<td>296</td>
<td>Baker and Winter 1981</td>
</tr>
</tbody>
</table>
was tested by Forest Service archaeologists on Sawyer Mesa near Obsidian Ridge in the higher ponderosa pine zone (Moore 1986). Lastly, BG-21 is a small lithic scatter located in Redondo Creek valley along the west side of the Valles Caldera. It is one of 23 sites excavated by the University of New Mexico (Baker and Winter 1981). All but three of the sites have sample sizes of over 1,000 artifacts. Four of the seven sites were analyzed for this study, whereas, published data were used for the two Museum of New Mexico and the Forest Service sites.

Analysis of the debitage assemblages from these sites indicates that there are some significant differences in the reduction tactics being implemented between riverine vs. upland sites. The sites are oriented from left to right, that is, from lower to higher elevations in Figure 10. As can be seen, the two riverine sites emphasize core reduction activities with less biface production/maintenance. In contrast, the upland sites emphasize biface production with less core reduction. The exception to this pattern is site 03-1172 which is located within the Cerro Toledo obsidian source area. Here the emphasis is on core reduction activities, which presumably reflects the production of prepared cores and flake blanks for transport to sites at lower elevation settings. Otherwise, the distinction between core reduction vs. biface production appears to reflect differences between lowland habitation vs. upland campsites.

This complementary link between lowland and upland sites is also reflected in the lithic material assemblage. Figure 11 illustrates that all the assemblages are dominated by obsidian. However, the four sites situated in the riverine and pijnon-juniper settings also contain some chalcedony/chert and other materials. This includes basalt and quartzite in the lowland sites and orthoquartzite at LA 70029. With the exception of the orthoquartzite, these materials are available in gravels along the flanks of the Rio Grande valley. The presence of waterworn cortex on these materials supports this contention. It is, however, undetermined as to whether the orthoquartzite is also available from this secondary source, or was obtained from primary sources to the north near Abiquiu Reservoir. Otherwise, the higher elevation sites are almost exclusively composed of obsidian that primarily exhibits a natural weathered (i.e., nodular) cortex, indicating that this material was derived from the primary source.
XRF analysis had been conducted on four of the sites identifying the specific obsidian sources utilized by these groups. Samples were analyzed from a lowland habitation site (Lent 1991:40), the LA 12587 and LA 70029 campsites located in the piñon-juniper zone (Shackley, 2007; Stevenson 1992) and the two higher elevation sites situated in the ponderosa pine/mixed conifer communities (03-1172: Hughes 1986; BG-21: Sappington and Baker 1981). Three points and four bifaces were analyzed at the lowland habitation site. Four of these artifacts are made of Cerro Toledo, two of Cerro del Medio and one of El Rechuelos (Polvadera) obsidian. Twenty-six flakes and two retouched tools were analyzed at the piñon-juniper campsites, with twenty-three being made of Cerro Toledo, four of Cerro del Medio and one of El Rechuelos obsidian. Twenty-one artifacts were analyzed from the campsite located within the Cerro Toledo obsidian source area, so it is not surprising that eighteen of these were derived from this source, with two made of El Rechuelos and one of an undetermined source. Lastly, 100 flakes were analyzed from three sites located in the area of BG-21. All but one of these were derived from the nearby Cerro del Medio source, with a single flake being made of El Rechuelos obsidian. Our own analysis indicates that El Rechuelos obsidian was visually identified at both the piñon-juniper campsites and BG-21, in both cases representing 2 to 3 percent of the debitage assemblage.

Overall, we see that the sites in our study are primarily linked to the Cerro Toledo and Cerro del Medio obsidian source areas, with each of the two high elevation sites being tied to the nearby obsidian source. This supports our contention that obsidian could have been procured at these high elevation settings during the mid-late summer, and later reduced at the lower elevation sites. The presence of small amounts of El Rechuelos obsidian may also reflect some distant ties to this area farther to the north.

SUMMARY AND CONCLUSION

In conclusion, a variety of resources is present as plant foods in all the vegetation communities. Therefore, multiple foraging tactics could have been used by Late Archaic populations depending on seasonal rainfall, plant productivity and changes in annual resource structure. Nonetheless, we have proposed one possible transhumance pattern, involving seasonal movements...
from the juniper-savanna to ponderosa pine/mixed conifer and then down to the piñon-juniper zone. It was in the latter community that maize could have also been harvested to reduce seasonal resource shortfalls. Nonetheless, these higher elevation resource settings were critical to Late Archaic foragers, including plant, animal and obsidian raw material procurement.

The analysis of debitage assemblages from a sample of sites distributed throughout these vegetation zones indicates that they are all linked by reduction tactic and obsidian procurement patterns. That is, lowland habitation sites are characterized by an emphasis on core reduction vs. upland campsites with biface production. Otherwise, obsidian dominated all the lithic assemblages, with sites situated in the juniper-savanna and piñon-juniper communities also containing a small amount of material derived from local river gravels. These data appear to lend some preliminary support to our model of a complementary settlement system that is distributed from river valley to mountaintop.

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Shackley, Michael S.

Stevenson, Christopher

Yellen, John E. and Richard B. Lee
The people involved in the Mesa Prieta Petroglyph Project would like to dedicate this document to Paul Williams. He deserves huge appreciation and special honor for the enormous contribution he has made to the project.

Paul was one of the first professional archaeologists to become aware of the vast store of petroglyphs and other archaeological features on Mesa Prieta. He began thinking about ways to protect them long before the Mesa Prieta Petroglyph Project began. He was one of the project’s founders and has supported it in countless ways. One of Paul’s special gifts is his warm and generous personality. He is a real “people person” who works equally well with adults and young people. Paul’s work with and devotion to the project’s Summer Youth Intern Program has been the backbone of the endeavor. He is a born teacher who captures “teachable moments” and uses them to full advantage. Paul is a big “bear” of a man who radiates gentleness and caring. He is easy going and has a keen sense of humor that often saves the day in the field working with teenagers in the broiling sun. Paul understands community, culture, and the importance of landscape to identity. Paul’s wife Judy has also been very supportive of the project. She has unselfishly relinquished Paul to spend endless hours working on it. Those involved in the program appreciate her sense of delight and love of the Southwest.

SITE LOCATION

Mesa Prieta, also known as Black Mesa, is located just north of Ohkay Owingeh (San Juan Pueblo). Situated on the south at the confluence of the Rio Grande...
and Rio Ojo Caliente, the 36-m² mesa extends 12 mi in a northeasterly direction towards the Taos Plateau. Over 20,000 examples of rock images are estimated to exist on the mesa in addition to other archaeological features. The east side of the mesa, where most of the images are located, is closely adjacent to the Rio Grande; the western side has large habitable and agricultural areas between the base of the mesa and the Rio Ojo Caliente.

**PROJECT HISTORY**

Vecinos del Rio is a grass-roots organization dedicated to sustaining the culture and traditions in the northern Española Valley. Vecinos recognizes that the petroglyphs offer an irreplaceable link to the past; the preservation of that history is critical to the area’s quality of life. In 1993 and 1994, a 188-ac privately owned parcel now known as the Wells Petroglyph Preserve was recorded by the New Mexico Archaeological Society’s Rock Art Field School led by Jay and Helen Crotty. In 1999, Vecinos began organizing a project to survey and record all the petroglyphs on the mesa. Over the next three years, maps were gathered, permission obtained to record on several parcels of land, volunteers were trained by the Crotty’s and Jerry and Jean Brody, funds raised, recording forms developed and many other related tasks were accomplished. Recording began in 2002. Since then about 10,000 petroglyphs have been recorded, including the re-recording of the Wells Petroglyph Preserve which was recorded before GPS units became affordable and digital photography was in wide use. Recording the entire mesa will take many years and require untold thousands of volunteer hours.

**SIGNIFICANCE**

Archaeologists note that there are numerous other archaeological features on the mesa such as shrines, water control systems, check dams, lithic scatters, field houses and grid gardens in addition to rock images. The number and quality of the glyphs make the mesa similar in importance to other major sites in New Mexico such as Petroglyph National Monument in Albuquerque and the Three Rivers site near Tularosa. Approximately 80 percent of the glyphs and other features are on private land. Most of the remaining 20 percent are located on Bureau of Land Management (BLM) land with The Archaeological Conservancy owning 156 acres and Ohkay Owingeh a small amount.

While the mesa’s more remote location has spared it the problems of Petroglyph National Monument, there are troubling issues. Development is encroaching in some areas. Some important petroglyph sites have been mined for riprap and the threat of future mining is always present. Vandalism has been less extensive than at some sites, but is evident in the most visited sections. One of the worst hazards is destruction caused by ATV traffic in areas with concentrations of glyphs, particularly on BLM land. Some areas of concentrated glyphs on steep slopes have been seriously eroded by centuries of overgrazing by sheep and torrential monsoon rains in the overgrazed areas.
The rock images found on Mesa Prieta represent three distinct time periods: Archaic, Pueblo IV and Historic. All three types are well represented, which makes the site unique and testifies to intense human occupation over the past several thousand years. Folsom points have been found, which verifies about 10,000 years of human activity in the area. The presence of the Rio Grande on the mesa's eastern flank and the Ojo Caliente on the west side have made it a compelling locale for humans and its huge, dark boulders are ideal for rock graphics.

Archaic period images are scattered around the site. They have much in common with ancient glyphs found around the world. Though exact dates are not verifiable at this time, the images can be related to Archaic era glyphs found in the Glorieta area of New Mexico that were associated with wood and have been carbon dated to about 5,000 years ago. Archaic images of meandering lines, asterisk-like forms, one-pole ladders, grids and other abstract forms as well as human and animal footprints are found on the mesa. Representational images of humans, animals, plants and other objects are not found among the Archaic glyphs. These ancient images are deeply pecked into the basalt boulders and are so repatinated that visitors easily miss them. Many are barely discernible under
the best light conditions. Hunter and gatherer people who were the first occupants of the area made the Archaic images.

The largest number of petroglyphs on the site is from the Pueblo IV period, roughly A.D. 1300 to 1600. Perhaps 75 percent of the glyphs fall into this category. These glyphs were etched by Ancestral Puebloan peoples who filtered into the area around A.D. 1300, probably from the Four Corners region. They created what has come to be known as Rio Grande Style. The florescence of rock images reached its peak sometime before the arrival of the Spanish conquistador Juan de Oñate arrived in 1598. He established a crown colony at Ohkay Owingeh (San Juan Pueblo) at the southern terminus of the mesa.

A huge number and variety of glyphs were created during this period. These include circles, spirals, stars, geometric patterns, human and animal footprints such as deer, elk, bear and turkey. Human figures appear as dancers, shamans, hunters, flute players, women giving birth and warriors. Most Pueblo IV glyphs are believed by archaeologists to be related to some form of ritual or ceremony.

The mesa is well known for its large number of shields, shield bearers and flute players. It is one of the largest flute player sites in New Mexico and has the largest number of animal flute players known.

Snake images abound on the Mesa. One of the most common types is the two-horned Awanyu whose head faces the viewer. There are a few Awanyus in profile with one horn facing backward. Other snake images appear to have rattles on their tails or to have the appearance of lightning.
The third major time period for petroglyphs on the mesa is that of the Historic era, which began around A.D. 1600. The most common image is that of the Christian cross. Shepherders and others created hundreds of examples. Less common but significant are the many images of horses and horses with riders. A unique feature on the mesa is that of Spanish lion images; several have been found and some are magnificently done. Other historic images include wagons, inscriptions, dates, names, initials, churches and humans.

RECORDING PROTOCOLS

In 2002, the first of several training classes were presented at Mesa Prieta to instruct trainees in the process of petroglyph recording. Led by Helen and Jay Crotty and Jean and Jerry Brody, long established leaders in petroglyph categorization and recording, the two-day class included over two dozen volunteers, many of whom continue with the project today.

Trainee volunteers are instructed in the use of GPS units and digital cameras, how to take measurements and compass readings, use of forms, drawing to document the art and the placement of each element into the categorical system developed by the Crottys and Brodys. This system, called the Rio Grande Style Petroglyph Categorization System, was developed to categorize most of the rock images found in New Mexico and especially in the region of the Rio Grande, running from the Colorado border to Texas and Mexico. Volunteers are also introduced to the dynamics of working in teams, which enhances accuracy, as well as discussions in how to categorize the elements.

DATA MANAGEMENT

As volunteers complete field recording, all data and photos undergo a quality check for accuracy and completeness. Completed data are stored in the Vecinos del Rio office in Velarde in a fire proof file; photos are on CD, computer data base and back up hard drive. Data are entered into a Geographical Information System.
System (GIS) for use by researchers, students, archivists, etc. The database being used is ArcView 9.3 that is compatible with other databases being used in the state. Petroglyph recording techniques, documentation and protocols meet the standards required by the New Mexico Archeological Records Management Section (ARMS), the ultimate repository for all the data.

SUMMER YOUTH PROGRAM

Because the ultimate goal of the Mesa Prieta Petroglyph Project is the preservation and protection of the rock images found there, those involved concluded that an educational component was in order. In 2002 we organized a Summer Youth Internship Program for 14 to 18 year old youth from local pueblos and
Hispano communities. Twelve teenagers and an equal number of adult volunteers participated. The youth received a small stipend. Because of the success of that original program we have repeated it every summer. In 2006 we were awarded a prestigious Piñon Award by the Santa Fe Community Foundation for this program.

In the Youth Internship Program, young people learn the same skills taught to adult recorders and are held to the same standard when they record in the field. They have the opportunity to work with archaeologists and other professionals and to learn about their own cultural history as they record petroglyphs created by their ancestors. Our hope is that the young people who participate in this program will be the future stewards and protectors of this important part of their cultural heritage.

SCHOOL CURRICULUM

In 2006 we began developing a curriculum for local public and Pueblo community schools called “Discovering Mesa Prieta.” Our hope was to expose as many local children as possible to the cultural treasure of the mesa in the hope that they will become invested in preserving their own cultural heritage. The program was piloted at Velarde Elementary School. In January 2007, the Española School Distinct requested the curriculum for grades four through nine. With the help of many project volunteers, we trained teachers from the Española district schools and two Bureau of Indian Affairs schools in how to present a dozen different activities that relate to petroglyphs but that also cover basic subjects required by the schools’ curricula. These included concepts about history, geology, math, time, observation and inference and a variety of science elements.

After completing the classroom activities each class had the opportunity to visit the mesa for a Field Study Day on the Wells Petroglyph Preserve. Each time there was great excitement among the children and an amazing amount of “expertise” based on what they had learned in the classroom. They were able to discuss concepts like patination and use words like basalt with comfort. For nearly all students it was their first encounter with the mesa and for many their first hiking experience. The exposure to outdoor activity is an important bonus. We continue to refine the curriculum and hope that many more children will have the opportunity to participate in it each year.
The Program "Discovering the Story of Mesa Prieta" and the Vecinos del Rio Mesa Prieta Petroglyph Project were awarded the first annual Education Award at the 2008 American Rock Art Research Association Conference.

As an adjunct to its educational programs the Mesa Prieta Petroglyph Project has developed a small resource library of books, periodicals and maps. Archaeology, anthropology, New Mexico history, Native American art and culture, the Southwest and related subjects are included. The library is available to teachers using the curriculum, volunteers, Vecinos del Rio members, researchers and others as deemed appropriate.

RECORDING CHALLENGES

The majority of the petroglyphs are found close to the base of the 1000-ft elevation mesa. Clusters exist around flat areas higher on the sides of the mesas that may have been used for field houses and agricultural purposes. Other very dense areas are found in difficult to reach, remote areas on the mesa. Conducting a proper archaeological survey raises challenges.

The side areas of the mesa consist of escarpments and scree slopes that are very steep and difficult to climb and maneuver. As the geology of the mesa is that of an alluvial mass covered at a later date with lava flows, the surface which volunteers work upon alternates between shifting river cobbles on coarse gravel and fields of basalt boulders dispersed throughout. Prickly pear cactus abounds in many areas.

Road access to Mesa Prieta is also difficult. Few roads penetrate the mesa and most are on private land. A utility road extends on top of the full length of the mesa. However again, few access points exist and much of the road requires four-wheel drive, high clearance vehicles. Many areas to be recorded are within a 15-45 minute walk from the base of the mesa, but much of the recording will require several hours of difficult hiking to reach the areas to be documented. A number of prehistoric trails have been identified; these trails often are marked with turkey tracks.

Obtaining accurate maps establishing borders and boundaries of both public and private land has been challenging. Many of the survey maps only have bench marks placed in the 1930s as orientation points. Progress is being made with persistence and continuous insertion of new data points as they are obtained. Thanks to GPS and GIS, areas that have been surveyed and recorded can be designated on area maps. The vast extent of the mesa that has not been surveyed or recorded far exceeds those areas completed.
Much of the mesa is privately owned and obtaining owners’ permission to document the images has presented challenges also. When a land owner is approached for permission to record on their land, the project is carefully and thoroughly described. All volunteers have signed volunteer agreements agreeing not to disclose the areas in which they work, not to use photos taken for any publications, not to bring dogs on the land or litter and in general, to be respectful of the land they are working on. The process of recording is described, including the entry of the data into a GIS database, then ultimately submitted to ARMS for archival storage and research. Each land owner receives copies of all documentation completed on their land with all the photographs taken placed on a CD. In spite of these efforts, a number of landowners do not wish to have strangers on their land and are sometimes wary of records of information gathered on their land being placed in a government archive (ARMS).

**PROTECTION**

Protection and preservation of Mesa Prieta is the founding theme of the entire project. Volunteers have a strong preservation ethic and share it with others they come in contact with through education, tours, etc. The preservation ethic is addressed in all activities—the youth summer intern program, the school curriculum, and the tours—all aspects of public interaction.

In 2007, Mesa Prieta Petroglyph Project linked with New Mexico SiteWatch to start a site steward program on the Wells Petroglyph Preserve. Twelve volunteer stewards were trained to observe for both natural and human made damage to the mesa and its archaeological resources. Hopefully the program will expand to other private and public lands on the mesa.
PEOPLE WHO MAKE IT WORK

The Mesa Prieta Petroglyph Project has been fortunate to have the commitment of exemplary people—people who make the project work. The first is Katherine Wells who, in the early 1990s, purchased 188 ac of petroglyph enriched land in Lyden of which most is now the Wells Petroglyph Preserve. Katherine had the vision for a preservation and educational effort for Mesa Prieta and the determination to develop a program dedicated to its protection. Even now after her land has been given to The Archaeological Conservancy, Katherine continues to envision and work towards further endeavors to protect the mesa.

The Mesa Prieta Petroglyph Project has been fortunate to attract the support of some of New Mexico’s most knowledgeable archaeologists and rock image experts. Starting with the Crottys and Brodys in the early 1990s in recording, mentoring and training, the project has a litany of professionals dedicated to the effort. Those who have been most involved on the ground are Dr. Richard Ford, professor emeritus and former head of the Department of Anthropology at the University of Michigan, now residing full time in Santa Fe; Paul Williams, Archaeologist for the Taos BLM district; Kurt Anschuetz, Santa Fe archaeologist whose specialty is ethnobotany and water control systems; and Martha Yates, a free-lance archaeologist who has worked for the Forest Service. Suzie Frazier, long time volunteer and resident of Lyden, is the Mesa Prieta Petroglyph Project Coordinator. Suzie brings strong organizational skills to the project and is leading the GIS documentation effort.

The Mesa Prieta Petroglyph Project is supported by generous contributions from individuals and through annual and ongoing grants. Costs incurred by the project are for equipment, copying, archival storage, the summer youth program, the school curriculum, database consultation, a half-time Project Coordinator and other related expenses. It is the volunteers who, in teams and individually have contributed thousands of hours annually to the Mesa Prieta Petroglyph Project, are the people who ultimately make the project possible.

VOLUNTEER RECRUITMENT

Volunteer recruitment is an ongoing process and successful component to which considerable effort and care is given. The project is fortunate to have long-standing volunteers and is continuing to attract new people with commitment to the philosophy of preservation. Volunteers come from tour attendees, area residents, the professional community and avocational groups as well as word of mouth by volunteers associated with the program and contact with similar groups. The recently initiated Pláticas presentations

Figure 17.

Dr. Richard Ford, who devotes countless hours to the Mesa Prieta Petroglyph Project. Photo by Suzie Frazier.
(monthly seminars held at Mesa Prieta) have also been a source of new volunteers. Volunteers contribute countless hours in petroglyph recording, the school curriculum and summer youth intern programs, as tour docents, in the archival library, in database management and many other ways.

PARTNERS

Over the duration of the Project, many treasured partnerships have been established with agencies, groups, individuals and others. Partners include the BLM based in Taos, Ohkay Owingeh, Rio Arriba County, the National Park Service, the Santa Fe National Forest, Northern New Mexico College, Española Public Schools and other schools, the Archaeological Conservancy (owner of the Wells Petroglyph Preserve), ARMS, the State Historic Preservation Office, the Archaeological Society of New Mexico and Rock Art Recording Program, the Taos Archaeological Society and New Mexico Site Watch. Last but not least, partnerships with private landowners have allowed the program to move forward with its mission of recording all the petroglyphs on the mesa.

AWARDS AND HONORS

The Mesa Prieta Petroglyph Project has been recognized with numerous prestigious awards and honors: 1999—State Register of Cultural Properties designation to the Wells Petroglyph Preserve; 1999—National Register of Historic Places designation to the Wells Petroglyph Preserve; 2004—New Mexico Environmental Law Center Youth Environmental Hope Award; 2004—New Mexico Heritage Preservation Alliance (Mesa Prieta was named one of the most endangered Sites in New Mexico); 2005—American Rock Art Research Association (Katherine Wells, Committee Chair for the Mesa Prieta Petroglyph Project, received the Conservation and Preservation Award); 2006—Santa Fe Community Foundation Piñon Award for Educational Service. 2008—American Rock Art Research Association First Annual Education Award for the program “Discovering Mesa Prieta.”

PUBLIC TOURS

Katherine Wells, who gave the Wells Petroglyph Preserve to The Archaeological Conservancy, has always been dedicated to allowing public access to the preserve. A docent program has been established and regular public tours are conducted on the land. The preserve opens for public tours four times a year; for 2009, the dates are April 18, May 16, September 19 and October 17. Tours are two hours long and are led by docents familiar with the preserve and history of the area. In addition, groups requesting tours are accommodated and docents are provided. Self guided tours are also available; a tour map and index are provided for that use.

CONTACT INFORMATION

The Mesa Prieta Petroglyph Project contact information for tours, volunteer activities, contributions or for any other reason is:

Suzie Frazier, Mesa Prieta Petroglyph Project Coordinator
505-852-1351 or at mesaprieta@cybermesa.com
SUGGESTED READINGS

Boyd, Douglas K., and Bobbie Ferguson

Blumenschein, Helen
1973  *Selected Petroglyphs in Rio Arriba County.* Pruett Press, Boulder, CO.

Jones, Bernard M. Jr.

Moore, Sabra

Packard, Gar and Maggy

Roberts, David

Schaafsma, Polly
2000  *Warrior, Shield and Star.* Western Edge Press, Santa Fe.

Slifer, Dennis

Slifer, Dennis and James Duffield

Wells, Katherine
In 1965 the Museum of New Mexico excavated three small sites situated on the same small mesa along the Rio Puerco of the East south of Cuba, New Mexico (Hammack 1965) (Figure 1). The largest of the three sites, Lagunitas Ruin (LA 6865) with its nearly square pit structure and Gallina-like floor features, is attributed to the Gallina phase and culture. A more detailed report on this site is now available (Wiseman 2008).

The other two sites, the Bull Snake Hill and Palisade sites, were originally believed to belong to the Rosa phase (Hammack 1965), the cultural precursor to the Gallina phase (Anschuetz 2006; Hall 1944). However, my analysis of both sites indicates that the occupations of Bull Snake Hill and Palisade, rather than preceding Lagunitas, were temporally interdigitated with, or may even have been contemporary in whole or in part with, the occupations of Lagunitas. Both occupations post-date the Rosa phase by about 150 years. Obviously, interpretation of the Bull Snake Hill and Palisade occupations requires reevaluation. But because of space limitations for the current paper, that reevaluation must await a future paper. This paper describes, compares, and contrasts the Bull Snake Hill and Palisade sites, for they embody significant differences that appear to signal different cultural derivations.

The project sites are situated at the intersection of three major prehistoric cultural regions—the Gallina to the north, the Chaco/San Juan basin to the west, and the Middle Rio Grande to the east. Dick (1976)
includes the headwaters of the Rio Puerco within the Gallina culture area, ignoring the presence of other sites attributed by others to the Middle Rio Grande and Chaco cultural regions (Baker and Durand 2003).

The Rio Puerco, to judge by the vast number of sites clustered along its axis, was a major water and farming resource as well as an avenue for human movement and interaction. For instance, Guadalupe Ruin, the southeastern-most Chacoan outlier community, sits on the Puerco some 55 km (34 mi) south of our sites. The Rio Puerco Valley Project and nearby surveys have documented hundreds of sites relating to Guadalupe Ruin and immigrant Mesa Verdean and Rio Grande occupations. (Baker and Durand 2003; Mackey and Holbrook 1978; Peckham 1987; Roney 1995). James Moore (2008) postulates that it was in the Rio Puerco valley that some of the migrant Mesa Verde populations transformed to such an extent that, when they moved eastward into the Rio Grande valley proper, their archaeological remains could no longer be identified as Mesa Verdean.

**THE BULL SNAKE HILL SITE, LA 6866**

Excavations at the Bull Snake Hill site revealed a single pithouse, a three/four-room surface structure, and two extramural hearths. A small lithic concentration and a group of three hearths located well to the northwest of the surface structure (Figure 2) probably represent non-associated occupation(s) and are not considered here.

The pithouse is circular with a ventilator to south; 3.5 m diameter, 1.6 m depth; earthen walls; a plastered floor; ventilator opening at floor level and tunnel 2.6 m long; a combination hearth/ash pit/deflector interconnected by an adobe rim; and a slab-lined meal bin with positions for two metates. The absence of main roof support post holes in the floor suggests that a dome- or cone-shaped roof was anchored outside the confines of the structure. Fill was compact and contained few artifacts. The burial of an adult was on the floor in the southwest quadrant of the structure.

The surface structure contains three small, nearly square rooms with walls of unmodified rocks laid up in mud mortar; no plastered floors or floor features in any of the rooms; north

![Figure 2. Map of the Bull Snake Hill site, LA 6866.](image-url)
room (Figure 7) 1.64 by 1.75 m, with wall heights of 25 to 40 cm; central room (Figure 8) 1.33 by 1.52 m with wall heights of 23 to 28 cm; south room (Figure 9), originally 1.23 by 1.37 m with remaining wall heights of 30 to 34 cm, was later subdivided into two small chambers by the addition of an interior wall.

Two extramural hearths (Figure 2 and Figure 5) are present, one located 4 m northeast of the pithouse and the other 3 m south of the surface structure.

THE PALISADE SITE, LA 6864

Excavations at the Palisade site revealed a single pithouse, an outside work area with a hearth and possible ramada structure, and a vertical pole fence or palisade that enclosed the site (Figure 3).

The pithouse is circular with ventilator to south; 3.6 m diameter, 2.1 m depth; earthen walls; mud-plastered floor; ventilator opening at the floor level; vent tunnel collapsed and exterior opening undefined; only three floor features—a circular adobe-rimmed hearth, a small adobe deflector, and a single, small diameter post hole located against the northeast wall (Figure 3); absence of main roof support post holes in floor suggests roof was dome- or cone-shaped. Fill was compact and contained few artifacts.

The palisade encircles the site, enclosing a "yard" space 26 m in diameter. The fence is a series of spaced post holes that contained the charred remnants of vertical poles ranging from 3 to 16 cm in diameter. Because of the spacing between the poles, Hammack (1965) postulates that materials were intertwined among them to close the spaces.

An extramural work area (hearth and ramada?), which Hammack (1965) refers to as "The Mealing and Hearth Area" in his text, is situated in the southern end of the site next to the palisade. However, no grinding equipment or facilities were documented for this locus. However, a slab-lined hearth, a haphazard collection of rocks and potsherds, a "burned area," and "large amounts of burned adobe...with beam impressions" were documented there. Hammack (1965:3) suggests that the "burning" and beam-impressed chunks of adobe indicate a ramada-like structure. If accurate, the structure would have measured approximately 2 by 3 m (Hammack's field notes). Evidently, no post holes directly attributable to a ramada or other type of structure (other than the palisade) were found. I suspect that the adobe impressions may have resulted from a partial burning of the palisade rather than from a ramada.

Figure 3.
Map of the Palisade site, LA 6864.
ARTIFACTS

Pottery

The pottery analysis was conducted by Joseph W. Allen (1965) under the direction of Dr. Alfred E. Dittert, Jr. The assemblages from Palisade and Bull Snake Hill are dominated by various utility wares classified by Allen and Dittert as Gallina Utility (Table 1). Specific types include Gallina Plain, gray variety; Gallina Plain, brown variety; Gallina Smoothed; and Gallina Indented. Together, they comprise 73 percent of the pottery assemblage from Palisade and 91 percent from Bull Snake Hill. Joe Allen characterized the Gallina Plain from Lagunitas ruin (and presumably from Palisade and Bull Snake Hill as well) as being very similar to the gray and brown varieties of Rosa Utility.

The pottery assemblages from Palisade and Bull Snake Hill embody important differences in relative percentages of the Gallina Utility varieties and the types of intrusive pottery (Figure 4; Table 1). The Bull Snake Hill assemblage is small (89 sherds) but appears to be the earlier one (see dating discussion below). It is dominated by Gallina Smoothed, followed by Gallina Plain, brown variety, Gallina Plain, gray variety, and Gallina Indented. Gallina Black-on-white is represented by only three sherds, or 3 percent of the assemblage. The intrusive types, Prewitt Black-on-white and Wingate Black-on-red, originated in western New Mexico and together comprise 6 percent of the total assemblage.

The assemblage from the Palisade site, with a total of 481 sherds, appears to be later than that from Bull Snake Hill and differs in several important ways. The utility wares are dominated by Gallina Plain, gray variety, followed in descending order by Gallina Plain, brown variety, Gallina Indented, and Gallina Smoothed. Gallina Black-on-white is far more common than at Bull Snake Hill (22 percent versus 3 percent). The intrusive types are more varied than at Bull Snake Hill and are dominated by Kwahe'e Black-on-white. Kwahe'e was the major painted-decorated pottery during the late Developmental period in the Middle Rio Grande province to the east. However, ac-

<table>
<thead>
<tr>
<th>Pottery Type</th>
<th>Bull Snake</th>
<th>Palisade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallina Utility and Painted Types</td>
<td></td>
<td></td>
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<tr>
<td>Gallina Plain, gray var.</td>
<td>17</td>
<td>178</td>
</tr>
<tr>
<td>Gallina Plain, brown var.</td>
<td>28</td>
<td>93</td>
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<tr>
<td>Gallina Smoothed</td>
<td>30</td>
<td>18</td>
</tr>
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<td>Gallina Indented</td>
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<td>61</td>
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<tr>
<td>Gallina B/W</td>
<td>3</td>
<td>107</td>
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<tr>
<td>Intrusive Types</td>
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<td></td>
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<tr>
<td>Taos B/W</td>
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</tr>
<tr>
<td>Kwahe'e B/W</td>
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<td>4</td>
</tr>
<tr>
<td>Cebolleta B/W</td>
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<td>&lt;1</td>
</tr>
<tr>
<td>Prewitt B/W</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Mancos B/W</td>
<td>2</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Wingate B/R</td>
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<td>1</td>
</tr>
<tr>
<td>&quot;Chacoan&quot;</td>
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<td>&lt;1</td>
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<tr>
<td>Totals</td>
<td>89</td>
<td>481</td>
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Figure 4.
Comparison of pottery assemblages from the Palisade and Bull Snake Hill sites.

cording to Mera (1935:Map 1), it is possible that some or all of the Kwahe’e at Palisade was made in the vicinity of the site.

Lithic Chipping Debris

A full analysis of the lithic chipping debris from the sites has not been accomplished. However, an unidentified staff member tabulated the toolstones from the Palisade site (but not from Bull Snake Hill) according to the materials code developed by A. H. Warren (Table 2). Interestingly, although only 275 chipped stone items were recovered, they represent quite a variety of materials—six chalcedonies, six cherts, four silicified woods, and one obsidian. This order of abundance is similar to findings for sites in the middle Puerco valley to the south where chalcedonies were also the preferred material. However, there, silicified woods were second most abundant, and cherts were third (Brett 2003: Table 7.4).

At Palisade, the most common chalcedony is Warren’s 1220, a colorless material bearing scattered yellow mossy inclusions. The most common cherts are white and translucent with dull to waxy luster (1050), fol-

<table>
<thead>
<tr>
<th>No. of Items</th>
<th>%</th>
<th>Material Type</th>
<th>A. H. Warren Lithic Material Code Numbers (dominants underlined)</th>
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<tbody>
<tr>
<td>117</td>
<td>43</td>
<td>cherts</td>
<td>1010, 1012, 1050, 1053, 1099, 1400.</td>
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<tr>
<td>14</td>
<td>5</td>
<td>silicified woods</td>
<td>1110, 1112, 1113, 1140.</td>
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<tr>
<td>142</td>
<td>52</td>
<td>chalcedonies</td>
<td>1210, 1220, 1221, 1231, 1233, 1232.</td>
</tr>
<tr>
<td>2</td>
<td>&lt;1</td>
<td>obsidian</td>
<td>3520 (Jemez).</td>
</tr>
<tr>
<td>275</td>
<td>100</td>
<td>Totals</td>
<td></td>
</tr>
</tbody>
</table>
lowed by an undifferentiated chalcedonic chert (1053) that is white or light gray with black dendritic or mossy inclusions. Silicified woods are present but not common. They occur mostly in undifferentiated dark gray and brown colors, both dull (1110) and waxy (1112; heat treated 1110?). The two pieces of obsidian (code 3520) are clear with brown tinges and most likely derive from the nearby Jemez Mountains.

Grinding Implements

Excavations at the Bull Snake Hill site produced five grinding implements. These include two presumably complete manos, a mano end fragment, a one-hand mano, and a metate. The one-hand mano came from the ventilator tunnel, and the fragmentary mano came from the fill of the south surface room, Feature 9. The two complete manos and the metate were recovered from positions within and on the floor next to the mealing bin in the pithouse. In his field notes, Ron Ice states that the mealing bin had positions for two metates, indicating that corn grinding was an important, presumably two-step process for coarse and fine grinding. No manos or metates were recovered from the Palisade site.

DATING THE SITES

Hammack (1965) states that the wood remains recovered from the Bull Snake Hill and Palisade sites are juniper. No attempt has been made as yet to determine whether they can be dated by the tree-ring method. Accordingly, we are left with dating by ceramic associations.

Taking the dates for the various pottery types in Figure 5 and Table 3 at face value, we have evidence suggesting two different occupations. The key markers appear to be the (presumably) earlier-dating Prewitt Black-on-white, which occurs only at Bull Snake Hill, and the later-dating Kwähe’e Black-on-white, which occurs only at the Palisade site. While Gallina Black-
on-white sherds occur at both sites, Bull Snake Hill has few of them, and at Palisade, Gallina Black-on-white is the primary painted type. The dating of Prewitt and Cebolleta are the most problematic, reflecting the fact that they are the most poorly dated types of the group.

Although we cannot be certain, I believe that the pottery assemblages of Bull Snake Hill and Palisade suggest separate but temporally close occupations. The difference may well be on the order of one to a few decades, and probably not more than a human generation in length.

We are now left with estimating the calendrical periods during which the occupations of Bull Snake Hill and Palisade occurred. The earlier occupation, Bull Snake Hill, is represented by Prewitt Black-on-white and some Gallina Black-on-white. Assuming that the Gallina sherds are not post-occupational intrusives, I suggest occupation sometime within the period A.D. 1050 to 1100 or 1125. The later occupation, at Palisade, is represented by Kwahe'e Black-on-white and a strong presence of Gallina Black-on-white. I suggest occupation within the period A.D. 1100 to 1150.

It should be noted that both dating estimates generally equate with the early and late occupations at the nearby Lagunitas Ruin (LA 6865; Wiseman 2008). And, for the same reasons discussed in the Lagunitas Ruin paper (particularly the small samples of potsherds recovered from Palisade [n=481] and Bull Snake Hill [n=89], versus nearly 3000 from Lagunitas; see Wiseman 2008 for discussion), I believe that the occupations were also quite short, perhaps no more than two to four years at Palisade and one to two years at Bull Snake Hill.

DISCUSSION

The Bull Snake Hill and Palisade sites are similar in some ways but very different in others. These similarities and differences are discussed below.

Architecture

The pithouses at Bull Snake Hill and Palisade are similar in that they are simply made, have a southerly orientation, are small in diameter, deep, and possess few floor features. They each have centrally located fire pits and adobe deflectors. Neither structure floor has

<table>
<thead>
<tr>
<th>Pottery Type</th>
<th>Estimated Dates of Manufacture (A.D.)</th>
<th>Known or Suspected Region of Manufacture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallina Black-on-white</td>
<td>1050-1300 (Dates of Phase)</td>
<td>Cuba district and north.</td>
</tr>
<tr>
<td></td>
<td>Anschuetz 2006</td>
<td></td>
</tr>
<tr>
<td>Taos Black-on-white</td>
<td>1050-1225</td>
<td>Taos district in upper Rio Grande.</td>
</tr>
<tr>
<td></td>
<td>Boyer 1997</td>
<td></td>
</tr>
<tr>
<td>Kwahe'e Black-on-white</td>
<td>1100-1200</td>
<td>Santa Fe region of middle Rio Grande, north-central NM.</td>
</tr>
<tr>
<td></td>
<td>Breternitz 1966; Wiseman 1989</td>
<td></td>
</tr>
<tr>
<td>Cebolleta Black-on-white</td>
<td>950-1100 (Ditter and Ruppe 1951: 120); 1125-1225 (Hurst 2003)</td>
<td>Acoma province (Grants region), west-central New Mexico.</td>
</tr>
<tr>
<td></td>
<td>Wilson and Blinman 1993</td>
<td></td>
</tr>
<tr>
<td>Prewitt Black-on-white</td>
<td>975-1050 Hargrave 1962</td>
<td>Grants region, west-central New Mexico.</td>
</tr>
<tr>
<td>Wingate Black-on-red</td>
<td>1040-1200</td>
<td>Zuni region, west-central New Mexico.</td>
</tr>
<tr>
<td></td>
<td>Breternitz 1966</td>
<td></td>
</tr>
<tr>
<td>Mancos Black-on-white</td>
<td>1000-1175 (Wilson and Blinman 1993)</td>
<td>Mesa Verde region, southwestern Colorado.</td>
</tr>
</tbody>
</table>
major support post holes for the roof, indicating that each was covered by an over-arching, probably domeshaped roof that was anchored in the ground away from the upper walls of the pits. But here the similarities end.

The Bull Snake Hill pithouse floor also contains an ash pit. Importantly, the fire pit, ash pit, and deflector are rather elaborately interconnected by a raised adobe rim or coping. This pithouse also has a two-place mealing bin located in the floor. By way of contrast, the Palisade pithouse has a non-connected hearth and deflector and a small-diameter post hole that served some ancillary purpose.

Considering the immediate environs of the pithouses, we see important differences between the two sites. Bull Snake Hill has a three/four room surface structure that presumably served a storage purpose. Palisade lacked such a structure. The Palisade site, on the other hand, was surrounded by a pole fence, a feature that Bull Snake Hill evidently lacked.

Pottery

The pottery assemblages of Bull Snake Hill and Palisade are similar in that both are dominated by Gallina Utility ware. They differ in that the Bull Snake Hill assemblage is dominated by Gallina Brown and Gallina Smoothed, and Palisade is dominated by Gallina Gray.

Gallina Black-on-white painted pottery is present in the assemblages of both sites, but at the Palisade site this type appears to be more important. However, we cannot make firm judgments in this matter because of the potential for sample size problems.

Subsistence

One of the more prominent aspects of the material culture of Bull Snake Hill and Palisade concerns corn grinding equipment. Bull Snake Hill produced several whole and complete manos and the remains of a mealing bin on the floor of the pithouse. These, plus macro-remains of corn cobs, make it clear that the inhabitants processed and consumed corn at this site.

Curiously, no manos, metates, or corn remains were recovered from the Palisade site, suggesting that corn may not have been used by its inhabitants at this particular location. But, we cannot say unequivocally on the basis of this evidence that the Palisade occupants lacked corn in their diet. The collection of fill samples for flotation processing to recover tiny plant remains was not yet standard archaeological procedure at the time of the excavations.

However, for what it is worth, it is difficult to argue on the basis of the evidence for a short occupation that manos and metates could have been present at the Palisade site but that none broke or were discarded during occupation. After all, nearby Bull Snake Hill produced several pieces of grinding stones but produced only 89 total potsherds. In contrast, Palisade produced 481 potsherds, suggesting a longer occupation than at Bull Snake Hill. By this measure, assuming that relative amounts of refuse can be used as a very rough proxy of occupation duration (see Kohler and Blinman 1985 and Schlanger 1990 for useful discussions of this matter), at least a few pieces of manos or metates should have been recovered from the Palisade site if these items had been used there.
SUMMARY AND CONCLUSIONS

In 1965 the Laboratory of Anthropology, Museum of New Mexico excavated three small sites situated on the same mesa beside the Rio Puerco near Cuba, New Mexico. The current report describes two of the three sites, Bull Snake Hill (LA 6866) and Palisade (LA 6864). Several aspects of these two sites indicate that they differ culturally from one another as well as from the third site, Lagunitas Ruin (LA 6865). The Lagunitas Ruin is assigned to the Gallina culture on the basis of its distinctive architecture and pottery assemblage (Wiseman 2008).

The earlier of the two sites, Bull Snake Hill, has a pit-hous, a three- to four-room surface structure, and two extramural hearths. The pottery assemblage is dominated by Gallina Utility and small numbers of Gallina Black-on-white sherds. The primary imported pottery is Prewitt Black-on-white from the southern Cibola/Prewitt province. Several manos, metates, a two-metate mealing bin, and charred corn cobs attest to the use of corn at this site. A short occupation dating sometime during the period A.D. 1050 to 1100 or 1125 is suggested by the pottery assemblage.

The later site, Palisade, has a pithouse with one extramural hearth but no surface structure. The pithouse, extramural hearth, and living area are surrounded by a pole fence. Like Bull Snake Hill, the pottery assemblage is dominated by Gallina Utility ware. Gallina Black-on-white is well represented. The primary imported pottery is Kwahe’e Black-on-white of the Middle Rio Grande province. Unlike Bull Snake Hill, no manos, metates, or corn macro-rema ins were recovered from Palisade even though the amount of cultural refuse suggests a slightly longer occupation at Palisade. A short occupation dating sometime during the period A.D. 1100 to 1150 is suggested by the pottery.

Although the occupations of Bull Snake Hill and Palisade may have been sequent, or perhaps overlapped to some extent, a direct cultural relationship aside from the sharing of the same utility pottery does not seem likely. The Bull Snake Hill occupants used surface rooms for storage and manos and metates to grind corn for their diet. The occupants of Palisade may not have used corn, at least not at this site, for store rooms, grinding equipment, and corn macro-rema ins are absent. The nearby Gallina site of Lagunitas (reported in Wiseman 2008), which appears to have been occupied at the same time as both Bull Snake Hill and Palisade, yielded plenty of evidence of the use of corn in the form of storage, grinding equipment, and corn macro-rema ins.

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